Strategic Fire Management Plan

for the

Meehan Range Region

December 2006

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TERMINOLOGY

PLEASE NOTE:

The bushfire terminology used in this strategy can mean different things to different people. A glossary of key terms has been included at the end of this fire management strategy.

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PROJECT TEAM

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Summary

This strategic fire management plan for the Meehan Range has been prepared for Clarence City Council, the Tasmania Fire Service, and the Tasmania Parks and Wildlife Service by AVK Environmental Management. The strategy covers a 15 year period (2006 to 2021).

The strategy covers an area of approximately 5340 ha and includes the Meehan Range and its foothills from Grasstree Hill Road in the north to South Arm Road in the south (see Figure 1). The area covered by the strategy is mostly in private ownership, but includes the Meehan Range Nature Conservation Area managed by the Tasmania Parks and Wildlife Service, and a number of other small reserves.

This fire management strategy broadly follows the 5Rs risk management framework recommended in the 2004 COAG inquiry into bushfire mitigation and management in Australia (Ellis et al, 2004).

Landowners on the Meehan Range have a general legal responsibility to take all reasonable steps to minimise the risk of fires that originate on their property causing personal injury, damage to adjoining property, or damage to items of natural or heritage value protected by government legislation.

The last major wildfire on the Meehan Range was the Rokeby fire in February 1967. This fire burnt from Flagstaff Hill to Cremorne in a few hours and was only stopped by a change in wind direction from north-west to south-west. McArthur and Cheney (1967) reported that this fire destroyed 24 houses, 1 cottage, 15 shacks, 4 farm buildings, 1 hall and 1 church. The fire also resulted in 3 deaths.

Analysis of Tasmania Fire Service records shows that deliberate lighting of fires is by far the major cause of vegetation fires on and surrounding the Meehan Range, with escape of fires lit for land clearing, hazard reduction, or disposal of rubbish accounting for most of the other known sources of fires in the area.

Tasmania Fire Service records show that the large majority of ignitions have occurred on the western side of the Meehan Range with 3 main clusters at Clarendon Vale, Risdon Vale, and Flagstaff Gully. This is a concern as the prevailing northerly to westerly winds on days of high to extreme fire danger would push fires that start in these areas into the Meehan Range where they would be more difficult to control.

It will not be possible to prevent wildfires occurring on the Meehan Range. Unless fires are suppressed when small and accessible (close to trails), there is a risk that large destructive fires may develop. Depending on weather conditions, such fires may burn a substantial area causing damage to assets and environmental values, and even loss of life. This strategic plan aims to lessen

these risks by providing a strategy for reducing the risk of fires starting, controlling fires that do start, and minimising the risk of loss of life or damage to assets.

The Meehan Range is known to contain 18 plant and 3 animal species listed in the Threatened Species Protection Act, 1995, as well as the Eastern Barred Bandicoot and Curly Sedge which are listed as vulnerable in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, but are not listed on the Tasmanian act. Wildfires can pose a risk to flora and fauna habitats on the Meehan Range, as burning of large areas in one high intensity fire event could remove species, and even whole plant communities, from the area. Extensive, frequent, and indiscriminate hazard reduction burning could have a similar effect. The potential risks to flora and fauna habitats from wildfire can be managed by minimising the risk of ignitions, maintaining adequate emergency vehicle access routes and other control lines, and by burning suitable areas of vegetation at different times to create a mosaic of vegetation units at different stages of recovery from fire. The approach taken in this fire management strategy is to prescribe fire regimes that aim to conserve existing plant community distribution, structure and floristics, unless there is a legitimate reason to change the vegetation. Generally, management burns will be of low intensity to limit canopy scorch, and not so frequent as to prevent the existing tree cover regenerating.

Public infrastructure at risk from fire on the Meehan Range are mainly communications facilities and power lines. The strategy includes recommendations for protecting public infrastructure but not for specific private property such as dwellings and fences. The fire management strategy will include an Individual Property Fire Management and Awareness Kit that will be distributed to residents in the area to assist them in reducing the bushfire risk on their property. The kit is still being prepared and will be appended to the strategy when completed.

Six Tasmania Fire Service Brigades; Richmond, Risdon Vale, Cambridge, Clarence, Rokeby and Lauderdale are responsible for fire suppression on the Meehan Range. Each individual landowner on the Meehan Range is responsible for managing the fire hazard on their property. The Parks and Wildlife Service, or Clarence City Council, are responsible for fire management in the reserves on the Meehan Range, depending on the status of the reserve.

At present there is very little planned fire hazard reduction on the Meehan Range. What work is carried out is done by infrastructure agencies such as Transend (power line easements), individual landowners, or the local fire brigades, without any overall coordination. This has resulted in a steady build-up of fuels such that there is a likelihood that a fire starting on a day of high or extreme fire danger could burn the length of the Meehan Range. The hazard management approach adopted in this strategy is to divide the native vegetation on the Meehan Range into areas where burning will be used primarily for hazard management (strategic hazard management), or for habitat management (ecosystem management). This will supplement Defendable Spaces maintained by landowners/managers around built assets.

Trails on the Meehan Range that are used as access by landowners are generally in good condition, however many other trails that could be required for fire fighting are overgrown and in poor condition, or impassable. This strategy provides a network of strategic emergency vehicle access routes on the Meehan Range that will be maintained for emergency use for the benefit of all landowners in the region. In the northern portion of the Meehan Range the emergency vehicle access routes form a grid of 3 routes running north-south, and 4 routes running east-west. In the southern portion of the Meehan Range there are 3 main routes running east-west across the range, and one running north-south along most of the crest of the range. Additional routes have been included to provide links between the main routes, escape routes, and/or access from public roads. In particular, routes have been included that provide emergency vehicle egress for residents along Mount Rumney Road. New links are recommended to remove dead ends, provide alternative egress for residents on Canopus Hill, and to provide a fire control line between Dulcot and Grasstree Hill Road.

Access to most trails on the Meehan Range is controlled by locked gates, however unauthorised access by 4WD vehicles and trail bikes is still a problem and a major concern of landowners. This strategy recommends a number of new gates and a security lock system to help control unauthorised access.

Water supplies for fire fighting are scarce on the Meehan Range, particularly the northern section. This strategy has assessed and mapped existing water sources for fire fighting and also recommended new sites to reduce travel time to refill tankers.

There are a number of residential areas within and adjoining the Meehan Range that could be threatened by fires on the range. This strategy provides recommendations for reducing the bushfire risk to these areas including; provision of Defendable Spaces, refuge areas and firebreaks, and improving access and water supplies.

There are a number of scattered dwellings on the Meehan Range that are in very high risk locations for bushfires, and more are being constructed. Many of these dwellings may be undefendable in a major bushfire. Clarence City Council has a responsibility to ensure that future dwellings constructed on the Meehan Range are defendable by ensuring they are located and constructed in accordance with current Tasmania Fire Service guidelines. This strategy includes a procedure to help Council determine if proposed developments are in bushfire prone areas.

The wet forest plant communities on the Meehan Range naturally have a low fire frequency and do not require management burning to ensure their long-term viability. These communities could be damaged, and even eliminated, by frequent fires. The dry forest, heathland and grassland plant communities are considered to be dependent on fire to maintain their present structure and floristics in the long term. Periodic burning will help to maintain diversity in the understorey, and allow fire dependent species to germinate and establish.

A number of fire management objectives have been set for the Meehan Range. These objectives, and the management actions recommended to achieve them, are summarised below. Some of the recommended actions have been referenced to a series of generic Management Procedures (MP) in the appendix to this strategy.

Fire Management Objective		Recommended Actions
1	Monitor the impact of fire management activities on the Meehan Range. Adjust practices to achieve relevant objectives, and periodically review the fire management strategy.	a) Monitor the impacts of fires carried out as outlined in Section 6.10. b) Review this fire management strategy at regular intervals using the procedures in Section 6.10.4. and Table 11. c) Regularly revise burning prescriptions to ensure they incorporate the most recent information on the fire ecology of flora, fauna and plant communities of conservation value on the Meehan Range. d) Carry out further research on the impacts of fire on the flora and fauna on Meehan Range.
2	Minimise the risk of wildfires starting and spreading within the Meehan Range region.	a) Carry out the management burns shown on Figure 13 and scheduled in Table 10. b) Improve compliance with conditions for permit fires to reduce the incidence of escapes. c) Maintain all power line easements on the Meehan Range. d) Implement the community education program in Section 6.2 to request residents on Meehan Range to report any smoke, or persons acting suspiciously, on days of total fire bans. e) Reduce unauthorised vehicle access by improving controls (gates, rocks etc.) and periodic policing, particularly in areas with a high frequency of car dumping.
3	Minimise the risk of fire to residents within the Meehan Range region.	a) Distribute Individual Property Fire Management and Awareness Kits to all residents, and organise field days to explain their use. b) Ensure residents on the Meehan Range are aware of emergency relocation procedures in the event of a bushfire. c) Ensure that resources are available to assist with emergency relocation, including a register of any residents who require special assistance. d) Implement planning controls on new developments in the Meehan Range region to ensure they incorporate adequate fire protection measures.
4	Minimise the risk of wildfire damaging built and cultural heritage assets on the Meehan Range.	a) Implement the fire protection measures listed in Table 6 for protection of public infrastructure. b) Implement the risk reduction measures for the settlements in and adjoining the Meehan Range in Section 6.1.1. c) Establish and maintain a fire break on the western side of Dulcot as shown in Figure 13. d) Encourage residents on the Meehan Range to use the Individual Property Fire Management and Awareness Kits to reduce the bushfire risk to their homes. e) Ensure properties are inspected at the beginning of the bushfire danger period and hazard abatement notices issued as required. f) Ensure that authorities planning wildfire control operations on the Meehan Range are aware of the location of cultural heritage assets and ensure they are not damaged by machinery movement or other activities. g) Implement planning controls on new developments in the Meehan Range region to ensure they incorporate adequate fire protection measures.

	Fire Management Objective	Recommended Actions
5	Minimise the impact of fire and fire management activities on water quality in streams.	Maintain a minimum unburnt buffer of 5 m along minor (intermittent) watercourses, and 20 m along major (permanent) watercourses during management burning wherever possible.
6	Maintain existing emergency vehicle access routes shown in Figure 10 in a trafficable condition.	a) Subject to landowner agreement, carry out emergency vehicle access route repairs and maintenance listed in Table 7. b) Negotiate with landowners to gain long term access to emergency vehicle access routes on private property for fire management purposes. Ideally enter into formal agreements such as under the Land Use Planning and Approvals Act, 1993. Non emergency access to trails on private property to be subject to the access protocol in MP 12. c) Subject to landowner agreement, and the access protocol in MP 12, ensure all emergency vehicle access routes shown on Figure 10 are inspected and maintained in a trafficable condition at all times according to MP 2. d) Subject to landowner agreement, establish and maintain the staging/assembly areas shown on Figure 10.
7	Establish additional emergency vehicle access routes to ensure adequate vehicle access for fire control and emergency relocation of residents (subject to landowner agreement).	Subject to landowner agreement, construct new emergency vehicle access routes as shown on Figure 10, and detailed in Section 4.4.
8	Minimise damage to the emergency vehicle access route system by preventing unauthorised vehicle access.	a) Implement a tiered security lock system to control access to emergency vehicle access routes on the Meehan Range (system that allows for master keys to open all locks, group keys to open several locks and individual keys to open a single lock). Issue master keys to Tasmania Fire Service brigades and other emergency services. Each brigade to be provided with a master key for each vehicle likely to be used to respond to a fire on the Meehan Range. Landowners to be provided with either a group or individual key depending on the access requirements for their property. Landowner keys should not provide access to other properties. b) Provide additional gates at the locations given in Section 4.4.1 and shown on Figure 10. c) Minimise usage of emergency vehicle access routes when wet. d) Inspect gates regularly to ensure that locks are in place and functioning. Inspections to be subject to the access protocol in MP 12, or an agreement with the landowner.
9	Signpost all emergency vehicle access routes at their access points, and at trail intersections.	a) Erect appropriate signage at all vehicle access points, and at trail intersections, to guide emergency service vehicles. Signs should include commonly used names and/or codes. Dead end trails should be marked as such on the signs. b) Signs to be reflective and to meet Tasmania Fire Service requirements. c) Erect signs on all emergency vehicle access route gates stating "do not block trail at any time".
10	Ensure an adequate and accessible water supply for fire fighting.	a) Ensure fire hydrants in nearby urban areas are clearly marked and maintained to Australian Standard AS2419.1 - 2005. b) Investigate and construct new waterholes/dams as recommended in Section 4.5, and near any designated staging areas.
11	Ensure all personnel carrying out fire management activities on the Meehan Range are suitably trained, equipped and supervised.	Ensure all personnel engaged in prescribed burning activities on the Meehan Range have the appropriate level of training and equipment as outlined in Section 6.7, and the minimum equipment listed in MP 5.

	Fire Management Objective	Recommended Actions
12	Develop, assist development of, or utilise existing education programs and materials aimed at: • reducing arson • informing residents of fire safety issues, and measures to improve protection of themselves and their property • informing residents of the potential impact of their fuel management activities on environmental and other values.	a) Provide residents with a regular newsletter as outlined in Section 6.4 to keep them informed of the progress of the strategy. b) Organise periodic field days in different parts of the Meehan Range as outlined in Section 6.2.
13	Maintain up-to-date information on; emergency vehicle access routes and their condition, water supply points, defendable spaces, and areas burnt in prescribed fires and wildfires.	a) Record fire management activities and wildfires using the procedures in MPs 8 and 9. b) Relay any updated information to the TFS.
14	Coordination of fire management activities on the Meehan Range amongst the various stakeholders.	a) Set up an implementation committee to oversee the implementation of the fire management strategy. b) Nominate a person (or persons) to be responsible for convening the implementation committee, and the implementation of the strategy. c) Implement the procedures for coordinating fire management activities in MP 7. d) Prepare pre-fire season map updates and distribute to TFS brigades and District Office, PWS and Clarence City Council. e) Approach all landowners who have works or activities recommended on their land in this fire management strategy and obtain their cooperation in implementing the relevant activities on their land. f) Immediately inform landowners of any damage to gates and fences during fire fighting or fire management operations.
15	Ensure that residents in the Meehan Range region have access to appropriate resources to assist them in recovering from a major bushfire.	Ensure that the resources listed in Section 6.9 can be made available at short notice to help the community recover from a major wildfire.
16	Ensure that all roads, trails and other infrastructure are checked after a fire to ensure they are safe prior to allowing use by the public.	Implement the safety and rehabilitation procedures in MP 11 following fires.

Fire Management Objective		Recommended Actions
17	Minimise fire risk to fire sensitive vegetation and threatened flora and fauna.	a) Apply the appropriate fire regime to populations of threatened flora and fauna that require periodic fire for their long-term survival. b) Consult with the DPIW Nature Conservation Branch when planning prescribed burns in units containing populations of threatened flora and fauna. c) Avoid burning the whole of any population of a threatened or rare plant species in a single fire. d) Monitor the recovery of any populations of threatened or rare flora and fauna burnt by wildfires or prescribed burns. e) Fire fighting foams should not be used in the vicinity of known populations of threatened plants during management burns without prior consultation with the DPIW Nature Conservation Branch.
18	Exclude fire from wet forest plant communities for the duration of this strategy.	a) Do not prescribe burn wet forest plant communities for the duration of this strategy. b) Exclude wildfire from these plant communities wherever possible.
19	Implement a mosaic burning program in selected dry forest plant communities to maintain and enhance existing habitat diversity, and reduce overall fuel loads in bushland areas.	a) Carry out prescribed burning according to the schedule in Table 10 using the procedure in MP 5. b) Regularly revise burning prescriptions to ensure they incorporate the most recent information on the fire ecology of flora, fauna and plant communities of conservation value on the Meehan Range.
20	Control unwanted plant species through minimising the spread of weeds.	a) Ensure that all vehicles involved in fire management and suppression activities on the Meehan Range are washed to remove any mud, soil or plant material prior to entering the area, particularly vehicle underbodies, in order to control the spread of weeds and plant diseases. b) Encourage landowners to carry out weed control in conjunction with fire management activities (MP 6).

1. Introduction

This strategic fire management plan for the Meehan Range has been prepared for Clarence City Council, the Tasmania Fire Service, and the Tasmania Parks and Wildlife Service by AVK Environmental Management. It is designed to be a working document, containing all the maps and information necessary for its immediate implementation.

The strategy covers an area of approximately 5340 ha and includes the Meehan Range and its foothills from Grasstree Hill Road in the north to South Arm Road in the south (see Figure 1). The area covered by the strategy is mostly in private ownership, but includes the Meehan Range Nature Conservation Area managed by the Tasmania Parks and Wildlife Service, and a number of other small reserves. Land tenure in the Meehan Range region is shown in Figure 2.

This strategy contains recommendations for the protection of public assets on the Meehan Range, but does not include recommendations for specific private assets, such as dwellings. However, the strategy includes an Individual Property Fire Management and Awareness Kit that will enable private landowners to assess the level of bushfire risk to their home and other assets, and appropriate risk reduction measures (still in preparation).

To help overcome the lack of information on the long-term responses of indigenous vegetation to fire, this fire management strategy has adopted the principles of 'adaptive management'. The strategy contains a monitoring and evaluation component which will provide the information required to progressively refine the strategy to ensure it is achieving its desired outcomes. In view of this, the scheduling of management burning in the fire management strategy covers a 15 year period (2006 to 2021). This will allow sufficient time to implement the recommendations in the strategy, and to collect enough information for an informed assessment and review. However, the strategy also includes procedures to ensure that key components of the strategy are continuously updated.

1.1 Aim of the Strategy

The aim of this fire management strategy for the Meehan Range region is to:

a) provide recommendations for fire management practices and operational procedures which will minimise the fire threat to:
   - Life and property;
   - Ecological diversity;
   - The sustainability of natural systems; and
   - Cultural and Aboriginal values.

b) be in accordance with Tasmania Fire Service's, Parks and Wildlife Service's and Clarence City Council's policies and best management practice.

c) provide a set of procedures to enable awareness and participation of the community, local fire brigade and property owners in the planning and managing of the bushfire threat to life, property and biodiversity.

d) compliment other management plans and fire management studies."

It must be noted that it will not be possible to prevent wildfires occurring in the Meehan Range region. Unless these fires are suppressed when small and accessible (close to trails), there is a risk that large destructive fires may develop. Depending on weather conditions, such fires may burn a substantial portion of the region causing damage to assets and environmental values, and even loss of life. This fire management strategy aims to lessen these risks by minimising the risk of fires starting in the Meehan Range region, and minimising the risk of loss of life or damage to assets in the region.

This strategy also provides for the use of fire as a management tool to:

- reduce fire hazard to protect assets from wildfires
- maintain plant communities and individual species of conservation value that require fire in order to ensure their long-term viability
- assist in the removal of weeds and the regeneration of degraded bushland.

1.2 Structure of the Strategy

SECTION 1 outlines the aim, scope and structure of the strategy, current landuse on the Meehan Range, and the necessity and advantages of fire management planning.

SECTION 2 outlines State and local government fire management policies and strategies that are relevant to fire management on the Meehan Range, as well as other relevant reports, standards and management plans. It also includes the statutory fire management responsibilities of Clarence City Council, other authorities, and private landowners.

SECTION 3 assesses the bushfire risk in the Meehan Range region including fire history and causes, and assets likely to be at risk from fire.

SECTION 4 provides an overview of fire management issues in the Meehan Range region including current fire management practices and community concerns.

SECTION 5 states the fire management objectives for this strategy, based on the overall aims of the strategy and specific fire management issues.

SECTION 6 covers strategy implementation, including prescribed burning, training, community awareness and involvement, and evaluation and review.

SECTION 7 outlines further research that could improve fire management on the Meehan Range.

SECTION 8 summarises the management activities required to achieve the objectives of the strategy in the form of an action table. This action table references the tables, maps and other parts of the strategy needed for on-ground implementation. It should therefore be used as the primary document for implementing the strategy.

Appended to the strategy are a series of management procedures (MP) to assist in implementing the strategy, as well as a methodology to assist with revision of the strategy.

Mapping of information relevant to fire suppression and fire hazard management has been done on a Geographic Information System (GIS). This will assist the Tasmania Fire Service (TFS) and other emergency services during wildfire events. The GIS maps and data fields can be updated regularly so that emergency services operating in the Meehan Range region during a wildfire have access to the latest fire management information.

Use of a GIS system to record the basic information for the strategy will allow it to be easily updated and revised. This is essential to the adaptive management approach used in this strategy, as there will be a need to modify the strategy in response to:

- new information on the fire ecology of the flora and fauna species on the Meehan Range
- the results of implementation monitoring and performance evaluations
- unplanned incidents, such as major wildfires
- changes in Council and government policy affecting fire management in the Meehan Range region.

1.2.1 Risk Management Approach

This fire management strategy broadly follows the 5Rs risk management framework recommended in the 2004 COAG inquiry into bushfire mitigation and management in Australia (Ellis et al, 2004). The COAG report adapted this from the more common PPRR framework (Prevention, Preparedness, Response and Recovery) used for emergency management in Australia to fit the requirements of bushfire management. The 5Rs framework as stated in the COAG report is:

Research, information and analysis;

Risk modification;

Readiness;

Response; and

Recovery.

The COAG report also states that: "Application of the 5Rs framework should be informed by a thorough understanding of the full range of assets that are threatened by bushfire; life and property, infrastructure and production systems, and environmental values."

It should be noted that this fire management strategy is not an operations plan and does not deal directly with "Response" to bushfires. Operational procedures are dealt with in various documents prepared by the Tasmania Fire Service and other emergency services.

1.3 Landuse and Vegetation on the Meehan Range

Most of the higher parts of Meehan Range are covered with native forest, although large sections are regrowth from earlier farming or forestry operations. The lower slopes on the eastern and western sides have been cleared, or partly cleared, and are generally used for sheep and cattle grazing, rural residential developments and vineyards. Some of the valleys and less steeply sloping land in the northern portion of the area covered by this strategy have been cleared and are used for sheep grazing.

Rural residential development on the Meehan Range is concentrated around Dulcot in the north, and Mt Rumney and Canopus Hill in the central section of the range. However, dwellings are scattered throughout the range, particularly on the southern section.

The area covered by this strategy adjoins urban areas at Risdon Vale and Clarendon Vale, as well as the village of Cambridge.

A large blue metal quarry is located in Flagstaff Gully on the western side of the northern portion of the area covered by strategy.

Three main roads run through or along the edge of the area covered by this strategy; the Tasman Highway, Grasstree Hill Road and South Arm Road.

The distribution of native and non-native vegetation on the Meehan Range is shown on Figure 3, and the conservation value of the native vegetation is given in Table 1. The vegetation mapping is based on TasVeg 2000 mapping, however it should be noted that the accuracy of the TasVeg 2000 mapping on the Meehan Range is relatively low. Some corrections to the vegetation mapping have been made during the fieldwork for this strategy, but the accuracy should still be considered low. Extensive fieldwork would be required to produce an accurate vegetation map of the region.

Landuse on the Meehan Range that is of particular relevance to this fire management strategy are:

- rural residential developments that are difficult to defend or evacuate during a major bushfire
- agricultural activities that could sustain damage during a bushfire (loss of livestock, fences etc.)
- recreation activities that could result in people being injured by fires (eg, walking, picnicking)
- infrastructure that would be adversely affected by wildfire (eg, high voltage power lines)
- activities that can cause damage to trails (eg, four wheel drive vehicles and trail bikes)
- activities that increase the risk of fires starting (eg, picnicking, car dumping).

Table 1 – Conservation value of the native vegetation in the Meehan Range region

1.4 Use of Fire in Sustainable Management of Bushland

Fire plays an important role in maintaining biodiversity in Australia. Changes in the fire regime (season, frequency and intensity of fire) can cause progressive changes in plant communities. Frequent fire and long-term exclusion of fire have both been shown to lead to progressive changes in plant community structure, and a reduction in biodiversity. Failure to use fire properly as a management tool can be considered a threat to some of the natural habitats on the Meehan Range.

Inappropriate fire regimes (season, intensity and frequency of fires) can cause progressive and sometimes irreversible changes in indigenous plant communities, including a loss of biodiversity. On the other hand, identification, prescription and implementation of an appropriate fire regime can be used to:

- manage indigenous flora and fauna habitats in a sustainable manner
- maintain biodiversity
- control selected weed species and promote natural regeneration in dry forest communities.

The potential risks to flora and fauna habitats from wildfire can be managed by minimising the risk of ignitions, maintaining adequate emergency vehicle access routes and other control lines, and by burning suitable areas of vegetation at different times to create a mosaic of vegetation units at different stages of recovery from fire. Adoption of a mosaic burning pattern has the following advantages:

- increases habitat diversity
- reduces overall fuel loads
- provides control lines to help in the suppression of wildfires
- reduces risk of a single, high-intensity wildfire burning large areas.

Within the mosaic of burning units the fire regime (frequency, season and intensity of fire) can be manipulated to achieve some or all of the following objectives:

- removal of woody and herbaceous weeds, and weed seeds from mid-storey, leaf litter, and soil surface
- reduction in the levels of plant nutrients, such as phosphorus and nitrogen, which may be contributing to weed invasion
- manipulation of ecological processes such as; species composition (via the promotion of selected species or communities), regeneration of senescent vegetation, and the creation of suitable conditions for native seed germination
- protection of species of conservation value by maintaining habitat elements that are critical for their survival.

It has been found that sites with accumulated forest litter support a larger and more diverse invertebrate fauna than sites where fire has reduced the litter (Suckling et al., 1985). If a wide range of invertebrate species is to be maintained on the Meehan Range, it is important that some patches of the different habitats on the range remain unburnt. These sites provide essential refugia from which recolonisation can occur (Campbell & Tanton, 1981). The optimal timing of fire for invertebrates in dry forest habitats maintained by relatively frequent burning is not known with certainty, although Hammer (1997) concludes that in dry sclerophyll forest late spring burning is likely to have the least adverse impact.

In bushland fire can be used to stimulate germination of indigenous plant seeds. She-oaks, most Eucalypts, Acacias, members of the pea family (*Fabaceae*) and many species from other plant families frequently germinate prolifically in areas which have been burnt. However, the burnt area will also be open to weed invasion and must be carefully monitored.

Frequent burning of native forests is known to reduce species diversity and make them more vulnerable to weed invasion (Williams, 1991). A high fire frequency (less than 5 years) will usually favour grasses in the understorey at the expense of shrubs, and severely restrict the re-establishment of canopy species.

In rural areas frequent burning is sometimes used to control woody weeds, and this method can also be helpful in native grasslands. However, in native bushland fire will generally increase an existing weed problem. Many woody weeds re-sprout rapidly from rootstock after fire, often coppicing densely (hawthorn, gorse). Herbaceous species (including many grasses) respond in a similar way, regenerating from growth buds on a network of robust underground rhizomes (pampas grass, bracken). Seed germination is usually prolific after fire, a response which necessitates prompt control measures, on-going monitoring, and site maintenance (gorse, boneseed, broom).

Therefore, where weeds are already a problem, prescribed burning should only be carried out after weeds have been treated, and follow up weed control can be carried out. In general, weed infested bushland areas should not be burnt if resources for post-fire weeding are not available. The exception to this is high fire hazard areas close to dwellings where burning is the only feasible method of hazard reduction.

1.5 Fire Hazard Reduction

As the intensity of a bushfire increases it becomes progressively more difficult to contain and suppress the fire. Very high intensity (> 4000 kW/m heat output at the fire front) fires with flame heights greater than 10 m are generally uncontrollable (NSW Rural Fire Service, 1997). The threat from a bushfire therefore increases as its intensity increases. Fire intensity is directly related to the quantity, type, and the distribution, of fine fuel (live and dead plant matter less that 6 mm diameter) available to the fire. Other factors, such as slope and moisture content of the fuel, also

influence fire intensity, but the only factor that can be effectively controlled to limit fire intensity is fine fuel load (usually expressed in tonnes per hectare).

The fire threat to infrastructure and built assets, such as dwellings, can be reduced by creating a buffer zone around the asset where fine fuel loads are maintained at low levels. Generally, these buffers consist of an inner zone around the asset with minimal fine fuel loads, and an outer zone with reduced fine fuel loads. The purpose of the outer zone is to reduce the intensity of any bushfire approaching an asset. The purpose of the inner zone is to protect the asset from flame contact and intense radiant heat. The inner zone is called the 'building protection zone', and the outer zone the 'fuel modified buffer zone'. The whole buffer can be termed a 'defendable space'. Slashing, mowing, or hand cutting of vegetation are generally the most effective methods for establishing and maintaining small defendable spaces around isolated assets, or long, narrow, defendable spaces along urban/bushland perimeters.

Protection of other assets and values, such as water catchments, views, and threatened species, is generally more difficult, and requires strategies that minimise the risk of wildfires starting and spreading. The main strategies are to:

- minimise the risk of wildfires igniting by removing or limiting as many potential causes of fire as possible
- maximising the ability of fire suppression agencies to detect and control any wildfires that do start.

Maintaining fuel loads at a low level will limit the intensity and rate of spread of wildfires, and make it easier for fire brigades to control and suppress them. Prescribed burning is generally the most effective way to reduce fuel loads over relatively large areas, or where other methods of fuel management, such as slashing, are not feasible. However, there is always a risk of prescribed burns escaping control lines and becoming destructive wildfires. In addition, some vegetation types accumulate fuel very rapidly and therefore require frequent burning to maintain fuel reduced conditions. Frequent burning can have adverse side affects, such as loss of plant communities and fauna habitat, increased erosion, and loss of visual amenity.

2. Fire Management Framework

This section outlines the statutory and policy responsibilities of landowners, local government, and government agencies for fire management in the Meehan Range region.

2.1 Statutory Responsibilities

Landowners in the Meehan Range region have a general legal responsibility to take all reasonable steps to minimise the risk of fires that originate on their property causing personal injury, damage to adjoining property, or damage to items of natural or heritage value protected by government legislation. Clarence City Council also has specific responsibilities under various Acts of Parliament for fire management, fire hazard abatement, and the conservation and management of native flora and fauna.

Fire Service Act, 1979

The main responsibilities of landowners/occupiers under the Fire Service Act, 1979, are:

- to take all reasonable precautions to prevent any fire lit on their property from spreading onto neighbouring land (Section 63)
- to take diligent steps to extinguish or control any unauthorised fire on their property during a fire permit period, and to report that fire to the Tasmania Fire Service, or the Police (Section 64).

As well as the obligations that apply to all landowners/occupiers, Clarence City Council has a number of specific powers and obligations under this Act. These are:

- to nominate a representative to sit on the local Special Fire Area Committee (Section 55)
- to "cause the formation in its municipal area of such fire breaks as it considers necessary or desirable to arrest the spread, or to facilitate the suppression of, fires" (Section 56)
- to contribute towards the operating costs of fire brigades (Sections 79 to 95).

It should also be noted that Section 49 of the Act authorises officers of the Tasmania Fire Service to enter and inspect land for any fire hazard. Where a fire hazard is detected, the Act further empowers the State Fire Commission, or an authorised officer, to:

> "by notice in writing given to the council of the municipal area in which that land is situated, require that local council to deal with the fire danger, within such reasonable period of not less than 30 days as is specified in the notice, as if that fire danger were a nuisance under the Local Government Act, 1993."

Clause 18 (2) of the Fire Service (Miscellaneous) Regulations 1996 states that holders of permits under Section 66 of the Fire Services Act: "must, before lighting a fire in the open air that he or she is authorised by the permit to light during a fire permit period, give notice orally or in writing of the intention to light such a fire" to "the owner or occupier of any land adjoining, whether separated by a road or watercourse or not, the land on which the fire is to be lit."

Threatened Species Protection Act, 1995

The Threatened Species Protection Act (TSPA), 1995, provides for "the protection and management of threatened native flora and fauna, and to enable and promote the conservation of native flora and fauna". Section 5 of the Act requires that:

> "A person who performs a function, or exercises a power, in the administration of a public authority must in so doing have regard to the objectives specified in Schedule 1 for the conservation and management of native flora and fauna".

Schedule 1 lists the objectives of the resource management and planning system of Tasmania, and the threatened species protection system established by the Act. These objectives include the principles of 'sustainable development'. The intent of this Act makes protection of threatened species a major objective of any fire management plan in the State.

Section 51 (a) of the TSPA states that: "A person must not knowingly, without a permit - take, trade in, keep or process any listed flora or fauna". The TSPA defines 'take' as including: "kill, injure, catch, damage, destroy and collect". Landowners and Councils may therefore be required to obtain a permit from the Tasmania Parks and Wildlife Service to carry out prescribed burning that may affect any of the species listed in the Act.

Land Use Planning and Approvals Act, 1993

Clarence City Council has a responsibility under this Act to produce planning schemes, and other legal planning documents, to guide the development of the city. Although fire protection is not specifically mentioned in this Act, Section 20 - 1c & 2f of the Act allows a council planning scheme to define bushfire prone areas and require developments within these areas to include bushfire protection measures. Section 48 of the Act requires Council to enforce compliance with its planning scheme.

Local Government (Building and Miscellaneous Provisions) Act, 1993

Under Section 55 of this Act, a council has the power to attach "any terms and conditions it considers appropriate" to a building approval. This would include provisions relating to fire protection. Section 56 of this Act gives a council the power to impose "any restrictions, limitations or conditions it considers appropriate" on developments.

Local Government Act, 1993

Section 93 of the Act allows a council to impose a service rate on rateable land for the purpose of providing fire protection.

Section 200 of the Local Government Act requires a council to issue a hazard abatement notice whenever it is satisfied there is, or is likely to be, a fire risk on any privately owned land. If the person served with an abatement notice fails to comply with the notice within the specified time, the council is empowered under Section 201 of the Act to carry out the action specified in the notice, and recover the cost from the owner or occupier of the land.

Environmental Management and Pollution Control Act, 1994

The objectives of the Act as stated in Schedule 1 of the Act includes;

> "3(c) to regulate, reduce or eliminate the discharge of pollutants and hazardous substances to air , land or water consistent with maintaining environmental quality"

Section 96C of this Act allows the Parliament to make environment protection policies for the purpose of furthering any of the objectives of the Act. Policies that affect fire management activities include the State Air Quality Policy and the State Water Quality Management Policy.

Environment Protection Policy (Air Quality), 2004

Clause 17 of the State Air Quality Policy covers "planned burning" which includes low intensity burning for fuel reduction and ecological management, but does not include backburning to control wildfires. Clause 17 of the policy states that:

> "(2) Persons or organisations involved in the conduct of planned burning or in the preparation of management guidelines for such operations must take account of the health and amenity impacts of smoke pollution on individuals and the community.
>
> (3) Best practice environmental management should be employed by those persons undertaking planned burning to minimise the effects of smoke pollution on individuals and the community. This includes, but is not limited to, complying with the State Fire Management Council Guidelines on high intensity and low intensity burning.
>
> (4) Where practicable, agencies, companies or organisations undertaking burning on a regular basis or on a large scale should:
>
> (a) adopt efficient and effective air quality monitoring programmes;
>
> (b) adopt a uniform approach to recording and assessing complaints;
>
> (c) focus upon minimising the impact of smoke on the community in terms of health, amenity and safety;
>
> (d) encourage the planning and execution of planned burning in a way that minimises the generation of smoke and improves the management of the effects of smoke; and
>
> (e) require a responsible person involved in planned burning for land management to be competent in relevant burning procedures."

The State Fire Management Council Guidelines for low intensity prescribed burning advises that:

> "The effects of smoke from planned fires should be considered when preparing burning plans, taking account of the probable wind direction. Where practicable, smoke mitigation strategies should be used including: prescribing favourable wind direction; ensuring that fuels are dry; limiting the size of the burning area; limiting the number of areas lit at the same time within the same airshed; allowing time for areas to burn out prior to evening inversions, particularly late in autumn ; avoiding planned fires coinciding with public events; avoiding week-ends and Public holidays; providing information to the public."

The State Air Quality Policy also requires that a uniform approach to recording and assessing complaints be developed. This will be implemented through the Tasmanian Air Quality Strategy.

Tasmanian Air Quality Strategy, 2006

The Tasmanian Air Quality Strategy has been established under the Environment Protection Policy (Air Quality) to guide the management of air quality in Tasmania. The overall aim of the Air quality Strategy is to "to achieve compliance with the National Environment Protection (Ambient Air Quality) Measure Standard and Goal for PM_{10} particles, in line with the stated requirements of the Environment Protection Policy (Air Quality)".

Objective 13 of the strategy deals with smoke management from planned fires and aims to:

> "Improve the management of smoke from planned burning in accordance with the Environmental Protection Policy (Air Quality) 2004 by:
>
> (a) Establishing smoke management procedures for planned burning;
>
> (b) Incorporating smoke management procedures into the Forest Practices Code;
>
> (c) Improving the co-ordination of planned burning to minimise smoke impacts; and
>
> (d) Investigating the most appropriate way to manage and respond to complaints relating to planned burning."

The strategy estimates that only about 3% of particulate (PM_{10}) emissions in Tasmania come from management burns and wildfires, however it also notes that poor planning and coordination of planned burns can lead to short-term exceedance of air quality targets.

The strategy also notes that:

> "Although fuel reduction burns may impact on air quality, it is recognised that this practice reduces the likelihood of wildfires that could have more significant impacts such as property destruction."

It should also be noted that Section 66 of the Fire Service Act states that:

> "a person who lights and controls a fire in accordance with the conditions of a permit granted to that person under this section is exempt from the Environmental Management and Pollution Control Act 1994."

Implementing the air quality policy and strategy will require management burns on the Meehan Range to be coordinated with other management burns in the area, and to be carried out when weather conditions will help to disperse the smoke.

State Water Quality Management Policy, 1997

One of the objectives of the State Water Quality Management Policy is to:

> "6.1(b) Ensure that diffuse source and point source pollution does not prejudice the achievement of water quality objectives and that pollutants discharged to waterways are reduced as far as is reasonable and practical by the use of best practice environmental management"

Clause 31.4 of the policy under the section dealing with diffuse sources of pollution states that:

> "Codes of practice or guidelines required by this Policy in respect of specific activities with the potential to impact on stream-side land should pay specific attention to defining appropriate stream-side buffer strips and acceptable management practices

> within these strips. Strategies and incentives, including economic instruments, to encourage the retention and/or improved management of streamside vegetation should be investigated."

In relation to the construction and maintenance of fire trails, Clause 35.1 of the policy states that:

> "35.1 Road construction and maintenance operations will be carried out in accordance with the guidelines or code of practice developed pursuant to clause 31.3 of this Policy, or employ other measures consistent with best practice environmental management, to prevent erosion and the pollution of streams and waterways by runoff from sites of road construction and maintenance."

The only codes of practice under the Water Quality Management Policy that are relevant to construction and maintenance of emergency vehicle access routes is the *Wetlands and Waterways Works Manual* (DPIWE, 2003).

Aboriginal Relics Act, 1975

Section 9 (1) of the Act provides for the protection of sites with Aboriginal relics:

> **"9. (1)** Except in accordance with the terms of a permit granted by the Director, no person –
>
> **(a)** shall destroy, damage, disfigure, conceal, uncover, expose, excavate, or otherwise interfere with a protected object;
>
> **(b)** shall carry out an act likely to endanger a protected object; or
>
> **(c)** shall destroy, damage, or deface, or otherwise interfere with any fencing or notice erected, or any other work carried out, in or in respect of a protected site in pursuance of this Act.
>
> **(2)** Except in accordance with the terms of a permit granted by the Minister on the recommendation of the Director, no person shall remove a protected object from a protected site."

A permit will therefore be required for any fire management works that may affect Aboriginal relics in the Meehan Range region.

Weed Management Act, 1999

This act provides a legislative framework for weed management throughout Tasmania. It includes a list of "Declared Weeds" which have statutory "Weed Management Plans" outlining how they are to be controlled. Actions in Weed Management Plans can be enforced through the Act.

2.2 National Standards and Guidelines

The following documents prepared by Standards Australia deal with bushfire protection issues at a national level:

- Australian Standard 3959 - 1999, Construction of Buildings in Bushfire Prone Areas
- Standards Australia Handbook 36 - 1993, Building in Bushfire Prone Areas.

Australian Standard 3959 is referenced in the Building Code of Australia and provides construction techniques to improve building resistance to varying levels of bushfire attack by

wind-blown burning debris, radiant heat and direct flame contact. The Standards Australia Handbook 36 (Ramsay and Dawkins, 1993) provides general advice on siting, landscaping, design and construction of buildings in bushfire prone areas.

2.3 Fire Management Policies

2.3.1 Clarence City Council Fire Management Policy

Clarence City Council's Fire Management Policy was first released in 1997 and revised in 2004. The Fire Management Policy aims to achieve the following outcomes:

- "Define Clarence City Council's statutory responsibilities in fire management, and determine the management actions required to meet these responsibilities;
- Implement ecologically based fire management of Clarence City Council managed natural areas to maintain and enhance the ecological, cultural and visual amenity values of those bushlands;
- Define the best management practice techniques and processes for meeting these obligations as part of standardised operational budgeting;
- Provide the community with a clear understanding of Clarence City Council's role in ensuring both the safety of residents and the long term maintenance of important natural areas within the Clarence City area; and
- Minimise the risk of the fire escaping from Clarence City Council owned bushland onto adjoining private property."

Under this policy a fire management plan was prepared for the Pilchers Hill Reserve which adjoins the area covered by this fire management strategy.

2.3.2 Department of Tourism, Arts and the Environment Fire Policy

This policy is currently under review. The policy states that: "The Department of Tourism Parks, Heritage and the Arts is responsible for fire prevention and suppression on land reserved under the *Nature Conservation Act* and the *Crown Lands Act 1976*." This applies to the Meehan Range Nature Conservation Area, the Mount Rumney Conservation Area, and any other crown land reserves in the Meehan Range area.

Whilst the policy states that the primary management aim for natural areas under the control of the Department is "the maintenance of a diversity of plant and animal communities in as near a natural condition as possible", the policy also stresses the importance of the protection of life and property from fire. The policy notes that: "the Department will attempt to manage reserved lands to minimise the risk to neighbours, while maintaining the values for which the reserve was

declared", and will undertake fire management works in cooperation with neighbouring landowners.

The policy also provides for:

- preparation of fire management plans for reserves
- use of fire as a vegetation management tool
- research into the effects of fire on native bushland
- minimising the environmental impact of fire management measures (construction of emergency vehicle access routes and clearing of fire breaks etc.)
- closing the whole or parts of reserves to visitors on days of high fire danger
- fuel reduction to reduce the bushfire risk to life and property, and fire sensitive vegetation
- cooperation with other fire fighting authorities and local government
- provision of resources for fire fighting (equipment and trained personnel).

2.4 Management Plans

Two previous management plans have addressed bushfire management issues in the northern portion of the Meehan Range.

2.4.1 Draft Meehan Range Fire Management Plan

This plan was prepared in 1984 by Ian Smith of the Tasmania Fire Service, and covered the portion of the Meehan Range north of the Tasman Highway. The plan include a history of recent fires, an analysis of the fire management issues at the time, and a management burning program for 1984 and 1985. David Downham, TFS District Officer at the time, reported that the burning program in the management plan was implemented. This plan was not renewed.

2.4.2 Middle Meehan Range Management Plan

This environmental management plan was prepared by Sinclair Knight Merz in 1998 for Clarence City Council, the Tasmania Parks and Wildlife Service and Pioneer Concrete. The plan covers the area managed by these three entities in the middle section of the Meehan Range. The plan addressed fire management issues and provided a framework for a fire management plan, however it did not recommend any specific fire management works, or include a burning program. Although this plan does not appear to have been fully implemented, it provides valuable background information that has been incorporated into this strategy.

3. Bushfire Risks

3.1 Fire Climate and Fire Weather

Bad fire weather can be expected from time to time in southern Tasmania when dry winters and springs are followed by summers where fuels are very dry. The strong north-westerly winds that often precede cold fronts in summer can contain dry air from the interior of the Australian mainland. These winds pick up some surface moisture crossing Bass Strait, but as the air stream descends from the Central Highlands dry air at a higher altitude descends to the surface resulting in extremely low humidity. This combination of strong winds and low humidity creates the ideal meteorological conditions for major wildfires. Fires that start under these conditions can be expected to move quickly downwind, and then move more or less at right angles on a broad front when the subsequent south-westerly wind change arrives. These fires can reach a very high intensity in a short time, even in areas with relatively low fuel loads, and are very difficult to control until the weather conditions abate.

If a high pressure system is blocked in the Tasman Sea, strong dry northerly winds can persist for days (Kirkpatrick, 1996). These were the conditions that produced the 1967 and 1998 bushfires around Hobart.

3.2 Bushfire History

The fire history of the Meehan Range before the arrival of Europeans is not known precisely, however, it is accepted that fire over a period of thousands of years has been instrumental in affecting the present distribution of vegetation types in Tasmania (Tasmanian Fire Review Committee, 1994) with more fire resistant types in drier areas, and less fire tolerant species in wetter sheltered sites.

Generally, Aboriginal Tasmanians were shrewd users of fire and used it widely for hunting and access. Relatively frequent Aboriginal burning in the region was noted by early visitors and settlers (McConnell et. al., 1998). It is known that the frequency of fires in some Tasmanian vegetation types increased after Europeans arrived, at least until the 1980s.

Information on the recent incidence of fires on the Meehan Range was taken from various reports and Tasmania Fire Service records, supplemented by information from local fire brigades and field observations during 2005 and 2006.

3.2.1 February 1967 Bushfires

The last major bushfire to cause major damage and loss of life on and around the Meehan Range was the Rokeby fire on 7 February 1967. The approximate extent of this fire is shown in Figure 4a. The rest of the Meehan Range was largely unaffected by the February 1967 bushfires.

McArthur and Cheney (1967) report that the Rokeby fire started in the vicinity of Flagstaff Hill, most likely lit by children. Chambers and Brettingham-Moore (1967) mention the ignition point as being "behind the drive in theatre". Both reports note that the fire had been burning slowly in the area for some days prior to 7 February 1967. Chambers and Brettingham-Moore (1967) report the progress of this fire as follows. The fire burnt slowly up Flagstaff Hill on the evening of 6 February. The fire progressed more quickly due to a breeze that arose about midnight, but did not start moving rapidly and out of control until around 11:00 am on 7 February. The fire travelled south on two fronts, these crossed the Tasman Highway around 1:00 pm, one in the vicinity of Pass Road, and the other on Tunnel Hill. The former fire made a high intensity run on an approximately 2 km wide front down Pass Road to Rokeby, joining up with another fire that had started at Bellerive. This fire destroyed several buildings in Rokeby and then split into two fronts, one moving down Droughty Point and the other proceeding towards Lauderdale spotting ahead as it went. The northerly front of the main fire burnt through heavily timbered country on the Meehan Range in the direction of Roches Beach, also starting spot fires around Lauderdale. Beyond Lauderdale one or more fires burnt strongly towards Cremorne destroying more buildings in these areas.

The Rokeby fire burnt out approximately 5200 hectares and travelled approximately 18 km in a few hours. It was only stopped by a change in wind direction from north-west to south-west. McArthur and Cheney (1967) report that this fire destroyed 24 houses, 1 cottage, 15 shacks, 4 farm buildings, 1 hall and 1 church. The fire also resulted in 3 deaths.

Since 1967 there have been numerous, generally small, fires in both the northern and southern sections of the Meehan Range, however the extent of many of these fires is not known. Fires between 1980 and 1984 were recorded in the Draft Meehan Range Fire Management Plan (Smith, 1984), however this plan did not distinguish between wildfires and hazard reduction burns. These fires are shown in Figures 4b and 4c. Hazard reduction burns planned by the TFS between 1985 and 1990 are shown in Figures 4d and 4e, however it is not known if all these burns were carried out. TFS records from 1993 to the present give the ignition point of a fire and the approximate size of the area burnt, but until recently the TFS has not recorded the actual area burnt.

3.2.2 Recent Bushfires on the Meehan Range

In the last 5 years there have been 3 relatively large bushfires on the Meehan Range. The extent of these fires is shown on Figures 4f and 4g. The fires in February 2001 and October 2006 were deliberately lit, whereas the fire in August 2006 was an escape from a burn off. The October 2006 fire occurred under weather conditions similar to 7 February 1967; temperature above 30 degrees, wind gusts exceeding 100 kph and relative humidity down to 4%. This fire started at 10:50 am near Risdon Vale, and like the Rokeby fire in 1967 moved in a south-easterly direction fanned by hot, dry, north-westerly winds. Late in the afternoon the fire spotted over the Tasman Highway

and started burning to the south of Mount Rumney Road. Luckily this spotover was brought under control when weather conditions abated in the evening.

Due largely to the efforts of the many brigades involved in fighting the October 2006 fire no dwellings were lost, and there were only minor injuries. Property damage was confined to sheds, cars, fences, and other outdoor equipment.

Even though the Tasmania Fire Service is far better trained, equipped and prepared than fire fighting authorities were for the 1967 fires, the October 2006 fire showed that a fire occurring on the Meehan Range under severe weather conditions will still be largely uncontrollable and could have similar results to the 1967 fire.

3.3 Bushfire Causes

Data supplied by the Tasmania Fire Service were used to analyse the causes of fires inside, and within 1 km of, the strategy area boundary, from 1993 to 2005. As well as vegetation fires, the records for vehicle fires were also examined to determine if car dumping is an important cause of wildfires in the area.

Tasmania Fire Service records show 226 vegetation fires (Figure 4h) and 47 vehicle fires (Figure 4i) were attended within the region between 1993 and 2005. A further 1337 vegetation and 342 vehicle fires occurred within 1 km of the strategy area boundary. A breakdown of the causes of the vegetation fires is given in Table 2.

Table 2 - Causes of vegetation fires in the Meehan Range region from 1993 to 2005

CAUSE	NUMBER	%
Malicious/suspicious	745	48
Unknown	461	29
Escape from burning off	154	10
Discarded cigarette	45	3
Heat from open flame/spark during farming activities	42	3
Escape from hazard reduction burns	30	2
Re-ignition of previous fire	24	1
Spark from equipment, cutting, grinding, welding etc.	24	1
Children playing	15	1
Campfire/BBQ	10	0.9
High wind	7	0.7
Short circuit	3	0.2
Hot embers	3	0.2
Total	**1563**	**100**

The analysis in Table 2 shows that deliberate lighting of fires is by far the major cause of vegetation fires in the area, with escape of fires lit for land clearing, hazard reduction, or disposal of rubbish accounting for most of the other known sources of fires in and surrounding the Meehan Range. This indicates that it should be possible to achieve a significant reduction in fire through public education and vigilance, and through better supervision and control of fires lit for other purposes.

Figure 4h shows that the large majority of ignitions have occurred on the western side of the Meehan Range with 3 obvious clusters at Clarendon Vale, Risdon Vale, and Flagstaff Gully Road. This is a concern as the prevailing northerly to westerly winds on days of high to extreme fire danger would push fires into the Meehan Range where they would be more difficult to control. Prompt reporting and rapid response to fires around the Meehan Range is therefore most important for overall fire control. It should also be noted that the frequent fires around the "hot spots" of Clarendon Vale, Risdon Vale, and Flagstaff Gully Road also reduce fuel loads which will slow the progression of fires until they reach areas with heavier fuel loads and/or steep slopes.

Figure 4i shows that the distribution of vehicle fires parallels that of vegetation fires indicating that some of the vegetation fires are a result of burning of dumped cars. As with vegetation fires the largest concentration was around Calarendon Vale. Recent measures to control vehicle access to bushland around Clarendon Vale should reduce the incidence of bushfires started through car dumping, however controls will need to be checked regularly to ensure they are not being bypassed.

3.4 Current Hazard Levels

The higher the intensity of a wildfire the greater its destructiveness and the more difficult it is to control. Fire intensity is a function of the heat content of the fuel, the quantity of fuel (fuel load), and the rate of spread of the fire. The heat content of vegetation fuels is roughly constant, so fire intensity is largely determined by slope and weather conditions (wind speed and relative humidity), and fuel quantity and distribution.

Fine fuels are the main factor influencing fire behaviour (larger fuels burn during a fire but do not contribute significantly to the spread of main fire front, though they may be a source of embers that start spot fires ahead of the main fire front). Fine fuels consist of live and dead plant matter (including grasses, bracken, leaves, bark, and twigs and branches) less than 6 mm in diameter. This measure normally includes any fine fuel in the understorey as well as litter on the ground. Fine fuel load (measured in tonnes per hectare) is therefore used as a convenient measure of the underlying fire hazard in a particular area. The fine fuel load at any given time is a balance between the rate of fuel build up, and factors that remove fuel, such as litter decomposition and fire. In the absence of fire, fuel loads build up to a maximum level where the rate of fuel production equals the rate of decomposition. This theoretical maximum varies for different

vegetation types, however it is rare for dry eucalypt forests and woodlands to reach their maximum fuel loadings due to relatively frequent fires.

Fuel loads can be roughly categorised in terms of the potential threat they pose as follows:

Low - < 5 tonnes per hectare

Medium - 5 to 15 tonnes per hectare

High - >15 tonnes per hectare.

Fine fuel loads in the various vegetation types on the Meehan Range were assessed using the visual method in Appendix D.

Current average fuel loads in the different fuel classes on the Meehan Range are as follows:

- **Wet sclerophyll forest** – high with elevated fuels to about 2 m in the understorey.
- **Dry shrubby sclerophyll forest/woodland** – generally high in eucalypt dominated shrubby forests and woodlands, medium in acacia dominated woodlands. Elevated fuels to about 2 m in the understorey.
- **Heathy forest/woodland** – generally medium, but low in some areas of *Eucalyptus tenuiramis* and *E. risdonii* forest. Elevated fuels to about 1 m in the understorey. Note that areas with the understorey dominated by *Ozothamnus scutellifolius* (kerosene bush) will generate higher intensity fires than areas with few or none of this species.
- **Grassy dry sclerophyll forest/woodland** – generally medium but with a high proportion of elevated fuels to about 0.5 m.
- **She Oak Forest** – generally medium, but low on rocky sites; generally sparse understorey.
- **Grassland** – generally low due to grazing by livestock and marsupials.

It should be noted that even the lower range of medium fuel loads are sufficient to generate uncontrollable fires on days of high to extreme fire danger, particularly if the fire is running upslope.

3.5 Bushfire Threat

The main bushfire threat to the Meehan Range is considered to come from the western side with its history of frequent ignitions, or from large regional fires moving in from the north. Given the north-west to south-east alignment of the Meehan Range there is a potential for a major bushfire to run the whole length of the range, fanned by strong, dry northerly to westerly winds. Given the experience of the Rokeby fire in 1967, a major bushfire could run the length of the Meehan Range in a day under extreme conditions and be virtually impossible to control.

Although it should be possible to reduce the incidence of ignitions in and around the Meehan Range, the threat of major bushfires will remain. Therefore one of the aims of this strategy is to

improve the ability of the TFS to contain fires before they spread into less accessible parts of the Meehan Range.

3.6 Assets at Risk from Fire

Assets potentially at risk from fire include; dwellings, infrastructure, and other items (such as ornamental plantings) which would cost money to replace; as well as items of scenic, cultural and natural heritage value which could be damaged or destroyed by fire, or fire suppression activities. Each landowner in the Meehan Range region has an obligation to reduce a fire hazard where it is a threat to neighbouring properties. However, even with extensive hazard reduction burning, the risk of high intensity wildfires cannot be completely eliminated. Therefore consideration must be given to protection measures that will reduce the risk of fire damage to assets in the area.

The majority of the assets at risk from fire on the Meehan Range are on private property. It is beyond the scope of this strategy to provide detailed advice for reducing the bushfire risk to specific private assets, however an Individual Property Fire Management and Awareness Kit has been developed to assist private landowners to assess their level of risk and implement appropriate risk reduction measures (see Appendix C).

3.6.1 Bushfire Risk to Natural Heritage Assets

Natural heritage assets include native flora and fauna, as well as scenic values. This strategy minimises the risk of fire damaging these assets through measures to minimise the risk of wildfires starting, and ensuring that any prescribed burns are of low intensity to limit canopy scorch, and not so frequent as to prevent the existing tree cover regenerating.

The location of known plant communities and species of conservation value in the Meehan Range region is shown on Figure 5. Known fauna of conservation value and important habitats are shown on Figure 6. The likely response to fire of the flora and fauna species of conservation value known to occur on the Meehan Range is given in Tables 3 and 4.

The flora and fauna of conservation value shown on Figures 5 and 6 is based on available information, and is therefore likely to be incomplete.

The main fire risk to natural heritage assets in the Meehan Range region is from fire regimes that are outside the thresholds within which a particular plant community, or habitat for flora and fauna species, has viability in the long-term. Fire regimes within the thresholds of a particular plant community will help maintain its long-term viability, whereas fire regimes outside the thresholds are likely to lead to progressive changes in the structure and floristics of the plant community, and loss of habitat for the fauna favouring that plant community. Similarly large, high intensity wildfires can destroy fauna habitat over a wide area. Species may be lost from the area if they cannot recolonise from nearby areas, or survive in unburnt patches.

Table 3 – Flora species of conservation value in the Meehan Range region

Table 4 - Fauna species of conservation value in the Meehan Range region

Management burning of the native plant communities on the Meehan Range at the optimum frequency for their long-term viability is considered the best way to conserve important habitat for both flora and fauna in the region. Management burning in a mosaic pattern, along with maintenance of emergency vehicle access routes, is the best way to minimise the risk of high intensity wildfires burning large sections of the Meehan Range. The fire management requirements of the different plant communities/habitats in the Meehan Range region are given in Table 5. Table 5 groups these plant communities into 8 types with similar fire management requirements. The distribution of these vegetation fire management classes is shown in Figure 7.

This fire management strategy is based on current knowledge of the effects of fire on the flora and fauna species known, or considered likely, to occur in the Meehan Range region. Where there is a lack of information about the fire ecology of a particular threatened species or plant community, a fire regime has been applied that aims to conserve their habitat by maintaining the structure and floristics of the particular plant community in which they occur. It should be noted that the flora and fauna in the Meehan Range region have persisted in an environment that has been burnt in the past at varying frequencies. The continued presence of these species on the Meehan Range suggests that they have the capacity to at least survive a number of fires. Additional species of conservation value may occur on the Meehan Range. If any such species are discovered this strategy may need to be modified to incorporate the fire management requirements of the new species.

Although the management burns prescribed in this strategy may kill some individuals of particular threatened species, the management prescriptions should have an overall beneficial effect on species of conservation value by ensuring the long-term conservation of their habitats, and reducing the risk of large wildfires eliminating isolated populations. The monitoring and review procedures in the strategy will allow fire regimes to be modified as new information on the ecology of any of the flora and fauna species of conservation value on the Meehan Range becomes available.

3.6.2 Bushfire Risk to Built and Cultural Assets

Public infrastructure on the Meehan Range includes: high and low voltage power lines, communications towers and roads. Private assets include homes, outbuildings, crops and livestock, and fences. There are no known Aboriginal or European cultural heritage sites on the Meehan Range likely to be at risk from fire. Public infrastructure assets in the Meehan Range region that are considered at risk from bushfires are shown in Figure 8 as well as private dwellings.

The degree of fire threat at any particular time is a combination of fine fuel quantity, slope, and the prevailing weather conditions. The actual risk of a fire causing damage to an asset is a function of the degree of threat, the probability of a fire starting, and any measures taken to prevent the fire causing damage.

Table 5 - Fire management requirements of the vegetation types in the Meehan Range region

The four major modes of attack by bushfires that can cause damage to assets are:

1. wind-blown burning debris
2. radiant heat which can ignite flammable materials ahead of the fire front and shatter glass
3. flame contact
4. strong winds generated or intensified by the fire.

The potential for damage to buildings in the path of large fires depends largely on:

- whether the fire will approach upslope or downslope
- the quantity and distribution of fuel surrounding the building
- whether they are defended during the fire
- their design
- the materials from which they are constructed
- how well they have been maintained.

The fire risk to the public infrastructure items in the Meehan Range region has been assessed by a simple estimate of likely fire intensity based on slope and vegetation type. Recommendations for fire protection are given in Table 6. It should be noted that the main risk to the communications infrastructure on Mount Rumney and Guy Fawkes Hill is not from direct damage during a bushfire but from loss of power as the electricity supply lines are on wooden poles and run through bushland. Damaged power lines could take some time to replace after a major fire so the operators of the communications facilities should be aware that they may have to provide an alternative power source following a bushfire.

A bushfire risk self-assessment procedure was developed from Australian Standard 4360 – 2004, Risk Management, to allow individual landowners on the Meehan Range to assess and, where necessary, reduce the bushfire risk to their homes. This will be included in the Individual Property Fire Management and Awareness Kit currently being prepared.

The University of Tasmania has been provided with advice regarding bushfire protection for their observatory on Canopus Hill.

Table 6 – Fire protection of public infrastructure assets on the Meehan Range

4. Fire Management Issues

4.1 Management Responsibilities

Control of fires on the Meehan Range is the responsibility of the Tasmania Fire Service. The area covered by this strategy includes the areas of 6 Tasmania Fire Service Brigades; Richmond, Risdon Vale, Cambridge, Clarence, Rokeby and Lauderdale. The boundaries of the brigade districts are shown in Figure 9.

Each individual landowner is responsible for managing the fire hazard on their property and ensuring their homes are protected. The Parks and Wildlife Service, or Clarence City Council, are responsible for fire management in the reserves in the region, depending on the status of the reserve.

Clarence City Council is responsible for managing community recovery after a major bushfire.

4.2 Fire Hazard Management

A fire management plan was prepared for the northern portion of the Meehan Range in 1984 (Smith, 1984). This plan was implemented for a number of years, including a number of hazard reduction burns, but then lapsed. At present there is very little planned fire hazard reduction on the Meehan Range. What work is carried out is done by infrastructure agencies such as Transend (power line easements), individual landowners, or the local fire brigades, without any overall coordination. This has resulted in a steady build-up of fuels such that there is a likelihood that a fire starting on a day of high or extreme fire danger could burn the length of the Meehan Range.

The approach adopted in this strategy is to divide the native vegetation on the Meehan Range into areas where burning will be used primarily for hazard management (strategic hazard management), or for habitat management (ecosystem management). This must be supplemented by Defendable Spaces maintained by other methods to ensure protection of built assets. These Defendable Spaces will be the responsibility of the landowner, with Clarence City Council able to ensure the required work is done through the hazard abatement notice system. Habitat management burns will have the additional benefit of reduced bushfire hazard for a period following each fire.

4.3 Firebreaks and Defendable Spaces

It is important to note the difference between a "firebreak" and a "defendable space". A firebreak is a strip of cleared, or partly cleared, bushland constructed and maintained to slow, or stop, the progress of a bushfire so as to assist in its control. Firebreaks in grassland can be effective in stopping fires if cleared down to mineral earth, but where trees and shrubs are present wind-blown burning embers will usually carry a bushfire across a firebreak. Therefore in bushland with

shrubs and trees the only benefit of a firebreak is to provide access for firefighters and a boundary for backburning operations. Currently there are no standards or guidelines for firebreaks in Tasmania.

A defendable space is an area of managed vegetation around an asset likely to be at risk from fire which protects it from direct flame contact and intense radiant heat, as well providing an area where fire fighters can defend the asset. The Tasmania Fire Service document *Guidelines for Development in Bushfire Prone Areas of Tasmania* recommends that a defendable space be established and maintained on the hazard side of dwellings in bushfire-prone areas. The defendable space consists of an inner building protection zone with minimal fine fuel, and an outer fuel modified buffer zone where fine fuel loads are kept in a reduced state (less than about 5 tonnes per hectare litter and shrubs, or grass less than 100 mm high). Fine fuel comprises live and dead plant matter less than 6 mm in diameter on the ground and in the shrub layer.

The building protection zone provides a space around buildings with minimal fine fuel that allows them to be defended from bushfires. It also reduces the risk of wind-blown burning debris from bushfires starting spot fires close to buildings. The building protection zone extends outwards from the walls of the building being protected.

The fuel modified buffer zone forms a concentric ring around the building protection zone and has fine fuel loads reduced sufficiently to isolate the building protection zone from direct flame attack, radiant heat, and the majority of wind-borne burning embers.

The minimum recommended width of the defendable space varies with fuel type and slope as follows:

Minimum Defendable Space Component Widths (from Tasmania Fire Service, 2005)

Slope[1] (degrees)	**Building Protection Zone Width**[2]	**Fuel-modified Buffer Zone Width**	
		Grassland	**Forest**
0	20 m	10 m	15 m
5	20 m	15 m	25 m
10	25 m	20 m	30 m
15	30 m	30 m	45 m
20 +	40 m	40 m	50 m

1 – For downslope and across slope fire approaches use the widths for 0 degrees.
2 - Distances are measured outwards from the wall of the building towards the fire hazard.

Landowners on larger lots (more than 1 hectare) will generally be able to establish and maintain a defendable space on their property as part of their overall bushfire risk management. This will be covered in more detail in the Individual Property Fire Management and Awareness Kit that will be supplied to all landowners on the Meehan Range (see Appendix C). Smaller lots (less than 1 hectare) will generally have to rely on cleared areas on adjoining properties for their bushfire protection.

At present there are no firebreaks maintained solely for fire control on the Meehan Range. The only defendable spaces maintained by government authorities on the Meehan Range for the protection of adjoining small lots are on the northern and eastern side of Risdon Vale, and along Faggs Gully Creek at Geilston Bay.

4.4 Emergency Vehicle Access Routes

Trails on the Meehan Range that are used as access by landowners are generally in good condition, however many other trails that could be required for fire fighting are overgrown and in poor condition, or impassable. The aim of this strategy is to have a network of strategic emergency vehicle access routes in the Meehan Range region that are maintained for emergency use for the benefit of all landowners in the region. In most cases the emergency vehicle access routes will follow existing roads and trails, and it is expected that landowners will receive assistance for their maintenance.

Use of access routes on private property will be for emergencies only. Access by the emergency services for familiarisation, inspection and maintenance will be subject to the access protocol in Appendix A (MP 12), and a formal access agreement with the landowner, if desired.

The location of the access routes on the Meehan Range considered necessary for fire management are shown on Figure 10, and their condition assessed in Table 7. Emergency vehicle access routes have been given names where these are in common usage, or are obvious from their destination.

The proposed emergency vehicle access routes have been prioritised for maintenance purposes. **High priority** trails are major through routes that are important for emergency vehicle access on the Meehan Range. **Medium priority** access routes generally provide links between the high priority trails and/or are important containment lines for controlling wildfires. **Dormant** access routes are minor control lines and boundaries of management burning units, that need not be trafficable at all times. Dormant trails will be re-opened when needed as control lines for containing wildfires or management burns. The only maintenance required on these trails are periodic inspections to ensure they are not eroding. It should be noted that some of the dormant access routes are also access roads to private property and infrastructure, their "dormant" status as emergency vehicle access routes does not imply that they will not be maintained for other purposes.

Many individual dwellings, and the two main settlements on the Meehan Range, Dulcot and the Canopus Hill/Mount Rumney area, have only one access point. Residents in these areas could be cut off from assistance in the event of a major bushfire, particularly if their only access is from the north or west. Of particular concern is Mount Rumney Road which is narrow, winding, and is accessed from Cambridge Road to the north. There are a number of potential emergency access routes to Pass Road and Acton Drive that could reduce this risk, and should be developed.

A number of new trafficable links are recommended to improve access and safety for fire fighters and to provide alternative egress routes for landowners. These include:

1. A link from the end of Canopus Road to the end of Dexter Drive. This link is already provided by private driveways but requires a gate in the boundary fence, or another link between the properties. This link would give residents along Canopus Road an emergency egress route to a refuge area at the end of Grahams Road.
2. A link from the end of Dexter Drive to the private driveway from Grahams Road (MR19). This link is partly provided by existing driveways. Approximately 100 m would be required plus a suitable gate. This link would give residents along Canopus Road and Dexter Drive access to Grahams Road.
3. A link from the end of the northern section of Downhams Road to the end of George Street, Dulcot. This link will provide a control line to stop fire moving into the Meehan Range from the north, and a second access route to Dulcot.
4. A link from the northern end of MR3 to Grasstree Hill Road. This will remove the dead end on MR3 and provide a control line to help contain fires starting in the valley north of Risdon Vale, as well as fires moving into the area covered by the strategy from the north. Most of this link exists but parts are overgrown and impassable. To prevent unauthorised usage the first 50 m on private property north of the current end of the trail should be left overgrown with low shrubs that will not impede TFS vehicles but will discourage unauthorised use.

Guidelines for the construction, repair and maintenance of emergency vehicle access routes on the Meehan Range are given in Management Procedures (MP) 1 and 2 in Appendix A. Recommended links 1 & 2 above need not be to the standard in MP 1 and should require minimal work. Links 3 and 4 should be constructed to the standard in MP 1.

All emergency vehicle access routes on the Meehan Range need to be clearly signposted to avoid confusion when out of town fire brigades and other emergency services are operating in the area. At a minimum the fire trail numbers should be able to be clearly read from the cab of a Tasmania Fire Service vehicle from a distance of at least 10 m during the day, and in headlights or torch light at night. Intersections on smaller trails may also need to be signposted where fire trail continuity is not obvious. Fire trail signs should also indicate the size of TFS vehicles that can use the trail (eg W31/5 for light tankers, or W31/3 for heavy tankers).

Table 7 - Condition and maintenance of emergency vehicle access routes on the Meehan Range

4.4.1 Gates

Access to most emergency vehicle access routes and private roads on the Meehan Range is controlled by locked gates, however this has not completely eliminated unauthorised usage by 4WD vehicles and trail bikes. The location of the existing gates (locked and unlocked) is shown in Figure 10. A number of trails do not have gates, or locks on existing gates. New gates are recommended at the following locations:

- where MR4 joins MR5
- where MR7 leaves Mount Rumney Road
- on MR6 at the boundary of the Meehan Range State Recreation Area
- in the fence at the eastern end of MR28
- in the fence on the southern side of the paddock to allow emergency access from MR28 to the trail system in the Pilchers Hill Reserve
- to replace the damaged gate at the junction of MR23 and the Flagstaff Gully Link.

New links will also require new gates where they cross property boundaries or fencelines.

All gates on emergency vehicle access routes should be provided with security locks that cannot be copied without permission. The locks should be keyed so that landowners, and agencies such as Transend, can be provided with keys that only unlock the gates leading to their property or assets, whereas the emergency services are provided with master keys. A register of who has keys and which gates they open will need to be maintained. All gates on emergency vehicle access routes should include a sign stating that they should not be blocked at any time.

Landowners in the area have commented that they would prefer that fences were cut to allow access for large bulldozers during fire fighting operations, rather than risk damage to gates. Farmers also requested that they be informed as soon as possible of any damage to gates or fences.

4.4.2 Unauthorised Access

Unauthorised use of trails in the Meehan Range by trail bikes and 4WD vehicles is a major problem for landowners, and may make them reluctant to agree to having trails upgraded or new links constructed. It is essential that unauthorised use of the emergency vehicle access route network recommended in this strategy be minimised. Boom gates and stone or steel barriers will control most unauthorised 4WD usage, particularly if trails not included in this strategy, and not required for other management purposes, are closed. However, gates are far less effective against trail bikes and active policing of areas where this is a problem should be considered.

4.5 Water Supply

Reticulated water for fire fighting is available from fire hydrants on suburban streets on the western side of the Meehan Range, and at Cambridge and along Centauri Drive on the eastern side

of the Range. There are currently no hydrants on the Canopus Hill water supply scheme although the header tank is easily accessible. There are also a number of access points on the irrigation scheme pipeline along Richmond Road (see Figure 10). Mount Rumney has a private water supply scheme with a small header tank and some hydrants along Mount Rumney Road. Accessing the Mount Rumney supply would require tankers to stop on, and block, Mount Rumney Road. It is considered that, as this supply is limited, it should be left for the use of residents defending their homes and only used by the Tasmania Fire Service as a last resort, or for fighting structural fires in the area.

Fire fighting on the remainder of the Meehan Range must rely on static water supplies such as water tanks, dams, waterholes, creeks and rivers. Some of these water sources may be dry during prolonged droughts. The location of water supply points on the Meehan Range is shown on Figure 10 and their characteristics given in Table 8. Water supply points on access routes leading into the Meehan Range have been included.

Existing dams and reticulated supplies provide a reasonably accessible water supply for fire fighting in the southern part of the Meehan Range. However, there are far fewer water sources in the northern part of the Range. To improve the water supply in this area the feasibility of establishing water sources at the following locations (shown on Figure 10) should be examined:

- near the junction of routes MR2, MR3 and MR29
- near the junction of MR5 and MR27
- in the saddle on MR6, there is a small waterhole at this location but it was dry at the time of inspection
- in the saddle to the south of the junction of MR9 and MR21
- at the water scheme header tank alongside Thomas Street, Dulcot.

All these locations have turning areas nearby.

4.6 Fire Detection and Suppression

Most parts of the Meehan Range are easily visible from surrounding urban and rural areas and it is likely that any fires would be quickly reported. The fire tower on the summit of Mount Faulkner has a good view of the Meehan Range and is staffed on days of high or greater fire danger in Summer.

Table 8 - Fire fighting water points on the Meehan Range

4.7 Protection of Dwellings

There are a number of major settlements within and adjoining the area covered by this fire management strategy, as well as isolated dwellings scattered throughout the Meehan Range. The fire management issues with each of the major settlements are discussed below.

Dulcot

Dulcot is a rural residential subdivision on a hill near Richmond Road on the eastern side of the Meehan Range. The bushfire risk characteristics of this settlement area are as follows:

- no reticulated water supply
- substantial amounts of unmanaged vegetation within the subdivision
- upslope fire approach to dwellings
- single access point onto Richmond Road
- no fire breaks or other measures to prevent bushfires moving into the area.

Bushfire risk reduction in Dulcot will have to rely mainly on residents managing hazards on their own properties. The main bushfire threat to Dulcot is likely to be from fires approaching from the northwest and west across Stony Creek. The slope running up to Dulcot from Stony Creek consists of grassy woodland dominated by she-oak. Hazard reduction on this slope will be difficult as it is covered by many private lots. Burning is not a suitable hazard reduction measure, however a firebreak consisting of an access trail with a slashed verge around 5 m wide on either side of the trail should help to stop, or slow the progress of, most fires as she-oaks do not normally produce many burning embers that could spot across a firebreak.

Dulcot only has one main access point from Richmond Road. This could cause congestion and accidents during a major emergency and hamper emergency services trying to reach the area. There is currently a track running from the southern end of George Street to Esplanade Street which provides a second access to Richmond Road that could be used in an emergency. It can be used by 2WD vehicles but is only single lane so it would not be able to provide simultaneous access and egress. Although prepared residents are advised to shelter in their homes, the old quarry at the top of Nichols Hill could be maintained as a refuge area for other residents and emergency service personnel.

Risdon Vale

Risdon Vale is an urban area on the western side of the Meehan Range. The bushfire risk characteristics of this suburban area are as follows:

- reticulated water supply
- high density of development, little unmanaged vegetation within the urban area
- downslope fire approach to dwellings
- multiple access routes to the suburb

- 10 m to 30 m wide defendable space on the northern and eastern sides of the suburb.

The factors listed above all serve to reduce the bushfire risk to Risdon Vale, although the defendable space is becoming overgrown in places and needs clearing. It is not considered that there are any other measures that could be taken that would substantially reduce the bushfire risk to Risdon Vale, without great expense.

Geilston Bay

Geilston Bay is an urban area on the western side of the Meehan Range. The bushfire risk characteristics of this suburban area are as follows:

- reticulated water supply
- high density of development, little unmanaged vegetation within the urban area
- downslope fire approach to dwellings
- multiple access routes to the suburb
- relatively convoluted urban/bushland interface
- no defendable space on the urban/bushland boundary except for Geilston Creek Road and along Faggs Gully Creek.

Most of the factors above reduce bushfire risk, however the relatively convoluted boundary and lack of a defendable space (except along Geilston Creek Road and Faggs Gully Creek) is a concern.

Warrane (TAFE Campus and Oakdale Industries)

These facilities are on the western side of the Meehan Range. The bushfire risk characteristics of this area are as follows:

- reticulated water supply
- buildings in large cleared areas
- downslope fire approach to buildings
- multiple access routes to the suburb
- separated from bushland on the Meehan Range by the Flagstaff Gully Link Road

The buildings close to the Meehan Range in this area are in large cleared areas that should provide an adequate defendable space.

Cambridge

Cambridge is a small village on the eastern side of the Meehan Range. The bushfire risk characteristics of this area are as follows:

- reticulated water supply
- downslope fire approach to dwellings
- multiple access routes to the village

- dwellings separated from bushland on the Meehan Range by open paddocks

The existing cleared areas around the village should provide adequate protection provided the grass is regularly slashed or grazed during summer.

Canopus Hill

Canopus Hill is a rural residential area on the eastern side of the Meehan Range. The bushfire risk characteristics of this settlement area are as follows:

- reticulated water supply but with limited capacity and no hydrants along roads
- upslope fire approach to dwellings
- multiple dead end roads with only one access onto Cambridge Road
- substantial amounts of unmanaged vegetation within the area
- no firebreaks or other measures to prevent bushfires moving into the area.

Bushfire risk reduction on Canopus Hill will have to rely mainly on residents managing hazards on their own properties. The main bushfire threat to Canopus Hill is likely to be from fires starting along the Tasman Highway or Cambridge Road, or spotting across the Tasman Highway from fires on the northern portion of the Meehan Range.

The Canopus Hill area has only has one access point from Cambridge Road and all the roads in the area are dead ends. This could prevent emergency service reaching the area, or residents leaving the area during a major bushfire. It will not be possible to provide an alternative access to Canopus Hill that runs in a different direction to the existing access and therefore there is a risk of residents being trapped in the area during a major bushfire. Although prepared residents are advised to shelter in their homes, the large farm at the eastern end of Grahams Road could function as a refuge area for other residents and emergency service personnel. Access to this refuge area could be improved by providing emergency access links between the end of some of the dead end roads in the area.

Regular hazard reduction of the patches of bushland on the northern side of Canopus Hill would reduce the rate of spread of fires and help to limit downwind spotting.

Mount Rumney Road

Mount Rumney Road is a rural residential area on the top of the Meehan Range. The bushfire risk characteristics of this settlement area are as follows:

- reticulated water supply but a private system with limited capacity
- substantial amounts of unmanaged vegetation within the area
- upslope fire approach to dwellings
- single access point onto Cambridge Road
- no firebreaks or other measures to prevent bushfires moving into the area.

Bushfire risk reduction in the Mount Rumney Road area will have to rely mainly on residents managing hazards on their own properties. The main bushfire threat to dwellings along Mount Rumney Road is likely to be from fires starting along the Tasman Highway or Cambridge Road, or spotting across the Tasman Highway from fires on the northern portion of the Meehan Range.

Mount Rumney Road runs from Cambridge Road to Mount Rumney. It is narrow and winding, and a dead end. This could prevent emergency services reaching the area, or residents leaving the area during a major bushfire. Although the TFS advises residents who have prepared their properties to shelter in their homes, the bushfire risk to some properties, particularly those at the top of steep north and west facing slopes, is very high and residents may have to be evacuated. There are two possible emergency vehicle access routes that could be used by residents evacuating in an emergency, if access to Cambridge Road is cut off (see Figure 10b). The first route runs from the southern end of Mount Rumney Road through private property to Acton Court. If the first emergency route is not usable, a second route runs from the end of Mount Rumney Road to the vineyard in the valley to the west of Guy Fawkes Hill. The vineyard provides a reasonably safe refuge area, however the feasibility of providing a link from the vineyard to Pass Road should be investigated to allow full evacuation from the area as well as emergency vehicle access from this side.

A burnt 'firebreak' across the Meehan Range at right angles to Mount Rumney Road as shown on Figure 13 would reduce the rate of spread of fires into the area, and help to limit downwind spotting.

Clarendon Vale

Clarendon Vale is an urban area on the western side of the Meehan Range. The bushfire risk characteristics of this suburban area are as follows:

- reticulated water supply
- high density of development, little unmanaged vegetation within the urban area
- downslope fire approach to dwellings
- multiple access routes to the suburb
- no formal defendable space although there is a powerline easement along the eastern boundary of the subdivision.

Proposed subdivisions on the eastern and northern sides of Clarendon Vale will include defendable spaces to TFS specifications which will further reduce the bushfire risk to Clarendon Vale if they proceed. There are frequent deliberately lit fires around Clarendon Vale. Although the arson is not condoned and should be controlled, it does have the effect of reducing fuel loads around the suburb. The factors listed above all serve to reduce the bushfire risk to Clarendon Vale. Given the frequency of recent fires in the area, it is not considered that any hazard reduction is required apart from slashing or burning grass close to dwellings if there is excessive growth.

Oakdowns

Oakdowns is a new urban subdivision on the western side of the Meehan Range. The bushfire risk characteristics of this suburban area are as follows:

- reticulated water supply
- high density of development, little unmanaged vegetation within the urban area
- downslope fire approach to dwellings
- single access routes to the suburb, though a second road is under construction
- no defendable space between dwellings and bushland on the Meehan Range.

Although this subdivision is still under construction it does not include any defendable space between dwellings on the perimeter lots and adjoining bushland. A defendable space to Tasmania Fire Service specifications should be provided on the eastern and northern perimeters of the subdivision.

Acton Park

This rural residential area is on the eastern side of the Meehan Range. The bushfire risk characteristics of this area are as follows:

- reticulated water supply
- dwellings on large cleared lots
- downslope fire approach to buildings
- multiple access routes to the suburb.

The dwellings close to the Meehan Range in this area are mostly on large cleared lots with ample room for an adequate defendable space. Bushfire risk reduction in the Acton Park area will have to rely mainly on residents managing hazards on their own properties.

4.7.1 Dwelling Location and Construction

It was noted that a number of dwellings have been, and continue to be, constructed in locations on the Meehan Range with a very high bushfire risk. Many of these dwellings may be undefendable in a major bushfire as the Tasmania Fire Service will not send crews into situations where their lives may be at risk. Dwellings at highest risk, and therefore the least defendable, are those at the end of long driveways with no alternative vehicle access and on, or at the top of, steep north or west facing slopes covered by bushland. Hazard reduction on the slopes below these dwellings can reduce the bushfire risk but a steep slope burnt by a cool fire in winter may still carry a high intensity fire in summer.

Clarence City Council has a responsibility to ensure that future dwellings constructed on the Meehan Range are defendable by ensuring they are located and constructed in accordance with current Tasmania Fire Service guidelines (Tasmania Fire Service, 2005). However, Council does

not currently have a map of bushfire prone areas to use with its planning scheme. Figure 11 shows bushfire prone areas within the area covered by this fire management strategy mapped using the procedure in MP 10. This could provide a procedure and template for mapping bushfire prone areas over the whole of Clarence.

4.8 Bushland Management

Fire can provide the disturbance that many introduced species need to spread to new areas, as well as to expand existing populations. Other fire management activities, such as construction and maintenance of emergency vehicle access routes, and bulldozing of fire breaks during fire suppression, can also provide opportunities for weeds to colonise native bushland. Fire can also be used as a tool to manage weed infestations. Some species are best controlled by herbicide application to regrowth following a fire. Other species can sometimes be controlled by the application of a fire regime that stimulates germination of seed but kills the regrowth before it has been able to flower.

The likely response to fire of introduced species on the Meehan Range is given in Table 9, and the distribution of known weeds is shown in Figure 12.

4.9 Conservation of Biodiversity

Fire plays an important role in maintaining biodiversity in Australia. Changes in the fire regime (season, frequency and intensity of fire) can cause progressive changes in plant communities. Frequent fire and long-term exclusion of fire have both been shown to lead to progressive changes in plant community structure, and a reduction in biodiversity. Failure to use fire properly as a management tool can be considered a threat to the natural habitats on the Meehan Range.

Frequent burning of native forests will generally reduce species diversity and make it more vulnerable to weed invasion. A high fire frequency (less than 5 years) will usually favour grasses in the understorey at the expense of shrubs, and severely restrict the re-establishment of canopy species.

Fire can adversely affect fauna by killing individual animals, removing their habitat, or removing specific elements in their habitats, such as nest sites and feeding areas. This fire management strategy aims to conserve the known habitats of fauna species of conservation value by prescribing an appropriate fire regime to ensure the long-term viability of the species, and ensuring the critical habitat elements are protected as much as possible.

Table 9 - Response to fire of the main weed species on the Meehan Range

The wet forest plant communities on the Meehan Range naturally have a low fire frequency and do not require management burning to ensure their long-term viability. These communities could be damaged and even eliminated by frequent fires. The dry forest, heathland and grassland plant communities are considered to be dependent on fire to maintain their present structure and floristics in the long term. Periodic burning will help to maintain diversity in the understorey, and allow fire dependent species to germinate and establish. However, there is a need to minimise damage to important habitat elements (such as dead trees, old logs and stumps) during these burns, and to ensure adequate retention of unburnt patches of each forest type to act as refugia for recolonisation of burnt areas.

The management procedure for prescribed burning in Appendix A of this strategy (MP 5) includes the retention of dead trees, logs, and stumps as one of its prescribed outcomes.

Currently there is some debate over the optimal season for burning dry forests, grassy woodlands and grasslands. In fact, it is likely that they benefit from a varied fire regime. The season of burning specified in this strategy has therefore been deliberately varied, except where there has been a specific need, such as avoiding the flowering time of a threatened species.

4.10 Community Consultation

At the start of the project, a letter and information leaflet was sent to all residents in the study area, explaining the aims of the fire management strategy and inviting them to attend a series of community forum meetings. A copy of this leaflet has been included in Appendix E. Community forums were held at Risdon Vale, Cambridge, Rosny and Lauderdale. The following issues were raised by the community in their written responses and the community forums:

- Plans prepared in the past but never implemented - will this be the same?
- Concern with build up of fuel in the area – no hazard reduction being done.
- Deterioration of fire trails and blocking of access – rocks need to be replaced with boom gates.
- Tasmania Fire Service not notified of new houses in the bush.
- Need better emergency escape routes.
- Dead willows in the creek at Risdon Vale are a fire hazard.
- Appears to be a lack of coordination in fire management.
- Arson (car dumping etc.) causing frequent fires in the Clarendon Vale area – also at the summit of Mount Rumney.
- 1987 fire in the Meehan Range threatened to jump the highway and threaten Mount Rumney.
- 1975/76 fire from Grahams Road ran up Mount Rumney.
- Difficult to evacuate residents along Mt Rumney Road.
- Fire trail on the western side of Mount Rumney is badly overgrown.

- How will fire trails on private property be maintained.
- Residents not informed of nearby burn offs.
- New residents not aware of bushfire risks.
- Not enough control over developments in high fire risk areas.
- Difficult to get local brigades to assist residents with hazard reduction (TFS explained that there were issues with adequate control lines and availability of crews and other resources).
- Sub-standard roads could hinder TFS access and resident evacuation, particularly Mount Rumney Road.
- Why can't the water tanks on Tara Drive be used as a water source for fire fighting.
- Need strategic burn-offs between Tunnel Hill and Risdon Vale.
- Need to know alternatives to burning for hazard reduction – where to get information and advice.
- Where will the funding come from to implement the strategy, particularly fire trail repair and maintenance.
- No wildfires in the NE portion of the study area for at least 18 years – some landowners do their own burn-offs but danger of burns escaping onto neighbouring property.
- Landowners need to take joint action on hazard management.
- TFS need good access - need keys to private security gates.
- Power line easements carried the 67 fires into Hobart suburbs.
- Narrow roads a safety concern.
- Concern about weed spread after fires – need follow-up weed control after burn-offs but residents not sure how to treat different weeds (cape weed, serrated tussock etc).
- Council only clear 1 m on either side of roads – should clear the whole road reserve to reduce fire hazard.
- Area losing larger trees – probably due to drought – vegetation is changing.
- What fire management is mandatory for landowners – what powers do Council and TFS have over fire management on private land.
- Landowners need information on fire protection and hazard reduction, eg maintaining private power lines, water supplies, fire fighting equipment and how to maintain it. Particularly a problem with new landowners who are often not aware of the bushfire risk.
- Cars torched near Warrane fire Station and the oval, also along Flagstaff Gully Road.
- Power lines a source of ignitions.
- Control lines need to be in place before the bushfire season.
- Residents need information on sprinkler systems for fire protection.

- TFS need access but need to control unauthorised access on private property, particularly trail bikes.
- High flammability plant species (kerosene bush) common in Flagstaff Gully.
- A number of landowners expressed concern about the bushfire hazard on their properties; some are willing to do hazard reduction themselves, but not sure how to do it, how much to do, safety issues, balance between fuel removal and vegetation conservation etc. Others feel they cannot do burn-offs on their own. Both groups would like advice and assistance from TFS and/or Council.
- Landowners need to work co-operatively to reduce fire hazard.
- Lack of hazard reduction in some gullies on the northern side of Mt Rumney Road.
- Mount Rumney/Canopus Hill area needs more fire trails and evacuation routes.
- Access and evacuation at the end of Dexter Drive.
- Concern that burn-offs to reduce fire hazard will adversely affect flora and fauna.
- Want to be kept informed of the progress of the strategy.
- Need to access local knowledge and expertise regarding past fires and fire behaviour in the area, particularly the 67 fires.
- Concern about unnecessary backburning during fire suppression – can cause damage itself to native vegetation, fences etc.
- Bulldozed fire breaks not "repaired" after previous fires.
- Regular checks of properties for high hazard levels, hazardous materials and rubbish etc. to reduce bushfire risks.
- Threat to Mt Rumney/Canopus Hill area from fires in the northern part of the Meehan Range.
- Concern about arson in the area – vandals, car dumping etc.
- Concern that Mount Rumney Road area is split between Cambridge and Rokeby TFS brigades – seems absurd as Mornington brigade are closer than Rokeby.
- More hazard reduction needed along road verges.
- Vulnerability of power lines in the area to fire damage.
- Adequacy of water supply for fire fighting in different areas. Are the TFS and PWS aware of the location of private water supplies?
- Who will manage and be responsible for hazard reduction burns on private property recommended in the strategy.
- Are utilities like Transend and Aurora involved in the strategy?

Further stakeholder consultation, including another round of community forums will be held during public exhibition of the fire management strategy.

5. Fire Management Objectives

The specific fire management objectives recommended for the Meehan Range for the 15 year duration of this fire management strategy are as follows:

Research, Monitoring and Review

1. Monitor the impact of fire management activities in the Meehan Range region. Adjust practices to achieve relevant objectives, and periodically review the fire management strategy.

Risk Modification

2. Minimise the risk of wildfires starting and spreading within the Meehan Range region.
3. Minimise the risk of fire to residents on the Meehan Range.
4. Minimise the risk of wildfire damaging built and cultural heritage assets on the Meehan Range.
5. Minimise the impact of fire and fire management activities on water quality.

Readiness

6. Maintain existing emergency vehicle access routes shown in Figure 10 in a trafficable condition.
7. Establish additional emergency vehicle access routes to ensure adequate vehicle access for fire control and emergency relocation of residents (subject to landowner agreement).
8. Minimise damage to the emergency vehicle access route system by preventing unauthorised vehicle access.
9. Signpost all emergency vehicle access routes at their access points, and at trail intersections.
10. Ensure an adequate and accessible water supply for fire fighting.
11. Ensure all personnel carrying out fire management activities on the Meehan Range are suitably trained, equipped and supervised.
12. Develop, assist development of, or utilise existing education programs and materials aimed at:
    - reducing arson
    - informing residents of fire safety issues, and measures to improve protection of themselves and their property
    - informing residents of the potential impact of their fuel management activities on environmental and other values.
13. Maintain up-to-date information on; emergency vehicle access routes and their condition, water supply points, defendable spaces, and areas burnt in prescribed fires and wildfires.

Response

14. Coordinate fire management activities on the Meehan Range amongst the various stakeholders.

Recovery

15. Ensure that residents in the Meehan Range region have access to appropriate resources to assist them in recovering from a major bushfire.
16. Ensure that all roads, trails and other infrastructure are checked after a fire to ensure they are safe prior to allowing use by the public.

Conservation of Biodiversity

17. Minimise fire risk to fire sensitive vegetation and threatened flora and fauna.
18. Exclude fire from wet forest plant communities for the duration of this strategy.
19. Implement a mosaic burning program in selected dry forest plant communities to maintain and enhance existing habitat diversity, and reduce overall fuel loads in bushland areas.
20. Control unwanted plant species through minimising the spread of weeds.

The actions recommended to achieve these objectives are given in the management action summary table in Section 8.

6. Strategy Implementation

6.1 Bushfire Risk Reduction Strategy

The overall bushfire risk reduction strategy recommended for the Meehan Range can be summarised as follows:

- Reduce ignitions through community education, better control of access, and prosecution of those who start fires.
- Improve the ability of the Tasmania Fire Service to control fires on the Meehan Range by improving access and water supply.
- Improve protection of public infrastructure assets on the Meehan Range.
- Provide information to residents to help them reduce the fire risk to their assets.
- Reduce the risk of injury and death by community education, improved access, and provision of emergency evacuation routes and refuge areas.
- Ensure that government agencies have the resources available to help the community recover from a major bushfire.
- Carry out strategic hazard reduction to slow the spread of fires along the Meehan Range, and reduce the risk to the main settlements within and adjoining the Meehan Range.

6.1.1 Risk Reduction for Settlements

Specific measures for reducing the bushfire risk to the various settlements on and adjoining the Meehan Range are as follows:

Dulcot

- Establish and maintain an emergency vehicle access route and firebreak on the north-western side of Dulcot as shown on Figure 13.
- Maintain minimal fuel loads in the old quarry at the top of Nichols Hill so it can be used as a refuge area during a bushfire.
- Maintain the link between the southern end of George Street and Esplanade Street to allow use by 2WD vehicles in an emergency.
- Provide Individual Property Fire Management and Awareness Kits to all residents.
- Issue hazard abatement notices as required to ensure landowners are reducing bushfire hazard on their properties.

Risdon Vale

- Maintain the defendable space on the northern and eastern side of Risdon Vale a minimum 20 m wide (see Figure 13).

- Maintain the existing emergency vehicle access route through the defendable space around Risdon Vale (MR1) to the standard in Management Procedure (MP) 1 (see Figure 10).

Geilston Bay

- Establish a minimum 10 m wide defendable space on the urban/bushland interface between llenroc Street and Bellemont Court (see Figure 13).
- Establish an emergency vehicle access route along the watermain easement to the standard in Management Procedure (MP) 1 (see Figure 10).

Canopus Hill

- Establish a strategic hazard management zone on the northern slopes of Canopus Hill as shown on Figure 13.
- Designate the farm at the end of Grahams Road as a refuge area during a bushfire.
- Provide emergency links between dead end roads as shown on Figure 10.
- Provide Individual Property Fire Management and Awareness Kits to all residents.
- Issue hazard abatement notices as required to ensure landowners are reducing bushfire hazard on their properties.

Mount Rumney Road

- Establish a strategic hazard management zone across the Meehan Range at right angles to Mount Rumney Road as shown on Figure 13.
- Designate the vineyard in the valley on the western side of Guy Fawkes Hill as a refuge area during a bushfire.
- Maintain the emergency vehicle access route to Acton Court.
- Provide Individual Property Fire Management and Awareness Kits to all residents.
- Issue hazard abatement notices as required to ensure landowners are reducing bushfire hazard on their properties.

Clarendon Vale

- Slash or burn any dry grass within 20 m of dwellings during the bushfire danger period.

Oakdowns

- Provide a defendable space to TFS specifications on the northern and eastern perimeters of the subdivision.

Acton Park

- Provide Individual Property Fire Management and Awareness Kits to all residents.
- Issue hazard abatement notices as required to ensure landowners are reducing bushfire hazard on their properties.

6.2 Community Education, Awareness and Involvement

This strategy has been prepared primarily for the benefit of the landowners and residents on the Meehan Range. Its primary purpose is the protection of life and property. As most of the bushfire risk reduction measures recommended in this strategy are on private property, the cooperation of landowners and residents will be vital for the success of this strategy.

It was noted in Section 3.3 that the majority of fires on and surrounding the Meehan Range were either malicious, or escapes from fires lit to clear land, dispose of rubbish, or reduce fire hazard. If this source of ignitions is reduced it will substantially reduce the risk of major fires in the region. Along with on-going awareness of this fire management strategy, it will be necessary to increase resident's awareness of the risks of bushfires and the precautions that must be taken when lighting fires for other purposes. It may also be possible to reduce the incidence of fire escapes by rigorous enforcement of the conditions in burning permits, including penalties for breaches of conditions.

Community education and awareness can best be accomplished by issuing a newsletter to residents on the Meehan Range at least annually, and organising periodic field days.

Newsletter

The newsletter should summarise bushfire management works carried out since the previous newsletter (access route maintenance, management burns etc), and works proposed for the next 12 months. It should also include a notice of planned field days and how to obtain an Individual Property Fire Management and Awareness Kit. The newsletter should also cover at least the following issues, though not necessarily all in one issue of the newsletter:

- a reminder of landowner responsibilities during a major bushfire
- what to do in the event of a bushfire – and what not to do
- protective clothing
- emergency relocation – who should go and who should stay, when to go, location of evacuation centres
- information on reducing bushfire risk to property
- location of refuge areas and when they should be used
- how to create and maintain a Defendable Space
- what assistance can be provided by the Tasmania Fire Service and Clarence City Council
- encourage residents to join their local fire brigade
- how to dispose of vegetation cleared to create Defendable Spaces
- minimising the impact of fire management activities on the environment
- reporting of fires and suspicious activities
- reporting blockages on emergency vehicle access routes

- penalties for illegal lighting of fires
- telephone numbers to report fires, illegal activities and blocked trails, etc.

Field Day

Field days are a valuable way of giving the community information and practical experience. Ideally these field days would be organised and carried out by the local TFS brigades and include.

- how to use the Individual Property Fire Management and Awareness Kit
- how to set up a stored water supply for fire fighting
- how to use and maintain portable pumps and fire hoses
- demonstration of how to use and maintain other fire fighting equipment (fire extinguishers, knapsack sprays etc.)
- building maintenance to reduce bushfire risk
- maintaining Defendable Spaces
- how to carry out small burn offs safely.

6.3 Wildfire Control Strategy

The strategy recommended in this report for the control of wildfires on the Meehan Range has the following components:

1. Establishment and maintenance of a network of emergency vehicle access routes that allow the Tasmania Fire Service to reach fires quickly, and provide control lines to stop the spread of fires (see Figure 10).
2. Improve the availability of water for fire fighting.
3. Establishment of strategic fire control lines within the Meehan Range (see Figure 13).
4. Hazard reduction burning to strengthen control lines and reduce the risk of long distance spotting (See Figure 13).

Tasmania Fire Service (TFS) records show that the Clarendon Vale, Flagstaff Gully Road, and Risdon Vale areas are the most likely ignition points for bushfires affecting the Meehan Range. Public education and vigilance may be able to reduce the frequency of ignitions in these areas, but is unlikely to prevent them completely. Under severe fire weather conditions fires could move a considerable distance before the TFS arrive. Maintaining relatively low fuel loads close to urban and other residential areas will both reduce the intensity of wildfires as they approach them, and to slow the initial spread of fires that originate in these areas so that the TFS have more time to control them.

It should be noted that this strategy will reduce the risk of wildfires spreading on the Meehan Range and make them easier to control, but it will not eliminate the risk of damaging wildfires.

For this reason this strategy also includes sections on emergency relocation (Section 6.8) and community recovery after fires (Section 6.9).

6.4 Management Burning

The general approach taken in this fire management strategy is to manage vegetation close to urban areas and other built assets for strategic hazard management by mechanical means (slashing, brushcutting etc.) and/or burning at a frequency to maintain relatively low fuel loads (less than 10 tonnes per hectare). Other burning will be undertaken to strengthen control lines, particularly a control line across the northern slopes of Mount Rumney and Canopus Hill, and to reduce fuel loads on slopes in the northern portion of the Meehan Range to slow the spread of major fires and reduce spotting. The danger of spotting is greatest on north and north-west facing slopes where a fire burning rapidly upslope could send out burning embers and start more fires hundreds of metres downwind. Keeping fuel loads on north facing slopes relatively low will reduce the risk of fires jumping control lines by spotting, both by reducing the intensity of wildfires burning up the slope as well as reducing the bark fuels which tend to produce the most long-lived embers. Burns on these slopes would be at a frequency compatible with the optimal fire frequency of the vegetation as shown in Table 5. Fuel reduction will be attained in these areas through strategic mosaic burns.

Burning has not been scheduled in stands of wet forest. These areas are generally too wet to burn in autumn and winter when conditions allow for open burning. These areas will consequently build up high fuel loads over time which could support high intensity wildfires. However, as this vegetation type in the Meehan Range is confined to isolated pockets on south facing slopes it is not considered a major fire hazard.

6.4.1 Fire Management Units

In order to implement the prescribed burning component of the fire management strategy, the native vegetation on the Meehan Range have been divided into a mosaic of management units which can be burnt at a frequency, season and intensity that is optimal for the plant communities within each unit (see Figure 13). These units allow for implementation of the most appropriate methods for managing fire hazard whilst ensuring conservation of biodiversity. Areas of farmland that are being grazed or cultivated have not been included in fire management units.

All units include private property and therefore successful implementation of this strategy will require the cooperation of the landowners. Some units close to assets, or where it is desirable to slow the rate of spread of wildfires, have been designated as strategic hazard management units and should be burnt as required to maintain relatively low fuel loads (less than 10 tonnes per hectare).

Wherever possible existing roads, tracks and suitable natural features have been used for fire management unit boundaries. Use of these existing fire control lines will reduce the amount of preparation required prior to burning. In some instances natural features or plant community boundaries have been used as boundaries. Some of the recommended burns do not have control lines and can only be carried out when weather conditions will ensure that the fire will go out overnight.

Some areas of Meehan Range are steep and inaccessible and are very difficult to burn. Where these areas are well away from any assets they have been left out of the burning program as it is considered that the effort and risks involved in burning them is far greater than any benefit in habitat management or hazard reduction. These areas generally contain wetter forest types which do not require frequent burning for ecosystem management. In addition, vegetation within 5 m of minor (intermittent) watercourses, and 20 m of major (permanent) watercourses should not be burnt wherever possible. This will help to minimise the impact of the prescribed burning program on water quality.

Details of the objectives, precautions and burning prescriptions for each fire management unit are given in Appendix G.

6.5 Prescribed Fire Regimes

Three different types of prescribed burn have been used in this strategy:

1. Spot or line ignition within established containment lines (trails or previous burns). These burns can be easily controlled within the containment lines, and can be carried out under conditions that would be unsuitable for the other two types of burns.
2. Ignition along one side of a trail. In these open burns there is only a containment line on one or two sides of the burn. These burns must only be lit under calm conditions when forecast overnight weather will extinguish the fire, and the forecast over the next few days is not likely to cause any flare ups from burning logs or trees. These conditions are specified in Management Procedure 5 (see Appendix A). In most cases these fires will be moving downslope which will reduce intensity.
3. Line or spot ignition along ridge tops. These burns can be lit by crews on the ground, or by aerial incendiaries. For longer ignition lines a temporary vehicle access could be constructed and retained as a dormant emergency vehicle access route. These open burns will slowly move downslope into the adjoining valleys, and must only be lit under calm conditions when forecast overnight weather will extinguish the fire, and the forecast over the next few days is not likely to cause any flare ups from burning logs or trees. These fires require the same weather conditions as the second type of fire. Larger areas can be burnt out by using multiple line or spot ignitions.

The last two types of burns have a much higher risk of escape and should only be lit in autumn or early spring. The extent of the area burnt by the uncontained fire can be controlled to some extent by the time of day the fire is lit. Ignition in the morning will allow the fire to move further before nightfall than a fire lit in the afternoon.

To allow for flexibility in budgeting and planning, burns have been scheduled within five 3-year periods as shown in Table 10. The burns can take place at any suitable time during the specified 3-year period. To ensure that the burning program is achievable, the number and scheduling of burns takes into account the availability of resources to carry out the burns. Burning units assigned a high priority should be burnt when scheduled if at all possible. Units assigned a low priority can be skipped if there are insufficient resources available for the burns. The low priority units are generally those with relatively low strategic advantage, difficult terrain and vegetation that does not require relatively high fire frequencies. The priority of these units would be re-assessed in the next cycle of the plan.

If a wildfire burns more than half of a unit, the whole of the unit should be considered to have been burnt and the schedule adjusted accordingly. In order to create a mosaic of native bushland with different fire histories, adjoining units should generally not be burnt in the same 3-year period. Fire management units scheduled for burning should be inspected some months prior to the proposed burn to check that the scheduling and burning prescriptions are still appropriate. Minor reviews of the burning schedules are recommended every 5 years, and a major review of the whole strategy every 15 years.

It should be noted that areas excluded from the prescribed burning program will still be vulnerable to wildfires. In fact wildfires in these areas are likely to be of higher intensity, and cause greater damage, than in areas included in the prescribed burning program due to higher fuel loads.

6.6 Refuge and Staging Areas

A number of potential refuge areas, and staging areas for fire fighting operations have been identified in the remoter parts of the Meehan Range, and in areas with difficult access, such as Mount Rumney and Canopus Hill. These are shown on Figure 10.

The refuge areas are relatively large cleared paddocks quarries, or horticultural areas where fire fighters and nearby residents could shelter from a bushfire with a reasonable chance of survival. Some of these areas are also suitable for landing helicopters if necessary.

Recommended staging areas are located at, or close to, major access route junctions, and/or water points. If there are no dams or waterholes near the staging areas, one should be constructed if possible.

Table 10 - Burning regimes for the Meehan Range

Unit	Priority	Period of Proposed Burn					Preferred Season
		2007-2009	2010-2012	2013-2015	2016-2018	2019-2021	
M1	High	Burn				Burn	Autumn, winter, spring
M2	Low		Burn				Autumn, winter, spring
M3	Low			Burn			Autumn, winter, spring
M4	High	Edge burn			Edge burn Ridge burn		Autumn/ early spring
M5	High		Burn				Autumn, winter, spring
M6	Low				Burn		Autumn, winter, spring
M7	Low		Burn				Autumn, winter, spring
M8	Low			Burn			Autumn, winter, spring
M9	High			Burn			Autumn, winter, spring
M10	High	Burn				Burn	Autumn, winter, spring
M11	Low				Burn		Autumn, winter, spring
M12	High			Burn			Autumn, winter, spring
M13	High	Do not burn for the duration of this strategy					
M14	High		Burn			Burn	Autumn, winter, spring
M15	High			Burn			Autumn, winter, spring
M16	High		Burn			Burn	Autumn, winter, spring
M17	High	Burn			Burn		Autumn, winter, spring
M18	High			Burn			Autumn, winter, spring
M19	High		Burn				Autumn, winter, spring
M20	Low	Do not burn for the duration of this strategy					
M21	Low				Burn		Autumn, winter, spring
M22	High	Burnt 2006				Burn	Autumn, winter, spring
M23	High	Burnt 2006					Autumn, winter, spring
M24	High	Burnt 2006					Autumn, winter, spring
M25	High	Burnt 2006				Burn	Autumn, winter, spring
M26	High		Burn				Autumn, winter, spring
M27	Low	Edge burn			Edge burn		Autumn, early spring

Unit	Priority	Period of Proposed Burn					Preferred Season
		2007-2009	2010-2012	2013-2015	2016-2018	2019-2021	
M28	Low					Burn	Autumn, winter, spring
M29	Low				Burn		Autumn, winter, spring
M30	High			Burn			Autumn, winter, spring
M31	High		Burn				Autumn, winter, spring
M32	Low			Burn			Autumn, winter, spring
M33	Low		Edge burn			Edge burn	Autumn only
M34	High	Burn					Autumn, winter, spring
M35	High	Burnt 2006				Burn	Autumn, winter, spring
M36	High	Burnt 2006					Autumn, winter, spring
M37	High	Burnt 2006					Autumn, winter, spring
M38	High	Burnt 2006					Autumn, winter, spring
M39	High	Burnt 2006					Autumn, winter, spring
M40	Low	Burnt 2006			Edge burn		Autumn, winter, spring
M41	High	Burnt 2006				Burn	Autumn, winter, spring
M42	High	Burnt 2006			Burn		Autumn, winter, spring
M43	High	Burnt 2006, maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M44	High	Maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M45	High	Maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M46	High	Maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M47	High	Maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M48	High	Maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M49	High	Burnt 2006, maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M50	High	Burnt 2006, maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M51	High	Burnt 2006					Autumn, winter, spring
M52	High			Burn			Autumn, winter, spring
M53	High		Burn			Burn	Autumn, winter, spring
M54	High	Burn					Autumn, winter, spring
M55	High	Do not burn for the duration of this strategy					
M56	High			Burn			Autumn, winter, spring

Unit	Priority	Period of Proposed Burn					Preferred Season
		2007-2009	2010-2012	2013-2015	2016-2018	2019-2021	
M57	High	Burn					Autumn, winter, spring
M58	Low	Burnt 2006				Burn	Autumn, winter, spring
M59	High			Burn			Autumn, winter, spring
M60	Low		Burn				Autumn only
M61	Low	Burn					Autumn, winter, spring
M62	Low	Do not burn for the duration of this strategy.					
M63	High	Maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M64	Low					Burn	Autumn, winter, spring
M65	High	Burnt 2006			Burn		Autumn, winter, spring
M66	High	Maintain fine fuel loads below 10 tonnes per hectare.					Autumn, winter, spring
M67	Low				Burn		Autumn, winter, spring
M68	Low	Do not burn for the duration of this strategy.					
M69	Low	Do not burn for the duration of this strategy.					
M70	High			Burn			Autumn, winter, spring
M71	High				Burn		Autumn, winter, spring
M72	High					Burn	Autumn, winter, spring
M73	Low	Do not burn for the duration of this strategy.					
M74	High					Burn	Autumn, winter, spring
M75	Low			Burn			Autumn, winter, spring
M76	Low	Do not burn for the duration of this strategy.					

6.7 Administration

As most of the Meehan Range is in private ownership it is very important that an existing authority, or a new body, be charged with the overall responsibility for implementing the strategy, even though some of the actions in Section 8 are clearly the responsibility of landowners or a particular government agency. It is recommended that the existing steering committee be expanded and continue to coordinate the implementation of the strategy. The implementation committee should include representatives of at least:

- Clarence City Council
- Risdon Vale, Richmond, Cambridge, Clarence Rokeby and Lauderdale TFS brigades, and either the local Group Officer or District Officer.
- Parkes and Wildlife Service
- Representatives of any landcare or bushcare groups active in the area covered by the strategy
- Two landowner representative, preferably from the northern and southern sections of the Meehan Range. These could double as landcare group representatives.

Representatives of authorities with infrastructure in the area, such as Transend and Aurora, should be invited to attend when management issues affecting their infrastructure are being discussed. It is suggested that the implementation committee be called the Meehan Range Fire Management Strategy Implementation Committee (MRFMSIC). The implementation committee for the project could best operate under the Special Fire Area committee that covers the Meehan Range. It is essential to allocate responsibility for convening the MRFMSIC, and ensuring the strategy is implemented, to an individual within one of the agencies on the committee. This person will, in effect, be the executive officer for the committee. It is also important to have a lead agency and a point of contact for the community, so that they know who to contact if they have any queries or concerns regarding the strategy. This is an issue the MRFMSIC will have to resolve as soon as possible.

Successful implementation of the prescribed burns in this strategy requires trained personnel and special equipment. The equipment and level of expertise required for the crews carrying out prescribed burns is given in MP 5 in Appendix A. Minimum crew strengths are also specified. Prescribed burns can be carried out by Clarence City Council, the Tasmania Fire Service, or by contractors. If the prescribed burning is contracted out, the contractor must be able to meet the required training, crew and equipment levels specified in MP 5, as well as provide evidence of experience in carrying out ecosystem management burns.

6.7.1 Keeping the Strategy Alive

Once any strategy is produced, the challenge then becomes how to implement and maintain it. Bushfire management strategies are no exception. There is no one best way to maintain interest

and commitment to a fire management strategy. The following are suggested strategies to keep interest and commitment alive.

Implementation Committee

The implementation committee allows the various agencies and community representatives to come together and discuss the strategy, who has responsibility for what aspects of it, how the community can participate, what resources are available to implement the strategy and timeframes for implementation. Members can agree on these issues and inform the people they represent by using their web sites and email networks to distribute the information. They can also take on the responsibility of promoting the issue of bushfire awareness and promoting the findings and recommendations of the plan via their networks. An active implementation committee also allows for ongoing discussion of issues, can assist in identifying any changes needed to the plan and help keep the motivation and enthusiasm of for the plan alive, by sharing the responsibility for it. It also helps prevent the plan becoming 'lost' through changes in personnel in the lead agency, as the implementation committee can lobby to ensure that the plan is part of the work agenda and awareness of the new person.

Using Web based Information and Email

Email, and accessing information via the internet, is an increasing part of most people's lives and can be very useful for keeping a wide variety of community members and government agencies informed. Information about the Meehan Range Fire Management Strategy, Individual Property Fire Management and Awareness Kits, recommendations etc should all be available online and easily downloadable.

Direct email and an annual newsletter to residents in the Meehan Range area, and to local Tasmania Fire Service members, would be an effective way of maintaining public awareness of the strategy. Residents on the Meehan Range could be notified by letter of the web address where they can view the strategy and download the Individual Property Fire Management and Awareness Kits. They could be asked to email their electronic address so that any further information could be sent electronically. The same information should be included in an annual newsletter. Once residents access the web site they could be given the option of providing their email address, so that they could get any further information about the strategy sent directly to them electronically.

While electronic communication will allow a good proportion of residents on the Meehan Range to be notified and kept informed about the strategy, traditional notification will also be necessary via newsletter, articles in local papers and rates notice newsletters, for those without computers. The local landcare groups are potentially also a good avenue for informing residents about the strategy, particularly as they are focused on bushland management and members are generally aware of fire issues. Indeed it is important to engage this group in order to ensure that any conflicts between revegetation and fire management are discussed and sorted at an early stage.

In order for any communications strategies, both electronic and traditional, to work effectively, an agency needs to take responsibility for being the point of contact and maintaining addresses and updating information.

6.8 Emergency Relocation

The Tasmania Fire Service and Tasmania Police policy on evacuation recommends that: "Where adequate fire protection measures have been implemented, able bodied people are advised to remain in their homes during the passing of the fire front" (see Appendix F). However, in a wildfire the following persons may need to relocate to a safe area:

- young children
- elderly persons
- persons with disabilities
- sick persons
- persons with conditions likely to be aggravated by smoke
- persons living in dwellings that are not adequately prepared
- persons living in very high risk areas where the dwelling is considered undefendable.

An adequately prepared dwelling will generally be one with all of the following:

- A well maintained defendable space that meets the current TFS guidelines (TFS, 2005)
- A well maintained dwelling that can be sealed to prevent the entry of burning embers into the interior of the dwelling (including the roof space) and the underfloor area if not slab on ground construction.
- A water supply that can be used to extinguish spot fires within and around the dwelling that is independent of the mains supply.
- No flammable materials close to or under the dwelling such as fuel containers, wood piles, extensive decks of softwood etc.

Very high risk areas are at the top of long west and northerly facing steep slopes and gullies covered with unmanaged native vegetation.

Persons who need to relocate to a safe area must do so well before the fire front reaches them. Many people have lost their lives trying to escape a fire at the last minute, either in cars or on foot. If there is already thick smoke in the area it is best for residents to stay in their dwellings, even if they are not adequately prepared.

In order to effect an orderly relocation of residents in the path of a fire on the Meehan Range who should not stay with their dwellings the emergency services need to provide the following:

- Safe areas, usually an evacuation centre, with appropriate services that residents can relocate to.
- Advice to residents on the location of the safe areas and safe routes they can take to reach them.
- Assistance to residents who cannot relocate themselves.

To facilitate the last point a register should be established of persons who will require special assistance to relocate, particularly those who will require an ambulance.

6.9 Post Wildfire Recovery

Although this fire management strategy will reduce the risk of wildfires causing loss of life and property, large wildfires will inevitably occur. The Clarence Emergency Management Plan (2006) lists the Clarence City Council as primarily responsible for managing community recovery after a major bushfire. Following such fires resources will need to be made available to allow people to return to the area affected by the fire. This can include:

- repair and reconnection of services, particularly power
- repair of telecommunications infrastructure
- removal of dangerous trees, fallen powerlines etc.

This can usually be accomplished in a relatively short time with available resources, however recovery of people affected by the fire can take much longer, and the response of authorities has often been criticised, such as following the Canberra bushfires in 2003. Resources that need to be available to help the community recover include:

- counselling for those who have lost possessions, pets and possibly members of their family
- counselling for emergency services workers
- cash, food and clothing for those who have lost all their possessions
- accommodation for those whose houses have been destroyed, or are unliveable while they are being repaired or rebuilt
- advice on how to make insurance claims
- assistance with getting plans for replacement buildings approved quickly.

All persons who have lost property in a bushfire should be given a copy of the Tasmania Fire Service brochure; *After the Fire, what to do in the hours and days after a fire strikes.*

6.10 Monitoring And Evaluation

Details of any prescribed burning or wildfires within the area covered by this fire management strategy should be recorded according to MPs 8 and 9 in Appendix A.

6.10.1 Species of Conservation Value

It is important that fires on the Meehan Range do not negatively impact upon known populations of species of conservation value, or endangered plant communities. In the absence of any specific information on the fire management requirements of a particular species or community of conservation value, this fire management strategy aims to maintain the structure and floristics of the plant communities in which they occur. However, given the uncertainties in our knowledge of the fire ecology of many species, known populations of species of conservation value should be monitored for any changes in population size following wildfires and prescribed burns. Accurate mapping and estimation of existing population sizes followed by periodic recounts should be considered. The monitoring program should be developed in consultation with the Nature Conservation Branch of DPIW. If the agencies involved in implementing the fire management strategy do not have the resources to carry out the monitoring, the University of Tasmania, or other educational institutions, should be invited to assist. Local bushcare/landcare groups my also be interested in carrying out the monitoring with appropriate training and assistance.

6.10.2 Plant Community Structure

A photographic record of the vegetation in each fire management unit should be set up to monitor any major changes in plant community structure over time. Photos should be taken of a representative section of each fire management unit at the beginning of each 3-year period of the strategy. Photos should be taken from the same location in each unit and show the same area of bushland. This will require a marked vantage point in each unit, and specifications as to the film type and camera settings to be used. Ideally the same focal length setting should be used throughout the monitoring period.

6.10.3 Performance Indicators

The management action summary in Section 8 includes performance indicators for actions, or groups of actions, recommended to meet the objectives of the fire management strategy. Desired outcomes for prescribed burns are given in the prescriptions in MP 5 in Appendix A, and in Table 10. The performance indicators should be used to determine if the specific objectives of this fire management strategy have been achieved. They should be monitored every 5 years during the operation of the strategy. Where performance targets are not being achieved, a review of the relevant portion of the strategy should be undertaken.

6.10.4 Review of the Fire Management Strategy

Minor reviews should be undertaken approximately every 5 years, and when any of the triggers listed in Table 11 are encountered. A full review of the fire management strategy should be undertaken after all the burns prescribed for the fifth 3-year period of the strategy have been completed.

The review should include:

- an audit to ascertain if procedures have been properly carried out and performance targets have been achieved
- a review of contemporary fire management and fire ecology literature to incorporate the latest information into the strategy
- comparison of the condition of burnt and unburnt fire management units
- assessment of any changes in plant community structure as a result of fire
- preparation of a revised fire management strategy to cover the next 15 years.

Table 11 - Fire management strategy revision procedures

ASSESSMENT	REVIEW TRIGGER	RECOMMENDED ACTION
Monitoring of wildfires on the Meehan Range.	Wildfire burns more than half of any single fire management unit.	Consider the whole unit to have been burnt and reschedule the next prescribed burn according to the optimal fire frequency given in Table 5.
Monitoring of wildfires on the Meehan Range	Wildfire burns more than 50% of the fire management units in any single year.	Completely revise the burning schedule.
Flora and fauna surveys or incidental recordings.	Threatened species considered sensitive to fire recorded on the Meehan Range.	Revise the burning prescription and/or burning schedule to ensure that the newly identified threatened species is/are not adversely affected.
At the end of each 3-year period check that each burn has produced the desired outcomes.	Burning prescription not producing the desired outcomes.	Revise burning prescription based on information recorded during the burn to ensure outcomes can be achieved.
Review of ecological literature.	Research shows that the optimal fire frequencies for particular plant communities or threatened species needs revision.	Revise burning schedules for the fire management units containing the particular species or plant community.

6.11 Maintaining Records

6.11.1 Annual Update

The following items should be inspected annually at the beginning of the bushfire season (October) and the maps and information tables in the fire management strategy updated if required:

- condition of emergency vehicle access routes and any new trails
- condition of gates and locks
- condition of waterholes and dams.

6.11.2 Update After Fires

After each prescribed burn or wildfire in the area covered by this fire management strategy, details of the burn should be recorded according to Management Procedure 8 in Appendix A.

6.12 Adaptive Management

It is recommended that an 'adaptive management' approach be adopted for the implementation of the part of this strategy concerned with the conservation of biodiversity on the Meehan Range. Although this strategy incorporates current knowledge on the impacts of fire on specific flora and fauna species and different plant communities, none of this knowledge is specific to the Meehan Range. It is therefore difficult to predict the effect of the management actions recommended in this strategy, particularly the prescribed burning program, on the ecosystems on the Meehan Range, or on individual flora and fauna species.

Adaptive management utilises an experimental approach to land management where full scientific knowledge is lacking but where immediate management actions are required. For the adaptive management approach to work, the management strategy will have to be run as an experiment with the following steps:

Model (hypothesis)

This is the aim of the experiment and can be stated as:

- To apply a specific fire regime to the various plant communities on the Meehan Range that will maintain their distribution, structure and floristics, as at 2006, in the long-term.
- To maintain the populations of indigenous fauna on the Meehan Range.
- To reduce the distribution and abundance of introduced species in the native plant communities on the Meehan Range.

Test

The test is the implementation of the strategy.

Collect Relevant Data

The performance indicators in the summary table in Section 8 of this strategy are designed to monitor the effectiveness of the implementation of the strategy, rather than its impacts. However, it should be noted that if the strategy is not being implemented effectively it will be more difficult to analyse and draw useful conclusions from the monitoring program.

It order to run this 'experiment', baseline data of sufficient accuracy for resampling and statistical analysis must be collected. This could be expensive and it is suggested that the assistance of the University of Tasmania be sought for the detailed design of the 'experiment', including data collection and analysis. Data collection could be undertaken by students and/or interested community groups, if properly supervised.

Analyse

Data collected will need to analysed in such a way that it will indicate where changes in the strategy are required.

Feed back

Use of the monitoring results to improve the strategy is the essential component of adaptive management. This will allow the strategy to be progressively improved so that it is more closely linked to the actual conditions on the Meehan Range.

7. Further Research

Apart from the adaptive management approach used in this strategy there are also opportunities to use the fire management activities recommended in the strategy as the basis for specific research projects. There has been a great deal of research into bushfires in Australia over the years. Initially the emphasis was on understanding fire behaviour, but recently more emphasis has been placed on fire ecology, and particularly the effects of fire on native flora and fauna, and native ecosystems. However, most of these studies have only been short-term, and Whelan (1995) states that: "There are very few long-term experimental studies of the effects of fire on any level of organisation - individual organism, population or community". Whelan goes on to state that: "The need for validation of models of long-term change based on short-term studies is becoming urgent". Valid models of long-term change will obviously contribute greatly to effective fire management in bushland reserves. However, even if new studies are begun today, useful results may not be available for decades, and even then may not be applicable to the situation on the Meehan Range.

The fire management activities in this strategy are based on current scientific knowledge, however, they also provide an opportunity for research into the problems of managing fire hazard while at the same time maintaining the aesthetic, and nature conservation values of the area. The results of any such research would be directly applicable to the management of similar areas.

Potential research topics that could be based on the fire management activities recommended in the strategy include:

- comparison of the effects on particular ecosystems of low intensity verses high intensity burning
- methods for creating fuel modified buffer zones which minimise environmental impact, and to what extent natural environments can be retained in these zones

The monitoring program outlined in this strategy should provide good data for many of these studies.

8. Management Action Summary

The management actions recommended in this strategy have been summarised and classified using the following criteria:

URGENT - Actions required to reduce a very high risk to life or property.

ESSENTIAL - Actions required to improve safety, or inadequate fire protection measures in high risk areas.

- Actions that are essential for control & suppression of wildfires, and/or conservation of threatened species.

RECOMMENDED - Actions required to improve inadequate fire protection measures in moderate risk areas.

- Actions required to ensure on-going effective fire management, or conservation of biodiversity.

ROUTINE - Maintenance of fire control resources and protection measures.

Urgent actions need to be undertaken as soon as possible.

Where applicable the desirable timing of other actions has been coded as follows:

A - Inspect and maintain annually, or as specified in the relevant MP

A/S - Timing as specified in the fire management strategy

1, 2, etc - Carry out action within the time period specified (years)

1A, 2A etc - Construct within the next 1, 2 etc years and then inspect and maintain annually, or as specified in the relevant MP.

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Backburning

A fire started intentionally along the inner edge of a fire control line to consume the fuel in the path of a wildfire. This is usually the only method for controlling large wildfires, or fires of high intensity.

Building Protection Zone

An area between buildings and the fuel modified buffer zone, where fine fuels are maintained in a minimum fuel condition to ensure that the zone acts as a barrier between the building and a fire.

Bushfire

A fire burning in plantations, forests, mallee, grasslands and other vegetation types. Usually classified as either a 'wildfire' or a 'prescribed fire'.

Bushfire Hazard

Synonymous with static risk, a relative assessment of the likely difficulty of controlling and suppressing a bushfire in an area. Bushfire hazard is a function of slope, access and vegetation type.

Bushfire Prone

Refers to the potential for the vegetation in an area to carry a bushfire at reasonable frequencies.

Bushfire Risk

In general, bushfire risk is the probability of a wildfire starting and spreading.

Defendable Space

An area of managed fuel around a dwelling or asset at risk that reduces the risk of damage by fire. It consists of a Building Protection Zone and a Fuel Modified Buffer Zone.

Fine Fuel

Live and dead plant matter (including grasses, bracken, leaves, bark, and twigs and branches) less than 6 mm in diameter. Fine fuel is what burns at the fire front and contributes directly to fire behaviour. Increasing fine fuel loads increases the rate of spread and intensity of fire fronts.

Fire Break

Any natural or constructed discontinuity in a fuel bed used to segregate, stop, and control the spread of a wildfire, or to provide a fire control line from which to suppress a fire.

Fire Control Line

A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of a fire. Fire control lines can include constructed trails, roads, cleared areas and environmental features such as watercourses and rock outcrops.

Fire Danger Rating (FDR)

A relative number denoting an evaluation of rate of spread, or suppression difficulty for specific combinations of fuel, fuel moisture and wind speed. FDRs range from 1 (low danger) to 100 (extreme danger). The FDR is used for general fire danger forecasting and is based on the expected behaviour of fires burning in eucalypt forest carrying a fuel loading of 12.5 tonnes per hectare and travelling over level to undulating ground.

Fire Intensity

The rate of energy output per unit length of fire perimeter, usually measured in kilowatts per metre. It is a function of the heat yield of the fuel (H), the weight of the fuel consumed (W), and the rate of spread of the fire (R) i.e. I = HWR.

Fire Regime

The pattern of fire occurrence within an area described by the frequency, intensity, and season of fire occurrence.

Fuel Load

The quantity of fine fuel in an area, usually measured in tonnes per hectare of dried fine fuel.

Fuel Modified Buffer Zone

A zone between a building protection zone and a bushfire hazard that can include an area of minimum fine fuel, or an area of vegetation (forest, grassland etc) that is maintained in a fuel reduced condition, or both. Provision of an inner building protection zone and an outer fuel modified buffer zone will ensure that there is a progressive reduction of fine fuel between a bushfire hazard and any combustible structures.

Fuel Reduced Condition

A condition where fine fuel is maintained below a maximum height of 100 mm in grasslands, or below 8 tonnes per hectare in other fuel types.

Hazard Reduction

Reduction of the average fuel load over an area by burning (prescribed burn or wildfire), chemical, mechanical, or manual means.

Indigenous Vegetation

A term used to describe the plant species and/or plant communities which occur naturally in a locality. The term 'indigenous' excludes Australian species from another locality or region, as well as non-native species, that have been introduced to a locality.

Introduced Species

Species of plants or animals that have been deliberately, or accidentally, brought to an area in which they did not naturally occur.

Minimum Fuel Conditions

A condition where fine fuels are minimised to the extent that the passage of a fire will be prevented or severely restricted. This generally requires the removal of dead fine fuel and control of live fuel, breaks in the continuity of any fuel, maintenance of a high moisture content in vegetation, or replacement of vegetation with roads, paths, etc.

Prescribed Burn

(Synonymous with prescribed fire, controlled burn, prescription burn, scheduled fire or management burn) 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. It is undertaken in specified environmental conditions.

Soil Dryness Index (SDI)

A measure of the average dryness of an area in terms of the number of millimetres of rainfall required to thoroughly wet the soil.

Spotting, Spot Fire

Isolated fires started ahead of the main fire by sparks, embers, or other ignited material carried by the wind, sometimes to a distance of several kilometres.

Wildfire

A bushfire which is not burning according to management prescriptions or requirements.

Figures

Figure 1 – Area covered by the Meehan Range Fire Management Strategy

Figure 2 – Land tenure in the Meehan Range region

Figure 3 – Vegetation in the Meehan Range region

Figure 4 – Recent fires on the Meehan Range

Figure 5 – Flora of conservation value in the Meehan Range region

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Figure 8 – Public infrastructure assets on the Meehan Range.

Figure 9 – Fire brigade boundaries in the Meehan Range region

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Figure 13 – Fire management units on the Meehan Range