Department of Sustainability and Environment (DSE) and Parks Victoria (PV) conceptual model of bushfire management in Victoria's high country

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Department of Sustainability and Environment (DSE)/ Parks Victoria (PV) high country fire management model

Background

The general approach and systems applied by DSE and PV to fire management planning and implementation in the high country are shaped by a range of drivers including:

- Compliance with statutory requirements for the management of fire;
- Compliance with statutory requirements for the management of conservation values on public land;
- Compliance with statutory Occupational Health and Safety requirements and maintenance of public safety;
- Compliance with Victorian government policy frameworks;
- Contemporary community expectations that government planning processes are transparent, and that members of the public have the opportunity to have input to planning and decisions;
- Potential legal risks arising from use of fire which results in harm or financial loss to others, particularly in light of increasing litigation trends in Australia;
- Management within budgetary allocations.

These requirements, along with the range, extent and distribution of people and fire vulnerable assets within and around public land, make contemporary fire management on public land a much more complex and resource intensive issue than was the case 30, 50, 100 or 200 years ago. Contemporary fire management planning processes and operating practices are therefore necessarily different to historical processes and practices.

General notes on interpreting the conceptual model and sub-models

In accordance with the project scope of work and specifications, GHD has organised the information provided by DSE and PV into a conceptual model of fire management in the Victorian high country. The conceptual model (on the following page) presents a summarised, high level overview of how DSE and PV apply a risk management approach to fire management. In the conceptual model, numbered notations refer to more detailed sub-model descriptions:

The sub-models provide more detailed and explanatory descriptions of the key components of the high level conceptual model. These are compiled from interviews and face-to-face consultations. Although a literature review was not part of this work, some references to which GHD was referred by DSE and PV staff have been cited.

Conceptual model of high country fire management by DSE / PV

Contemporary risks to manage and operating constraints [1]

Local communities and holiday populations dispersed through the high country landscape at risk from bushfire impact

Permanent settlements, local businesses, and high-dependency infrastructure within high country landscapes at risk from bushfire impact

Cultural heritage items (many irreplaceable) within high country landscapes at risk from bushfire impact

Natural values reserved in conservation reserves at risk from high-severity and/or frequency bushfire impact and requiring a variety of fire regimes

Visitor experience enjoyment and regional tourism business values which can be adversely affected by fires and post-fire impacts

Occupational health and safety laws to be complied with during fire management activities

Reputational risks for public land management agencies arising from high-consequence fires and perceptions of too much/not enough hazard management

Significant legal action risks arising from high-consequence fires and increasing litigation trends in contemporary society

Public expectations for planning transparency, public consultation in planning processes, and for operational accountability.

Note:
A number of these risks and constraints did not exist, or exist to the same extent and degree, in times past when different fire management models prevailed in the high country. Current societal expectation is that all these risks are appropriately managed.

Risk Assessment

Consideration of human life, property and infrastructure risks (on and off public land); identification of locations where such values at risk are situated. Information sources include Township Protection Plans, OESC Bushfire Risk Landscape Mapping; Victorian Fire Risk Register; spatial infrastructure data and local knowledge.

Consideration of cultural heritage assets, their location, fire-vulnerability and proximity to fire hazards.

Fire Ecology Risk Assessment – based on Ecological Vegetation Divisions (EVDs), considers their theoretical Tolerable Fire Intervals (TFIs), their current post-fire age class/growth stage distributions and severity of recent fire impacts, fire response categories and level of practicality for application of prescribed burning. EVDs with long TFIs are typically considered for inclusion in Fire Management Zones which exclude or provide for restriction of planned burning. EVDs which are tolerant of short to moderate TFIs are considered for inclusion in Fire Management Zones in which planned fire can be used.

Consideration of access, control line/feature availability and burn treatment difficulty issues associated with particular landscape areas. This is done principally by desktop assessment of mapped features and tapping into local knowledge of conditions and issues.

Potential impact issues beyond public land boundaries are also considered, with smoke management tourism impact issues key considerations.

Notes:
APZ = Asset Protection Zone
SBMZ = Strategic Bushfire Moderation Zone
EMZ = Ecological Management Zone
PBEZ = Prescribed Burning Exclusion Zone
TFI = Tolerable Fire Interval
EVD = Ecological Vegetation Division

Risk Treatment

Fire prevention programs: A range of activities are undertaken to reduce the incidence of unplanned fires. These include risk-based reserve closures, potential fire generating activity restrictions, fire awareness signage and education activities, deterrence and enforcement patrols. Many activities are inter-agency.

Fire mitigation programs[2]: Fuel reduction programs are implemented to mitigate the behaviour and impacts of bushfires. Based on risk assessment (covering life, property and infrastructure, cultural and natural values), public land areas are assigned to Fire Management Zones for the purpose of identifying appropriate bushfire mitigation works programs. Areas (small scale) adjacent to fire vulnerable assets may be assigned as APZs. Strategic locations (near settled areas or across historical fire paths) where fire control advantages and spotting reduction benefits can be gained may be allocated to SBMZs. Broader areas where ecological risks are more prominent than life and property impact risks, more fire tolerant EVDs which can be treated with planned burning are assigned to the EMZ. Areas that are considered fire sensitive and would be negatively impacted by planned burning are assigned to the PBEZ.

Based on the management objectives for each zone, land management units are identified and scheduled for planned burning treatment through the Fire Operations Planning process.

Preparedness and Response programs. This covers a wide range of activities including community education, access and facility maintenance, response capability readiness (seasonal and daily), and bushfire response/incident management.

Recovery programs. Post-fire recovery programs including restoration of services, community recovery assistance, suppression works rehabilitation, and works to prevent post-fire degradation in natural areas.

High country fire regimes and fuel landscape

Alpine Treeless EVD:
Includes a range of alpine zone (and frost hollow) tussock grassland, herbfields, open and closed heaths. These communities are considered to be fire sensitive (TFIs: 55 – 120 years) and therefore planned burning is excluded (bushfire recurrence typically within TFIs). Alpine landscape considered flammable only rarely in severe drought (however, alpine shrubs are highly flammable).

High Altitude Wetlands EVD:
Includes peat bogs, mossbeds and fens. Considered very fire sensitive (TFIs: 90 - ∞ years). Planned burning excluded; very low flammability.

High altitude shrubland/woodland EVD:
Includes sub-alpine woodlands (including snowgum). Considered fire sensitive (TFIs 35/50 – 125 years) and therefore planned burning is excluded (bushfire recurrence typically within TFIs). Grassy or shrubby understorey can be highly flammable in drought years.

Tall Moist forest EVD :
Typically in montane zone on sheltered aspects (incl. Alpine Ash). Mesic or moist grassy understorey. Considered fire sensitive (TFIs 80 – 300 yrs) therefore planned burning is excluded (bushfire recurrence typically within TFIs).

Foothills Forest EVD:
Tolerant of low and high intensity fires, but considered sensitive to fire regimes more frequent than 10-15 years. Mostly zoned to allow planned burning.

OVERALL LANDSCAPE EFFECT
Alpine, sub-alpine and montane zones carry mature-state vegetation and fuel loads unless recently burnt by bushfires. Regeneration is sensitive to fire, but generally only prone to fire in severe drought seasons. This residual risk is managed through bushfire suppression.

Unless burnt recently by bushfire, fire-prone lower altitude woodlands and forests are ideally more than 10 years since fire – these can carry large high intensity fires in adverse conditions. Residual risks are managed through preparedness and response programs

Sub-model 1 General risks and constraints

Protection of human life and public safety

Since the early 1800's, lands within numerous valleys and tableland systems connected to the Australian Alps were progressively occupied by European settlers. Townships, villages and highly dispersed agricultural business were (and continue to be) developed within the fire-prone Victorian landscape. Within the high country, villages and ski resorts and infrastructure have been progressively established. These villages and townships, and public land areas experience visitation by holiday makers during the bushfire season, and at other times. A wide range of roads, trails, camping areas and walking tracks are used by both local communities and visitors.

With public land users, permanent residents of settled landscape areas, and visitor populations present in high country landscapes throughout the bushfire season, public land managers have legal and moral obligations to manage risks to the public from fires that may start and/or spread on public land. Due to the potential for extreme fire weather conditions to occur during the Victorian bushfire season, and the large distances that fires can travel in such conditions, it is desirable for fires to be contained to areas where they do not threaten human life. Victoria's landscape, settlement patterns and climatology do not always allow this to be achieved.

Infrastructure and built/business asset protection

Townships, villages, built assets on freehold/agricultural lands, and essential infrastructure (eg, roads, bridges, power lines, pipelines etc) are dispersed throughout high country areas. Bushfires starting in and/or spreading from public lands can cover large areas, and have in the past resulted in large-scale impacts on built assets, infrastructure, agricultural and natural resources and businesses. In conjunction with maintaining public safety, public land managers have obligations to reduce the risk of bushfires impacting and damaging infrastructure, built assets and business enterprises.

Natural values management

The fundamental purpose of national parks and other types of conservation reserves is the conservation of natural values. This encompasses conservation of the physical environment, natural processes, and the range of biodiversity values present. How different biota respond to fire varies enormously, and there are both fire sensitive and fire advantaged species existing together within landscapes. Fire management on public land must consider the widely varying requirements of its component ecosystems, managing fire regimes which conserve the variety of biodiversity values. Fire regimes that result in diminished natural values are to be avoided.

Cultural landscape management

The conservation of cultural heritage values is an important objective of public land management. Cultural heritage values also exist on private lands adjacent to public land and these also require protection. Fire management on public land must therefore avoid degradation of the cultural landscape.

Employee occupational health and safety

As an employer, public land management agencies have statutory obligations to provide safe working environments and work practices. For public land managers managing bush fire risk, this is particularly challenging due to the highly dynamic nature of environmental conditions and bushfires. Fire management activities undertaken must consider the risks involved, and apply appropriate risk management measures consistent with public sector requirements for safety management systems.

Visitor experience enjoyment and tourism values

Visitors to conservation reserves seek a broad range of experiences. Visitor enjoyment may be affected by fire (planned or unplanned) impacts. Smoke is also a significant factor affecting visitor enjoyment and tourism businesses that utilise conservation reserves of the landscape areas in which they are situated. Peak visitation/tourism periods need to be considered in the planning of planned burning.

Smoke impacts within and outside the boundaries of public land

Smoke from bushfires and planned burns can impact on a range of businesses and communities, well beyond public land boundaries and neighbouring properties. Smoke impacts from bushfires are typically more intense and can be of longer duration than planned burns, however for some smoke-sensitivity issues timing is important. Local issues associated with smoke from planned burns need to be taken into account during the planning of planned burns.

Reputational risk (for public land management agency and Government)

Fire management on public land within fire-prone landscapes is contentious and will continue to be so for the foreseeable future. There are challenging reputational risks to be managed. Communities expect that risks arising from bushfires burning on public land will be well managed. It is widely accepted by people with a well informed view that risk management involves the use of planned burning as a bushfire risk mitigation measure. However, the matter of how much planned burning, where and how often is the subject of divided opinion and intense debate. Reputational risks arise on both sides of the debate. From groups that consider public land managers do not undertake sufficient bushfire mitigation measures, public land management agencies and the Government, can expect to receive strident criticism when bushfires impact communities – this will be particularly intense and public when lives are lost and/or widespread property damage occurs. On the other hand, from groups that consider public land managers are undertaking too much planned burning, agencies and the Government can expect equally strident criticism that natural values in conservation reserves set aside for their protection, are being 'sacrificed' for no fire protection benefit. Public land managers can also expect strident criticism for not meeting Government targets, and Governments may expect criticism for under-resourcing the agencies to which the targets apply. These reputational risk factors require consideration in strategic fire management planning.

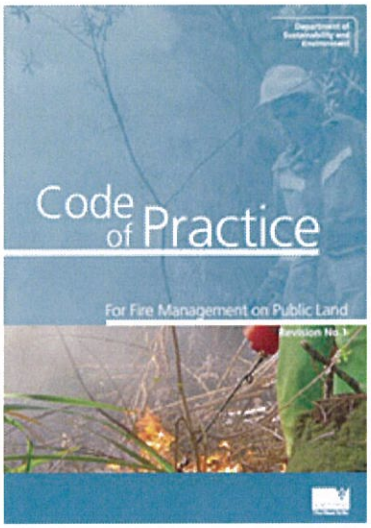
Legal action risk

Bushfires can result in very significant financial losses and damage. Society generally, is increasingly resorting to legal action to pursue financial compensation for losses incurred during bushfires. Increasingly, public land managers are becoming subject to such claims, with legal action being initiated by individuals, groups, and more recently insurance companies seeking to recover insured losses where they believe public land managers have not acted reasonably to manage bushfire risk. These legal actions can amount to very large claims, and the costs of defending such claims can also be very significant.

Sub-model 2 Application of fire management planning to the high country

Specific Government directions which must be considered in Regional level planning

There are a range of high-level direction setting or standards documents, approved at Ministerial level, which public land managers must consider in fire management planning:

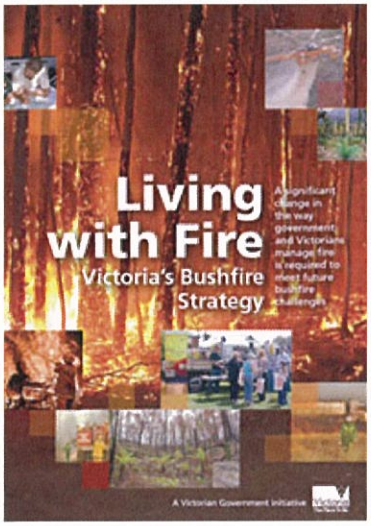


Code of Practice for Fire Management on Public Land

Signed-off at Ministerial level.

The purpose of the Code is to promote the efficient, effective, integrated and consistent management of fire-related activities on public land for the purpose of protecting human life, assets, and other values from the deleterious effects of bushfire or inappropriate fire regimes.

The Code establishes minimum state-wide procedures and standards to be applied for fire management on public land in Victoria, in a logical Planning, Land Management Burning, and Wildfire Prevention, Preparedness, Response and Recovery framework.



Living with Fire – Victoria's Bushfire Strategy

Signed-off at Ministerial level.

The Strategy provides direction and a framework to:

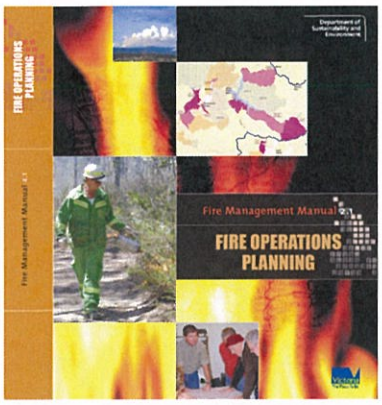
- Increase the area of Victoria's public and private land treated with fire to reduce fuel loads, maintain ecosystems and manage bushfire risk;
- Inform local communities engaged in bushfire planning, preparedness, response and recover;
- Optimise firefighting resources available for planned burning and response operations;
- Supported by improved land-use planning and adaptive management by fire agencies

2009 Victorian Bushfires Royal Commission

VBRC Report
Recommendations accepted by the Victorian Government.

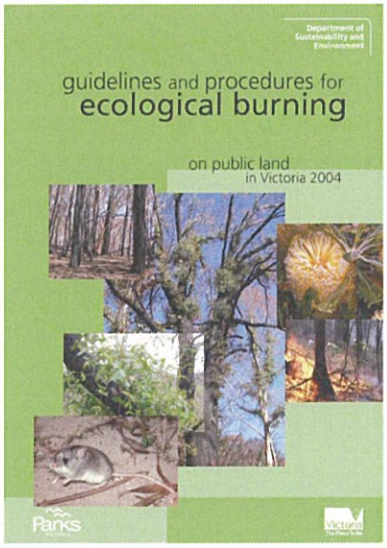
Specific inter-agency (DSE and PV) guidelines for strategic fire management planning

There are a range of inter-agency guideline documents, adopted by both DSE and PV, agencies must consider in strategic fire management planning:



Fire Management Manual – Fire Operations Planning

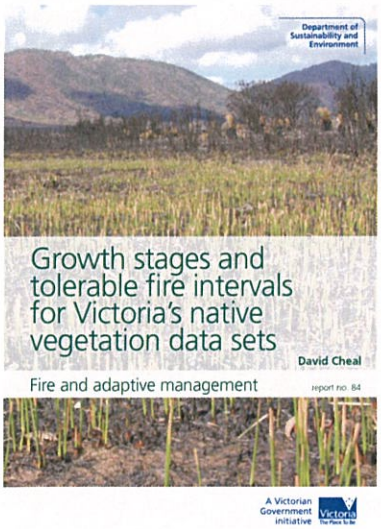
Sets out the standards, procedures and guidelines for the planning of planned burns and non-fuel management works. It covers the process to develop, approve, distribute, publish and amend the Fire Operations Plan (FOP), and includes mandatory standards and formats.



Guidelines and procedures for ecological burning on public land in Victoria 2004

This document outlines the principles, standards and planning procedures for ecological burning on *public* land throughout Victoria.

The objective is to provide a practical and adaptive framework to guide management decisions. These are guidelines and are not prescriptive. They should be interpreted in the light of *local* biodiversity and fire information.



Growth stages and tolerable fire intervals for Victoria's native vegetation data sets

The report summarises how tolerable fire intervals and growth stage attributes have been developed for native vegetation across Victoria to create new, spatially explicit data sets for fire management planning and fire ecology assessments.

It provides:

- the minimum and maximum tolerable fire intervals for EVDs
- descriptions of growth stages for EVDs.

Other relevant documents to be considered when undertaking fire management strategy development for the Alpine National Park include:

- Alpine National Park Management Plan
- DSE Fire Risk Mapping for East Gippsland and North-east Fire areas
- Determination of sustainable fire regimes in the Victorian Alps using plant vital attributes (2003)
- Landscape Mosaic Burning Planning Guidelines (2009) [Working Draft]
- OESC Busfire Risk Landscapes
- Published Township Protection Plans

There are two key strategies (among others) undertaken by DSE and PV to manage fire risk in the high country. These are bushfire mitigation strategies in the form of planned burning, and fire preparedness and response operations.

Note: DSE's Land and Fire Management Division's primary strategy is *to deliver a planned burning program that reduces the impact of major bushfires on people* (DSE Fire Business Plan 2011/12).

Bushfire mitigation strategy and works planning

DSE and PV undertake a fire operations planning process which identifies:

- Fire management zones (strategic level planning)
- 3 year fuel management works programs (operational program level planning)

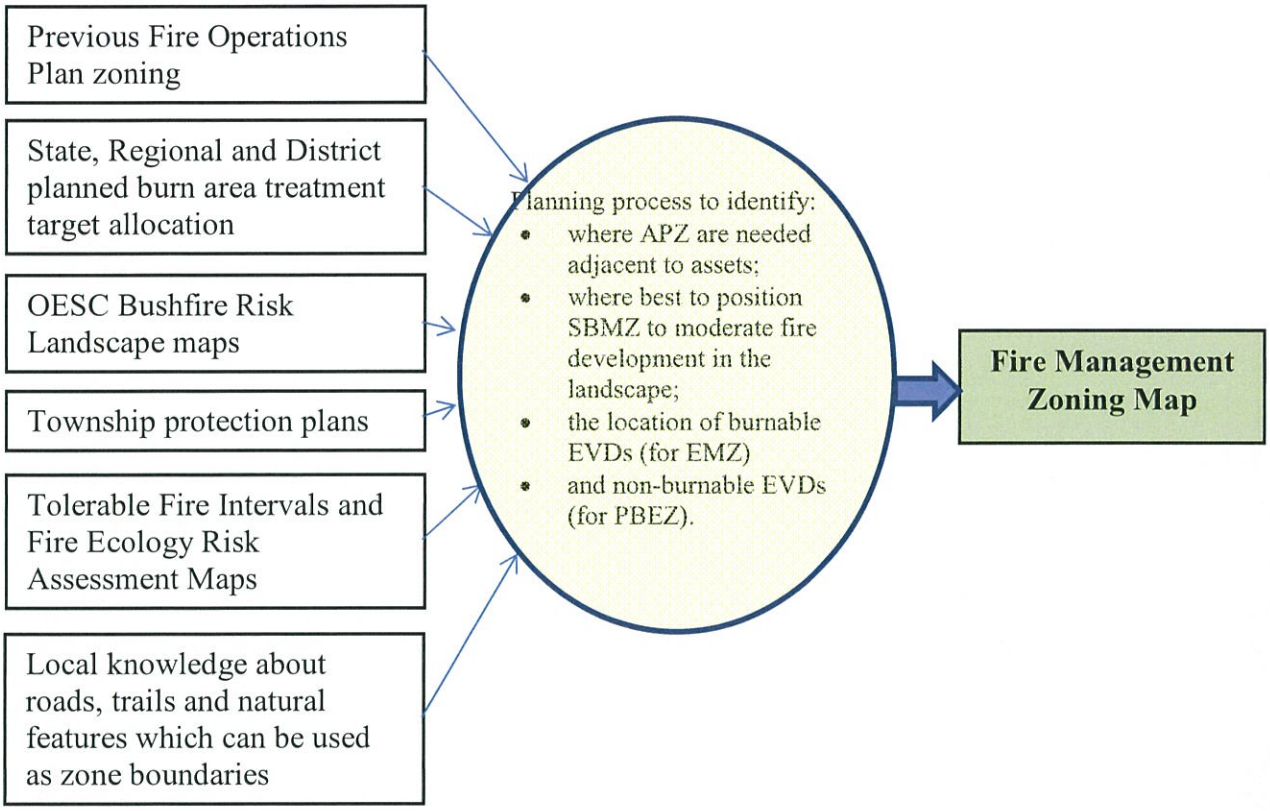
Planning is undertaken principally at District level (for Regional approval), by District Planning Teams. At the strategic planning level, for each District it is necessary to identify and map the following zones:

- Zone 1 - Asset Protection Zone (APZ)
- Zone 2 - Strategic Bushfire Moderation Zone (SBMZ)
- Zone 3 - Ecological Management Zone (EMZ)
- Zone 4 - Planned Burning Exclusion Zone (PBEZ)

The following planning process is followed to generate the zonings:

Fire management zoning strategy development

Information inputs:



Essentially, the planning process used to develop the fire management zoning maps is a semi-structured, qualitative risk assessment process.

Once the strategic level fire management zoning is developed, Fire Operations Planning can be undertaken.

Application of fire management zoning systems in the high country

The approach to identifying Asset Protection Zones (APZ) and Strategic Bushfire Moderation Zones (SBMZ) in high country landscapes is not significantly different to that applied more widely across Victoria. SBMZs take into particular account the following factors:

- proximity to settlements and vulnerable assets;
- the extent to which spotting can be reduced from adverse aspects;
- the location of roads and fire trails from which fuel reduction works can be managed;
- block sizes achievable and manageable in the landscape area;
- proximity to recently burnt areas (planned or unplanned) to create connectivity such that dimensions are appropriate to likely fire paths

The approach to identifying Ecological Management Zone areas suitable for burning and Planned Burning Exclusion Zone areas is based largely on:

- Tolerable Fire Intervals identified for the Ecological Vegetation Division;
- Risk assessments based on recent fire history, particularly to take account of where large bush fires have resulted in large areas with a high proportion of particular EVDs being dominated by a single age class or growth stage.

As EVDs in alpine and sub-alpine areas are quite broad and encompass a range of ecological communities with widely varying fire response attributes and tolerance, the EVD based Tolerable Fire Intervals are somewhat limiting. Currently, appropriate parts (i.e. EVCs) that make up particular EVDs where burning is not appropriate are incorporated within the PBEZ, with no planned burning considered in these vegetation types.

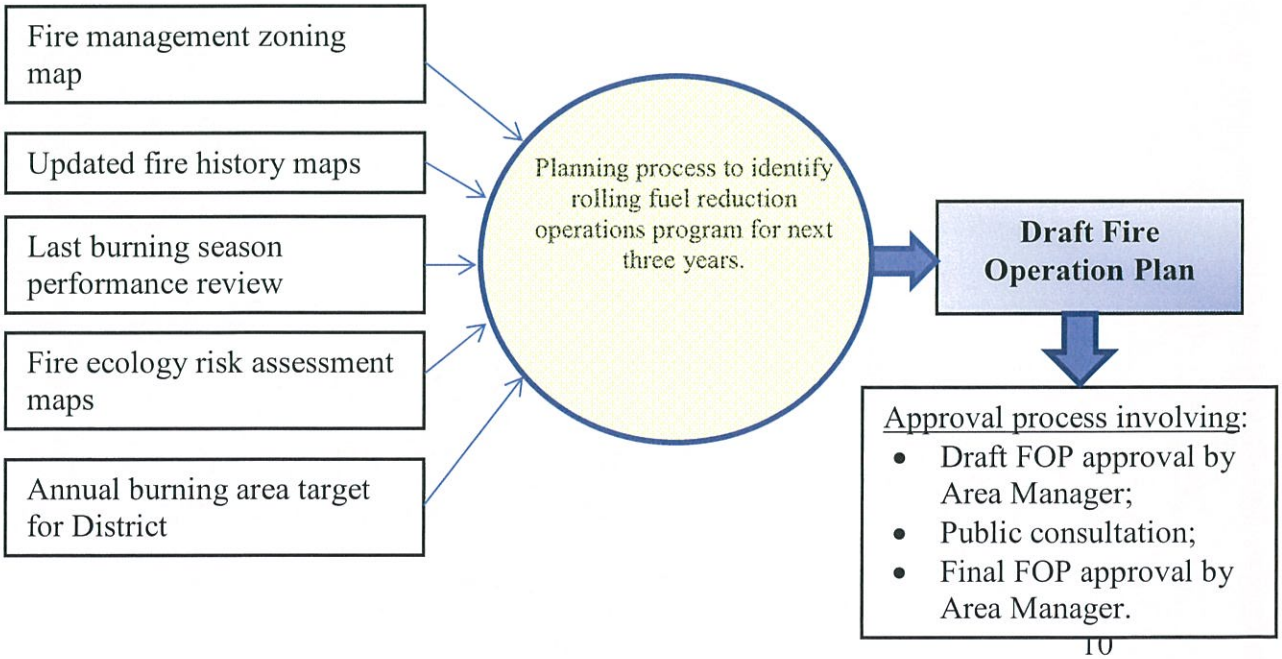
In high country areas below the alpine and sub-alpine zones, in most areas EVD based Tolerable Fire Intervals are similarly limiting due to the occurrence of large bushfires in recent years (1997/98; 2003; 2006; 2009) across a very high proportion of the high country. Therefore, Tolerable Fire Intervals are reviewed locally and amended (to shorter intervals than published in *Growth stages and tolerable fire intervals for Victoria's native vegetation data sets* (Cheal, 2010), to take account of the additional risk factors arising from having very high proportions of EVDs in one post-fire age class/growth stage.

Fire Ecology Assessment maps are generated which factor in:

- The degree of intensity and patchiness of the most recent fire;
- How readily the vegetation type can be burnt;
- How the vegetation type responds to fire (eg dependent, influenced or sensitive).

Fire Operations Plan Development

Information inputs:



Site-specific Burning Operations Planning and Operations

All burning operations need to be thoroughly planned in accordance with relevant legislation, codes of practice, procedural instructions and guidelines.

Planned burn planning and implementation is carried out in accordance with DSE *Fire Management Manual 10.1 Prescribed Burning* (2008).

Future fire management planning

The foregoing sections describe the current state-wide process of fire management zoning and fire operations planning. DSE is currently conducting a project in the Otways (called the Future Fire Management project) which aims to develop and trial a new approach to fire management planning, ultimately to replace the existing approach. The aim is to move from the current semi-structured, qualitative risk management model, to a structured, quantitative and predictive risk management model.
It is envisaged the Future Fire Management model being developed will enable fire management planners to:

- Measure and predict the likely outcomes of current and future bushfire management strategies in relation to impacts of severe bushfires;
- Introduce risk landscapes as the basis for strategic bushfire management planning;
- Allow planners to respond to changes in the bushfire planning environment;
- Reduce severe bushfire risk efficiently for each hectare treated in planned burning, facilitating improved resource allocation and achieve optimal risk and ecological outcomes;
- Improve the resilience of natural ecosystems and the services they deliver;
- Inform planning processes across the prevention, preparedness, response and recovery framework;
- Optimise the range of values (eg. risk to human life, ecological resilience, and water yield) and enable discussions on preferred actions.

This project is only in the pilot stage, and therefore not currently operationalized across Victoria.

Fire suppression

Bushfires starting in or moving into the high country are managed according to codes of practice, procedural instructions and guidelines, and inter-agency protocols as bushfires are elsewhere on public land in Victoria.

Planning for each fire suppression operation is tailored to the individual circumstances of each fire. This planning is undertaken by the Planning section of the Incident Management Team (IMT). Within the Planning section, for potentially significant fires, a 'values team' may be assigned to identify specific values (eg. commercial/economic, ecological cultural) to be taken into account during suppression operations. Fire suppression operations do not always attempt to minimise area burnt – depending on the circumstances assessed by the IMT, decisions

may be made to bring fire out to existing fire containment lines/features and this may involve ground and/or aerial incendiary operations.

During late spring and summer a very high proportion of fires are responded to with early and well resourced Initial Attack due to the high risk that uncontained fires may be subject to severe fire weather at that time of year. Initial Attack efforts attempt to contain fires to minimum area with minimal mechanical disturbance (noting that failure of early Initial Attack while fires are small can result in large fires developing which require much more extensive mechanical works for containment). The result is that some proportion of fires (lightning-caused and human-caused) are restricted to smaller areas than they would otherwise have burnt unrestricted.