Bushfire Risk Management Planning Guidelines 2020

State Fire Management Council
Department of Police, Fire and Emergency Management

Document Development History

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Contents

Glossary

Asset	A term used to describe anything valued by the community that may be adversely impacted by bushfire. This may include houses, infrastructure, agriculture, production forests, industry, and environmental and heritage sites.
Asset Zone (AZ)	The geographic location of asset(s) and values of importance requiring bushfire exclusion.
Asset Protection Zone (APZ)	An area adjacent to or near Asset Zones, the primary management purpose of which is to protect human life, property and highly valued assets and values. Treatment can include intensive fuel reduction, manipulation of fuel moisture or response plans.
Bushfire	Unplanned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires both with and without a suppression objective.
Bushfire hazard	The potential or expected behaviour of a bushfire burning under a particular set of conditions, i.e. the type, arrangement and quantity of fuel, the fuel moisture content, wind speed, topography, relative humidity, temperature and atmospheric stability.
Bushfire-prone area	Land that is within the boundary of a bushfire-prone area shown on an overlay on a planning scheme map; or where there is no overlay on a planning scheme map, land that is within 100 m of an area of bushfire-prone vegetation equal to or greater than 1 hectare.
Bushfire-prone vegetation	Means contiguous vegetation including grasses and shrubs but not including maintained lawns, parks and gardens, nature strips, plant nurseries, golf courses, vineyards, orchards or vegetation on land that is used for horticultural purposes.
Bushfire Risk Assessment Model (BRAM)	A computer-based modelling tool that uses a series of inputs to assess the risk of bushfire to a specific area. The BRAM has a capacity to produce a series of outputs. It was developed and is managed by Tasmania Parks and Wildlife Service.
Bushfire risk management	A systematic process to coordinate, direct and control activities relating to bushfire risk with the aim of limiting the adverse effects of bushfire on the community.
Bushfire Risk Unit	Staff of the Bushfire Risk Unit (TFS), including bushfire planners, spatial analysts and community engagement officers.
Community Bushfire Protection Plan	A bushfire plan for community members that provides local, community-specific information to assist with bushfire preparation and survival. The focus of the Bushfire Protection Plan is on bushfire safety options, and the intent of the plan is to support the development of personal Bushfire Survival Plans.
Community Bushfire Response Plan	An Emergency Management Plan for emergency managers and responders. The Bushfire Response Plan aims to better protect communities and their assets during bushfire emergencies, through the identification of protection priorities and operational information.
Community Mitigation Plan	A strategic plan that focuses on addressing bushfire hazards and improving the survivability of communities and assets. The Bushfire Mitigation Plan identifies key areas for fuel management, and provides tactical guidance on prescribed burning, fuel treatment, fire management infrastructure, and asset protection work.
Consequence	Impact(s) of an event on the five key areas: environment, economy, people, social setting and public administration.
Control	A measure that modifies risk. This may be an existing process, policy, device, practice or other action that acts to minimise negative risk or enhance positive opportunities.
Fire management zoning	Classification system for the areas to be managed. The zoning system indicates the primary purposes for fire management for an area of land.
Fuel break	A natural or manmade change in fuel characteristics which affects fire behaviour so that fires burning into them can be more readily controlled.

Hazard management area	The area between a building and the bushfire-prone vegetation that provides access to a fire front for firefighting, which is maintained in a minimal fuel condition and in which there are no other hazards present that will significantly contribute to the spread of a bushfire.
Human Settlement Area (HSA)	Term given for the dataset used to define where people live and work. The dataset was developed for the purpose of risk modelling and was created using a combination of building locations, cadastral information and ABS data. Includes seasonally populated areas and industrial areas.
Land Management Zone (LMZ)	An area that is managed to meet the objectives of the relevant land manager such as: Traditional Owner practices, biodiversity conservation, production forestry, farming or recreation. Management can include planned burning, experimental treatments, fire exclusion or no planned action.
Likelihood	Chance of something happening. It is used as a general description of probability and may be expressed qualitatively or quantitatively.
Risk	The combination of the probability of an event and its negative consequences.
Risk analysis	Process to comprehend the nature of risk and to determine the level of risk.
Risk assessment	The overall process of risk identification, risk analysis and risk evaluation.
Risk criteria	The State's endorsed risk criteria and associated tools and guidelines which form the minimum required level of analysis/reporting.
Risk evaluation	Process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude are/is acceptable or tolerable.
Risk identification	The process of finding, recognising and describing risks.
Risk register	A document usually presented in a tabular form which lists concisely the following information for each risk: the risk statement, source, hazard, impact area, prevention/preparedness controls, recovery/response controls, level of existing controls, likelihood level, risk level, confidence level and treatment strategy.
Risk tolerance	An organisation's or stakeholder's readiness to bear the risk after risk treatment to achieve its objectives.
Risk treatment	Process of selection and implementation of controls to modify risk. The term 'risk treatment' is sometimes used for the controls themselves.
Strategic Fire Management Zone (SFMZ)	An area located close to or some distance away from assets (e.g. the urban–rural interface), the primary management purpose of which is to provide a mosaic of areas of reduced fuel in strategic locations to reduce the speed and intensity of bushfires, potential for spot-fire development, and size of bushfires. Treatment is by fuel reduction burning and other bushfire protection measures such as fire trails, water points, detection measures and response plans.
TERAG bushfire tool	An Excel workbook that was developed for the Tasmanian Emergency Risk Assessment Guidelines (TERAG) that has been adapted for the bushfire context. It includes the risk register and the treatment plan.
Treatable vegetation	Types of vegetation which are suitable for fuel reduction burning, for example, dry eucalypt forest, scrub, heathland and buttongrass.
Treatment plan	A document related to the risk register presented in a tabular form which lists concisely the following information for each risk: the agreed strategies to manage the risk (i.e. treatments), the responsible organisations, proposed completion date, comments and progress.
Urban–rural interface	The line, area, or zone where structures and other human development adjoin or overlap with undeveloped bushland.
Vulnerable group location	A locality that has been identified as a place where people may gather, or people may need assistance during a major bushfire.

Acronyms

AZ	Asset Zone
APZ	Asset Protection Zone
AEP	Annual Exceedance Probability (%)
BoM	Bureau of Meteorology
BRAM	Bushfire Risk Assessment Model
BRU	Bushfire Risk Unit (Tasmania Fire Service)
BRMP	Bushfire Risk Management Plan(s)
FFDI	Forest Fire Danger Index
DoE	Department of Education
FMA	Fire Management Area(s)
FMAC	Fire Management Area Committee(s)
GIS	Geographic information system
HSA	Human Settlement Areas
LMZ	Land Management Zone
NERAG	National Emergency Risk Assessment Guidelines
PWS	Parks and Wildlife Service
SEMC	State Emergency Management Committee
SFMC	State Fire Management Council
SFMZ	Strategic Fire Management Zone
STT	Sustainable Timbers Tasmania
TASVEG	Digital map of Tasmania's vegetation
TERAG	Tasmanian Emergency Risk Assessment Guidelines
TFS	Tasmania Fire Service

1 Introduction

1.1 Initiation and background

Every year Tasmania experiences bushfires; most of these are small incidents that are easily controlled, while some become major conflagrations that cause substantial impact on communities, industries and the environment. A significant investment is made every year by government at various levels, as well as all kinds of organisations and individual landowners, to be prepared for and respond to bushfires, as well as to mitigate the risk of bushfires. A huge range of practices, systems and infrastructure underpins where and how bushfire is managed and if a complete list of these efforts across all sectors of our community were to be made, it would be vast. The coordination of these efforts benefits everyone.

Climate is changing in Tasmania. Major bushfire events in 2013, 2016 and 2019 have escalated emergency response to levels previously not seen in Tasmania, and the upward trend in bushfire climate indicators is likely to continue (Fox-Hughes et al. 2015). The Tasmanian community should plan for even more destructive bushfires. The challenge for bushfire management is recognised across Australia:

> *Addressing climate change impacts and their associated risks remains an urgent and significant challenge for fire and emergency services despite concerted effort from various agencies. (AFAC 2018)*

Therefore, the imperative for coordination of bushfire risk management is increasing.

State Fire Management Council (SFMC) is a statutory body under the *Fire Service Act 1979* that aims to coordinate the investment in bushfire risk management across all of Tasmania. It is important that efforts are coordinated because landowners and organisations do not have direct control over all the factors that contribute to their individual bushfire risk, nor can they operate independently of their neighbours in managing their bushfire risk. Therefore, the community has to act together, which involves cooperation, coordination and planning.

Under the guidance of SFMC, 10 Fire Management Area Committees (FMAC) aim to coordinate the activities associated with managing bushfire risk within their area. To achieve this, FMAC are required to produce fire protection plans under Section 20 of the *Fire Service Act 1979*.

Feedback from planners and stakeholders involved in the fire protection planning process in Tasmania has revealed the following points:

- A consistent and strategic approach should be applied to risk assessment and prioritising treatment options.
- The development of fire protection plans should use FMAC member time efficiently.
- An improved and shared understanding is required of the risk assessment process as it applies to bushfire risk planning.
- The fire protection plans should be better known and used as a central and influential document for directing investment in bushfire risk treatment.
- The fire protection plans should consider all kinds of community values (e.g. built assets, natural environment, production forests).
- Community awareness of and input into identifying values and treatments should be improved.

This guidelines document presents a revised approach to preparing fire protection plans for Fire Management Areas, based on the experiences of and consultation with stakeholders.

'Fire protection plan' is the statutory name under the *Fire Service Act 1979*. However, for clarity and consistency with the objectives of the guidelines and contemporary terminology, hereafter the term 'Bushfire Risk Management Plan (BRMP)' will be used instead.

In accordance with Section 20 of the *Fire Service Act 1979*, State Fire Management Council has requested that these guidelines will be used as the basis for the preparation of Bushfire Risk Management Plans by the Fire Management Area Committees (FMAC) in Tasmania.

1.2 Aims and objectives of bushfire risk management

The aims and objectives of these bushfire risk management planning guidelines are:

- To present a framework and guide that facilitates Fire Management Area Committees (FMAC) and subject matter experts to consistently undertake and prepare bushfire risk assessments and Bushfire Risk Management Plans.
- To ensure that the approach in these guidelines aligns with the Tasmanian Emergency Risk Assessment Guidelines (TERAG).
- To improve the central and coordinating effectiveness of Bushfire Risk Management Plans at influencing bushfire mitigation investment.
- To identify risk priorities that are commensurable across all FMAC and adequately discriminate priority rankings for values and treatment actions.
- To consider and evaluate all kinds of treatment options (not just fuel reduction burning).

1.3 Alignment to Tasmanian Emergency Risk Assessment Guidelines

The Tasmanian Emergency Risk Assessment Guidelines (TERAG) were prepared in 2017 with the aim of ensuring that all risk assessments for emergency hazards are conducted in a consistent way. The following is a quote from the introduction to the TERAG:

> *The State Emergency Management Committee (SEMC) has prepared these guidelines to support Tasmanian emergency management committees and hazard management authorities to prepare emergency risk assessments in line with the National Emergency Risk Assessment Guidelines (NERAG), handbooks 10 and 11. It is anticipated that these guidelines and associated templates and tools will provide an easy-to-follow process that produces consistent and reliable risk assessments. These assessments will provide the basis for maintaining current works and identifying new projects to manage existing and emerging risk to Tasmania's people, economy, environment, society and administration.*

The SEMC determined that risk assessment for bushfire should be aligned with TERAG but that separate guidelines would be developed; hence this document fulfils that role. Fire protection plans and Fire Management Area Committees are established under the *Fire Service Act 1979*, but they have similar intent to Municipal Emergency Management Plans and Municipal Emergency Management Committees respectively, which are established under the *Emergency Management Act 2006*. It is desirable to minimise duplication between these parallel frameworks and ensure consistency and complementarity as far as possible.

The Tasmanian Vegetation Fire Management Policy 2017 calls for a risk-based approach to vegetation fire management in accordance with AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines, National Emergency Risk Assessment Guidelines (NERAG) and Tasmanian Emergency Risk Assessment Guidelines (TERAG).

These bushfire risk management planning guidelines try to minimise the duplication of content from TERAG, except where adapted specifically for the bushfire context or included for clarity. The general framework of risk assessment is now well established in Australia, not only in emergency management, and the reader is referred to TERAG for further background if required: https://www.ses.tas.gov.au/about/risk-management/terag/.

2 Bushfire risk management framework

2.1 Overview

This bushfire risk management framework identifies the broad outline of interlinked components which are the approach to managing bushfire risk in Tasmania, as well as guiding consistency in the efforts of Fire Management Area Committees (FMAC) and stakeholder organisations. The framework is summarised in Figure 1 and explained below.

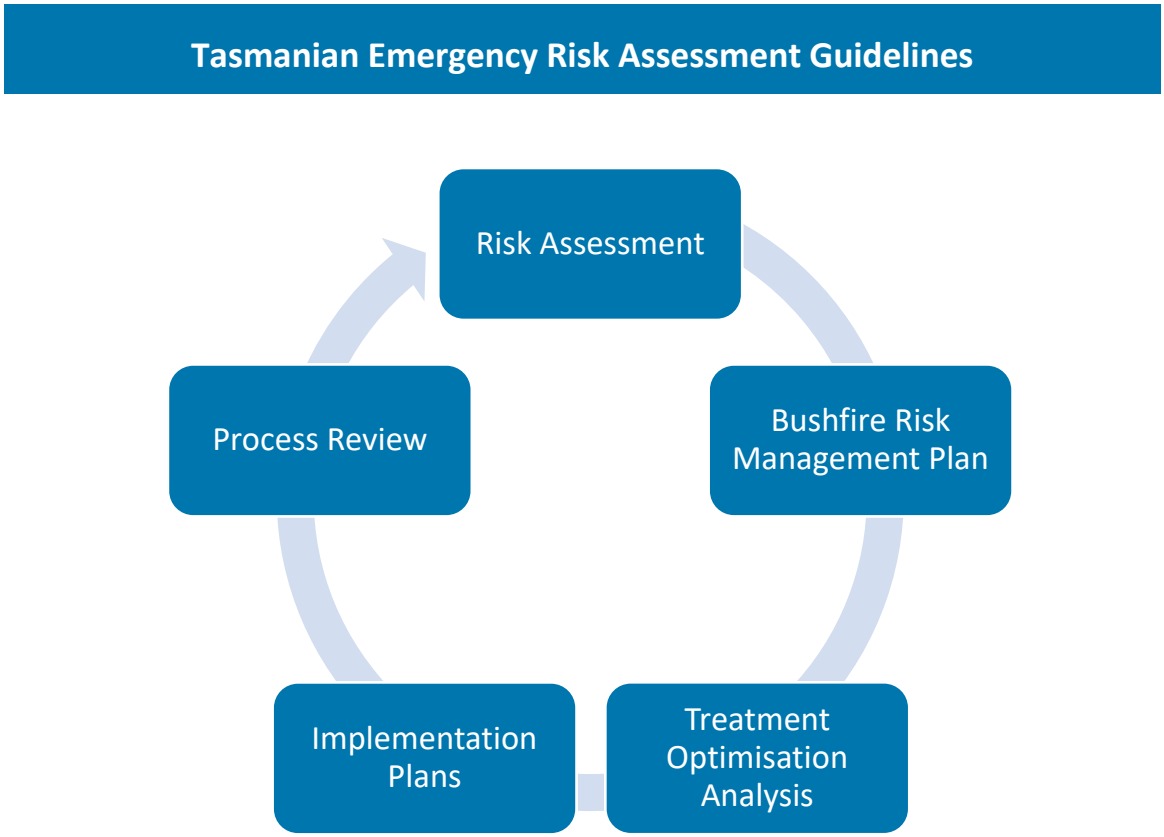


Figure 1. The bushfire risk management framework for Fire Management Area Committees.

Tasmanian Emergency Risk Assessment Guidelines (TERAG): directed by policies from the State Fire Management Council and the State Emergency Management Committee, TERAG provides the overarching approach for this bushfire risk management framework.

Bushfire risk assessment and treatment selection process: The process follows the TERAG and associated tools adapted to suit the bushfire context; the purpose of this guidelines document is to provide the basis for FMAC conducting risk assessments for bushfire. The Bushfire Risk Assessment Model (BRAM) developed by the Parks and Wildlife Service provides inputs for some components of the process.

Bushfire Risk Management Plans (BRMP): Under Section 20 of the *Fire Service Act 1979*, each FMAC is required to prepare a fire protection plan. This guidelines document renames the fire protection plan as Bushfire Risk Management Plan and provides direction on the structure, content and development of these plans. Products from the bushfire risk assessment process that identify priorities and treatments are central components of the BRMP – these are the risk register and the treatment plan (see Glossary).

Treatment optimisation analysis: The bushfire risk assessment process described in these guidelines is a strategic level; how and where treatments are to be applied is only summarised in the BRMP, as presented in tables and maps. Detailed treatment planning may still be required including further analysis and plans. For example, details on individual burn units for fuel reduction burning is not included in the BRMP. Some treatments, such as fuel reduction burning, may involve further analyses with modelling tools (e.g. Fuel Treatment Analysis tool, FIRESCAPE-SWTAS) to optimise the burning schedule. Some treatments will require field investigation and analysis to develop detailed design, for example, fuel breaks and strategic fire trails.

Implementation plans and schedules: The detail of implementation of treatments will in some cases be presented in other planning documents prepared by various organisations (e.g. fire strategies prepared by councils, bushfire mitigation plans prepared by Tasmania Fire Service). These implementation plans will often include detailed maps and schedules for treatment locations (e.g. fuel reduction burning units, fuel breaks) and may or may not have included a treatment optimisation analysis. Each organisation/landowner that is responsible for treatment implementation prepares their own plans and schedules which may have various names and formats (see section 3.6.2 and Appendix A). Operational plans for individual fuel reduction burning operations are also prepared.

Process review: Bushfire risk management planning is ongoing and cyclic. The effectiveness of the process needs periodic review to evaluate the progress towards the desired outcomes and improvements that can be made for future iterations.

2.2 Principles

The framework includes these principles that guide the design of the overall approach:

- The bushfire risk management process is aligned with Tasmanian Emergency Risk Assessment Guidelines (TERAG).
- Statewide mapped data sets of values should be used as much as possible – there is much that is now available.
- The Bushfire Risk Assessment Model (BRAM) components should be adopted as far as possible to avoid duplication of mapped data inputs.
- The tools and mapped value data need to be practical to be used at the scale appropriate for Fire Management Area Committees (FMAC).
- The risk assessments and Bushfire Risk Management Plans (BRMP) are at a strategic level; they do not include all the detail of treatment actions that need to be documented elsewhere; nor do they consider every asset or value individually.
- All kinds of assets and values should, as far as practical, be considered in the risk assessment.
- A collaborative approach to developing risk treatments across multiple land tenures is encouraged.
- The risk register tool, which is central to the risk assessment, has components that can be updated and replaced separately to improve later risk assessments. For example, the likelihood modelling (section 3.2.2.3) may use different fire prediction tools in future years.
- Each risk assessment must be completed with a definite deadline for completion. Therefore, compromises will be made on data, tools and methods.

- Every three years a comprehensive review of the BRMP, involving a new risk assessment (that may include revised input methods) and consideration of the risk assessment and proposed treatments, will be undertaken, unless significant circumstances exist to warrant an earlier comprehensive review, for example, changes to Fire Management Area boundaries, organisational responsibilities, or legislation; or following a major bushfire event.

2.3 Steps in bushfire risk management planning

The framework (Figure 1) for managing bushfire risk in Tasmania encompasses a process, so another way of viewing the framework is as a series of steps in a process.

The steps are as follows:

1. RISK ASESSMENT AND TREATMENT SELECTION

Activity	Stakeholders involved	Responsibility
a. Determine risk assessment criteria and standard approaches for analyses for all FMACs that are consistent with the TERAG.	Working groups representing subject matters experts and FMAC member organisations	Bushfire Risk Management Planning Project Officer (BRMP PO)
b. Data prepared and preliminary risk analysis undertaken, at state-wide level. Analysis is divided into risk register for each FMA.	BRU	BRU BRMP PO
c. FMAC/Member Organisations identify other mapped assets and values to add to risk registers	FMAC members FMAC member organisations Stakeholder organisations (e.g. forest companies, agriculture, Aboriginal community)	BRMP PO
d. Fire planning specialists determine control scores for the risk registers (section 3.4.1)	BRU PWS STT Forest companies	BRU Planning Officers
e. Workshops with selected value owners to review risk registers and commence treatment selection and planning	Electricity companies Forest industries Natural values	BRMP PO
f. Risk registers reviewed and finalised. Priorities to be addressed in treatment plans agreed by FMAC members.	BRU FMAC	BRU Planning Officers
g. Develop treatment plans for assets/values of the risk register.	FMAC FMAC member organisations	FMAC members/member organisations

This step can be done at meetings or out of session.	Collaboration of member organisations and appropriate stakeholder groups	
h. All individual treatment plans combined into single treatment plan for the FMAC.	BRU	BRU Planning Officers
i. FMAC meeting convened to review and finalise risk assessment and treatment plan.	FMAC BRU	BRU Planning Officers and TFS regional administration

2. BUSHFIRE RISK MANAGEMENT PLAN (BRMP)

Activity	**Stakeholders involved**	**Responsibility**
a. FMAC supported by the BRU, draft BRMP. Key components of the BRMP include: community engagement, risk register (from risk assessment), treatment plan (from risk assessment), bushfire management zoning maps.	FMAC BRU	BRU Planning Officers
b. The draft BRMP is placed on public exhibition and comments invited.	FMAC BRU State Fire Management Council (SFMC)	SFMC
c. The final version of BRMP is prepared.	BRU	BRU Planning Officers
d. State Fire Management Council (SFMC) approves the BRMP.	SFMC	Executive Officer, SFMC
e. A State-level BRMP is prepared that summarises the highest priorities across the State.	BRU SFMC member organisations	BRMP PO

3. TREATMENT OPTIMISATION ANALYSIS

Activity	**Stakeholders involved**	**Responsibility**
a. Individual organisations, or collaborations of organisations, may undertake more detailed analyses to develop mitigation programs such as a planned burning schedule (e.g. FIRESCAPE-SWTAS, Fuel Treatment Analysis tool).	Examples: BRU, PWS, STT, forest companies	Individual organisations

4. IMPLEMENTATION PLANS AND SCHEDULES

Activity	Stakeholders involved	Responsibility
a. Detailed implementation plans and schedules are developed for treatments by individual organisations (see Appendix A for list of plan titles prepared by member organisations) or collaborations of organisations.	As identified in treatment plans of BRMP	As identified in treatment plans of BRMP
b. Implementation Status Report prepared at least annually by the FMAC assisted by the BRU.	FMAC BRU	BRU Planning Officers

5. IMPLEMENTATION PLANS AND SCHEDULES

Activity	Stakeholders involved	Responsibility
a. The risk assessment, BRMP and the implementation of treatments is reviewed and adjustments are developed for the next cycle.	BRU New working groups representing subject matter experts and FMAC member organisations	BRMP PO

3 Risk assessment

3.1 Risk assessment process

The risk assessment for bushfire follows the standard risk assessment steps (Figure 2). To ensure consistency across all Fire Management Area Committees (FMAC), and because so much data is now available in a mapped format for the whole State of Tasmania, the design and much data compilation and analysis for the risk assessment is done at the State level. This saves time for the FMAC, but it is still important for individual FMAC to check and validate data as well as fill in any significant gaps. Figure 2 illustrates how all inputs come together for the risk assessment process for Fire Management Areas (FMA); it can be seen that different components are undertaken by the:

1. **Working Group** – includes representatives from FMAC and subject matter experts from the Tasmania Fire Service (TFS) and other agencies – determines the risk criteria, data and tools that will be used by all FMAC to ensure a consistent approach by all FMAC
2. **Bushfire Risk Unit** – are staff of the Bushfire Risk Unit (BRU) in the TFS, including bushfire planners, spatial analysts and community engagement officers – prepares statewide data and risk registers; provides support to the FMAC at all steps in the process
3. **State Risk Workshops** – are facilitated by the BRU with individual organisations that manage specific values across the state (e.g. electricity infrastructure, production forests, natural values) – the participating organisations prepare statewide data for their value and participate in the state risk workshops
4. **FMAC** – the members of the FMAC are supported by the BRU to add to and refine the risk register and treatment plan

A working group, with similar expertise and representation, should be reconvened for each iteration of the risk assessment (i.e. every three years or as required) because it is likely that adjustments to various inputs for the risk assessment will be required.

Support for the FMAC from the BRU for the risk assessment is essential because FMAC members generally do not have the time or resources to do this alone.

The state risk workshops are intended to provide efficiency and consistency for values that are managed by organisations that operate across many FMA. In some cases, one representative from an organisation may participate in three or more FMAC.

	ESTABLISH CONTEXT	IDENTIFY RISK	ANALYSE RISK	EVALUATE RISK	TREAT RISK
Working Group	Risk criteria designed: • consequence categories, ratings, data sources (GIS, BRAM) • likelihood measures (fire modelling, ignition potential) • control strength & expediency • confidence level	• Design hazard scenarios and risk statement format • Design standard control list			Design: • treatment standard list • treatment evaluation method/tool
Bushfire Risk Unit	Prepare: TERAG bushfire tool	Prepare: • draft 'asset' map units from existing data • draft risk register, partially completed	Add to risk register: calculated consequence, control effectiveness, likelihood, risk, confidence level	Add to risk register: calculated priority values & actions	Support FMAC
FMAC		• Community concerns canvassed & collated • Add 'assets' to draft risk register	Update risk register: review & reality check consequence, likelihood, risk rating, confidence level	Update risk register: review priorities & actions	• Consider treatment options • Develop treatment plan
State Risk Workshops		Value owner (e.g. TasNetworks, forest industries, DPIPWE) prepare asset maps & risk register	Update FMAC risk registers	Update risk register: review priorities & actions	• Consider treatment options • Develop treatment plan

Figure 2. Risk Assessment Process

The end product is the risk assessment for each FMA, which provides the basis for developing the treatment plan. A very important component of the risk assessment is the risk register; for the FMAC risk assessments it is compiled in an Excel workbook that has been adapted specifically for bushfire hazard from the Tasmanian Emergency Risk Assessment Guidelines (TERAG) tool; this is called the TERAG bushfire tool.

For each FMAC, a draft risk register is prepared initially by the BRU using existing data and following input from individual value managers and owners. This draft risk register is the starting point for the risk assessment to be reviewed, refined and completed by the FMAC (section 3.4).

The TERAG bushfire tool has the following worksheets:

Home – A version of the risk register where all the risk data for a single or several asset/values can be reviewed on one screen, for example, on a projection screen at FMAC meetings. The data cannot be edited in this worksheet; it can only be viewed and copied.

Risk Register – The version of the risk register where data is entered and edited for the risk assessment (section 3.4).

Control Effectiveness – A worksheet for recording the control strength and control expediency estimations for each asset/value in the risk register (section 3.2.2.4 and section 3.4.1).

Treatment Plan – The treatment plan is written here (section 3.6.2). The first three columns are linked to the risk register and cannot be edited, other than entering a TERAG Code. When finished, a version of the worksheet is copied and pasted to the treatment plan of the BRMP. The final three columns in the worksheet are for recording and reporting progress of treatment implementation (section 6); when finished a version of the worksheet is copied and pasted to the Implementation Status Report (Appendix C).

Decision Tables – This worksheet has tables to assist completing the risk register and treatment plan, including a version of the TERAG consequence and confidence level tables and the treatment strategies (Table 12).

There are other hidden worksheets in the TERAG bushfire tool that are used for automatic calculations.

Table 1 provides explanation on the columns of the risk register and how they are determined.

It is very important that a protocol for version control for the TERAG bushfire tool is established and maintained by the FMAC Chairperson. Thus it is important to keep track of the version date, editing undertaken and by whom. The BRU will support the FMAC Chair in establishing online storage arrangements.

Table 1. Guide to the column headings of the risk register in the

Column Name	Description	Guidelines Section
TERAG code	Unique identifier for the asset/value (many generated in GIS)	
Asset category	Standard list for assets/values	
Asset description (risk statement)	Name of asset/value including a location	
Dollar value	Value ($) for Economy, blank for other values	3.2.2.2
Hazard	'Fire-bush' (this does not change for bushfire risk registers)	
Additional hazard	Mostly blank for these risk registers	
Cumulative impact %	The measure of impact used for the Fire behaviour impact metric	3.2.2.3 and Appendix B
Unique fire count	The number of bushfire simulation ignition points contributing to the Fire behaviour impact metric	3.2.2.3 and Appendix B
Fire behaviour impact metric	Calculated by bushfire simulation modelling	3.2.2.3
Ignition potential	Calculated from BRAM, derived mostly from recorded ignition history	3.2.2.3
Likelihood (AEP)	Automatically calculated by combination of Fire Behaviour Impact Metric and Ignition Potential	3.2.2.3
Likelihood (AEP Score)	Automatically calculated by combination of Fire Behaviour Impact Metric and Ignition Potential	3.2.2.3
Impact area	One of five TERAG categories of consequence	3.2.2.2
Consequence	Determined by either Table 2 or TERAG Table 13	3.2.2.2
Control effectiveness	Automatically calculated by filling in the Control Effectiveness worksheet	3.2.2.4
Confidence	Method to determine the level of confidence in the risk assessment rating	3.2.2.5
Combined likelihood	Automatically calculated from Likelihood (AEP) and Control Effectiveness	
Risk level	Automatically calculated from Consequence and Combined Likelihood	
Priority	Automatically calculated from Consequence, Confidence and Combined Likelihood	3.5.1
Priority FMAC	Calculated from Likelihood (AEP Score) and Priority columns	3.5.1
Treatment options	Choice of treatment, further analysis, or monitor and review	3.5.2
LGA	The primary local government area for the asset and FMAC	
Region	The TFS region for the primary local government area; automatically filled	

3.2 Establish the context

3.2.1 Community context

Context-setting means developing as good a picture as practical of the values, assets and community characteristics of the Fire Management Area (FMA). Each FMA has different kinds of communities, environments, industries and values. Much data has been compiled and mapped for many of these values by the Bushfire Risk Unit (BRU) (see also section 3.2.2.2), but the Fire Management Area Committee (FMAC) needs to review these data and add more assets and values that they want to be assessed.

Ideally, local communities are provided an opportunity to contribute input at this context setting stage. FMAC will need to be realistic, however, about how much community consultation can be achieved given the timeframe to finalise the risk assessment. FMAC should consider the guidelines on community engagement (section 4.3) to develop plans for community engagement that will be documented in the Bushfire Risk Management Plan (BRMP).

3.2.2 Risk criteria

3.2.2.1 Overview

'Risk criteria' means how consequences and likelihood are classified and quantified. The Tasmanian Emergency Risk Assessment Guidelines (TERAG) were used to guide the development of the following criteria:

- Consequences – what values and assets are at risk given the standard bushfire scenario under consideration (section 3.2.2.2)
- Likelihood measures – how the likelihood of the consequence occurring is quantified (section 3.2.2.3)
- Control strength and expediency – how effective the existing controls are at reducing the risk and how much they are used (section 3.2.2.4)
- Confidence level – how certain we are about the evidence and data used (section 3.2.2.5)

The risk criteria are used to develop ratings and scores for rows in the risk register (section 3.4); each row of the risk register is a defined mapped unit that relates to a specific asset or value. The Working Group made decisions about which existing data sets would be used and how they should be used in the risk assessments undertaken for FMA.

The rest of this section 3.2.2 explains how each of these risk criteria is calculated, rated or scored in the risk register.

3.2.2.2 Consequence

The risk assessments are at a strategic level and, by practical necessity, not every asset and value in the FMA can be included in the risk register as a separate entity. Grouping of assets and values is essential, relative to the scale of bushfire scenario under consideration (section 3.3.2), and only significant consequences should be included.

A group of mapped assets or values has a one-to-one relationship to a row in the risk register; the group also represents a risk statement (section 3.3.3). To ensure a manageable number of entities in the risk register, mapped assets/values are grouped as much as practical into larger map units after considering the following qualitative criteria:

1. Similar asset characteristics (*e.g. human settlement areas, or environment values, or production forest)*
2. All could be impacted by the same significant bushfire
3. Consequence of at least Moderate level or higher (including Major or Catastrophic)

Assets/values that meet the criteria above are grouped by a computer model that identifies shared exposure to the same potential ignition points and fire paths (Appendix B).

The impact(s) of the bushfire scenario are identified for the five impact areas from TERAG: people, economy, environment, public administration and social setting. The TERAG State Consequence Table 13 (*pages 66 and 67*) are used to develop consequence criteria for the bushfire context.

For People, Table 2 summarises the values to be applied for mortality and injuries/illness, based on the TERAG and latest census population of Tasmania. For Economy, Table 2 indicates the financial values to be applied for Agriculture and Tourism sectors. Other Economy values should use the State row to determine a consequence rating. Table 13 from TERAG should be used for all other values.

Table 2. Consequence values for People and Economy categories

	Insignificant	Minor	Moderate	Major	Catastrophic
PEOPLE					
Mortality	NA	1	1 to 5	6 to 50	>=51
Injuries/Illness	1 serious	1 critical 1 serious	1 to 5 critical 6 to 50 serious	6 to 50 critical 51 to 509 serious	>=51 critical >=510 serious
ECONOMY					
State	<$1,272,760	$1,272,760 to $12,727,600	$12,727,600 to $127,276,000	$127,276,000 to $1,272,760,000	>$1,272,760,000
Agriculture	<$64,000	$64,000 to $640,000	$640,000 to $6,400,000	$6,400,000 to $64,000,000	>$64,000,000
Forestry	<$24,600	$24,600 to $246,000	$246,000 to $2,460,000	$2,460,000 to $24,600,000	>$24,600,000
Tourism	<$128,000	$128,000 to $1,280,000	$1,280,000 to $12,800,000	$12,800,000 to $128,000,000	>$128,000,000

People data source: *Australian Bureau of Statistics Census 2016 (population 509,965)*
Economy data sources:
State – *Total Gross State Product (GSP) 2018-19 ($31,819,000,000), Department of Treasury and Finance*
Agriculture – *Gross Value of Production 2017-18 ($1,600,000,000), Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)*
Forestry – *Gross Regional Product (GRP) 2015-16 total contribution including flow-on ($615,000,000), Schirmer et al 2018*
Tourism – *Tourism total GSP 2017-18 ($3,200,000,000), Tourism Tasmania*

Mapped data sets have been used to prepare consequence data for risk registers for all FMA. The data sets used are listed in Table 3.

To ensure that the risk assessment is strategic and manageable, an asset or value group must have at least a Moderate or higher consequence level (Table 2) and must be within a bushfire-prone area (or nearby in some cases) to be considered. To further ensure a practical and manageable list for the risk assessment, for the following assets/values, only those assessed as Major or Catastrophic consequence are included:

- electricity infrastructure
- communications towers
- all Public Administration
- all Social Setting

Table 3. Mapped geographic information system (GIS) datasets that have

TERAG Consequence Category	Asset or Value	Mapped Data Source	Selection
People	Bushland users: parks & reserves, mountain bike areas	PWS, STT, councils	Selection by stakeholders
People	Human Settlement Areas (HSA)	TFS HSA	Intersection with bushfire-prone area
Economy	Human Settlement Areas (HSA)	TFS HSA	Intersection with bushfire-prone area
Economy	Production forests & plantations: capital value plus industry disruption	BRAM	All categories
Economy	Electricity infrastructure: capital value plus disruption	Owner	Selection by value owner
Economy	Communications towers: disruption	Owner	Selection by stakeholders
Environment	Bushfire biodiversity consequence (fire sensitive vegetation, threatened species, threatened communities)	BRAM	All groups
Public Administration	Hospitals, Rural Health Facility, Community Health Centre	TFS Response Plans	Selection by stakeholders if within bushfire-prone area
Social Setting	Human Settlement Areas (HSA)	TFS HSA	Selection by stakeholders if within bushfire-prone area
Social Setting	Historic sites (e.g. Port Arthur, Darlington)	TFS Response Plans	Selection by stakeholders if within bushfire-prone area

The Human Settlement Areas (HSA) contribute many rows in the risk register. The HSA are mapped areas that were delineated by geographic information system (GIS), based on a density model of buildings and populations (State Fire Management Council 2014). Individual HSA are grouped for the risk register by a computer model that identifies shared exposure to the same potential ignition points and fire paths.

All HSA groups have one row in the risk register for Economy value; an HSA group may have another row for People and Social Setting, because these are different consequences that require separate consideration and treatment.

For the People value, only HSA that have a Moderate, Major or Catastrophic consequence are included, after consideration of existing controls (e.g. community warnings). Where vulnerable groups have been identified (e.g. schools, nursing/aged care facilities, childcare centres) they are not included separately in the risk register if they are located within an HSA.

The Economy value for HSA is calculated by multiplying the number of dwellings within the mapped HSA group by the average capital value of dwellings in Tasmania (Valuer-General data), but only for dwellings within the bushfire-prone area, an overlay map which is under development for all Tasmanian planning scheme maps. The value is assigned a consequence level according to Economy State categories of Table 2.

Production forest values include all available mapped data of hardwood and softwood plantations, as well as production native forests. Both private and public land are included. The relative value of individual coupes and plantations is determined by the asset owners on a five-point scale in the BRAM. Individual coupes and plantations are grouped for the risk register by a computer model that identifies shared exposure to the same potential ignition points and fire paths. Each group of production forest assets is assigned a consequence level based on the forestry row of Table 2.

Electricity infrastructure and communication towers are selected by the owners or stakeholders based on a qualitative assessment of the impact that a bushfire would have on an impact area (e.g. the capital value plus disruption of economy).

For Environment, the Bushfire Biodiversity Consequence GIS layer prepared by DPIPWE is used, which is aligned to TERAG consequences ratings. This layer considers the conservation significance of natural values such as threatened species, threatened vegetation communities and fire-sensitive vegetation, as well as the vulnerability of the value to bushfire. The mapped units are grouped for the risk register by a computer model that identifies shared exposure to the same potential ignition points and fire paths. All natural values included have a consequence level of at least Moderate or higher.

Some natural values are more vulnerable to damage from bushfire than others: some native vegetation is very sensitive to fire (e.g. rainforest with King Billy pine) while other kinds are well adapted and may even benefit from fire (e.g. lowland grassland) (Pyrke and Marsden-Smedley 2005). The rainforest with King Billy pine is rated as either Major or Catastrophic bushfire consequence, depending on the size of the forest stand, because the recovery of the pines, if it happens at all, will take centuries. In contrast, the lowland grassland is rated as Insignificant because it is a vegetation community that is well adapted to bushfire. Both of these vegetation communities have very high conservation value.

3.2.2.3 Likelihood measures

The likelihood of a bushfire impacting a value depends on the weather, neighbouring fuels, topography, flammability of the value, ignition sources and suppression capability. Here is a summary of how these factors are considered in the risk register of the TERAG bushfire tool:

- *weather, neighbouring fuels, topography*: computer modelling (Phoenix RapidFire) is used to calculate metrics for fire behaviour; this is one of the two inputs for determining the likelihood (AEP) of the risk register
- *flammability of the value:* the metrics calculated above are deemed to have impacted at fire intensity thresholds that relate to very broad categories of assets/values (e.g. human settlement areas, softwood forest plantations, rainforest); detailed information on individual asset flammability (e.g. buildings) is not considered
- *ignition sources:* the Bushfire Risk Assessment Model (BRAM) Ignition Potential map is a model of ignition point history that provides the second of the two inputs for determining the likelihood (AEP) of the risk register
- *suppression capability:* is considered while estimating control strength (see section 3.2.2.4)

Phoenix RapidFire is a fire spread modelling tool used to quantify the potential impact of ignitions to each mapped value area. This computer tool 'ignites fires' on a one kilometre grid across the entire State and they spread independently (i.e. they do not run into each other) under scenario weather conditions (section 3.3.2) for 11 hours. The impact is measured for those assets where the fire intensity was deemed high enough when the modelled fires arrived. More details on the simulation methodology is provided in Appendix B.

Phoenix provides a measure of some components of likelihood of impact, expressed as fire intensity and spotting density, that are a function of the current state of fuels and the topography in the broader landscape adjoining the value under the design fire (section 3.3.2) weather conditions. Phoenix accounts for some, but not all, of the factors that contribute to likelihood, for example, it does not consider ignition potential (as related to the known history of ignitions), nor the flammability of the value *(e.g. the flammability of buildings is highly variable)*, nor the fuel status immediately adjacent to values *(e.g. presence or absence of hazard management areas)*. The Phoenix output also has a component of consequence, because it quantifies impact, but for the risk register of the TERAG bushfire tool this is not part of the consequence rating that is assigned to each value/asset.

The fire behaviour impact metric calculated from Phoenix RapidFire and the BRAM Ignition Potential are combined in a matrix (Table 4) to determine the likelihood level, which is calculated automatically in the risk register and presented in the Likelihood (AEP) and Likelihood (AEP Score) columns.

Table 4. Matrix used to determine likelihood level in the risk register

	Ignition Potential (BRAM)				
Fire Behaviour Impact Metric	**Very Low 1**	**Low 2**	**Moderate 3**	**High 4**	**Very High 5**
Very Low 1	Very Rare 1	Rare 2	Rare 3	Rare 4	Rare 5
Low 2	Rare 2	Rare 4	Rare 6	Unlikely 8	Unlikely 10
Moderate 3	Rare 3	Rare 6	Unlikely 9	Unlikely 12	Unlikely 15
High 4	Rare 4	Unlikely 8	Unlikely 12	Unlikely 16	Likely 20
Very High 5	Rare 5	Unlikely 10	Unlikely 15	Likely 20	Likely 25
Fire behaviour impact metric from Phoenix RapidFire – thresholds will vary depending on asset type, e.g. 10,000 kW/m for HSA, 1,000 kW/m for plantations, 120 kW/m for natural values ( )					

3.2.2.4 Control effectiveness

The effectiveness of existing controls is rated for each asset/value of the risk register. Applying the TERAG method, effectiveness is assessed for:

- control strength – how well or how much the control reduces risk at the present time
- control expediency – the willingness, practicality and or capacity for the managing organisation or landowners to use the control, including the management and social arrangements that have been established

Typical controls for bushfire, not including those that are widely applicable for all assets/values, include:

- fuel reduction burning
- fuel breaks
- planning (building and development)
- community preparedness (active individual property owner preparedness)
- suppression capability

Table 5 is used as a guide to estimate combined strength for all the controls for bushfire risk for the specific value/asset. Similarly, Table 6 is used to estimate a combined expediency score for the specific value/asset.

Table 5. Strength of existing controls

Level	Fuel reduction burning	Fuel breaks	Land use planning and building	Community preparedness	Suppression capability
High	>75%	>75%	>75%	High level of individual preparedness	Immediate or rapid response of sufficient and appropriate resources
Medium	26 to 75%	26 to 75%	26 to 75%	Moderate individual preparedness	Moderate response of sufficient and appropriate resources
Low	1 to 25%	1 to 25%	1 to 25%	Little individual preparedness	Slow response of sufficient and appropriate resources
Very Low	0%	0%	0%	No individual preparedness	Poor response of sufficient and appropriate resources

Fuel reduction burning: percentage of scheduled burn units implemented; Very Low if no burn program.
Fuel breaks: percentage of the asset boundary that has managed fuel breaks or hazard management areas that comply with current planning standards (e.g. TFS Fuel Break Calculator) – includes any hazard management area on the property of the building owners.
Land use planning and building: percentage of structures that comply with current planning controls (typically built since December 2012).
Community preparedness: considers how well the community as a whole and land managers are actively preparing for bushfire.
Suppression capability: consider proximity of all resources for initial attack and defensive strategies, including appliances from all organisations, remote firefighters, machinery and aircraft.

Table 6. Expediency of existing controls

Level	Fuel reduction burning	Fuel breaks	Land use planning and building	Community preparedness	Suppression capability
High	Tenure blind risk-based burning program	Coordinated & ongoing funded works program	Bushfire-prone area overlay in planning scheme	Active Bushfire-Ready Neighbourhood program in local area; current & tested plans in place	Tailored resource to risk allocation (e.g. Three Capes Track, machinery in forested areas)
Medium	Some organisation-specific programs	Variable level of commitment by landowners	N/A	Successful BRN Program or recent major bushfire in local area	Standard hot day response capability arrangements, i.e. local brigades supported by aircraft and strike team
Low	Occasional ad hoc burning; or most fuel untreatable	Occasional ad hoc maintenance of existing breaks	N/A	Low capacity stakeholders and community members	Minimal response capability arrangements
Very Low	No burning; or all fuel untreatable	No breaks	N/A	Community not receptive to preparedness activities	No response capability arrangements

3.2.2.5 Confidence level

The consequence and likelihood for assets/values in the risk register can be readily quantified when and where good data is available. Some assets/values, however, may require an estimate to be determined, and therefore our confidence in the risk rating would be much lower. A confidence rating is assigned to each row in the risk register, applying the criteria in TERAG Table 17, particularly participant agreement; weight should be given to the lowest rating criterion.

3.3 Identify the risks

3.3.1 Identify potential exposure

Many assets and values exposed to potential bushfire impact are already identified and grouped in the risk register, applying the criteria explained in section 3.2.2.2.

The Fire Management Area Committee (FMAC) can add values that meet the following criteria:

1. The map unit should be a group of assets/values that could all be impacted by a single major bushfire event. This map unit represents a risk statement (section 3.3.3).
2. The group of assets/values should have similar characteristics (e.g. a power station site and associated infrastructure).
3. The consequence that is determined should be at least Moderate level or higher (including Major or Catastrophic) for the appropriate impact area (People, Economy, Environment, Public Administration, Social Setting).
4. Single point assets (i.e. small areas) can be included if they are outside Human Settlement Areas and the consequence has been assessed as Moderate, Major or Catastrophic.
5. Where appropriate (e.g. Economy), the consequence is aggregated across all of the group where appropriate.
6. Consequence of the group is the highest level within the group. For example, a group of buildings may have various Social Setting levels (i.e. Minor, Moderate, Major) but the group level is Major.
7. Economy value is assigned a level that considers not only the capital cost of replacing buildings and other infrastructure, but the disruption cost for loss of income for services, business and production for the anticipated period.

Table 7 indicates examples of assets and values for which the FMAC, time permitting, could seek further information from the community or add to the risk register based on the knowledge of FMAC members. The consequence rating for any such values that are added is determined by the FMAC members, based on Table 2 for People or Economy, or Tasmanian Emergency Risk Assessment Guidelines (TERAG) Table 13 for Social Setting.

Table 7. Examples of assets or values that could be added to the risk register

TERAG Consequence Category	Asset or Value	Category Calculation
Economy	Pasture, crops, vineyards	TERAG Economy category
Economy	Industrial sites	TERAG Economy category
Economy	Tourism: cost of disruption to businesses	TERAG Economy category
Economy	Road access (e.g. loss of a bridge): cost of disruption to businesses	TERAG Economy category
Economy	Critical infrastructure: disruption to businesses	TERAG Economy or Social Setting
Social Setting	Displacement of people	TERAG Community wellbeing
Social Setting	Community groups: disruption of ability to function	TERAG Community wellbeing
Social Setting	Special value for community (natural, built or recreational)	TERAG Culturally important objects

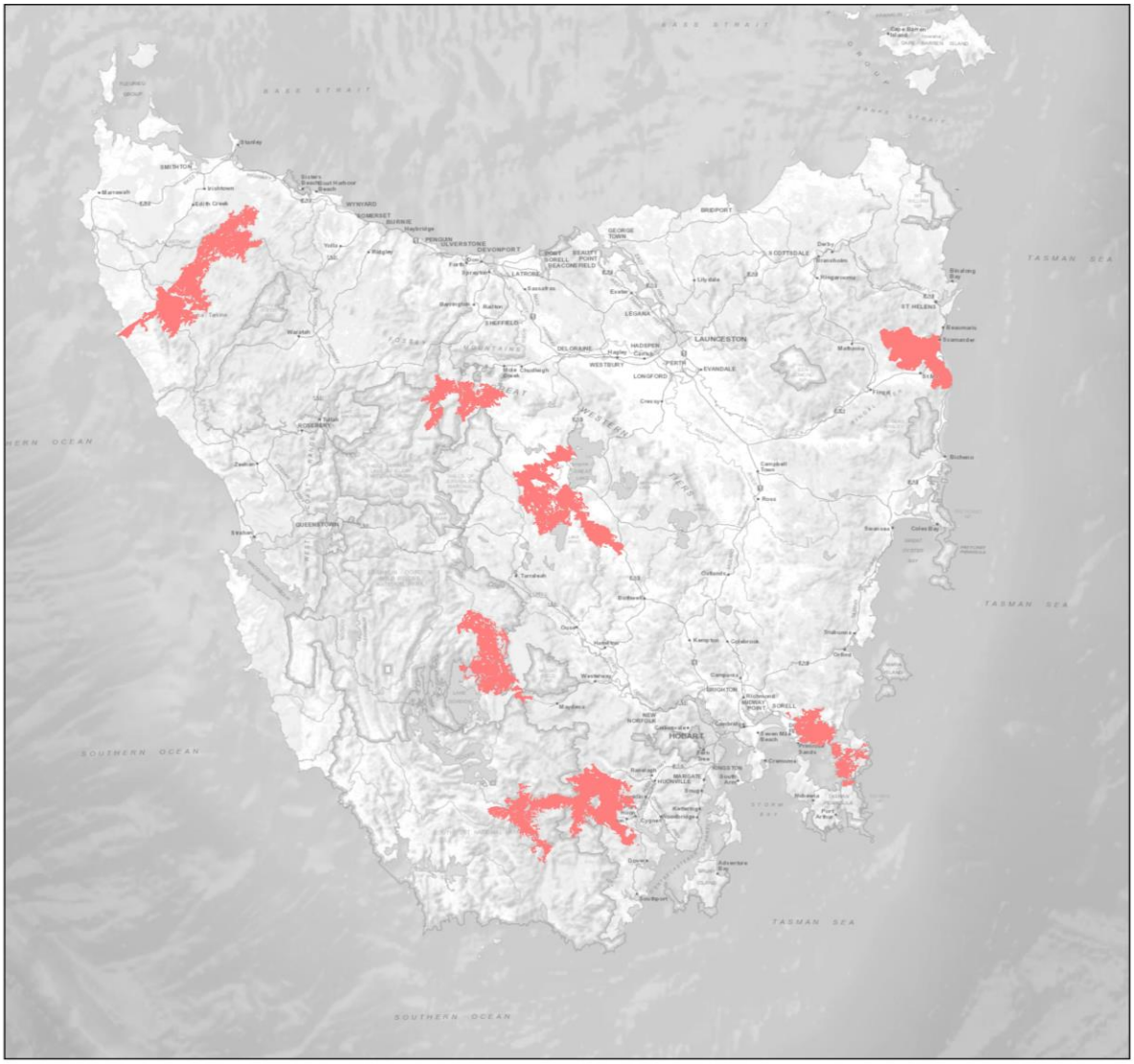
3.3.2 Bushfire hazard scenarios

The bushfire hazard scenarios that should be considered for this risk assessment are very large events, typically 10,000 to 20,000 hectares, occurring under severe fire weather conditions. Such fires could be expected to have considerable social, economic and environmental impact. Smaller bushfires can, of course, also have catastrophic impacts, but it is important not to underestimate the scale of the risk and 'thinking big' helps to create this mindset. In any case, risk treatments developed for large bushfires will generally mitigate risk for smaller bushfires in the same area.

Some examples from recent Tasmanian fire history illustrate the kind of events to consider (Table 8). It is helpful to examine a map of Tasmania displaying major fire boundaries to gain an appreciation of scenario scale – see Map 1 which displays examples of major fires that have occurred since 2006.

Table 8. Examples of bushfire scenarios since 2006 that are at the scale

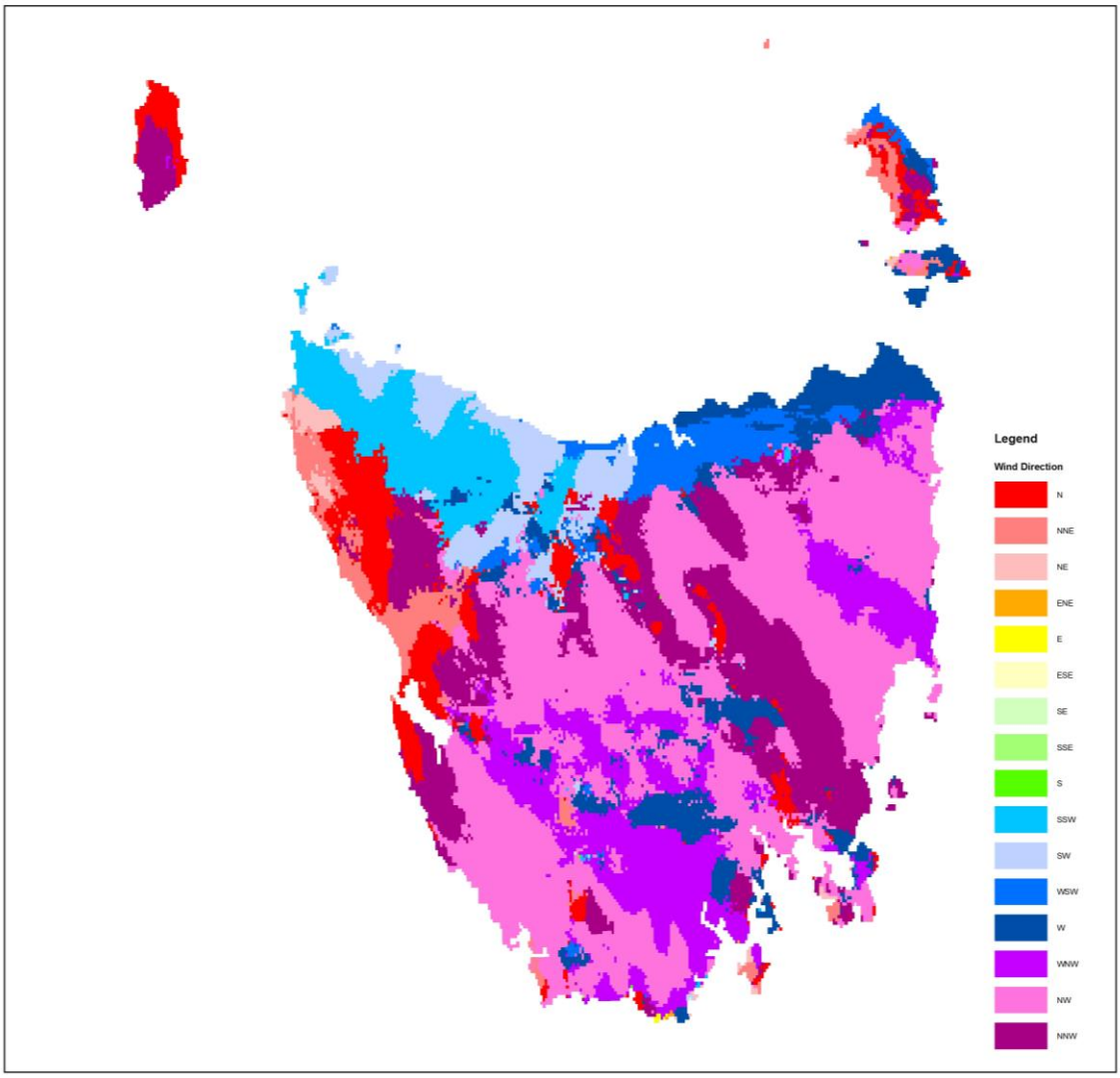
Fire Name	Year	General Location	Size (ha)	Major Impacts Summary
Lohreys Road	2006	Scamander	30,900	• 1 firefighter killed • 26 dwellings destroyed • significant loss of production forests
Inala Road	2013	Forcett, Dunalley and Forrestier Peninsula	23,360	• 1 firefighter died (indirectly) • 193 dwellings destroyed • significant disruption of primary industries and tourism
Pipeline Rd & Rulla Rd	2016	Arthur River & Tarkine	61,820	• significant loss of production forests
Lake Mackenzie Road	2016	Mersey River valley & Central Plateau	24,700	• significant damage to natural values • significant loss of production forests
Gell River	2019	Franklin-Gordon Wild Rivers National Park	35,036	• damage to natural values • disruption of tourism, bee keeping and forest industries
Great Pine Tier	2019	Central Plateau	51,185	• 1 dwelling destroyed • very significant disruption of local communities • significant damage to natural values
Riveaux Road	2019	Southwest National Park to Geeveston	63,720	• 7 dwellings destroyed • damage to tourism and forest industry infrastructure • very significant losses of production forests • very significant disruption of tourism and forest industries • significant damage to natural values



Map 1. Examples of major fires since 2006 with significant impacts, indicating the

The bushfire hazard scenarios are rare events that only occur when fuel dryness and weather conditions combine to create one or more days of very significant fire danger. The Annual Exceedance Probability (AEP, see TERAG page 55) of around 10% is the target scenario to be used, as expressed as a Forest Fire Danger Index (FFDI) value; this is calculated by analysis of weather records of the inputs that are used to calculate the FFDI (drought factor, wind speed, temperature and relative humidity), applying the method of Douglas et al. (2014). The same FFDI value is the basis for the weather inputs that are used for determining the likelihood, as related to fire behaviour (section 3.2.2.3).

Each Fire Management Area (FMA) has a different climate history and therefore a different FFDI value that relates to the ~10% AEP fire event. Furthermore, the wind direction associated with a significant fire weather day tends to be consistent in any one area, but not the same across all of Tasmania (Map 2).



Map 2. Most common wind direction on days of significant fire weather

Table 9 shows examples of the AEP for FFDI applied for each FMA, along with the wind direction associated with that event. This is also known as a design fire scenario. These fire weather conditions are not the worst that have ever been recorded for that area; for example, Black Tuesday 1967 was considerably worse than the scenario indicated for the Hobart FMA in Table 9. The scenarios represent a Fire Danger Rating of Very High for most areas, although Severe for some parts of south-east Tasmania.

Table 9. Examples of weather parameters used for the bushfire hazard scenarios

Fire Management Area	Weather station	FFDI	AEP (%)	Wind direction	Event date
King Island	King Island airport	37	10	N	12 December 1994
West Coast	Strahan aerodrome	30	15	NNW	12 December 1994
	Wynyard airport	20	10	WSW	21 January 2016
Central North	Devonport airport	27	10	SW	11 March 2018
Tamar	Low Head	19	10	NNW	23 January 2010
	Cressy	39	12	NW	4 January 2013
Flinders	Flinders Island airport	43	14	NW	14 March 2008
North East	St Helens aerodrome	39	11	NW	4 January 2013
	Scottsdale	26	12	NW	11 January 2016
Midlands	Ouse fire station	44	13	NW	14 March 2008
	Liawenee	24	11	NW	30 January 2019
East Coast	Friendly Beaches	47	10	NNW	4 January 2013
	Hobart airport	55	13	NNW	28 January 2014
Hobart	Hobart (Ellerslie Road)	53	13	NW	28 January 2014
	Hobart airport	55	13	NNW	28 January 2014
Southern	Geeveston (Cemetery Road)	29	10	NW	25 December 2015
	Bushy Park	44	13	NW	28 January 2014

FFDI: Highest Forest Fire Danger Index recorded for this date.
AEP: Annual Exceedance Probability of the FFDI.

3.3.3 Risk statements

Risk statements are single sentences that detail the relationship between the source(s) of risk, the impacted area(s) and the consequences for the given scenario (section 3.3.2). There should be as many statements as necessary to cover all the impact categories and possible consequences.

Each risk statement describes:

- the source of risk
- the emergency event that emerges from the source of risk
- the impact area
- consequences that may result from the source of risk interacting with the impact area

Examples of a risk statement for each of the five impact categories is as follows:

Economy: A dry lightning storm on a day of FFDI 29 ignites a bushfire that spreads and impacts the rural area of Scottsdale resulting in extensive damage to forests and infrastructure causing a serious economic impact to the forest industry.

People: A campfire on a day of FFDI 53 escapes and ignites a bushfire that spreads and impacts the Freycinet National Park resulting in death and injury to visitors.

Environment: A dry lightning storm on a day of FFDI 29 ignites a bushfire that spreads and impacts the Walls of Jerusalem National Park resulting in extensive damage to ancient pencil pine forests.

Public Administration: A garden waste fire on a day of FFDI 44 escapes and ignites a bushfire that spreads and impacts the St Marys area resulting in destruction of the district school.

Social Setting: An arsonist on a day of FFDI 63 ignites a bushfire that spreads and impacts the Tasman Peninsula area resulting in destruction of heritage buildings and the visitor centre at the Port Arthur Historic Site.

In practice, for the bushfire risk assessment, these statements are listed in the risk register worksheet as a brief description of consequence; this column in the risk register is called Asset Description (Risk Statement). The bushfire hazard scenario has already been designated in section 3.3.2, while the source of ignition will be considered, if appropriate, in the risk treatment actions. The concept of a risk statement underpins what is captured in summary in each row of the risk register worksheet.

3.3.4 Existing controls

For every risk statement there will already be some controls in place to mitigate that risk. For example, consider the *public administration* example from section 3.3.3: an escape from a garden waste fire at St Marys destroys the district school. The controls that are in place at the present time are as follows:

- School bushfire plans, for example, Bushfire Response Plan (DoE)
- Fire permit period, Total Fire Ban, media campaigns (TFS)
- Action plans of PWS, STT and forest companies
- St Marys Bushfire Response Plan (TFS)
- Bushfire-Ready Schools program (TFS)
- Volunteer fire brigade (TFS)
- Standby arrangements for severe fire weather days, typically when FFDI is 38 or higher (e.g. aircraft, Incident Management Team, hot day response, pre-positioning of strike teams)
- Weather forecasting (BoM) and fire behaviour prediction (TFS)
- Fuel reduction burn (March 2017)

Many of these controls will have wider application and do not need to be listed for every risk statement, but they are important to recognise when analysing the risk (section 3.4.1).

3.4 Analyse the risks

3.4.1 Effectiveness of current controls

For each asset/value in the risk register, the *strength* of the overall combination of the controls that are currently in place for that value is estimated as an average, using Table 5. Ideally, a more quantitative assessment of each control would be calculated applying the ratings inherent in Table 5. However, this is not practical because of the large scale of the Fire Management Area (FMA) bushfire risk assessment, so it is necessary to make an estimation. Neither is it possible at this time to measure quantitatively how the controls interact and combine to reduce bushfire risk, or the relative strength of the controls.

Using Table 6, for each asset/value in the risk register, the *expediency* of the overall combination of controls for this asset/value is estimated as an average, that is, the willingness, practicality and or capacity for implementing the controls.

3.4.2 Review consequence, likelihood and risk level

The consequence and likelihood ratings are calculated for statewide data sets applying criteria and methods described in sections 3.2.2.2 and 3.2.2.3. It is necessary for the Fire Management Area Committee (FMAC) to review these determinations to be certain that no inconsistencies or obvious errors are present.

The consequence and likelihood need to be determined for any other values that are added to the risk register individually. The consequence is determined by the FMAC members while the likelihood is calculated by the method described in section 3.2.2.3.

The risk level is calculated automatically in the risk register of the Tasmanian Emergency Risk Assessment Guidelines (TERAG) bushfire tool, but if the risk rating does not make sense, then checking of other rows in the risk register is required to ensure they are correctly determined (e.g. consequence, likelihood, control effectiveness). Table 10 is from TERAG and shows the matrix that is used to calculate the risk level.

Table 10. Tasmanian emergency risk assessment likelihood /consequence matrix used to calculate overall risk level in the risk register of the TERAG bushfire tool.

	CONSEQUENCE LEVEL				
LIKELIHOOD	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
Almost Certain	MEDIUM	MEDIUM	HIGH	EXTREME	EXTREME
Likely	LOW	MEDIUM	HIGH	EXTREME	EXTREME
Unlikely	LOW	LOW	MEDIUM	HIGH	EXTREME
Rare	VERY LOW	LOW	MEDIUM	HIGH	HIGH
Very Rare	VERY LOW	VERY LOW	LOW	MEDIUM	HIGH
Extremely Rare	VERY LOW	VERY LOW	LOW	MEDIUM	HIGH

3.4.3 Determine confidence level

The confidence rating in the risk register is set by default to 'Highest', however, the FMAC should review the assigned ratings in the risk register and also apply the same criteria to any assets/values that are added to the risk register. If necessary, the confidence rating can be changed to a lower level using the criteria in TERAG Table 17.

3.5 Evaluate the risks

3.5.1 Review priority ratings

The risk register of the Tasmanian Emergency Risk Assessment Guidelines (TERAG) bushfire tool automatically calculates the priority rating based on the levels assigned to consequence, likelihood and confidence. Not surprisingly, the priority rating increases as the risk level increases (i.e. the combination of consequence and likelihood levels). The priority increases, however, with *decreasing* confidence level. This is because a low confidence rating helps to identify a need for some form of further investigation or detailed risk assessment; failure to do this could lead to an unexpected and significant impact as a result of a bushfire, or conversely, unwarranted investment in treatments.

There are only four TERAG priority ratings (i.e. 2, 3, 4 or 5) in the Priority column of the risk register, so many asset/values can have the same TERAG priority, even within one Fire Management Area. The Priority FMAC column provides a finer scale resolution of priority by utilising the Likelihood (AEP Score) column in combination with the TERAG priority. In other words, in the Priority FMAC column, the fire simulation modelling is used to subdivide the TERAG priority into more levels.

Sorting of the data based on Priority FMAC and then reviewing the list in the register is useful because it helps develop an understanding of what are the drivers of the priority rating.

Each category of assets/values has been treated differently in terms of designated consequence, bushfire impact metric and controls, so direct comparisons of priority between asset categories may not be possible. For example, comparisons of priority will make more sense when comparing one human settlement area group with another, than when comparing a human settlement area group with a production forest group. This is an inherent feature of the risk assessment process that must be recognised.

3.5.2 Determine action: treat, further analysis or monitor

A treatment option must be selected in the risk register of the TERAG bushfire tool, following review of the priority ratings:

Category 1: Risk requires treatment (with confidence to determine treatment objectives).

Category 2: Risk requires further analysis (which may require a further investigation or workshop).

Category 3: Risk (currently) requires ongoing monitoring and maintenance of existing controls.

The decision tree in Figure 14 of the TERAG can be used to help select the treatment option. Furthermore, the priority columns of the risk register are used as a guide to decide on a cut off for inclusion in the treatment plan, if this is necessary to determine a realistic limit to the number of treatment actions to be included. Occasionally, however, risk register priority scores may be disregarded, and assets/values excluded or included in the treatment plan when considering the following factors:

- Local knowledge of FMAC members and stakeholders that was not considered in the risk assessment
- Queries about risk assessment scores, for example, consequence or likelihood ratings that do not look logical or correct
- These are important decisions to make for the risk assessment and may require some discussion by FMAC members.

3.6 Treat the risks

3.6.1 Identify and evaluate treatment options

This stage of the risk assessment process is where the FMAC members should invest most of their time. It will involve discussion and consideration of various treatment options. There are many actions that can be undertaken to treat bushfire risk; the most common strategies are listed in Table 11. The first step is to list the realistic possibilities for treatment strategies.

The next step is to evaluate the listed treatment options. Table 12 provides a checklist of questions that are worth considering during this evaluation; there could be many reasonable explanations for rejection of a treatment suggestion.

It is important at this stage to consider where efficiencies and benefits can accrue from collaboration for risk treatments across multiple land tenures, which implicates an agreement from two or more organisations or individuals. This is sometimes referred to as a tenure blind approach.

Treatment options for assets should be considered using a landscape approach. If there are multiple assets in an area, consider whether one strategically placed treatment can be used rather than multiple smaller treatments.

If assets have been listed in more than one consequence area, then it is important to ensure that the treatment option is appropriate for each asset. For example, if an asset is listed as both an economic and an environmental asset, it is important that treatments required to protect the economic asset do not negatively impact on the environmental values of the asset and vice versa.

Here are some more considerations when developing the treatment plan (see also Table 12):

- All treatment actions that are determined and documented in the BRMP should be realistic and acceptable to the organisations or individuals responsible for their implementation.
- Treatments applying to multiple assets will take on the priority of the asset with the highest risk.
- Environmental implications associated with the treatment should be considered. This includes the impacts that the treatment might have on the environment and environmental factors that might impact on the success of the treatment.
- It is possible for treatment strategies to include existing fuel management and fire trails, including ongoing work.

Finally, a selection of treatment options is made. This list is added to the treatment plan of the Tasmanian Emergency Risk Assessment Guidelines (TERAG) bushfire tool in summary format.

Table 11. Examples of common treatment strategies for bushfire risk

Risk treatment strategy	Treatment category	Example treatment types
Avoid the risk	Prevent development	Bushfire-Prone Areas Code (e.g. vulnerable uses)
Remove the risk source	None	Generally not possible (i.e. complete removal of bushland)
Change the consequence of the risk	Asset ignitability	Hardening/maintenance of critical infrastructure (e.g. utilities)
		Fire-resistant construction materials
		Retrofitting existing buildings
		Building Code of Australia, Australian Standard AS 3959 – 2018 Construction of buildings in bushfire-prone areas
	Land use planning	Bushfire-Prone Areas Code (subdivisions, vulnerable uses)
	Community safety	Designated Evacuation Centres & Nearby Safer Places
		Risk management plans for high-risk land uses
		Bushfire Survival Plans (individual properties)
		Emergency Response and Evacuation Plans
	Behavioural change initiatives	Targeted education programs (e.g. Bushfire-Ready Neighbourhoods, Community Bushfire Protection Plans)
		Community-based social marketing programs
		Information campaigns
Change the likelihood of the risk	Fuel reduction	Planned burning, Strategic Fire Management Zones
		Fuel breaks, hazard management areas, Asset Protection Zones
		Chemical treatments
		Animal grazing
	Ignition management	Permit Period, Total Fire Bans, campfire restrictions
		Targeted anti-arson campaigns in collaboration with law enforcement
		Industry sector specific programs (e.g. utilities, forest industry, transport)
		General and targeted public education campaigns (farm equipment, hot works, private power poles and powerlines, Red Hot Tips)
	Preparedness	Access/egress improvements (e.g. fire trails)
		Upgrading of water supply for fire suppression
		Increased suppression capability
		Pre-positioned suppression resources
		Bushfire Response Plans
		Improved detection services
Retain the risk by informed decision	Accept risk	Community engagement
Share the risk	Insurance	Insuring for value of home or other asset replacement
		Sector-specific insurance (e.g. crop insurance)
		Business planning (e.g. record security)
		Business disruption planning (e.g. tourism enterprises)
		Resource spatial planning (e.g. plantations)

Table 12. Criteria for assessing treatment options

Criterion	Questions to assess the treatment option
Cost	Is this option affordable? Is it the most cost-effective? Is it capital and/or recurrent?
Practicality	Is applying this option realistic?
Timing	Will the beneficial effects of this option be quickly realised?
Leverage	Will the application of this option lead to further risk-reducing actions by others?
Administrative efficiency	Can this option be easily administered, or will its application be neglected because of difficulty of administration or lack of expertise?
Continuity of effects	Will the effects of applying this option be continuous or merely short term? If continuous, will the treatment option be sustainable over time?
Compatibility	How compatible is this option with others that may be adopted?
Jurisdictional authority	Does this level of government have the legislated authority to apply this option? If not, can higher levels be encouraged to do so?
Effects on people	What will be the health and wellbeing impacts of this option?
Effects on the economy	What will be the economic impacts of this option?
Effects on the environment	What will be the environmental impacts of this option?
Effects on public administration	What will be the administrative impacts of this option?
Effects on the social setting	What will be the social impacts of this option?
Risk creation	Will this option itself introduce new risks?
Equity	Do those responsible for creating the risk pay for its reduction? When the risk is not a result of people's decisions, is the cost fairly distributed?
Risk-reduction potential	What proportion of the losses due to this risk will this option prevent?
Political acceptability	Is this option likely to be endorsed by the relevant governments?
Public and pressure-group reaction	Are there likely to be adverse reactions to implementation of this option?
Individual freedom	Does this option deny basic and/or existing rights? Is it legal?

Adapted from NERAG (2015).

3.6.2 Develop the treatment plan

The treatment plan provides detail on the implementation of treatments. The treatment plan is prepared by the FMAC members at various forums:

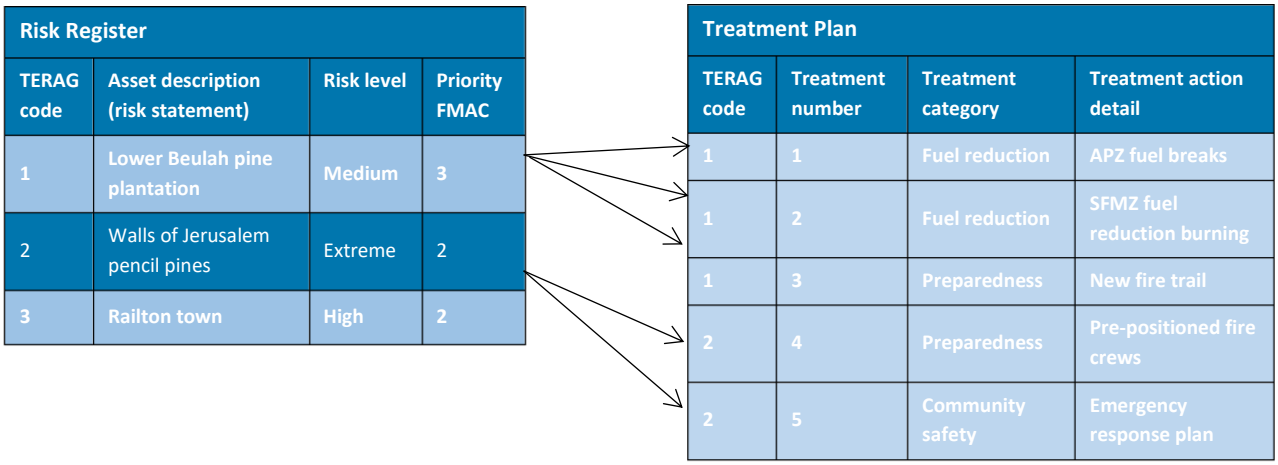
- Member organisations, separately from other FMAC members, develop treatments for the assets/values that they are responsible for managing
- A sub-group of FMAC members meet to develop treatments for assets/values in which they have a joint interest in collaborating
- FMAC meetings

The total amount of work involved in developing the entire treatment plan is too much to complete in one FMAC meeting, hence the need to undertake much of this work out of session. The treatment plans are compiled by the BRU planning officer and the consolidated treatment plan is reviewed by the FMAC members.

The treatment plan is developed in the TERAG bushfire tool and then copied to the template for the Bushfire Risk Management Plan (BRMP). The headings for the treatment plan worksheet are as follows:

1. TERAG Code – from the risk register
2. Asset description (risk statement) – from the risk register
3. Priority FMAC – from the risk register
4. Treatment number – unique number for every treatment
5. Treatment category – choose from standard list from Table 11
6. Treatment action detail
7. Bushfire management zone (if relevant)
8. Responsible organisation – which organisation/individual will undertake further planning and implementation
9. Completion date proposed
10. Comment

The treatment plan is related to the risk register – each risk statement is one row in the risk register, but it can have any number of treatments determined for it. Therefore, there can be many rows in the treatment plan that relate to one asset/value in the risk register (Figure 3). In the same respect, a single treatment can be assigned to more than one asset or group of assets.



Risk Register

TERAG code	Asset description (risk statement)	Risk level	Priority FMAC
1	Lower Beulah pine plantation	Medium	3
2	Walls of Jerusalem pencil pines	Extreme	2
3	Railton town	High	2

Treatment Plan

TERAG code	Treatment number	Treatment category	Treatment action detail
1	1	Fuel reduction	APZ fuel breaks
1	2	Fuel reduction	SFMZ fuel reduction burning
1	3	Preparedness	New fire trail
2	4	Preparedness	Pre-positioned fire crews
2	5	Community safety	Emergency response plan

Figure 3. Relationship between the risk register and the treatment plan

It is important when documenting the treatment action detail in the treatment plan to be clear about exactly what is proposed and the stage of that proposal. Figure 4 illustrates that treatment planning starts with the risk assessment, gets documented in the Bushfire Risk Management Plan, but the implementation plans and schedules can take various formats. It is helpful if the treatment action detail is consistent, where possible, with the terminology presented in Figure 4:

- Program schedule – is documentation of a proposed treatment program; may be informal such as map layers in GIS or spreadsheets
- Fire strategy – is a formal written document and may have various names, for example: bushfire management plan, bushfire mitigation plan, fire management strategy
- Bushfire response plan – is a formal written document (e.g. see Community Bushfire Response Plan in Glossary)
- Plan for a single activity (e.g. a new fire trail or fuel break)
- Operational plan – is a formal plan written to guide implementation of a single operation (e.g. fuel reduction burn)
- Works plan – is documentation of mitigation works (e.g. slashing program for one season)

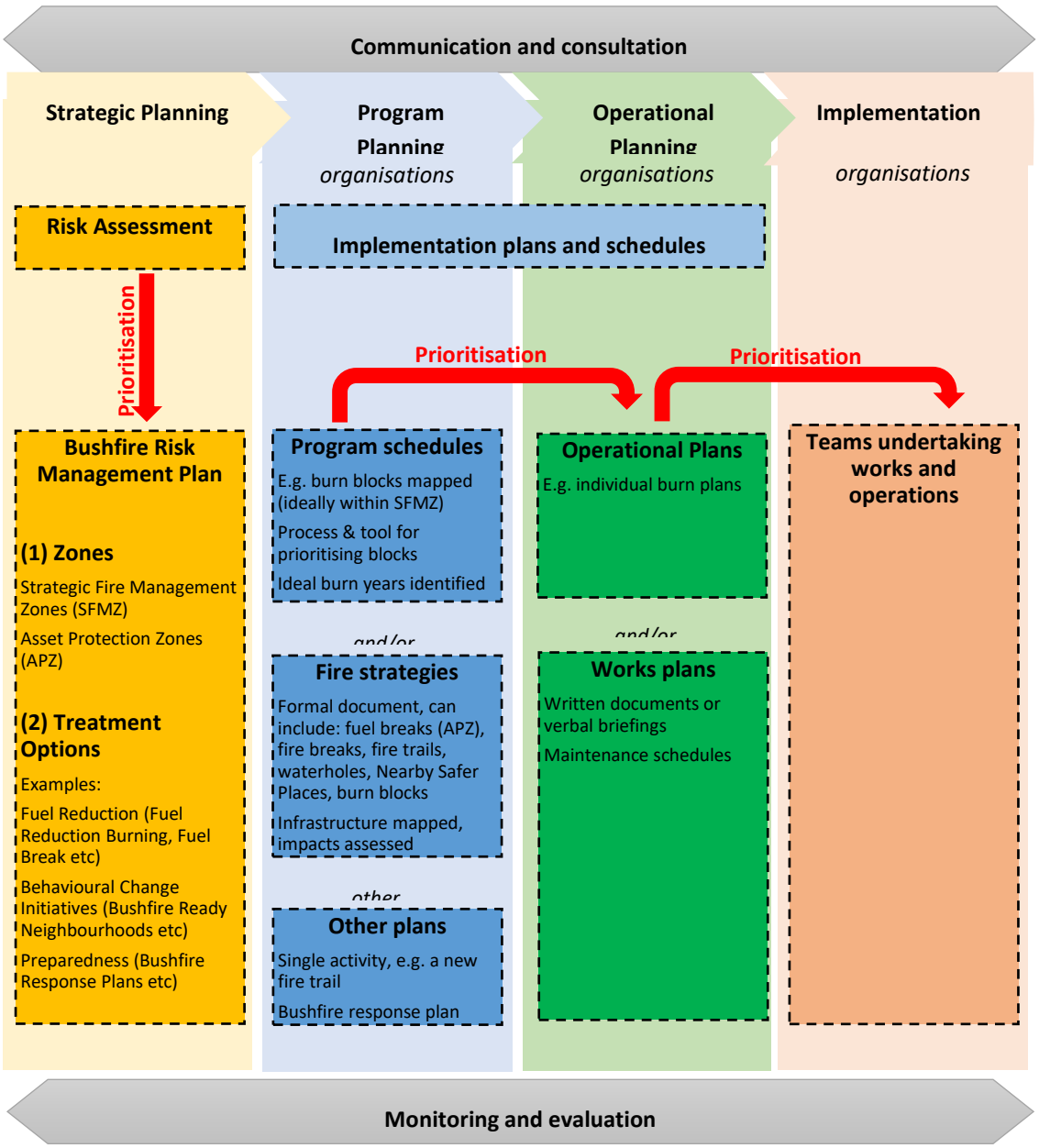


Figure 4. Process of treatment planning

The *stage* of the action is important to document because the Implementation Status Report (Section 6) will show progress against this description, for example:

- Field investigation of feasibility (e.g. for a new SFMZ or APZ)
- Prepare a map of a zone (e.g. a new SFMZ)
- Prepare a program schedule for a specified area (e.g. a program of burn blocks for one or more SFMZ)
- Write a new fire strategy or bushfire response plan
- Ongoing implementation of an existing fire strategy
- Write an operational plan or works plan
- Implementation of existing operational plans and works plans
- Request funding for a new initiative (e.g. a fire strategy or new fire trail)

3.6.3 Strategic fire infrastructure

Strategic fire infrastructure includes access roads, fire trails, tracks and water sources.

Strategic fire trails are listed in the BRMP and are designated where they are essential for fuel reduction and bushfire suppression and are regularly maintained. Fire trails that meet one or more of the following criteria could be considered strategic:

- Adjacent to the assets which they are required to protect
- Facilitate access and egress to assets
- Facilitate containing bushfires within a property (i.e. to meet landowner legal obligation)
- Facilitate access for firefighters, fire-fighting vehicles and earthmoving equipment to extinguish fires by direct attack
- Provide control lines for prescribed burning blocks or indirect attack on bushfires
- Lead to strategic water sources
- Reduce damage caused to natural and cultural values within a property by reducing the chance of emergency fire suppression works

Not all access tracks will be considered strategic fire trails, although some may be used for fire operations even if not designated as strategic. Some fire trails may have been deliberately closed or not maintained and identified to be quickly re-opened with minimal works; these are not strategic fire trails. Some tracks may be maintained for a variety of purposes including fire management, land management and recreation activities, as determined by the landowner or manager.

Strategic roads, typically public roads, are designated if likely to be used as control lines for prescribed burning blocks or bushfires. For effective use to control bushfires, the vegetation verges of strategic roads should be maintained by reducing fuels.

All strategic fire infrastructure is maintained to specified standards determined and applied by the respective landowner or manager.

4 Bushfire Risk Management Plans

4.1 Audience and presentation style

The Bushfire Risk Management Plans (BRMP) are written primarily for use by people and organisations who are going to be implementing the treatment actions; therefore, this influences the style and format of the plans. Some key principles guiding the content of the BRMP are as follows:

- The primary purpose of the plans is to guide the prioritisation of treatment programs.
- The documents should be as simple and brief as practical.
- The documents should not duplicate detail available in other plans (e.g. plans listed in Appendix A).
- Background and explanatory information should be kept to a minimum and should be, if necessary, contained in these guidelines or other supporting documents.
- The structure of the plans should follow the BRMP template presented in these guidelines.
- There should be a standard list of tables and maps using the formats detailed in the BRMP template.

4.2 Plan development and approval

The BRMP is prepared by the Fire Management Area Committee (FMAC) supported by the Bushfire Risk Unit (BRU).

A draft version of the BRMP will be advertised and made available to the public prior to preparation of the final version which is submitted to State Fire Management Council (SFMC) for approval. The purposes of the public exhibition are:

- to promote public awareness and understanding of bushfire risk management planning
- to facilitate community support for treatment of bushfire risk
- to enable comment on the draft BRMP

The process involved in receiving and addressing comments will be limited to altering errors of fact or information that is not an outcome of the risk assessment process. All feedback will be considered but may not necessarily be adopted; some matters may be noted for consideration in the next cycle of risk assessment and preparation of the BRMP.

A report summarising comments received from the public, inclusive of a response to the issues presented, will be prepared by the FMAC and BRU. This report will be made publicly available online along with the final version of the BRMP.

4.3 Community engagement

4.3.1 Community engagement for Fire Management Area Committees

The International Association for Public Participation (IAP2 2017) defines community engagement as follows:

> *Community engagement is a planned process with the specific purpose of working across organisations, stakeholders and communities to shape the decisions or actions of the members of the community, stakeholders or organisation in relation to the problem, opportunity or outcome.*

The FMAC will receive facilitated support from the Bushfire Risk Unit (BRU) staff through the processes that are outlined in this section. What follows are some broad 'guidelines' relevant to FMACs that will help contextualise how contemporary engagement is designed, implemented and evaluated.

Engagement carries a fundamental link to decision-making, with stakeholders being involved at a range of levels depending on the situation at hand.

The IAP2 developed the 'Public Participation Spectrum' to help organisations define what level of engagement is required by considering what level of influence the community can have in the decision-making process (Figure 5).

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Figure 5. Public Participation Spectrum

4.3.2 Community engagement purpose and design

To engage effectively with the community, the following matters must be clearly defined:

- What is the engagement project's purpose? Why? What is the problem?
- What is the decision or activity the stakeholder or community can influence?
- What are the 'negotiables' and 'non-negotiables'?
- What are the expectations for stakeholder or community action or behavioural change?

The approach for specific communities or stakeholders is tailored through the engagement design.

Contemporary engagement model design is a function of relationships, the critical relationship being between who leads and who acts. The FMAC has a role to *lead* and the community to *act* and *contribute*. The community, through the engagement process, will be led through a process of behavioural change, for example:

- understanding and responding to extra smoke resulting from fuel reduction burns (ranging from actual health issues requiring direct action to community dis/satisfaction with smoke events)
- landowners/managers implementing property risk treatments

At an institutional level, it could include:

- new or existing commercial enterprise incorporating bushfire risk and or smoke (planned or unplanned fire) risk in business planning
- property developers and local governments considering bushfire risk in the design and maintenance of new developments and green spaces.

4.3.3 Community engagement context and methods

Factors to consider for each design methodology include:

- global, national and regional trends/events
- community factors
- organisational factors
- local economic factors
- social factors (e.g. community groups in a feud and those considering themselves as 'leaders')
- seasonal timing, e.g. farmers
- personal factors

Selection of engagement method(s) is a function of an understanding of the community engagement purpose, design and context.

There are various approaches that help to support method selection (see examples in Table 13). Critical factors include matters such as scale (such as physical area to cover, or population) and time. Other considerations include FMAC and organisational capacity; there is little point in selecting a method no one feels comfortable to deliver.

Table 13. Examples of methods for engagement

Focus Group	A small group discussion hosted by a facilitator about a defined topic. Designed to allow for an open discussion that is guided by questions but may follow the flow of the participant's discussions
Focused Conversation	A structured process to host a conversation with community or stakeholder representatives. Includes a series of questions that are objective, then reflective, interpretive and decisional
Future Search Conference	A future planning process where participants undertake a series of sessions on the past, present and future, common ground, and action planning. Designed to develop a shared future vision
Public Meeting	A meeting organised by either the organisation or community with presentations and questions asked by the crowd
Public Display	Staffed or unstaffed displays of information, options, drafts or final decisions which are made available in a public place (see also below)
Public Events	An event involving food and activities around the engagement topic. Designed to reach audiences that may not have otherwise engaged. May also be an existing event and incorporate a 'Public Display' or a 'Drop-in' session
Submissions	Formal written submissions which must be made in line with defined rules
Surveys	A series of questions provided to a population sample, which may be a representative sample or a self-selected sample
'World Cafés'	A structured process where participants discuss a series of questions at a group of small tables. Each table has a 'host' that facilitates conversations during 'rounds'. At the end of each round, participants move to new tables/questions/concepts. Designed to share ideas, concerns, fears, feedback

4.3.4 Community engagement evaluation and monitoring

When designing a community engagement project, it is important to build in evaluation. Underpinning the statement(s) of purpose should be defined objectives and goals that:

- indicate that the purpose or intent is being realised
- guide the design of the community engagement method

Note that in some cases the evaluation criteria may not be met. If the evaluation criteria are strongly related to the community engagement purpose, this is not a failure. *Not meeting an evaluation criterion highlights where a gap in achieving the overall purpose is apparent*.

BRU staff will develop tools for recording relevant outputs specific to a community engagement project, along with its selection and design. This detail will be recorded in the community engagement tab of the Tasmanian Emergency Risk Assessment Guidelines (TERAG) bushfire tool.

4.4 Bushfire management zones

The bushfire management zones (Table 14) are a tool to identify assets and values and appropriate mitigation and response actions to protect or manage the risk to those values.

The names of zones and descriptors defined in Table 14 have been developed to work at the strategic level; organisations may choose to develop sub-groups of zones to implement on their own tenure, or to include additional detail on the treatments for each zone category.

The treatment plan identifies the priority assets/values; the bushfire management zones are used to delineate the treatment areas on the maps of the Bushfire Risk Management Plan (BRMP). All designated zones will have some specific detail on the treatment in the treatment plan.

Table 14. Bushfire management zones for treatment areas

Zone	Primary purpose	General location	Risk treatments
Asset Zone (AZ)	To identify assets and values requiring bushfire exclusion.	The physical boundary of the asset.	Building design elements such as: fire-resistant materials, ember proofing, sprinklers, water storage etc. Response plans.
Asset Protection Zone (APZ)	To protect human life, property and highly valued assets and values.	Adjacent to Asset Zones or elements in the landscape that can be used to this effect. Width determined by characteristics of the asset and the bushfire hazard (effective slope, vegetation type). This zone may encompass multiple land tenures.	Intensive bushfire fuel treatment around specific assets and the urban–rural interface to provide a fuel reduced buffer. May include both burning and mechanical fuel reduction. Includes Hazard Management Areas. Manipulation of fuel moisture (e.g. sprinklers), response plans.
Strategic Fire Management Zone (SFMZ)	To provide areas of reduced fuel in strategic locations, to reduce the: • speed and intensity of bushfires • potential for spot-fire development • size of bushfires. To help contain bushfires.	Close to or some distance away from assets (e.g. the urban–rural interface). Identified fire paths inform the location and delineation of the zone.	Fuel reduction burning, including broad-scale fuel treatment. Management should aim to achieve mosaic fuel reduction patterns. Fire intervals and intensity generally do not exceed ecological thresholds. Other bushfire protection measures to assist bushfire control: fire trails, water points, detection measures, response plans.
Land Management Zone (LMZ)	To meet the objectives of the relevant land manager such as: Traditional Owner practices, biodiversity conservation, production forestry, farming, research or recreation.	Any bushland areas outside the above zones.	Various, but can include planned burning, experimental treatments, fire exclusion or no planned action.

Asset Zone

Asset Zones correspond to the assets and values of the risk register (Map 3 of the BRMP, section 4.7) and may include, for example, Human Settlement Areas, forest plantations and fire-sensitive natural values. In addition to the building design elements indicated in Table 14, treatment can include a response plan that details pre-incident planning of appropriate response actions.

Asset Protection Zone

Asset Protection Zones (APZ) are indicated on Map 4 of the BRMP (section 4.7) and are designated in locations for one or more of the following treatments:

- fuel breaks that will be regularly maintained to a management standard (e.g. TFS 2016)
- fuel reduction burning at frequent intervals that may exceed ecological thresholds
- manipulation of fuel moisture (e.g. sprinklers to protect fire sensitive natural values)
- response plans that detail pre-incident planning of appropriate response actions

The designation of APZ is guided by the following considerations (see also Table 12):

- the priority of the need for treatment, which originates from the risk register
- the flammability of the asset
- the width of the zone that is appropriate for the treatment
- practicality of establishing the APZ, for example, slope and accessibility for maintaining a fuel break
- financial cost for establishment and recurring maintenance
- environmental and cultural impact (e.g. threatened communities and species, Aboriginal heritage sites)

Strategic Fire Management Zone

The Strategic Fire Management Zones (SFMZ) are indicated on Map 4 of the BRMP (section 4.7). The method and steps for delineating the SFMZ are as follows:

1. A draft SFMZ map is prepared with geographic information system (GIS), based on the intersection of the 'modelled ignition cell impact'[1] points (that relate to specific assets/values listed for treatment in the treatment register) and the 'treatable vegetation' layer. This is the 'first raw cut' that is then adjusted.
2. The Fire Management Area Committee (FMAC) and experienced fire practitioners review and adjust the draft SFMZ map based on local knowledge, potential and historic fire paths and logical boundaries. Adjustment can include adding areas not identified by the modelling map, plus areas of untreatable forest that are potential fire paths for which other bushfire protection measures may be determined (e.g. fire trails, water points, detection measures, areas identified as suitable for burnout during response operations, response plans).

Some more considerations for the design of boundaries for the SFMZ include:

- The location of an SFMZ adjacent to or near an APZ or AZ may provide synergy with other treatments.
- A minimum width will be required to provide an effective buffer.

[1] The ignition points that resulted in an impact to an asset/value with the fire behaviour modelling tool (Phoenix RapidFire).

The treatable vegetation layer is a GIS map that has been classified on the basis of the suitability of the vegetation community for fuel reduction burning (DPIPWE 2020). It is not appropriate to apply fuel reduction burning to the following kinds of vegetation and they are therefore classified as untreatable:

- fire-sensitive vegetation communities where any fire, planned or unplanned, will cause a long-term or permanent loss of biodiversity, vegetation structure or key species; for example, rainforest, alpine vegetation, native conifers or sphagnum peatland
- vegetation communities where burning under safe, controlled weather conditions will be ineffective at reducing the fuel; for example, wet eucalypt forest
- agricultural land and forest plantations because they are usually managed for an economic purpose that would be compromised by burning.

A complete list of treatable vegetation types is in Appendix 1 of DPIPWE (2020), but typically includes most types of the following vegetation groups:

- dry eucalypt forest and woodland
- buttongrass moorland
- native grassland and woodland
- coastal heathland and woodland

A map of treatable vegetation is also available online at LISTmap in the TASVEG 4.0 Fire Attributes layer, indicated by the 'FRB Treatment' field.

The SFMZ are not final boundaries for individual burning blocks but show where one, several or many burn blocks are to be determined (sections 2.1 and 2.3). Thus, the SFMZ delineates general areas for treatment. The individual burn units will need to be identified at the implementation planning stage, which is not part of the bushfire risk management planning at the FMAC level, but undertaken by the organisation(s) responsible for the fuel reduction burning treatment. Some form of treatment optimisation analysis (section 2.3) may be used to prioritise burning blocks within the already prioritised SFMZ.

Land Management Zone

Land management zones are only designated on Map 4 of the BRMP (section 4.7) where a bushfire-related treatment or prescription is identified, which may be secondary to the primary land management objective. For example, ecological or silvicultural burning may be the primary objective, while fuel reduction may be a secondary objective.

4.5 Template

The template Bushfire Risk Management Plan (BRMP) is to be used by all Fire Management Area Committees (FMAC), using the same structure, headings and order. The template includes:

- instructions shown in blue italicised font that are to be deleted from the final version of the plan;
- standard text that will be the same for all plans and should not be changed
- Appendix 1: Risk register – a standard table format which is copied and pasted from the Risk Register BRMP worksheet of the Tasmanian Emergency Risk Assessment Guidelines (TERAG) bushfire tool
- Appendix 2: Treatment plan – a standard table format which is copied and pasted from the TERAG bushfire tool
- Appendix 3: Bushfire Management Zones – a standard table that is the same for all plans
- Appendix 4: Current implementation plans – a standard format table to be completed by the FMAC

4.6 Treatment plan

The treatment plan is compiled in a worksheet of the Tasmanian Emergency Risk Assessment Guidelines (TERAG) bushfire tool (section 3.1); it is completed during the risk assessment process by FMAC member organisations and at various meetings (section 3.6), but after the completion of the risk register.

The treatment plan is copied from the TERAG bushfire tool and pasted into Appendix 2 of the Bushfire Risk Management Plan (BRMP). All updating should be done in the TERAG bushfire tool to maintain version control.

4.7 Maps

The Bushfire Risk Management Plans (BRMP) will have a standard set of map themes (Table 15) using standard formats and symbology. All the maps are published on LISTmap with hyperlinks from the BRMP to each theme, for example:

<hyperlink to LISTmap example>

Several of the maps are not published in entirety in the BRMP because they include too much detail to be seen on an A4 map – sample areas for these maps will be included in the BRMP at a legible scale.

Table 15. Standard maps in the Bushfire Risk Management Plan

Map number	Map title	Included in BRMP	Comment
Map 1	<FMA name> Fire Management Area location	Yes	
Map 2	Tenure summary map	Yes	
Map 3	Assets and values from the treatment register	Sample area only	Shows treatment number from treatment plan
Map 4	Bushfire Management Zones	Sample area only	Shows treatment number from treatment plan
Map 5	Strategic fire infrastructure	Sample area only	Shows treatment number from treatment plan
Map 6	Fuel treatability	Yes	
Map 7	Vegetation	Yes	

To view a map in LISTmap, follow these instructions:

1. Click on the hyperlink, for example: <hyperlink to LISTmap example>
2. To view the legend, click on the Layers tab on the right side of the map window. The layers in the map each have a legend which can be viewed by clicking on the arrow at the left of the item in the Layers window.
3. To zoom in or out of the map, click on the Tools tab on the left side of the map window, then click on Map Tools – a tool bar will appear with zoom in and out icons. If using a mouse with a wheel, zoom in and out by rolling the wheel.
4. Move around on the screen by clicking on the screen, holding the button, and dragging.
5. To find out more information on a map item or location, click on the map once and an 'Identify Results' box will appear with details on all layers for that point. Click on the arrows at the left side of this list to view more information.

4.8 Responsibilities

Responsibility for contributing to the development and finalisation of Bushfire Risk Management Plans (BRMP) is as follows:

4.8.1 Bushfire Risk Unit (BRU, TFS)

- Prepare statewide asset/value map data ready for the risk assessment
- Undertake fire behaviour modelling input for likelihood (section 3.2.2.3)
- Prepare draft risk register (partially completed)
- Prepare draft zone maps (modelled Strategic Fire Management Zones (SFMZ), section 4.4)
- Support Fire Management Area Committees (FMAC) in undertaking their risk assessments
- Assist with editing and final production of BRMP, including preparation of maps
- Advise on and support community engagement

4.8.2 Fire Management Area Committees

- Contribute to inclusion of additional asset/value data not already in the risk register
- Facilitate community participation (supported by BRU)
- Review and update the risk register (supported by BRU)
- Develop the treatment plan, both out of session and at FMAC meetings (supported by BRU)
- Review and refine draft bushfire management zone maps
- Contribute to writing BRMP based on the template (supported by BRU)

4.8.3 Individual organisations represented on FMAC

- Provide asset data in mapped format, including consequence rating, for Bushfire Risk Assessment Model (BRAM) or BRU to include in statewide asset/value layers
- Contribute to community participation events
- Attend risk workshops relevant to their assets/values
- Develop the treatment plan for those assets and values in which they have a management role, collaboratively if required

5 Implementation Plans

The Bushfire Risk Management Plan (BRMP) identifies priority areas for risk treatment actions at a strategic level but does not include all the detail for treatments. The organisations and individuals that are responsible for delivering the bushfire risk controls are responsible for developing further plans for implementation (section 2.3), as well as arranging resources and funding.

The joint preparation of implementation plans for treatments by collaborations of organisations is strongly encouraged, particularly where there are efficiencies and benefits from a tenure blind approach.

Neither the BRMP nor Fire Management Area Committee (FMAC) provide a source of funding for treatments actions, nor do they provide a process for seeking funding. The BRMP is, however, intended to provide evidence and justification for where funding and resources are most appropriate to be committed by stakeholders to mitigate bushfire risk. Therefore, identification of treatment actions and priorities in the treatment plan should be quoted in applications for funding whenever needed, for example, internally within organisations, or for any program funds that may be available from time to time from all levels of government.

The BRMP does not imply a statutory obligation for any stakeholder organisation or individual to commit to implementing the risk treatment actions, although this is certainly encouraged as far as possible and where agreed to in the treatment plan. An individual organisation's own policies and legal obligations will still apply, for example, environmental impact assessment.

The delivery of treatment actions is typically carried out by the landowner, either an individual or an organisation, where the actions involve land management activities such as fuel reduction burning or the construction and maintenance of fuel breaks and fire trails. One exception is the Fuel Reduction Program that is funded, coordinated and implemented by the Tasmania Fire Service, Parks and Wildlife Service and Sustainable Timbers Tasmania; this is undertaken on behalf of and with the agreement of individual landowners or organisations (e.g. councils). The priorities of the Fuel Reduction Program are guided by the priorities identified in the treatment plans of all BRMP.

Some examples of organisations that may be responsible for implementing treatment actions, including development of further plans, include:

- **Local government councils** – bushland reserves that they manage or own
- **Parks and Wildlife Service (PWS)** – all categories of reserve land managed under the *National Parks and Reserves Management Act 2002*, public reserves under the *Crown Lands Act 1976* and Future Potential Production Forest
- **Sustainable Timbers Tasmania (STT)** – Permanent Timber Production Zone Land
- **Wellington Park Management Trust** – preparation of fire plans for the Wellington Park that are implemented by councils and PWS
- **Timber companies** – all land that they own or for which they have management agreements
- **TasNetworks** – all powerline easements and infrastructure
- **Hydro Tasmania** – all power generating infrastructure
- **Tasmania Fire Service (TFS***)* – fuel reduction burning and associated access and control lines by agreement with private property owners or organisations; Bushfire Protection Plans; Bushfire Response Plans; Community Bushfire Mitigation Plans.

6 Review and monitoring

The Bushfire Risk Management Plan (BRMP), including appendices and maps, will be subject to an annual review. The resulting revised Bushfire Risk Management Plan is submitted to the State Fire Management Council on or before 30 September for approval for the 1 October – 30 September period following that review (Section 20(1)(c) Fire Service Act 1979).

The revised BRMP meets the requirement of Section 20(1)(c) where:

1. It is applicable for 1 October to 30 September
2. It is based on the 3-year risk assessment for the FMA. This risk assessment is considered relevant in light of the fire seasons since the last risk assessment
3. It is based on the last accepted BRMP for the FMA
4. Within the FMA, it details changes to
    a. Fire history (major bushfire events)
    b. the Treatment Plan
    c. the Risk Register
    d. usage of the area
    e. new or changed asset values
5. It is endorsed by the relevant Fire Management Area Committee and approved by the State Fire Management Council.

The Fire Management Area Committee (FMAC) is required to monitor progress towards the completion of treatment works listed in the Bushfire Risk Management Plan (BRMP), including the timeliness of the works. The Implementation Status Report provides a summary of progress on treatment actions. The report is prepared twice a year by the FMAC supported by the Bushfire Risk Unit (BRU) and provided to the State Fire Management Council (SFMC).

The Implementation Status Report is compiled in a worksheet of the Tasmanian Emergency Risk Assessment Guidelines (TERAG) bushfire tool – adding information that is related to the treatment plan, then copying and pasting the table into the template (Appendix C). In addition to the table, the report should include a written narrative summary that:

- highlights major progress on treatment actions;
- highlights any current issues that are barriers to implementation; and
- makes recommendations to SFMC that relate to treatment implementation

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Appendices

Appendix A Implementation Plans

List of implementation plans and other plan titles at 2020 that relate to Bushfire Risk Management Plans (BRMP) in the bushfire risk management framework.

Plan owner	Plan title
Tasmania Fire Service	Bushfire Protection Plan
	Bushfire Response Plan
	Bushfire Mitigation Plan
Parks and Wildlife Service	Fire Management Strategy
City of Hobart	Fire Management Plan
Wellington Park	Fire Management Strategy
Devonport City Council	Bushfire Management Plan
Kingborough Council	Bushfire Management Plan

Appendix B - Fire simulation modelling for likelihood calculation

Introduction

The methodology for the fire behaviour impact metric component of the likelihood analysis for the risk assessment (section 3.2.2.3) follows the same basic principles as outlined in the 'Bushfire Risk Assessment Methodology' section in the Bushfire in Tasmania Report (State Fire Management Council, 2014). A complete listing of assumptions and limitations is contained in Appendix 1 of the report. Furthermore, Furlaud et al. (2017) describes a similar approach used to run the modelling simulations and provides a more detailed description of some of the techniques used to run the state-wide batch analyses.

Significant methodology deviations from State Fire Management Council (2014) and Furlaud et al. (2017) include:

- The spatial resolution for the ignition grid was increased from 2.5 km to 1 km. The total number of ignitions modelled statewide increased from 11,019 to 68,064.
- For each of the 45 weather regions, three weather scenarios were used instead of one, and the methodology for generating those scenarios was completely changed (see 'Weather Scenarios' section below).
- The original report used Phoenix RapidFire Version 4.0.0.0; this modelling uses version 4.1.1.
- Impact cells were not limited to areas overlapping Human Settlement Areas (HSA). Impacts were assessed against a modified HSA layer, forest industry plantation assets and natural value assets.
- The fuel types XML was updated to the latest version TFS is using operationally.
- The fuel layer was updated to 'TASVEG 3 live'.
- The Phoenix 'disruption' layer created in 2012 was updated with new data, and to correct inconsistencies and missing data.

Weather Scenarios

The high resolution Regional Reanalysis for Australia (BARRA) Tasmanian sub-domain gridded weather (Su et al. 2019, Jakob et al. 2017) produced by Bureau of Meteorology was used to generate weather scenarios for determining the fire behaviour impact metric. This includes just over 29 years of weather data (21 Jan 1990 to 1 March 2019) at 1.5 km cell resolution.

To select weather days for the bushfire hazard scenarios (section 3.3.2) from the historical BARRA dataset, the Generalised Extreme Value (GEV) analysis was calculated using the daily maximum Forest Fire Danger Index (FFDI) at each of the 45 Bureau of Meteorology (BoM) station locations. It is recognised that FFDI is not necessarily a good indicator of a bad fire day for all regions of Tasmania, but time constraints on the project necessitated its use statewide. Future work might refine the selection process to use the Moorland Fire Danger Index (MFDI), Grassland Fire Danger Index (GFDI) or a combination of multiple indexes or sub-components (i.e. wind speed, temperature etc.).

The statistical selection of GEV to determine target days was used in preference to a percentile approach (i.e. 95, 99th percentile), which can either underestimate or overestimate fire weather conditions and is not suitable for establishing FFDI values for design bushfires (Douglas et al. 2014). The GEV analysis was deemed a suitable method to identify the return periods of targeted FFDI because of its robustness, ease of implementation, and lower sensitivity to the period length of the data (Douglas et al. 2015).

GEV equations

1. BARRA 1.5 km FFDI grid cells that overlapped with the BoM station location were extracted, with the exception of six of the 45 stations for which the nearest grid cell was used because the station did not overlap a BARRA cell.
2. Daily maximum FFDI was calculated in local time.
3. A ranked table of data was created that represented the highest FFDI values for n years of data. Despite only having 29 years of data given the majority of 1990 was included, and the summer months of 2019, a value of 30 for n was used instead of 29.
4. The n+1 was then divided by the rank to produce a return interval for each of the FFDI values. Table 16 shows an example for Hobart airport station (94008).
5. A non-linear least squares approach was used to fit a function to this data assuming the equation took the form of a log function: FFDI = a * np.log(x) + b.
6. In the example above, this results in the following y = 7.983 * ln(x) + 39.044, where y = FFDI and x = return interval.
7. Plots were produced for each station.

Table 16. Hobart Airport 94008 Ranked Daily Maximum FFDI

Rank	FFDI	Return	Rank	FFDI	Return	Rank	FFDI	Return
1	68.79	31	**12**	45.77	2.58	**23**	41.6	1.35
2	64.65	15.5	**13**	45.04	2.38	**24**	41.38	1.29
3	55.3	10.33	**14**	44.91	2.21	**25**	41.23	1.24
4	52.41	7.75	**15**	44.88	2.07	**26**	40.85	1.19
5	52.37	6.2	**16**	44.68	1.94	**27**	40.72	1.15
6	52.25	5.17	**17**	44.17	1.82	**28**	40.55	1.11
7	49.42	4.43	**18**	44	1.72	**29**	39.96	1.07
8	49.19	3.88	**19**	43.96	1.63	**30**	39.56	1.03
9	48.8	3.44	**20**	42.94	1.55	**31**	39.19	1
10	47.66	3.1	**21**	42.08	1.48			

Day Selection

The groups of days which formed the weather scenarios for each region were determined using the following method:

1. Using the equations for each station, the ranges of days in the dataset were extracted where their max FFDI was greater than a 1 in 5 year return interval or 20% Annual Exceedance Probability (AEP). For most stations this was about six days, with the maximum being 10 and least being three.
2. From each group of days it was assumed the BOM station GEV result was a suitable proxy for the surrounding area, as informed by the BOM zones of influence dataset.
3. A desktop exercise was undertaken to reduce the number of days for each region to three, considering the following criteria:
    a. Was the day too 'extreme', i.e. was the GEV AEP in our target range (10-20% AEP)?
    b. Were there significant fire history events recorded around the time?
    c. Was the starting time (10 am) likely to carry fire?
    d. Was the wind direction broadly representative of typical wind directions for the area (and did that complement other chosen days)?
    e. Did the day overlap with days from other regions (with more weight given to those that did)?
    f. Did the day include an inversion/south-westerly change or other weather phenomenon (did that phenomenon complement other chosen days, i.e. suitable spread)?
    g. Was the day representative for the region (had the BoM station proxy selected a day that covered the region well, or was it only a suitable selection for BoM station point and immediate surrounds)?

The resulting groups of three days for each region formed the basis of the weather scenarios.

Clustering Assets and Values

Assets and values within an individual asset category were grouped using machine learning and hierarchical agglomerative clustering techniques, based on the simulated ignitions that impacted on the assets in a maximum fuel load scenario (no fire history). Therefore, individual assets (e.g. forest coupes and plantations) are clustered into a group because they share simulated fire impacts arising from shared ignition points. The aim of this grouping is to simulate a large bushfire impact scenario which would impact many assets and values in a single event.

Hierarchical agglomerative clustering is an algorithm that builds nested clusters by merging them successively. This hierarchy of clusters is represented as a tree (or dendrogram). The root of the tree is the unique cluster that gathers all the samples (i.e. single mapped asset units), the leaves being the clusters with only one sample. The clustering analysis was performed using Scikit-learn and the Python programming language.

Fire Spread Simulator

Phoenix Rapidfire is used to simulate the spread and behaviour of fires from a grid of over 68,048 ignitions spaced evenly every 1 km apart. Each fire starts at 11:00 in the morning and runs freely with no suppression until 22:00. Fire impacts are measured if a fire reaches part of or all of an asset over a certain fire intensity or ember density that is specified for the asset category (Table 17). Here are some notes on impacts:

- An impact is counted whenever the intensity and or ember thresholds are exceeded.
- There is a significant likelihood of asset loss above the threshold limit.
- Thresholds limits are based on fire behaviour in dry eucalypt forest.

Table 17. Fire intensity thresholds applied for determining impact

Clustered Assets and Values	Intensity Threshold	Ember Threshold	Rationale
Human Settlement Area (HSA)	>10,000 kW/m	>2.5 embers per square meter	
Forest plantations & native production forests	>1000 kW/m	No ember threshold	
Natural Value	>120 kW/m	No ember threshold	
People in the open (e.g. mountain bike parks, walking tracks, Falls Festivals, campgrounds in bushland)	>400 kW/m	>2.5 embers per square meter	At 400 kW/m, flame heights up to 2m and slow ROS. Below this threshold, people should be able to move away or find shelter.
Communications towers	>4000 kW/m	>2.5 embers per square meter	Assume the towers are high priority for protection. Structures contain materials sensitive to intense heat and embers (e.g. wires and air intakes). Structures require defence. Defence difficult above 4000 kW/m.
Historic structures in bushland (e.g. Coal Mines Historic Site, Wybalenna, West Coast Historic Railway)	>750 kW/m	>2.5 embers per square meter	Assume structures are surrounded by bush, no clear space, timber construction. Meet definition of 'poorly prepared, unattended structures' likely to be lost above this threshold.
Industrial sites (e.g. coal mines, cement works, landfill sites)	>10,000 kW/m	>2.5 embers per square meter	Same intensity threshold as HSAs.
Water catchments (typically forested)	>10,000 kW/m	No ember threshold	High intensity bushfires are typically responsible for large-scale management issues. Sustainable low intensity burning regimes in water catchments is encouraged to reduce likelihood of high intensity bushfire impacts.

The risk register includes two summary statistics for each asset/value group, based on the summed impact from all simulations (three per ignition point, one for each weather stream):

- *Cumulative Impact %* – which means the percentage of the mapped asset group area impacted, summed across all ignition points impacting on the asset group; if numerous ignition points impact a group then the percentage can be significantly greater than 100%.
- *Unique Fire Count* – indicates how many ignition points impacted the asset group at the designated ember and intensity threshold; a single ignition point can have a Unique Fire Count = 3 if all three simulations impacted the asset group.

To determine the Fire Behaviour Impact Metric column of the risk register, the range of Cumulative Impact % scores was divided into five value classes across the complete set of all asset/value groups in the risk register. All asset/values with a zero impact score were classified as 'Very Low,' while a geometric interval classification was used to divide the remaining asset/values into four classes. The resultant classes are summarised in Table 18.

Table 18. Classification of the Cumulative Impact % scores to create the Fire Behaviour Impact Metric

Cumulative Impact %	Fire Behaviour Impact Metric
0	Very Low
1 to 92	Low
93 to 556	Moderate
557 to 2882	High
2901 to 14705	Very High

Appendix C

Template for the Implementation Status Report

Bushfire Risk Management Plan Implementation Status Report
FMAC:
Date:
Highlights of treatment progress:
Current issues and barriers to implementation:
Other comments:
Recommendations to SFMC:
FMAC Chairperson: **Signature:**

TERAG code	Asset description (risk statement)	Priority	Treatment number	Treatment action detail	Responsible organisation	Completion date proposed	Progress	Funding source	Issues