

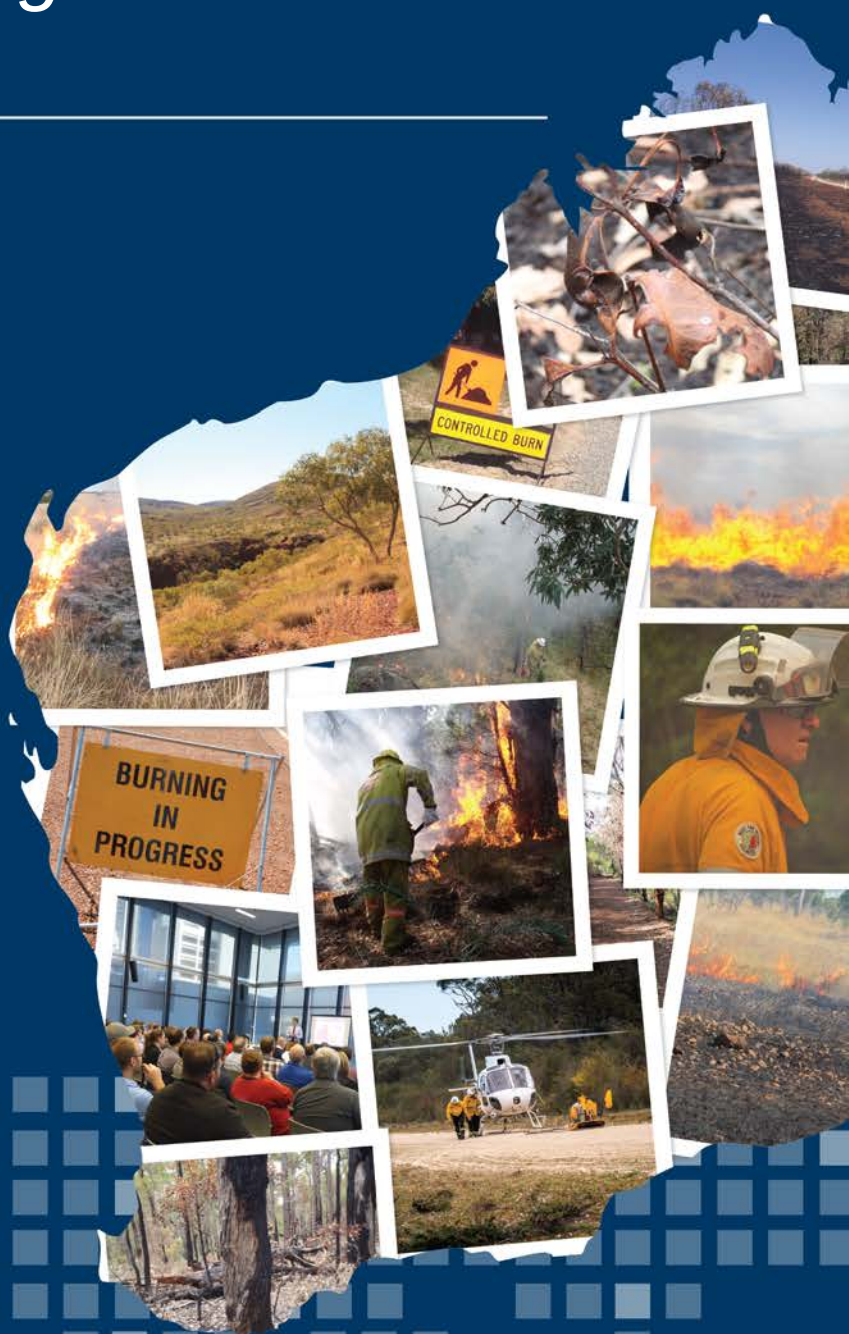


Government of Western Australia
Department of Fire & Emergency Services
Office of Bushfire Risk Management



Bushfire Risk Management Planning

Guidelines for Preparing a Bushfire Risk Management Plan



November 2015

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These Guidelines were prepared for Western Australia by the Office of Bushfire Risk Management (OBRM). They have been endorsed as the standard for bushfire risk management planning in Western Australia under the OBRM Charter. OBRM would like to thank all those who contributed to the development and testing of these Guidelines, especially those involved in the Bushfire Risk Management Planning pilot project. OBRM also wishes to thank the New South Wales Rural Fire Service for kindly sharing their Bushfire Risk Management Planning framework, knowledge and experience, which informed the development of the Western Australian Guidelines.

Currency of the Guidelines

These Guidelines describe the standard and methodology for developing a Bushfire Risk Management Plan. Unless earlier review is warranted, the Guidelines will be reviewed by OBRM after the first two years of operation and then every five years thereafter.

The formulas and data used within these Guidelines are based on the best available information at the time of development. These may be subject to change overtime as new knowledge becomes available.





Image from the Baldivis Fire 2015 courtesy Department of Fire and Emergency Services.



Table of Contents

Table of Contents	5
Chapter 1 – Introduction	10
1.1 Background	10
1.2 What is a Bushfire Risk Management Plan?	10
1.3 Legislation and Policy	11
1.4 Other Related Documents	12
1.5 The Risk Management Framework	13
1.6 Principles of Risk Management	14
1.7 The Risk Management Process	15
Chapter 2 – Developing a Bushfire Risk Management Plan	16
2.1 The BRMP Risk Management Process	16
2.2 Roles and Responsibilities	16
2.3 Documenting the BRMP	21
2.4 The Bushfire Risk Management System	21
2.5 Record Keeping and Auditing	22
2.6 Communication Strategy	22
2.7 Project Plan (Optional)	23
2.8 Establishing the Context	23
2.9 Describing the Local Government and Community Context	24
2.10 Describing the Environment and Bushfire Context	25
2.11 Dividing the Local Government for Assessment	26
2.12 Using the Planning Area Assessment Tool	27
Chapter 3 – Assets and Risk Assessment	28
3.1 What is an Asset?	28
3.2 Identifying Assets	29
3.3 Multiple Asset Categories	30
3.4 Grouping Assets	31
3.5 Asset Identification Number	31
3.6 Completing the Risk Assessment for an Asset	32
3.7 How is Bushfire Risk Assessed?	32
Chapter 4 – Human Settlement Assets	37
4.1 Human Settlement Assets	37

4.2 Asset Definitions – Human Settlement Assets	37
4.3 Identifying Human Settlement Assets	38
4.4 Completing the Risk Assessment for Human Settlement Assets	38
4.5 Risk Rating (Automatically Calculated)	44
4.6 Priority (Automatically Calculated)	44
Chapter 5 – Economic Assets	47
5.1 Assessment of Economic Assets	47
5.2 Asset Definitions – Economic Assets	47
5.3 Identifying Economic Assets	48
5.4 Completing the Risk Assessment for Economic Assets	48
5.5 Risk Rating (Automatically Calculated)	51
5.6 Priority (Automatically Calculated)	51
Chapter 6 – Environmental Assets	52
6.1 Assessment of Environmental Assets	52
6.2 Asset Definitions – Environmental Assets	52
6.3 Considering the Minimum Fire Threshold	53
6.4 Identifying Environmental Assets	53
6.5 Completing the Risk Assessment for Environmental Assets	53
6.6 Risk Rating (Automatically Calculated)	57
6.7 Priority (Automatically Calculated)	57
Chapter 7 – Cultural Assets	58
7.1 Assessment of Cultural Assets	58
7.2 Asset Definitions – Cultural Assets	58
7.3 Identifying Cultural Assets	59
7.4 Completing the Risk Assessment for Cultural Assets	59
7.5 Risk Rating (Automatically Calculated)	65
7.6 Priority (Automatically Calculated)	65
Chapter 8 – Risk Evaluation and Treatment	66
8.1 Purpose of Risk Evaluation	66
8.2 Confirming Risk Ratings are Appropriate	66
8.3 Treatment Priority	66
8.4 Risk Acceptability	67
8.5 Risk Treatment	68
8.6 Local Government-wide Controls	69
8.7 Asset-Specific Treatment Strategies	71

8.8 Selecting the Treatment Strategy	71
8.9 Recording Asset-Specific Treatments.....	73
8.10 Rescheduling Treatments.....	76
8.11 Unplanned Event.....	76
8.12 Completing a Treatment	76
8.13 Evaluating the Treatment.....	77
8.14 Retreatment.....	78
8.15 Recording Treatment and Evaluation Costs.....	78
8.16 Completing a Post-Treatment Risk Assessment.....	78
Chapter 9 – Approval, Monitoring, Review and Reporting	79
9.1 The Approval Process	79
9.2 Dispute Resolution	81
9.3 Publishing the BRMP.....	81
9.4 Annual Reporting.....	81
9.5 Reviewing the Bushfire Risk Management Plan	81
Glossary.....	82
Common Abbreviations	85
Appendix A – Vegetation Categories	86
Appendix B – Planning Area Assessment Tool	88
Appendix C – Assessment Criteria	89
Assessment Criteria	89
Self-Assessment Checklist	91

List of Figures

Figure 1 – The Risk Management Framework.....	13
Figure 2 – The Risk Management Process.....	15
Figure 3 – The BRMP Risk Management Process.....	17
Figure 4 – BRMP Roles and Responsibilities	20
Figure 5 – Examples of Planning Areas.....	26
Figure 6 – Grouping and Mapping Assets.....	31
Figure 7 – Selecting the Hazard Vegetation for Assessment	41
Figure 8 – Examples of Upslope and Downslope	42
Figure 9 – The Risk Assessment Process for Human Settlement Assets	45
Figure 10 – Assessment Process for Human Settlement Assets – Worked Example	46
Figure 11 – Selecting the Hazard Vegetation for Assessment	62
Figure 12 – Examples of Upslope and Downslope	63
Figure 13 – Bushfire Management Zones.....	75
Figure 14 – Treatment Evaluation Process.....	77
Figure 15 – The BRMP Approval Process	80
Figure 16 – Classification of Vegetation Summary	87

List of Tables

Table 1 – Principles of Risk Management.....	14
Table 2 – Alternative Priorities for Asset Identification and Assessment	27
Table 3 – Asset Categories and Subcategories.....	28
Table 4 – The Asset Identification Number.....	31
Table 5 – Likelihood Ratings for Bushfire Risk	33
Table 6 – Likelihood Descriptions.....	34
Table 7 – Consequence Descriptions	35
Table 8 – Determining the Risk Rating	36
Table 9 – Human Settlement Asset Subcategories.....	37
Table 10 – Separation Distance Categories	40
Table 11 – Slope Categories	42
Table 12 – Vulnerability Categories for Human Settlement Assets	43
Table 13 – Consequence Ratings for Human Settlement Areas	44
Table 14 – Economic Asset Subcategories	47
Table 15 – Level of Impact Categories	49
Table 16 – Recovery Cost Categories.....	50
Table 17 – Recovery Cost and Time	51
Table 18 – Consequence Ratings for Economic Assets	51
Table 19 – Environmental Asset Subcategories	52
Table 20 – Conservation Status Categories	54
Table 21 – Geographic Extent Categories.....	55
Table 22 – Vulnerability Ratings for Environmental Assets.....	55
Table 23 – Potential Impact of Fire Categories.....	56
Table 24 – Consequence Ratings for Environmental Assets	57
Table 25 – Cultural Asset Subcategories.....	58
Table 26 – Separation Distance Categories	61
Table 27 – Slope Categories	63
Table 28 – Vulnerability Categories for Cultural Assets	64
Table 29 – Consequence Ratings for Cultural Assets.....	65
Table 30 – Treatment Priorities	66
Table 31 – Risk Acceptability and Course of Action.....	68
Table 32 – Control Rating Table.....	70
Table 33 – Criteria for Assessing the Suitability of a Treatment.....	72
Table 34 – Bushfire Management Zones.....	74



Table 35 – Levels of Dispute Resolution	81
Table 36 – Classification of Vegetation.....	86
Table 37 – Planning Area Assessment Tool.....	88
Table 38 – Assessment Criteria.....	89
Table 39 – Self-Assessment Checklist	91





Chapter 1 – Introduction

1.1 Background

Under the *State Emergency Management Plan for Fire (Westplan Fire)*, local governments with significant bushfire risk are required to develop an integrated bushfire risk management plan outlining a strategy to treat bushfire-related risk across all land tenures. **These Guidelines describe the process and requirements for identifying and assessing bushfire-related risk and preparing a Bushfire Risk Management Plan (BRMP).**

State Emergency Management Committee Policy (SEMP) 2.9 – Management of Emergency Risks identifies *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines* (AS/NZS ISO 31000:2009) as the standard for emergency risk management in Western Australia. While all local governments are required to develop and maintain an emergency risk management plan for the hazards relevant to their locality, Schedule 3 of SEMP 2.9 identifies local governments with a high or extreme level of bushfire risk that require a bushfire specific plan. These are to be developed in accordance with these Guidelines.

1.2 What is a Bushfire Risk Management Plan?

A Bushfire Risk Management Plan (BRMP) is a strategic document that:

- Identifies bushfire-related risk at the strategic level and prioritises areas of the local government for further risk assessment;
- Identifies assets of value that are at risk from bushfire, including communities, the built environment, infrastructure and economic, cultural and environmental assets;
- Documents the risk ratings assigned to assets identified and assessed in the BRMP and their priority for treatment;
- Documents the treatment strategies to be implemented to reduce risk to an acceptable level, with priority given to the assets of greatest importance, that are most at risk;
- Documents the responsibilities of land owners and treatment managers tasked with implementing the treatment strategies outlined in the BRMP; and
- Specifies a timeframe for land owners to implement the treatment strategies identified in the BRMP.

Government agencies and other land managers with responsibility for implementing treatments participate in the BRMP process to ensure treatment strategies are collaborative and efficient, regardless of land tenure.



The Department of Fire and Emergency Services (DFES) BRMP template provides the standard format for a BRMP. Once developed, a BRMP will include a written plan, communication strategy, asset risk register, asset-specific treatment schedule, local government-wide works plan and associated maps. It is the preference of OBRM that all BRMPs are developed using available DFES templates.



1.2.1 Aim

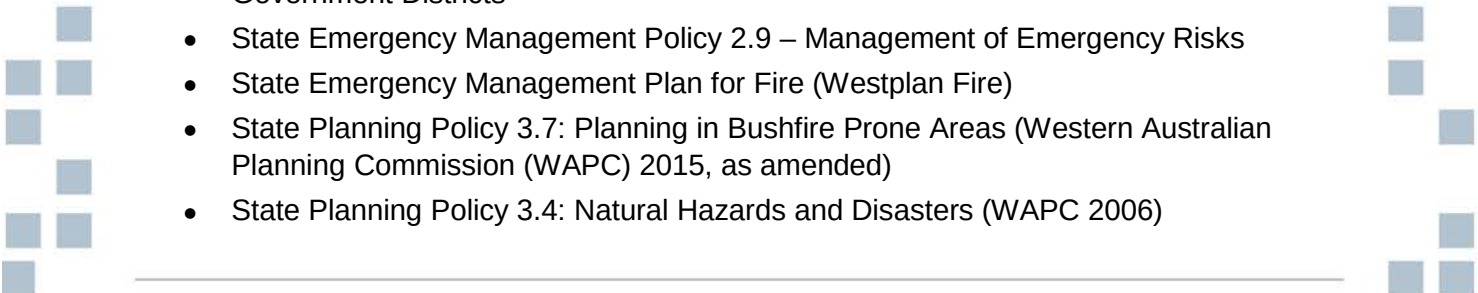
The aim of a BRMP is to facilitate a coordinated and efficient approach towards the identification, assessment and treatment of assets exposed to bushfire-related risk.

1.2.2 Objectives

The objective of a BRMP is to effectively manage bushfire-related risk in order to protect people, assets and other things of local value. Specifically, the objectives of a BRMP are to:

- Guide and coordinate a tenure blind, multi-agency bushfire risk management program over a five year period;
- Document the process used to identify, analyse and evaluate risk, determine priorities and develop a plan to systematically treat risk;
- Facilitate the effective use of the financial and physical resources available for bushfire risk management activities;
- Integrate bushfire risk management into the business processes of local government, land owners and other agencies;
- Ensure there is integration between land owners and bushfire risk management programs and activities; and
- Monitor and review the implementation of treatment plans to ensure they are adaptable and that risk is managed at an acceptable level.

1.3 Legislation and Policy

- *Bush Fires Act 1954*
  - *Emergency Management Act 2005*
  - *Fire Brigades Act 1942*
  - *Fire and Emergency Services Act 1998*
  - *Conservation and Land Management Act 1984*
  - *Environmental Protection Act 1986*
  - *Environmental Protection and Biodiversity Conservation Act 1999*
  - *Wildlife Conservation Act 1950*
  - *Aboriginal Heritage Act 1972*
  - *Metropolitan Water Supply, Sewerage and Drainage Act 1909*
  - *Country Areas Water Supply Act 1947*
  - Bush Fires Regulations 1954
  - Emergency Management Regulations 2006
  - State Emergency Management Policy 2.5 – Emergency Management in Local Government Districts
  - State Emergency Management Policy 2.9 – Management of Emergency Risks
  - State Emergency Management Plan for Fire (Westplan Fire)
  - State Planning Policy 3.7: Planning in Bushfire Prone Areas (Western Australian Planning Commission (WAPC) 2015, as amended)
  - State Planning Policy 3.4: Natural Hazards and Disasters (WAPC 2006)
- 



1.4 Other Related Documents

- AS/NZS ISO 31000:2009
- AS 3959-2009 Construction of buildings in bushfire-prone areas
- National Emergency Risk Assessment Guidelines (Second edition) (Attorney-General's Department 2014)
- National Strategy for Disaster Resilience (Attorney-General's Department 2011)
- National Statement of Capability for Fire and Emergency Services (AFAC 2015)
- Guidelines for Planning in Bushfire Prone Areas (WAPC 2015, as amended)
- Planning for Bush Fire Protection Guidelines (Edition 2) (WAPC 2010)
- Western Australian Emergency Risk Management Guide (Emergency Management WA 2005, State Emergency Management Committee (SEMC) 2015)
- A Guide to the Use of Pesticides in Western Australia (Department of Health 2010)
- Public Service Circular No. 88 Use of Herbicides in Water Catchment Areas (Department of Health 2007)
- Guidelines for Plantation Fire Protection (DFES 2011)
- Code of Practice for Timber Plantations in Western Australia (Forest Products Commission 2006)
- Firebreak Location, Construction and Maintenance Guidelines (FESA 2007)
- Building Protection Zone Standards (DFES 2014)
- Bushfire Risk Management Planning Handbook (DFES 2015)
- Bushfire Risk Management System User Guide (DFES 2015)
- Bushfire Risk Management Planning Templates (DFES 2015)

1.5 The Risk Management Framework

The *National Emergency Risk Assessment Guidelines* (NERAG) 2014 describe a widely accepted approach to risk identification, analysis and reporting, based on the principles discussed in AS/NZS ISO 31000:2009. An integrated risk management system goes beyond the assessment and treatment of risk. To effectively embed risk management into an organisation, a sound framework is required. While these Guidelines focus primarily on risk assessment, it is important for those involved in the BRMP process to embed bushfire-related risk management within their own organisational risk frameworks.

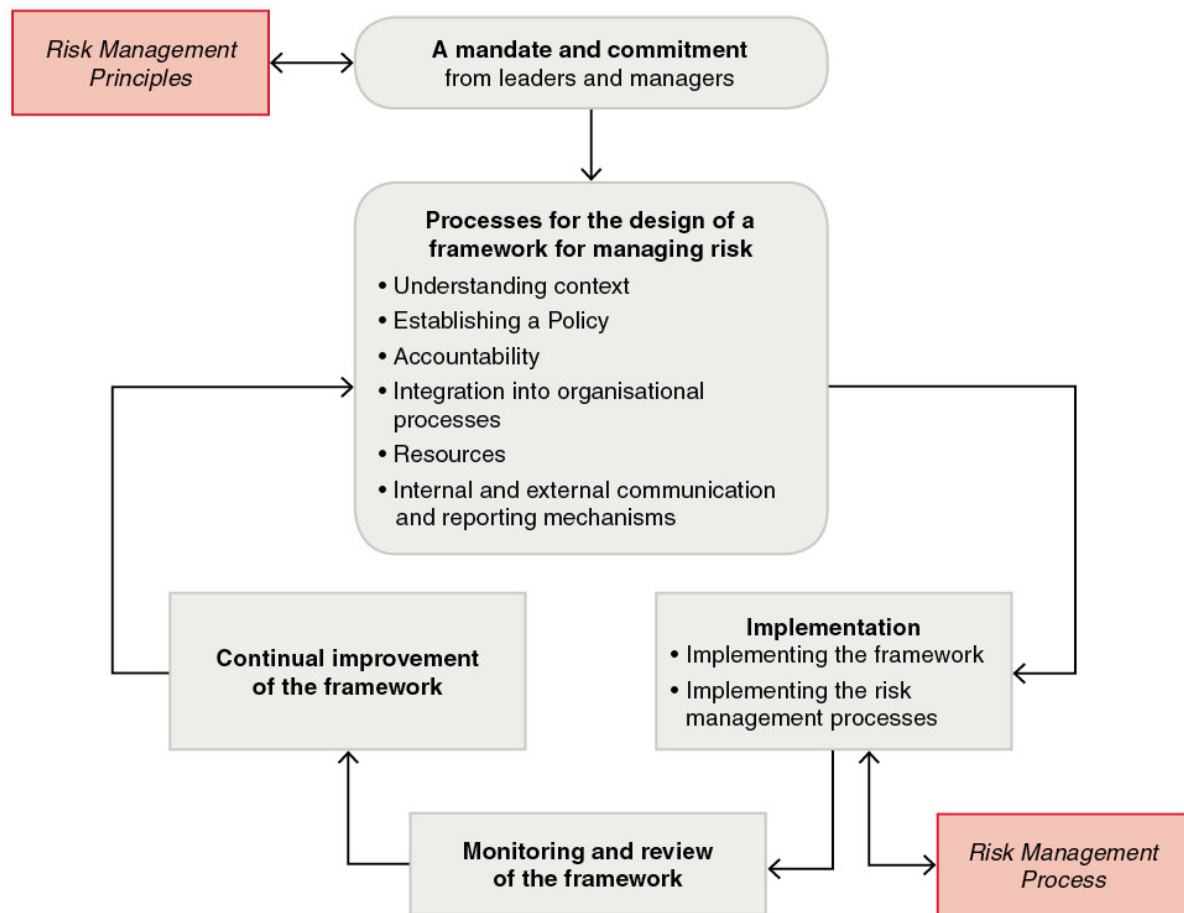


Figure 1 – The Risk Management Framework¹

¹ Source: AS/NZS ISO 31000:2009, Figure 2, reproduced under SAI Global copyright Licence 1411-c083.

1.6 Principles of Risk Management

There are eleven principles that underpin effective risk management. These principles are articulated in AS/NZS ISO31000:2009 and are applied to emergency risk management in NERAG (2014). Table 1 describes the principles of risk management.

Table 1 – Principles of Risk Management²

The Principles of Risk Management	
1. Creates and protects value.	Bushfire risk management contributes to the wellbeing, sustainability and resilience of human health, the environment, the economy, public administration and social setting.
2. Integrates into all organisational processes.	Bushfire risk management is a mainstream activity that is most effective when integrated into the standard business practices of organisations, governments and communities.
3. Informs decision-making.	Bushfire risk management supports informed decision-making and prioritisation of resources for risk treatment activities.
4. Explicitly addresses uncertainty.	Bushfire risk management recognises and accounts for uncertainty of supporting data and information when undertaking risk assessments.
5. Is systematic, structured and timely.	Consistent, reliable and comparable results are achieved when bushfire risk management is systematic, structured and timely.
6. Is based on the best available information.	Best available data and information on risks, hazards, exposure and vulnerability are applied from a variety of sources, including historical data, forecasts, modelling, spatial atlases, metadatabases, observations, community input, local knowledge and expert judgement. Decision-makers can still derive useful results despite the limitations of data, modelling and the possibility of divergent opinions among experts.
7. Is tailored.	The approach is fit for purpose and aligned with societal needs, the context and risk profile.
8. Considers and takes account of human and cultural factors.	The capabilities, perceptions and intentions of individuals, stakeholders and the risk assessment team should be taken into account in bushfire-related risk management processes.
9. Is transparent and inclusive.	Bushfire risk management includes stakeholders and, in particular, decision-makers in an appropriate and timely manner.
10. Is dynamic, iterative and responsive to change.	Bushfire risk management responds to changing risk profiles and emerging information on hazards, exposure and vulnerability. When monitoring and review of risks is effective, this process can identify when risks emerge, change or disappear.
11. Facilitates continual improvement.	Effective bushfire risk management relies on the development and implementation of strategies that improve a government, organisation or community's risk management maturity. Such an approach underpins a resilient and adaptive community.

² Source: AS/NZS ISO 31000:2009, Clause 3, reproduced under SAI Global copyright Licence 1411-c083.

1.7 The Risk Management Process

In the context of the BRMP, the risk management process involves identifying, analysing, evaluating and treating bushfire-related risk within the community, consistent with the methodology of AS/NZS ISO 31000:2009 as incorporated into the NERAG. Using a systematic and consistent approach to risk analysis (assessment) allows risk to be prioritised for treatment and informs selection of the most appropriate treatment options. Key components of the risk management process are shown in Figure 2 and summarised below:

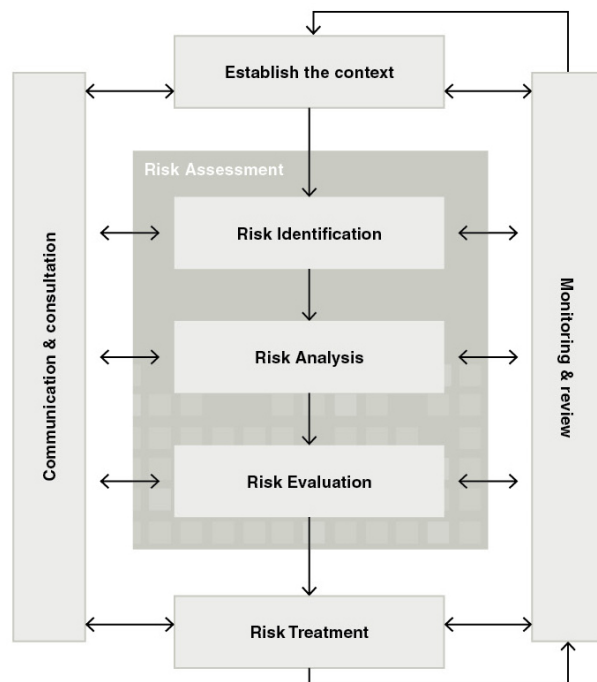


Figure 2 – The Risk Management Process

Communication & Consultation –

Communicate and consult with the relevant stakeholders at the appropriate stage of the risk management process. Promote a general understanding of the process and the role of stakeholders.

Establish the context – Define the context, or environment, in which the risk management process will occur. Setting the criteria that will be used to evaluate risk.

Risk Identification – Identify events or circumstances that could impact the achievement of objectives. In relation to BRMP, risk identification will identify assets that could be impacted by bushfire.

3

Risk Analysis – determine the likelihood of an event occurring and the expected consequences. Likelihood and consequence combine to give the level of risk.

Risk Evaluation – Consider the level of risk determined during analysis against the pre-established criteria. Risks can be avoided, accepted or treated. Decisions are made about the priority of risks and the nature of the treatments required.

Risk Treatment – Plan and implement specific strategies to address risks. Risk treatments need to be appropriate and cost effective based on the potential benefit.

Monitoring & Review – Monitor the effectiveness of each stage of the process, including systems and processes that form part of the risk management framework. Risks and treatment strategies should be monitored for effectiveness and to ensure changing circumstances do not alter risk levels or priorities. Review process findings should promote continuous improvement. New risks to be detected and managed.

³ Source: AS/NZS ISO 31000:2009, Figure 3, reproduced under SAI Global copyright Licence 1411-c083.



Chapter 2 – Developing a Bushfire Risk Management Plan

2.1 The BRMP Risk Management Process

As described in Chapter 1, the BRMP process involves identifying assets that are important, or determined to have local value and assessing the likelihood and consequence of a bushfire impacting upon these assets. Based on the risk rating, assets are prioritised for treatment. When a risk treatment is recommended, monitoring and review processes ensure that risks are continuously managed. Figure 3 shows the overall BRMP risk management process.

2.2 Roles and Responsibilities

2.2.1 Local Government

Under *Westplan Fire* local government are responsible for the prevention, preparedness and response to bushfire, within their designated areas. They are also responsible for managing the ongoing recovery of the community after a bushfire event.

Westplan Fire and SEMP 2.9 require local governments with a significant risk of bushfire to develop an integrated BRMP for their area. While DFES, Department of Parks and Wildlife (P&W) and other agencies and land owners are required to participate in, and contribute to, the locally-developed plan, local government are the custodians of the BRMP and coordinate its development and ongoing review. With support from DFES, local government negotiate commitment from private and government land owners to treat risks identified in the BRMP. This is appropriate in light of the powers and responsibilities given to local government under the *Bush Fires Act 1954*, their responsibility for community service provision at the local level, local knowledge, existing relationships with land owners and involvement in local planning, fire management and community engagement programs. Local government, as a land manager, implement treatment strategies to address risk on their land. As part of the approval process, the BRMP is submitted to council for endorsement and adoption in their local government area.

Under the *Emergency Management Act 2005* local government are responsible for establishing a Local Emergency Management Committee (LEMC). The LEMC is chaired by local government and tasked to undertake a range of emergency management functions. This includes providing advice on the management of emergency risks and maintaining Local Emergency Management Arrangements (LEMA) and recovery plans. Development of a BRMP, in accordance with this standard, meets the requirements under SEMP 2.9 for local governments with significant bushfire risk to develop a specialised Emergency Risk Management Plan (ERMP) for bushfire.

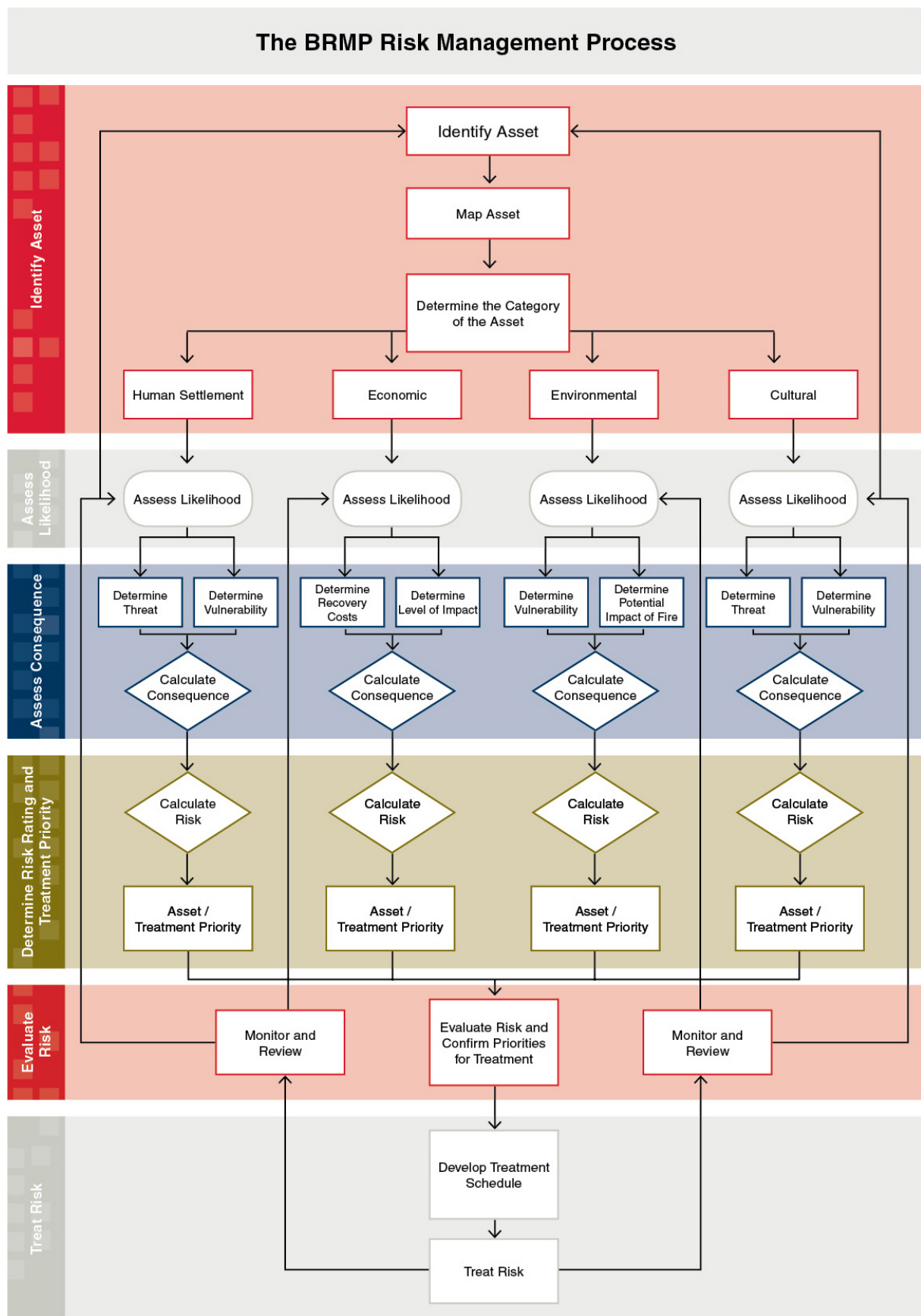


Figure 3 – The BRMP Risk Management Process



2.2.2 Department of Fire and Emergency Services

DFES is the lead state government agency for the Bushfire Risk Management Planning Program. The Fire and Emergency Services (FES) Commissioner is the prescribed Hazard Management Agency (HMA) for fire and has overall responsibility for the preparation of *Westplan Fire*. Under *Westplan Fire*, DFES has responsibility for bushfire prevention and preparedness within their designated area and response to bushfire state-wide.

DFES is required under *Westplan Fire* to participate in, and contribute to, locally-developed and implemented BRMPs. DFES will support local government by providing expert knowledge and advice in relation to bushfire risk, prevention and treatment. This includes assisting with the identification of appropriate risk treatment strategies and engaging state and federal government agencies in the BRMP process.

DFES facilitate a number of state-wide programs and initiatives that will be included as treatment strategies in a BRMP. DFES may also act in support of other agencies and land owners that do not have the capacity to undertake particular treatment strategies, such as prescribed burning, on their own land.

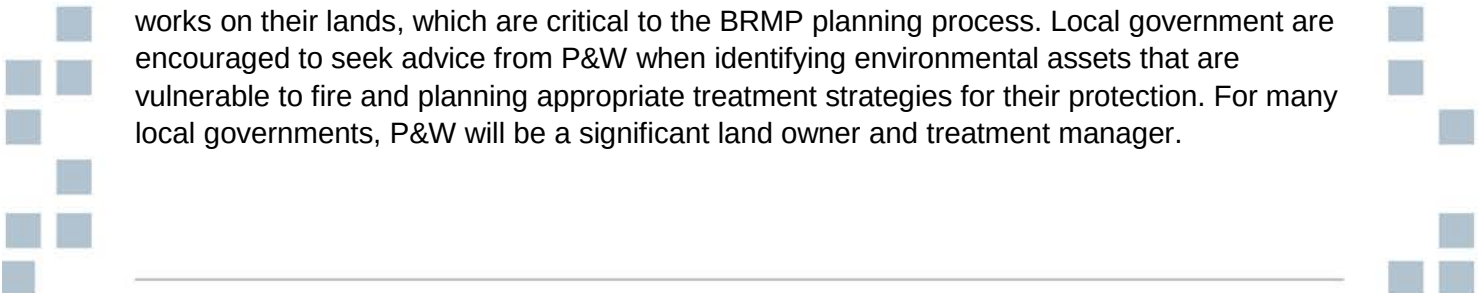
DFES is the custodian of the Bushfire Risk Management System (BRMS). BRMS supports the BRMP process by providing an integrated system to spatially identify assets at risk from bushfire, plan treatments and report progress against the BRMP. DFES will administer a BRMP training program that includes learning modules for the BRMP process and BRMS.

2.2.3 Office of Bushfire Risk Management

OBRM is an independent office within DFES reporting directly to the FES Commissioner and is responsible for ensuring that bushfire risk is managed in accordance with AS/NZS ISO 31000. OBRM has developed and endorsed these guidelines as a standard for preparing a BRMP and will be responsible for their review as per the agreed schedule. In addition, OBRM will review a local government's draft BRMP for consistency with the Guidelines, prior to final approval by the local government council. OBRM may also implement a quality assurance and audit program in relation to bushfire risk management planning. OBRM will report annually to the FES Commissioner and SEMC on the state of bushfire risk across Western Australia.

2.2.4 Department of Parks and Wildlife

Under *Westplan Fire*, P&W has responsibility for the prevention, preparedness and response to bushfire, within their designated areas. P&W is required under *Westplan Fire* to participate in, and contribute to, locally-developed and implemented BRMPs. P&W hold expert knowledge in relation to bushfire risk management and undertake a significant program of works on their lands, which are critical to the BRMP planning process. Local government are encouraged to seek advice from P&W when identifying environmental assets that are vulnerable to fire and planning appropriate treatment strategies for their protection. For many local governments, P&W will be a significant land owner and treatment manager.





2.2.5 Other State and Federal Government Agencies

As required, local government and DFES will engage other state and federal government agencies (that own or manage assets or land) in the development and implementation of BRMPs. State and federal agencies can assist local government by providing information about their assets and current risk treatment programs and/or by participating in the risk assessment process. In most cases, the role of state and federal agencies will be to manage government land that presents a significant risk to assets, by implementing the treatment strategies identified and agreed through the BRMP process.

2.2.6 Public Utilities

As required, local government and DFES will engage public utilities (that own or manage assets or land) in the development and implementation of BRMPs. Utilities can assist local government by providing information about their assets and current risk treatment programs and/or participating in the risk assessment process. Public utilities may also implement risk treatments on their own land to address significant risks identified and agreed through the BRMP process.

2.2.7 Corporations and Private Land Owners

As required, local government and DFES will engage corporations and private land owners (that own or manage assets or land) in the development and implementation of BRMPs. Where privately owned or managed land presents a significant risk to assets, corporations and private land owners may implement treatment strategies on their own land, as identified and negotiated through the BRMP process. Similarly, the BRMP process may identify privately owned assets that are at significant risk from bushfire. Local government and DFES will assist asset owners to identify additional measures for reducing the vulnerability of such assets. The roles and responsibilities of all agencies are shown in Figure 4.

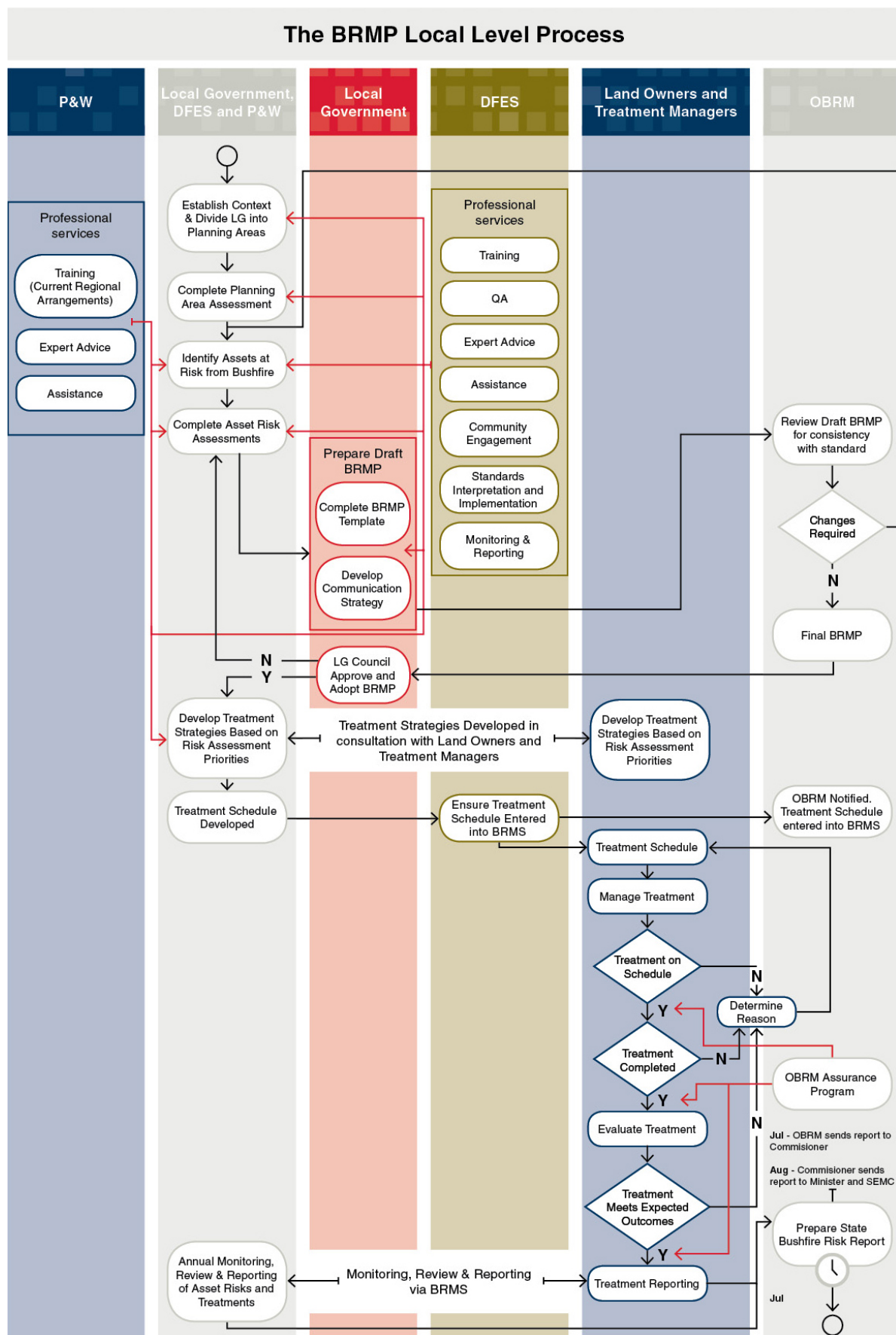


Figure 4 – BRMP Roles and Responsibilities



2.3 Documenting the BRMP

Components of the BRMP need to be documented, such as the written plan and communications strategy. It is the preference of OBRM that documentation is produced using DFES templates where these are available. The information documented for these components will remain relatively static throughout the life of the BRMP. The dynamic components of the BRMP will include the Asset Risk Register and Treatment Schedule. These components will be managed and produced within BRMS.

- **The Written Plan (DFES template available)**

The written plan documents the context and process used to complete the risk assessments.

- **The Communication Strategy (DFES template available)**

The Communication Strategy documents the consultation and communication outcomes to be achieved during development of the BRMP, including the scope and objectives of consultation, the stakeholders involved, key messages and methods for communication.

- **The Asset Risk Register (BRMS Report)**

The Asset Risk Register details the likelihood, consequence, risk rating and treatment priority for each asset identified in the BRMP. The Asset Risk Register is developed by generating a report in BRMS. A copy of the report is to be appended to the written plan.

- **The Treatment Schedule (BRMS Report)**

The Treatment Schedule lists the assets identified, their priority for treatment and the planned treatment strategies assigned to address risk. The Treatment Schedule is developed by generating a report in BRMS. A copy of the report is to be appended to the written plan.

2.4 The Bushfire Risk Management System

BRMS is the software application that supports the development and implementation of BRMPs. BRMS is used to identify (map) assets, complete risk assessments and record information about risk treatments. The three main components of BRMS are:

- **The Asset Register**

Used to record the details of assets identified in the BRMP.

- **The Risk Register**

Used to record, review and monitor risk assessments and treatments associated with assets identified in the BRMP.

- **The Geographic Information System (GIS) Map**

Assets, treatments and other associated information is spatially identified, displayed and recorded within the GIS Map.

Further information will be available in supporting DFES publications and via the help function available within BRMS.

2.5 Record Keeping and Auditing

Many decisions will be made during the development and implementation of the BRMP. It is important to maintain adequate records that capture the basis for decision-making, agreed outcomes and actions taken for compliance with corporate record keeping policies and to meet legal requirements.

From time to time, OBRM may audit local government and other agencies to ensure that BRMPs are implemented appropriately and treatment objectives are achieved.

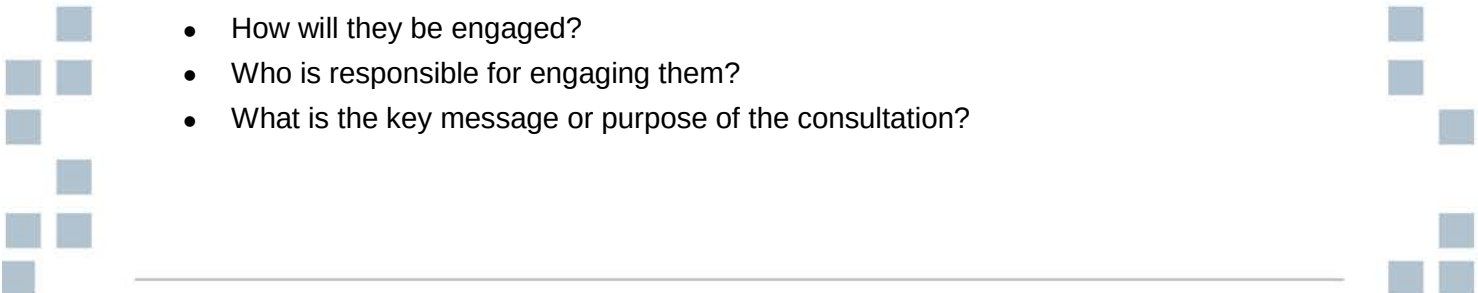
To satisfy audit and record keeping requirements records should provide evidence of:

- A systematic approach to risk identification and analysis;
- The reasoning behind decision-making and the outcomes;
- Appropriate consultation and approval processes have been followed; and
- Treatments completed and objectives achieved.

In addition to normal record keeping practices, decisions, notes and other information are recorded within BRMS. Documents should be uploaded to BRMS and linked as an attachment to the relevant risk assessment or treatment.

2.6 Communication Strategy

Communication and consultation is an important part of effective risk management. Participation from a diverse range of stakeholder groups is important to the BRMP process. Development of a communication strategy ensures consultation is appropriate, timely and effective. The strategy should detail:

- Who needs to be involved?
  - At what stage do they need to be engaged?
  - How will they be engaged?
  - Who is responsible for engaging them?
  - What is the key message or purpose of the consultation?
- 



Once developed, the strategy should detail the objective of communication and outline a broad plan for communicating with the various stakeholder groups. When developing the strategy, consider the following points:

- The type of information that will be distributed and who it will be distributed to.
- Provide information in a simple, clear and unambiguous form.
- It may be necessary to present messages in different ways for different groups of people.
- Many issues regarding risk can cultivate strong emotions, appropriate presentation is important if rational decisions are to be made.
- That Freedom of Information (FOI) legislation may provide future public access to information.

2.7 Project Plan (Optional)

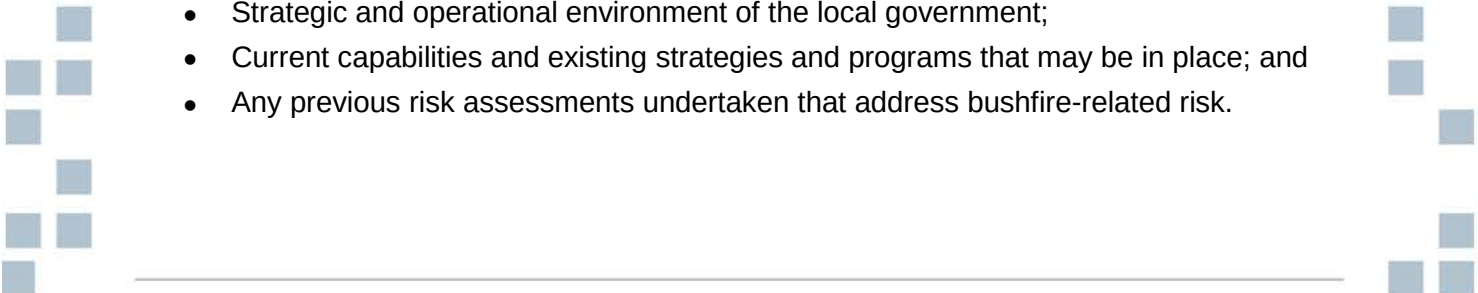
To guide overall development of the BRMP, local government is encouraged to develop a project plan with reference to the DFES project plan template.

2.8 Establishing the Context

Before assessing risk, the context for the assessment must be defined. Information discovered during this stage will inform decision-making and provide perspective for decisions on the likelihood of an event occurring and the expected consequences. Context will inform whether a risk is selected for treatment and the possible treatment options available. The context should aim to:

- Describe the strategic objectives and core values of the local government that relate to bushfire risk;
- Describe the local factors and conditions affecting bushfire risk and treatment;
- Inform the communications strategy; and
- Inform a plan for achieving the core outcomes of the BRMP.

When sourcing information that describes the context, consider the following factors and how they might impact the development and implementation of the BRMP:

- Community perceptions, attitudes and expectations in regards to bushfire-related risk;
  - Legislation, policies and guidelines (internal and external);
  - Political and economic factors;
  - Strategic and operational environment of the local government;
  - Current capabilities and existing strategies and programs that may be in place; and
  - Any previous risk assessments undertaken that address bushfire-related risk.
- 



2.9 Describing the Local Government and Community Context

2.9.1 Strategic and Corporate Framework

To ensure the BRMP objectives are achieved, it is important to establish the relationship between bushfire risk management and existing local government strategic and corporate frameworks. Identifying how the BRMP will be embedded into the local government's strategic and corporate frameworks will reinforce a commitment to bushfire risk management at the corporate level. The context should aim to address the following:

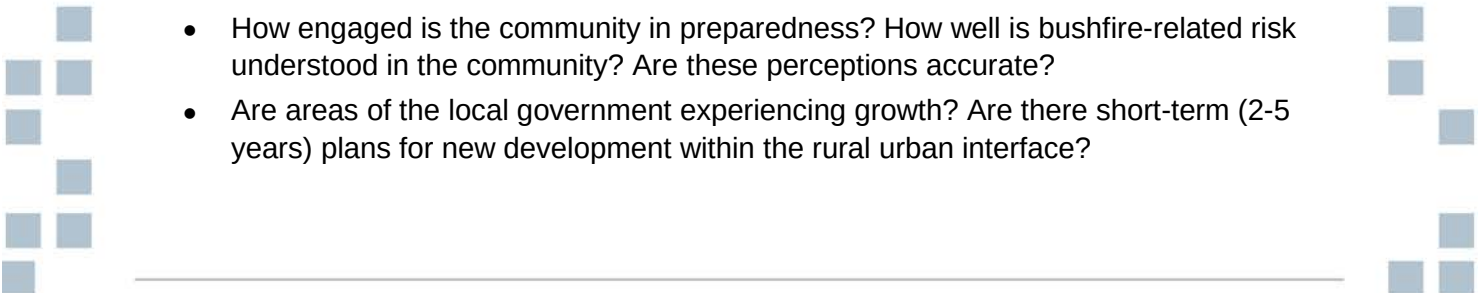
- Identify how the BRMP helps the local government achieve its corporate vision and how it relates to outcomes of the corporate or business plan and other high level community strategies and plans;
- Briefly describe the governance and structure of the local government, identifying the area(s) responsible for BRMP processes;
- Identify how outcomes from the BRMP will link to, or be used to inform, related local government functions, such as the LEMC or annual works programs; and
- Describe the current perception of bushfire risk and the general attitude of the community towards bushfire risk and preparedness. **Note:** Local government have a sufficient understanding of their community to provide general comment its behalf, without the need to specifically engage on this subject. However, where available, any previous studies or surveys that measure community preparedness or understanding of risk can be referenced in the BRMP.

2.9.2 Location, Boundaries and Tenure

The context should describe the location and boundaries of the local government and provide a general breakdown of land tenure (by percentage). This defines the area covered by the BRMP and identifies the key land owner groups to be involved in the development and/or implementation of the BRMP.

2.9.3 Population and Demographics

Consider the population and demographics of the local government area, including where and how people live, the location of communities and general trends. The context should aim to address the following:

- Where are the primary communities situated? How many people live in these locations?
  - What are the demographics of the area? For example, retirees, young families, tourist populations, FIFO or other absentee land owners, culturally and linguistically diverse (CALD) communities.
  - How engaged is the community in preparedness? How well is bushfire-related risk understood in the community? Are these perceptions accurate?
  - Are areas of the local government experiencing growth? Are there short-term (2-5 years) plans for new development within the rural urban interface?
- 



2.9.4 Economic Activities and Industry

Consider the significant economic activities and industries based within the local government. Include any major agricultural industries and mining operations. If tourism is a significant activity, detail the general number of annual visitors (if known) and the peak seasons of activity. Identify any activities that may have an effect on bushfire risk, management or treatment (for example, the impact of smoke on vineyards and grape production or during significant tourist seasons). Particular attention should be given to documenting industry or economic activities that are of regional or state significance.

2.10 Describing the Environment and Bushfire Context

2.10.1 Topography and Landscape Features

Topography has a significant effect on potential bushfire behaviour and therefore the overall risk to assets. Slope is a significant factor to consider when selecting treatments that address bushfire risk. The context should provide a general description of the local government's topography, making reference to any major landscape features that increase bushfire risk or limit the capacity to implement effective treatments (for example, wetlands, riparian vegetation, peat soils, or areas sensitive to erosion or salinity).

2.10.2 Climate and Bushfire Season

Bushfire behaviour is significantly influenced by the climate. Understanding the climatic and seasonal factors that affect bushfire risk will help determine appropriate options for treatment. It could also identify potential conditions that could reduce the effectiveness of treatments. The context should aim to describe the following:

- Length and period of all seasons;
- Annual temperature and rainfall patterns;
- Forest Fire Danger Index (FFDI) and Grassland Fire Danger Index (GFDI) (Extremes 95th percentile); and
- Prevailing conditions – weather patterns that affect the speed and direction of bushfires.

2.10.3 Vegetation

The vegetation type, arrangement and fuel load will affect the potential fire behaviour experienced under certain conditions. This includes the potential intensity of a fire front, the probability of a crown fire developing or an ember attack. When setting the context, a vegetation map should be prepared for the local government, showing the broad vegetation categories relevant to the BRMP process.

The list of vegetation categories is provided at [**Appendix A**](#).

2.10.4 Bushfire Frequency and Causes of Ignition

Considering the bushfire frequency for the local government, common sources of ignition will help identify potential areas where fires are more likely to start. Historical information such as fire reports and investigations could be considered, along with input from local Fire Control Officers. The context should consider how and where bushfires are likely to start, including:

- Fire history and areas of frequent ignition (that is, more frequent than other locations within the local government);
- Known ignition sources or activities, such as campgrounds, roads or power lines;
- Potential fire paths; and
- The frequency of natural events, such as dry lightning storms.

2.11 Dividing the Local Government for Assessment

Developing a BRMP for an entire local government can seem like a daunting task. Assets can be widespread and it may be difficult to know where to start. To ensure a systematic approach is used to identify and assess assets, divide the local government into smaller, more manageable sections that can then be assessed individually in more detail. These sections are referred to as Planning Areas. Figure 5 shows two examples of how a local government could be divided into planning areas.

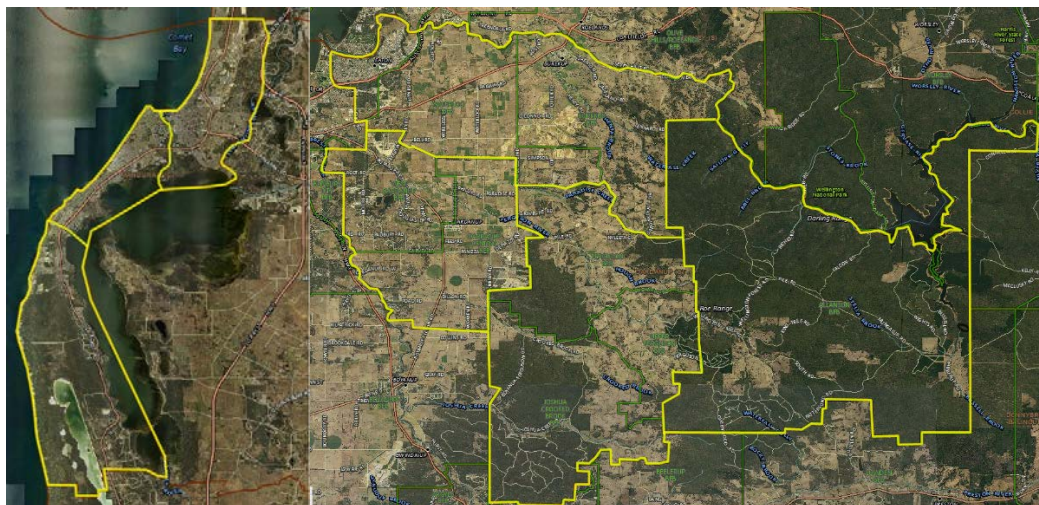


Figure 5 – Examples of Planning Areas

When dividing the local government area, consider boundaries that are logical and location based. Planning area boundaries can be based upon existing:

- Suburb, locality or postcode boundaries;
- Local government wards;
- Bush Fire Brigade boundaries;
- Natural landscape features, such as a vegetation type, hydrology or landform;
- Landmarks, such as major roads or highways;
- Catchment, tenure or land management boundaries; or
- A mixture of the above.

2.11.1 Mapping and Naming Planning Areas in BRMS

Once the planning boundaries are decided, they will need to be created in BRMS and allocated a name and two or three letter code. The same code cannot be assigned to more than one planning area within a local government.

2.12 Using the Planning Area Assessment Tool

The *Planning Area Assessment Tool* has been designed to help local government determine the priority of planning areas for assessment. The tool allocates a score to each planning area, based on factors that affect the overall level of bushfire-related risk. The planning area with the highest score is considered the first priority for assessment - where assets should be identified and assessed first. The planning area with the second highest score is the second priority for assessment and so on until all planning areas have been assessed.

The *Planning Area Assessment Tool* is provided at [Appendix B](#).

2.12.1 Alternative Method for Prioritising Asset Identification and Assessment

An alternative method for prioritising asset identification and assessment is available to those local governments opting not to apply the *Planning Area Assessment Tool*. If the alternative method is used, assets (across all planning areas) are to be identified and assessed in the order of their priority, as listed in Table 2.

Table 2 – Alternative Priorities for Asset Identification and Assessment

Priority	Asset Category	Asset Subcategory	Planning Area
First Priority	Human Settlement	Special risk and critical facilities	All
Second Priority	Human Settlement	All other subcategories	All
Third Priority	Economic	Critical infrastructure	All
Fourth Priority	Economic	All other subcategories	All
Fifth Priority	Environmental	All subcategories	All
Sixth Priority	Cultural	All subcategories	All

Chapter 3 – Assets and Risk Assessment

3.1 What is an Asset?

An asset is anything that is important or determined to have local value. There are four categories of assets considered in the BRMP. The asset categories and subcategories are outlined in Table 3.

Table 3 – Asset Categories and Subcategories

Asset Category	Asset Subcategories
Human Settlement	Residential areas Urban interface areas and rural properties. Places of temporary occupation Commercial, mining and industrial areas located away from towns and population centres (that is, not adjoining residential areas). Special risk and critical facilities Hospitals, nursing homes, schools and childcare facilities, tourist accommodation and facilities, prison and detention centres, local government administration centres and depots, incident control centres, designated evacuation centres, police, fire and emergency services.
Economic	Agricultural Pasture, livestock, crops, viticulture, horticulture and other farming infrastructure. Commercial and industrial Major industry, waste treatment plants, mines, mills and processing and manufacturing facilities and cottage industry. Critical infrastructure Power lines and substations, water and gas pipelines, telecommunications, railways, bridges, port facilities and waste water treatments plants. Tourist and recreational Tourist attractions and recreational sites that generate significant tourism and/or employment within the local area. Commercial forests and plantations Drinking water catchments
Environmental	Protected Rare and threatened flora and fauna, ecological communities and wetlands. Priority Fire sensitive species and ecological communities. Locally important Nature conservation and research sites, habitats, species and communities, areas of visual amenity.

Cultural	Aboriginal heritage Places of indigenous significance. Recognised heritage Assets afforded legislative protection through identification by the National Trust, State Heritage List or Local Planning Scheme Heritage List. Local heritage Assets identified in a Municipal Heritage Inventory or by the community. Other Other assets of cultural value, for example community centres and recreation facilities.

Only those assets at risk from bushfire need to be assessed and included in the BRMP. As a guiding principle, assets located within 100 metres of bushland (50 metres for unmanaged grassland) are deemed to be at sufficient risk from bushfire to warrant inclusion in the BRMP. Assets should not be included solely because they are registered on an agency's asset register. For example, a childcare centre located further than 100 metres from bushland is unlikely to warrant an assessment for bushfire risk and would not be included as an asset.

To be included in the BRMP, an asset must be considered something of value (that is, something to be protected) and be vulnerable to fire. The decision to include an asset in the BRMP will be assessed case by case and should be determined in consultation with the asset owner or managing agency.

3.2 Identifying Assets

To register an asset, record the details of the asset in BRMS and capture the location by drawing a marker, line or polygon around the asset on the GIS Map. The following sections outline the information to be recorded in BRMS when registering an asset.

3.2.1 Asset Name

The name given to an asset should be unique and easily identifiable to the local community (except for sensitive assets). When naming an asset, consider using the locality or a well-known landmark near the location of the asset, followed by a description, for example 'Nannup Primary School'.

Note: The specific location of some environmental and cultural assets may be considered highly sensitive. Where this is the case, BRMP documentation (including maps) made available to the public must use a non-specific asset name and refer to a general location only. As a guide, consider the source information that led to the asset being identified and whether it is already published in a public format, such as in a public database.

3.2.2 Asset Category

Enter the category of the asset. One or more asset categories may be selected.



3.2.3 Location Description

The location description should identify exactly where the asset is located (except for sensitive assets). Markers such as street names, bearings, rivers could be used.

3.2.4 Asset Owner

Select the owner of the asset. The asset owner is the owner, occupier or custodian of the asset itself.

Note: this may be different from the owner of the land that the asset is located on, for example, a Telstra communications tower located on leased land or private property.

3.2.5 Asset Value

Enter an estimated value for the asset, or group of assets (\$ x1000). Where assets are grouped, it is the total value of all assets within the group.

Note: This field may not be applicable to some assets, as it is difficult to equate loss or damage to an environmental or historical cultural asset to a monetary value.

3.2.6 Number Protected

Enter the number of assets that would be protected, should any treatments be implemented, for example, 10 houses or one school.

3.2.7 Comments

The comments field may be used to record other relevant information about the asset.

3.3 Multiple Asset Categories

In some circumstances, an asset may fall into more than one asset category. The asset category (or categories) is selected when the asset is recorded in BRMS. BRMS will allow an asset to be assigned to more than one asset category. If an asset falls into more than one asset category, a risk assessment can be completed under each category selected. The risk assessment that results in the highest risk rating will determine the overall risk rating and treatment priority for the asset.

Where an asset falls into more than one asset category, treatments will need to consider all aspects of the values at risk. For example, if an asset has both a human settlement and economic risk, treatments may be implemented to improve the physical protection of the asset (such as through fuel management or improved construction) and to minimise the effects of a business or service disruption or outage (such as to business continuity and emergency planning) in the event that the asset is not damaged or destroyed by a fire, but services are still interrupted by a bushfire event. An asset with multiple asset categories may be prioritised for treatment over an asset with the same treatment priority that belongs to only one asset category.

3.4 Grouping Assets

Where possible, assets should be grouped for assessment rather than assessed on an individual basis. This will reduce the time taken to complete the risk assessments and determine appropriate treatments.

Assets can only be grouped if they are of the same asset category. They should also have similar risk characteristics so that the risk assessment inputs will apply across the group. Appropriate groupings will make it easier to identify and implement treatments later in the process. Figure 6 provides an example of assets identified individually and as groups.

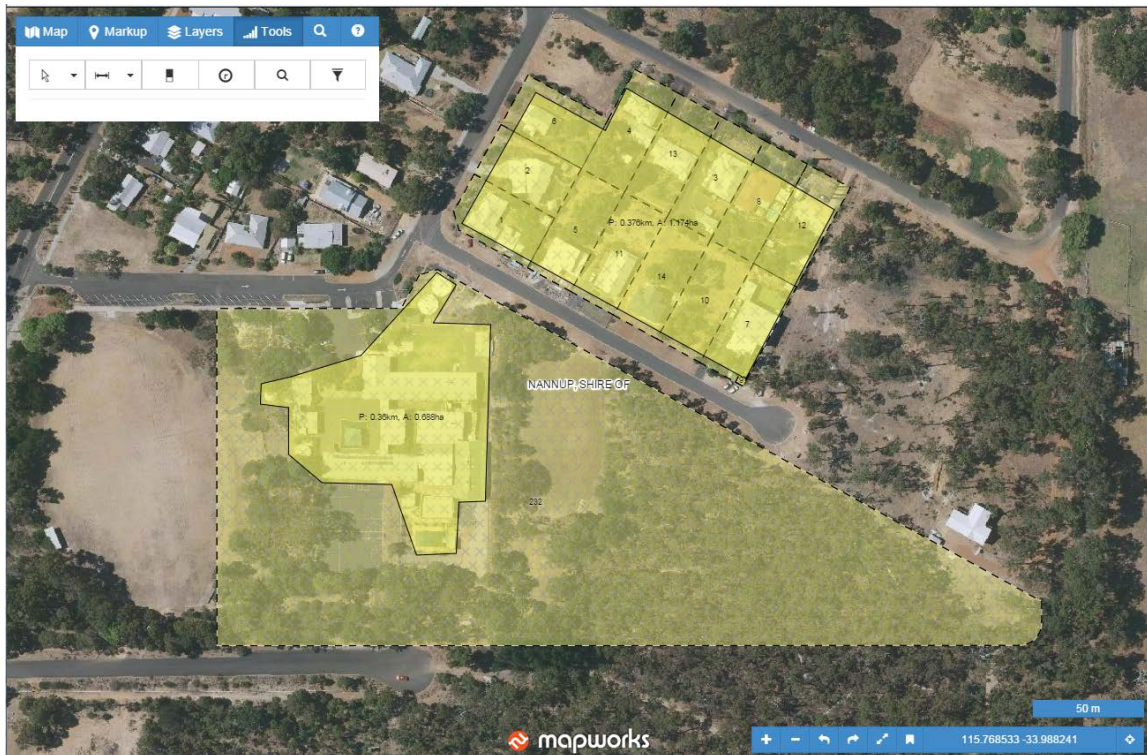


Figure 6 – Grouping and Mapping Assets

3.5 Asset Identification Number

Each asset identified in BRMS is allocated a unique identification number (asset ID). This is automatically generated by BRMS and is a concatenation of the fields in Table 4.

Table 4 – The Asset Identification Number

The Asset Identification Number		
Local Government code	2-3 letter code	<u>AMR</u> GP0001
	e.g. AMR (Shire of Augusta - Margaret River)	
Planning area code	2-3 letter code	AMR <u>GP</u> 0001
	e.g. GP (Gnarabup – Prevelly planning area)	
Incremental ID number	4-digit number	AMRGP <u>0001</u>
	e.g. 0001	



3.6 Completing the Risk Assessment for an Asset

Before commencing the risk assessment for an asset, information about the type of analysis used to assess the risk is entered into BRMS, including:

- **Analysis Type**
The type of analysis used to complete the risk assessment, such as desktop or field.
- **Date of Risk Assessment**
The date the risk assessment was completed.
- **Risk Assessor**
The person who completed the risk assessment.
- **Assessment Team**
Any other people that assisted with the risk assessment, or an alternative contact person responsible for review of the risk assessment.
- **Effort Hours**
The total number of hours taken to complete the risk assessment (actual hours of effort).
- **Hourly Rate**
The total hourly rate for all persons involved in the risk assessment, excluding on-costs.
- **Total Cost**
The total cost associated with completing the assessment. Where effort hours and hourly rate are entered, BRMS will automatically calculate the total cost.

3.7 How is Bushfire Risk Assessed?

Risk assessment uses a combination of likelihood and consequence to determine the level of bushfire risk. Once an asset has been identified, mapped and categorised, a risk assessment can be conducted to determine an asset's exposure to bushfire risk. The level of exposure to bushfire risk is called the risk rating.

3.7.1 Assessing Likelihood

Likelihood is described as the chance of a bushfire igniting, spreading and reaching an asset. The approach used to determine the likelihood rating is the same for each asset category: Human Settlement, Economic, Environmental and Cultural.

There are four possible likelihood ratings: unlikely, possible, likely and almost certain.

To determine the likelihood rating, consider the following for the asset being assessed:

- **Do fires occur frequently?**
When answering this question, consider the ignition and fire history of vegetated areas near the asset. Are there frequent ignitions due to arson, nearby campsites, escaped prescribed or agricultural burns or major transport routes?

Note: In this context, frequency is a measure relative to the local government not a comparison to other localities within the State. Consider where in the local government bushfires generally start and how often.

- **If a fire occurs, is it expected to spread and reach the asset?**

When answering this question, information such as access, slope, prevailing wind direction, containment potential (bushfire management zones and fuel loads) and fire run potential should be considered. Ignition data, situation reports (sitreps) and fire history can be used to determine where bushfires occur historically and how often they run.

Table 5 shows the matrix used to determine likelihood.

Table 5 – Likelihood Ratings for Bushfire Risk

		If a fire occurs, is it expected to spread and reach the asset?	
		No	Yes
Do fires occur frequently?	Yes	Possible	Almost certain
	No	Unlikely	Likely

It is often challenging to determine the likelihood rating for assets. Fire history data, (if available) local knowledge and an understanding of the landscape may be helpful when determining the likelihood of a bushfire occurring.

Ignitions should include vegetation fires, non-structural fires, road bound or vehicle fires and other undefined fires known to have occurred.

For each asset listed in the Asset Register, determine the likelihood rating that best matches the estimated likelihood of a bushfire igniting, spreading and reaching the asset. Where it is difficult to decide between two categories, select the higher risk category. Remember to document the basis for such decisions by attaching a note to the risk assessment in BRMS.

The table below provides a general description of each likelihood rating. The descriptions can be used to validate the likelihood rating determined through assessment. To use the table, check that the description listed for a likelihood rating accurately reflects the expected likelihood of a fire igniting, spreading and reaching the asset.

Table 6 – Likelihood Descriptions

Likelihood Rating	Description
Almost Certain (Sure to Happen)	Is expected to occur in most circumstances; High level of recorded incidents and/or strong anecdotal evidence; and/or Strong likelihood the event will recur; and/or Great opportunity, reason or means to occur; May occur more than once in 5 years.
Likely (Probable)	Regular recorded incidents and strong anecdotal evidence; and /or Considerable opportunity, reason or means to occur; May occur at least once in 5 years.
Possible (feasible but < probable)	Should occur at some stage; and/or Few, infrequent, random recorded incidents or little anecdotal evidence; and/or Some opportunity, reason or means to occur.
Unlikely (Improbable, not likely)	Would only occur under exceptional circumstances.

3.7.2 Assessing Consequence

Consequence is described as the outcome or impact of a bushfire event. The approach used to determine the consequence rating is different for each asset category: Human Settlement, Economic, Environmental and Cultural. This is due to the different aspects, or values at risk, and the type of information that needs to be considered when undertaking a risk assessment. For example, different information needs to be considered when determining the risk to an economic asset in comparison to an environmental asset, as each type of asset would be affected by a bushfire very differently.

The process for determining the consequence rating for each asset category is provided in Chapters 4 to 7 of these Guidelines. There are four possible consequence ratings: Minor, Moderate, Major and Catastrophic. Table 7 provides a general description of each consequence rating. The descriptions cover all asset categories and can be used to validate the consequence rating determined during assessment. To use the table, check that some (or all) of the descriptions listed against a consequence rating accurately reflect the type or level of consequences generally expected, if the asset was impacted by a bushfire.

Table 7 – Consequence Descriptions

Consequence Rating	Description
Minor	No fatalities. Near misses or minor injuries with first aid treatment possibly required. No persons are displaced. Little or no personal support (physical, mental, emotional) required. Inconsequential or no damage to an asset, with little or no specific recovery efforts required beyond the immediate clean-up. Inconsequential or no disruption to community. Inconsequential short-term failure of infrastructure or service delivery. (Repairs occur within 1 week, service outages last less than 24 hours.) Inconsequential or no financial loss. Government sector losses managed within standard financial provisions. Inconsequential business disruptions.
Moderate	Isolated cases of serious injuries, but no fatalities. Some hospitalisation required, managed within normal operating capacity of health services. Isolated cases of displaced persons who return within 24 hours. Personal support satisfied through local arrangements. Localised damage to assets that is rectified by routine arrangements. Community functioning as normal with some inconvenience. Isolated cases of short to mid-term failure of infrastructure and disruption to service delivery. (Repairs occur within 1 week to 2 months, service outages last less than 1 week.) Local economy impacted with additional financial support required to recover. Government sector losses require activation of reserves to cover loss. Disruptions to businesses lead to isolated cases of loss of employment or business failure. Isolated cases of damage to environmental or cultural assets, one-off recovery efforts required, but with no long term effects to asset.
Major	Isolated cases of fatalities. Multiple cases of serious injuries. Significant hospitalisation required, leading to health services being overstretched. Large number of persons displaced (more than 24 hours duration). Significant resources required for personal support. Significant damage to assets, with ongoing recovery efforts and external resources required. Community only partially functioning. Widespread inconvenience, with some services unavailable. Mid to long-term failure of significant infrastructure and service delivery affecting large parts of the community. Initial external support required. (Repairs occur within 2 to 6 months, service outages last less than a month.) Local or regional economy impacted for a significant period of time with significant financial assistance required. Significant disruptions across

	industry sectors leading to multiple business failures or loss of employment. Significant damage to environmental or cultural assets that require major rehabilitation or recovery efforts. Localised extinction of native species. This may range from loss of a single population to loss of all of the species within the BRMP area (for a species which occupies a greater range than just the BRMP area).
Catastrophic	Multiple cases of fatalities. Extensive number of severe injuries. Extended and large number requiring hospitalisation, leading to health services being unable to cope. Extensive displacement of persons for extended duration. Extensive resources required for personal support. Extensive damage to assets that will require significant ongoing recovery efforts and extensive external resources. Community unable to function without significant support. Long-term failure of significant infrastructure and service delivery affecting all parts of the community. Ongoing external support required. (Repairs will take longer than 6 months, service outages last more than 1 month.) Regional or State economy impacted for an extended period of time with significant financial assistance required. Significant disruptions across sectors leading to widespread business failures or loss of employment. Permanent damage to environmental or cultural assets. Extinction of a native species in nature. This category is most relevant to species that are restricted to the BRMP area, or also occur in adjoining areas and are likely to be impacted upon by the same fire event. 'In nature' means wild specimens and does not include flora or fauna bred or kept in captivity.

3.7.3 Determining the Risk Rating

The risk rating for an asset is a product of likelihood and consequence. BRMS will automatically calculate the risk rating, based on the likelihood and consequence inputs entered for an asset. Table 8 demonstrates how likelihood and consequence combine to determine risk rating. There are five risk ratings: Low, Medium, High, Very High and Extreme.

Table 8 – Determining the Risk Rating

Consequence Likelihood	Minor	Moderate	Major	Catastrophic
Almost certain	High	Very High	Extreme	Extreme
Likely	Medium	High	Very High	Extreme
Possible	Low	Medium	High	Very High
Unlikely	Low	Low	Medium	High

Chapter 4 – Human Settlement Assets

4.1 Human Settlement Assets

This section describes how to identify, map and assess human settlement assets that are potentially at risk from bushfire. Risk is a product of likelihood and consequence. When considering human settlement assets, the methodology used to assess the level of bushfire risk will be based on the following:

- **Likelihood Rating**

The chance of a bushfire igniting, spreading and reaching the asset; and

- **Consequence Rating**

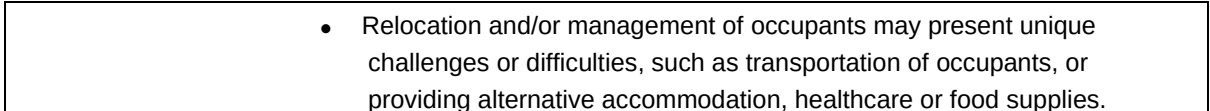
The outcome or impact of a bushfire event on the asset, as measured by the threat posed by the hazard vegetation and the vulnerability of the asset.

4.2 Asset Definitions – Human Settlement Assets

Table 9 describes the three subcategories for human settlement assets.

Table 9 – Human Settlement Asset Subcategories

Human Settlement Asset Subcategory	Description
Residential	Residential areas, including rural properties and urban interface areas. • In urban areas, a street, or a group of streets, along the urban interface may be classified as an asset. • Where possible, group human settlement assets with similar risk profiles together (for example, vegetation, slope, or separation distance) to assist with assessment. • When grouping assets, consider the treatment options that may be employed to manage the risk.
Places of temporary occupation	Commercial districts and industrial areas, mining sites or camps and other locations where people may work or gather that are located away from towns and population centres (<i>for example, mining camps, industrial complexes, showground's, sports facilities and recreation centres</i>).
Special risk and critical facilities	Locations and facilities where occupants may be more vulnerable to bushfire for one or more of the following reasons: • Occupants may have limited knowledge about the impact of bushfires; • Occupants may have a reduced capacity to evaluate risk and respond adequately to bushfire threat; • Occupants may be more vulnerable to stress and anxiety arising from bushfire threat or the effects of smoke; • There may be significant communication barriers; or



- Relocation and/or management of occupants may present unique challenges or difficulties, such as transportation of occupants, or providing alternative accommodation, healthcare or food supplies.
(for example, schools, nursing homes, hospitals, specialised care facilities, childcare facilities, tourist accommodation, prisons and detention centres, retirement villages, shared home or supported accommodation and independent living facilities.)
Facilities that are critical to the community during a bushfire emergency.
(for example, police, fire and emergency services facilities, designated evacuation centres, incident control centres, local government administration and depot facilities)

4.3 Identifying Human Settlement Assets

When a human settlement asset is identified, enter the asset details into the BRMS Asset Register and capture the asset on the GIS Map.

4.4 Completing the Risk Assessment for Human Settlement Assets

4.4.1 Rating the Likelihood

To determine the likelihood rating for an asset, the following is considered:

- Do fires occur frequently?
- If a fire occurs, is it expected to spread and reach the asset?

Based on the inputs selected, BRMS will automatically calculate the likelihood rating for the asset *(refer Section 3.7.1 for further information)*.

4.4.2 Rating the Consequence

To determine the consequence rating for a human settlement asset, the following information is considered:

- **Threat**
The threat posed by the hazard vegetation; and
- **Vulnerability**
The vulnerability of the asset.

4.4.3 Calculating the Bushfire Threat

The bushfire threat is calculated in BRMS using relevant information about the hazard vegetation, slope and separation distance between the vegetation and the asset. There are four threat categories: low, medium, high and very high.

Note: The level of bushfire threat for an asset is calculated within BRMS using a quantified bushfire threat assessment model. The model uses the methodology set out in AS3959-2009 *Construction of buildings in bushfire-prone areas* that is used to undertake a Bushfire Attack Level (BAL) assessment. The methodology is based on a set of bushfire behaviour and radiant heat flux prediction models, incorporating bushfire research findings.

Low Threat Exclusion

If the hazard vegetation being assessed in relation to an asset meets one or more of the following criteria⁴, the bushfire threat will automatically be rated as **LOW**.

- **More than 100 metres from the asset**
Vegetation of any type that is more than 100 metres from the asset.
- **Single area less than 1 hectare**
Single areas of vegetation less than 1 hectare in area and not within 100 metres of other areas of vegetation being classified.
- **Multiple areas less than 0.25 hectares each**
Multiple areas of vegetation less than 0.25 hectares in area and not within 20 metres of the asset or each other.
- **Strips of vegetation with a width less than 20 metres**
Strips of vegetation less than 20 metres in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of the length and not within 20 metres of the asset or each other or other areas of vegetation being classified.
- **Non-vegetated areas**
Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.
- **Low threat vegetation**
Including grasslands managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.

Note: Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, recognisable as short cropped grass to a height of 100 millimetres.

⁴ Source: AS 3959-2009: Clause 2.2.3.2, reproduced with permission from SAI Global under licence number 1510-c081.



Where the vegetation being assessed is not excluded as low threat, the following information is used to calculate the bushfire threat.

4.4.3 (a) Vegetation Class

Select the vegetation class that best describes the vegetation being assessed as the greatest risk to the asset. This may or may not be the vegetation located closest to the asset. In some circumstances, more than one vegetation class may be present. Assessments should always be based on the vegetation that presents the greatest risk to the asset.

Note: Accurate fuel age data and local knowledge will be valuable during this part of the assessment. Classification of vegetation should not be based solely on the edge of the vegetation as edges may be invaded by weeds. Where there is more than one vegetation type present, classify each type separately and apply the worst case scenario (the worst case scenario may not be the predominant vegetation).

4.4.3 (b) Vegetation (Fuel) Age and Canopy (%)

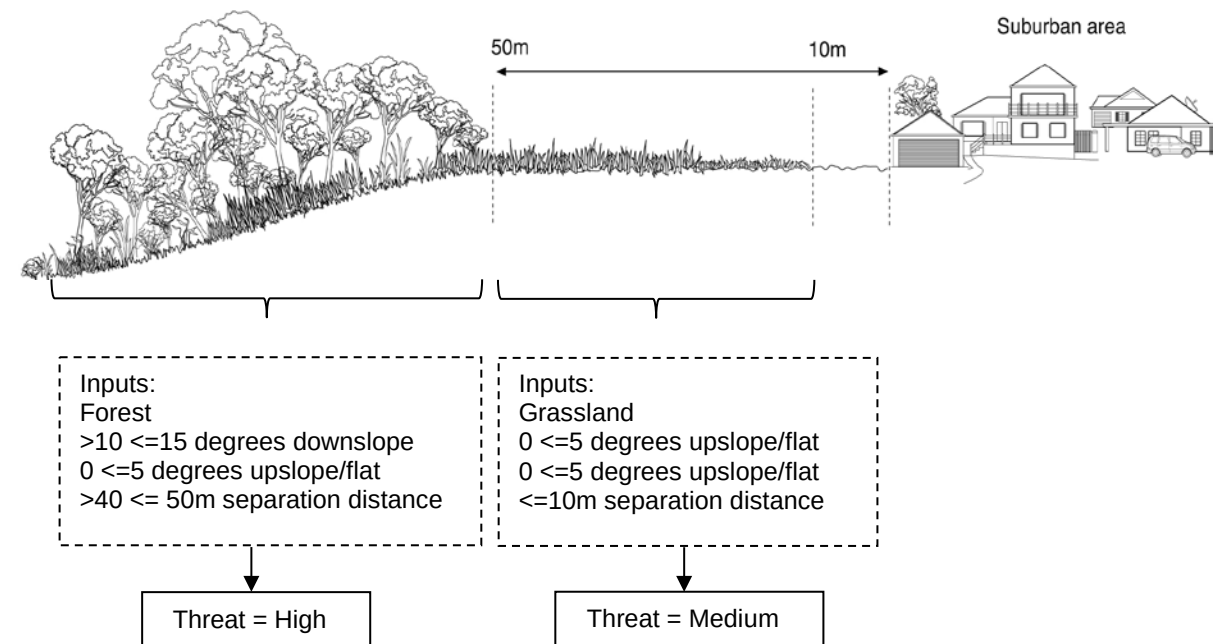
Select the age (in years) of the vegetation (fuel) being assessed as the risk to the asset and the estimated percentage of canopy cover.

4.4.3 (c) Separation Distance

The separation distance is defined as the distance between the asset and the vegetation identified as the hazard. The separation distance is measured from the closest part of the asset, such as the house, to the nearest edge of the hazard vegetation. It is not measured from the property boundary or fence line to the vegetation. Select the separation distance category which best suits the asset or group of assets.

Table 10 – Separation Distance Categories

Separation Distance
≤10
>10 - ≤20 metres
>20 - ≤30 metres
>30 - ≤40 metres
>40 - ≤50 metres
>50 - ≤60 metres
>60 - ≤70 metres
>70 - ≤80 metres
>80 - ≤90 metres
>90 - ≤100 metres
>100 metres



Note: the threat assessment should be based on the vegetation which is the greatest risk to the asset. In this example, the threat assessment should be based on the forest vegetation because it poses the greatest threat to assets.

Figure 7 – Selecting the Hazard Vegetation for Assessment

4.4.3 (d) Slope

Slope is the angle of the ground's surface measured from the horizontal. Slope will dramatically affect a fire's forward rate of spread, and therefore intensity, when burning upslope or downslope.

The threat assessment uses two slope measurements to calculate the bushfire threat to an asset. They are described as the:

- **Slope Under Vegetation**
The effective slope in the land under the hazard vegetation; and
- **Slope from Asset to Vegetation**
The slope of the land between the asset and the hazard vegetation.

To measure the slope, determine whether the slope is upslope, flat or downslope and the angle of the slope in degrees.

A slope analysis can be conducted in BRMS using the GIS Map. Alternatively, the slope can be measured manually using the contour lines on a topographic map or assessed in the field.

Table 11 – Slope Categories

Degrees	Slope Type	Description of degrees
0 degrees	Flat land	No degrees.
>0-5 degrees	Upslope or downslope	Level ground.
>5-10 degrees	Upslope or downslope	Easy to walk, but cycling is difficult – moderate to walk, too steep for cycling.
>10-15 degrees	Upslope or downslope	Moderate to walk, too steep for cycling – hard climb, limit of 2WD roads.
>15 degrees	Upslope or downslope	Difficult to climb.

4.4.3 (e) Upslope, Flat or Downslope

For the threat assessment, slope is always measured in relation to the asset. If standing at the asset and looking uphill at the vegetation, then the slope is upslope. If standing at the asset and looking downhill at the vegetation then the slope is downslope. Figure 8 provides examples to demonstrate how slope is measured.

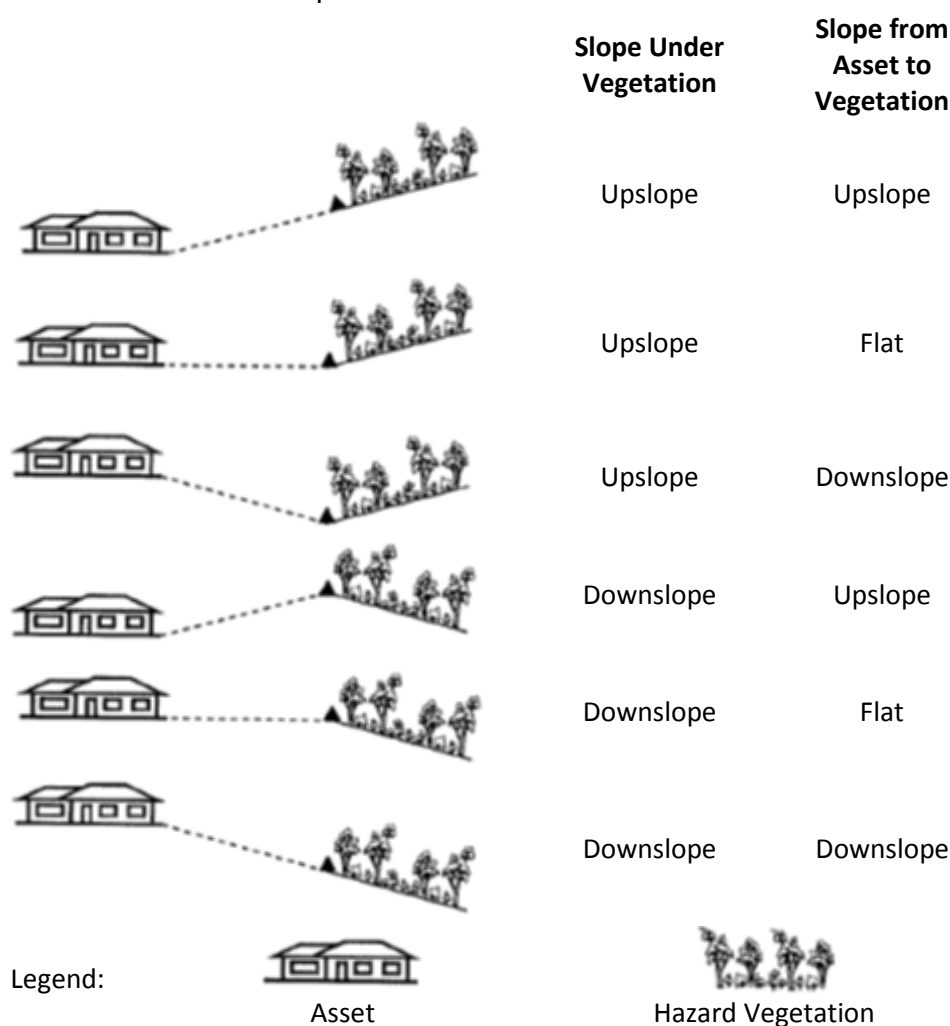


Figure 8 – Examples of Upslope and Downslope⁵

⁵ Source: AS 3959-2009: Figure 2.2 (partial), reproduced with permission from SAI Global under licence number 1510-c081.

4.4.4 Vulnerability

The vulnerability of a human settlement asset describes the susceptibility of the asset to the adverse effects of a bushfire. There are three categories of vulnerability for human settlement assets: High, Moderate and Low. To complete the risk assessment, select the vulnerability category which best describes the estimated vulnerability of the asset.

Note: Special risk and critical facility assets should not be assessed as low vulnerability. This is due to the nature of the occupants that reside at, or temporarily occupy, such facilities, including schools, hospitals and nursing homes.

Table 12 – Vulnerability Categories for Human Settlement Assets

Category	Description
High	No recent targeted community education, or such programs have been ineffective. Properties are not prepared. Inadequate access or egress. Residents or owners unlikely or unable to defend their own property, significant support will be required from firefighting resources. Inadequate water supply. The majority of homes or structures are timber or fibre-cement construction. Special Risk and Critical Facility Assets Criteria: Occupants are under 5 or over 70 years of age or are non-able bodied persons. Independent living requiring outside assistance or special needs. Seasonal and/or non-permanent populations. Ineffective emergency management and/or evacuation plan in place. Facility is critical to bushfire response. There is no suitable alternative available or contingency arrangements are inadequate.
Moderate	Area has had targeted community education programs. Properties are not prepared. Adequate access and egress. Residents or owners likely to be able to defend their own property, with some additional support from firefighting resources. Adequate water supply. The majority of homes or structures do not meet the current construction standards for building in bushfire prone areas, but are concrete or brick and tile/steel construction. Special Risk and Critical Facility Assets Criteria: Occupants are from 5 to 70 years of age and are able bodied persons. Independent living with no outside assistance. Permanent residents. Effective emergency management and/or evacuation plan in place. An alternative bushfire response facility is available or contingency arrangements are in place.

Low

Area has had targeted community education programs (impact is visually evident).

Properties are prepared (for example, Asset Protection Zones maintained, gutters are cleaned and flammable objects are located away from hazards and buildings).

Adequate access and egress.

Residents or owners likely to be able to defend their own property, with minimal support from firefighting resources.

Adequate water supply.

The majority of homes or structures meet current bushfire construction standards.

Special Risk and Critical Facility Assets Criteria:

Special Risk and Critical Facility assets should **not** be assessed as low vulnerability.

If an asset falls into more than one vulnerability category, choose the category that is most applicable to the asset. This may be the category with the most number of relevant examples, or if there is a 50/50 split between two categories, then the higher category is to be selected. If the vulnerability is split between low and high, a half-way point may be chosen and a moderate rating applied. If in doubt, take a conservative approach and select the higher vulnerability category.

4.4.5 Consequence (Automatically Calculated)

BRMS will automatically calculate the consequence rating for a human settlement asset, based on the bushfire threat and vulnerability category selected. There are four ratings for consequence: Minor, Moderate, Major and Catastrophic.

Table 13 – Consequence Ratings for Human Settlement Areas

Threat \ Vulnerability	Low	Medium	High	Very High
High Vulnerability	Moderate	Major	Catastrophic	Catastrophic
Moderate Vulnerability	Minor	Moderate	Major	Catastrophic
Low vulnerability	Minor	Minor	Moderate	Major

4.5 Risk Rating (Automatically Calculated)

The risk rating will be automatically calculated by BRMS once the likelihood and consequence assessments are complete.

4.6 Priority (Automatically Calculated)

The priority will be automatically calculated by BRMS, based on the risk rating.

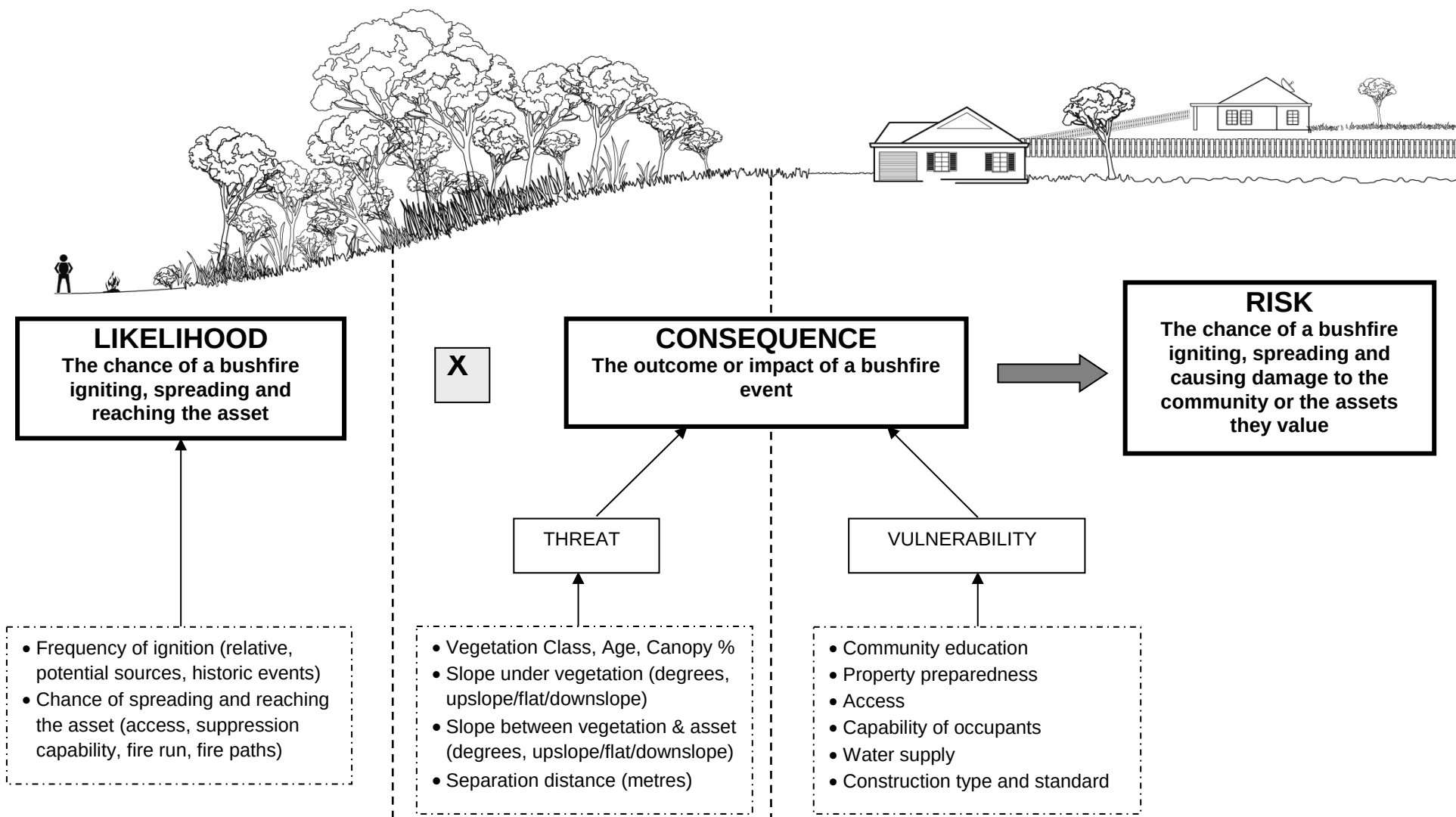


Figure 9 – The Risk Assessment Process for Human Settlement Assets

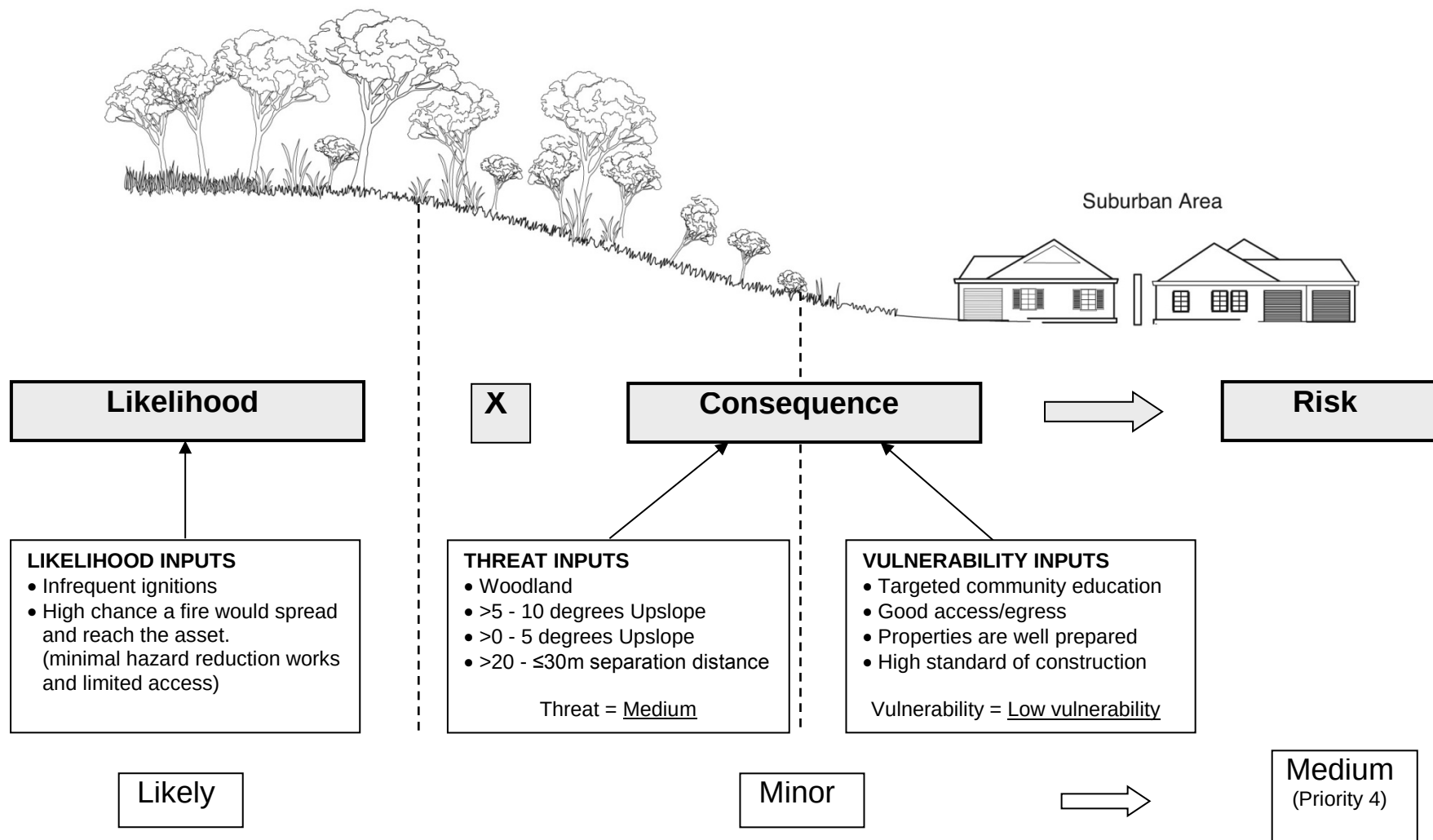


Figure 10 – Assessment Process for Human Settlement Assets – Worked Example

Chapter 5 – Economic Assets

5.1 Assessment of Economic Assets

This section describes how to identify, map and assess economic assets that are potentially at risk from bushfire.

Risk is a product of likelihood and consequence. When considering economic assets, the methodology used to assess the level of bushfire risk will be based on the following:

- **Likelihood Rating**

The chance of a bushfire igniting, spreading and reaching the asset; and

- **Consequence Rating**

The outcome or impact of a bushfire event on the asset, measured by the level of economic impact and the recovery costs.

5.2 Asset Definitions – Economic Assets

Table 14 describes the six subcategories for economic assets.

Table 14 – Economic Asset Subcategories

Economic Asset Subcategory	Description	
Agricultural	All areas under production, such as pasture, livestock, crops, viticulture, horticulture and other farming infrastructure. <i>Group agricultural assets together, do not assess at the level of individual properties or farms.</i>	
Commercial/Industrial	Major industries	Mills
	Waste water treatment plants	Processing or manufacturing facilities
	Mines (economic interest)	
Critical Infrastructure	Power lines and electrical substations	Telecommunications infrastructure
	Water, gas and oil pipelines	Bridges and key transport routes
	Railway lines	Port facilities
Tourist and Recreational	Events	Retreats
	Resorts	Ecotourism facilities
Commercial Forests and Plantations	Plantations	
	Commercial native forests	
Drinking Water Catchments	Land and infrastructure associated with drinking water catchments.	



5.3 Identifying Economic Assets

When an economic asset is identified, enter the asset details into BRMS and capture the asset on the GIS Map, as per the procedure outlined in Chapter 3.

5.4 Completing the Risk Assessment for Economic Assets

5.4.1 Rating the Likelihood

To determine the likelihood rating for an asset, the following is considered:

- Do fires occur frequently?
- If a fire occurs, is it expected to spread and reach the asset?

Based on the inputs selected, BRMS will automatically calculate the likelihood rating for the asset (*refer Section 3.7.1 for further information*).

5.4.2 Rating the Consequence

To determine the consequence rating for an economic asset, the following information is considered:

- **Level of Impact**
The relative importance of the asset and the implications on the economy; and
- **Recovery Costs**
The recovery cost and timeframe for the asset to return to a functioning capacity, after being impacted by a bushfire.

5.4.3 Level of Impact

The level of impact describes the relative importance of the asset and the potential impact its loss, disruption or damage from bushfire, may have on the wider economy. There are three levels of impact: local, regional and state.

Table 15 describes each impact level across five key sectors: people, infrastructure, public administration, environmental and financial.

Table 15 – Level of Impact Categories⁶

	Local	Regional	State
People (including livestock)	Health systems operating at optimum capacity levels. Displacement of >50 to ≤200 people within the region and the capacity to cope. Personal support needs being met. Single fatality and/or multiple serious injuries requiring hospitalisation as a direct result of the bushfire event. ≤30 houses damaged or destroyed. ≤3,000 livestock lost.	Health system operating at surge capacity; under severe pressure. Displacement of >200 to ≤500 people within the State and the capacity to cope. State personal support systems operating at maximum capacity. 2-10 fatalities as a direct result of the bushfire event and/or large number of severe injuries. Large number of people affected by smoke or trauma 100+ homes damaged or destroyed 3,000 – 10,000 livestock lost.	Health system unable to cope Beyond the capacity of the State to cope with displaced people. State personal support systems unable to cope. >10 fatalities as a direct result of bushfire and/or extensive number of severe injuries. 300+ houses damaged or destroyed >10,000 livestock lost and/or significant loss of breeding stock.
Infrastructure	Loss of critical infrastructure and/or services for up to 1 hour to the Perth metropolitan area. Loss of services to a major regional centre for up to 1 day. Loss of services to a community for up to 1 week.	Loss of critical infrastructure and/or services for >1 to <24 hours to the Perth metropolitan area. Loss of services to a major regional centre or several suburbs for >1 day to <1 week.	Loss of critical infrastructure and/or services for >24 hours to the Perth metropolitan area. Loss of services to a major regional centre or several suburbs for >1 week.
Public Administration	Local outrage and concern.	Some outrage at local and regional levels.	Significant state-wide outrage. Formal inquiry commissioned at State level or above leading to changes in policy and practice.

⁶ Source : adapted from Country Fire Authority 2012, Victorian Fire Risk Register – Bushfire Reference Guide, Version 12.5, Victoria.

Environment/Culture	Temporary disturbance to one or more ecosystems or critical habitat elements. Local response and/or support for animal welfare.	Long term disturbance to one or more ecosystems or critical habitat elements. National response and/or support for animal welfare. Loss of regionally significant cultural asset.	Permanent total loss of one or more ecosystems or critical habitat elements. Extinction of a species or significant increase in the likelihood of extinction to “almost certain” meaning that intervention measures such as captive breeding programs are required. Loss of significant State cultural assets.
Financial	Damage costs including legal action and/or industry impacts (tourism or businesses etc) to the value of \$30M or more or complete loss.	Damage costs including legal action and/or industry impacts (tourism, businesses etc) to the value of \$100M or more.	Total costs of \$1B or 30% of State Revenue. Damage costs including legal action and/or industry impacts (tourism, forestry, wine and grapes etc) to the value of \$300M or more.

5.4.4 Recovery Costs

Recovery is described as the capacity of the asset to recover from the impacts of a bushfire event. This includes expenses associated with:

- Re-establishment;
- Repair or rebuilding;
- Lost production time or downtime;
- Service disruption;
- Lost revenue or decreased activity;
- Provision of support and recovery services; or
- Any other recovery activities that incur a cost to the economy.

There are three categories of recovery costs: Low, Moderate and High.

Table 16 – Recovery Cost Categories

Category	Level of State or Federal Support	Recovery Time	Repair Time	Recovery Cost
High	Significant	Long Term – Months to Years.	> 6 months	≥ \$300M
Moderate	Additional	Mid Term – Weeks to Months	1 week to 6 months	≥ \$100M
Low	Minimal	Short Term – Hours to Days	< 1 week	≥ \$30M or complete loss

If recovery costs and recovery time are split between categories, refer table 17.

Table 17 – Recovery Cost and Time

Cost \ Time	Approximately to the value of \$30M or more or complete loss	Approximately to the value of \$100M or more	Approximately to the value of \$300M or more
Months to Years (> 6 months)	Moderate	High	High
Months (1 Week to 6 Months)	Low	Moderate	High
Days (< 1 Week)	Low	Low	Moderate

5.4.5 Consequence Assessment for Economic Assets (Automatically Calculated)

BRMS will automatically calculate the consequence rating for an economic asset, based on the level of impact and recovery cost categories selected. There are four ratings for consequence: Minor, Moderate, Major and Catastrophic.

Table 18 – Consequence Ratings for Economic Assets

Level of Impact \ Recovery Costs	Local	Regional	State
High Recovery Costs	Major	Major	Catastrophic
Moderate Recovery Costs	Moderate	Major	Major
Low Recovery Costs	Minor	Moderate	Moderate

5.5 Risk Rating (Automatically Calculated)

The risk rating will be automatically calculated by BRMS once the likelihood and consequence assessments are complete.

5.6 Priority (Automatically Calculated)

The priority will be automatically calculated by BRMS, based on the risk rating.

Chapter 6 – Environmental Assets

6.1 Assessment of Environmental Assets

This section describes how to identify, map and assess environmental assets that are potentially at risk from bushfire. Risk is a product of likelihood and consequence. When considering environmental assets, the methodology used to assess the level of bushfire risk will be based on the following:

- **Likelihood Rating**

The chance of a bushfire igniting, spreading and reaching the asset; and

- **Consequence Rating**

The outcome or impact of a bushfire event on the asset, measured by the vulnerability of the asset and the potential impact of a bushfire or fire regime.

6.2 Asset Definitions – Environmental Assets

Table 19 describes the three subcategories for environmental assets.

Table 19 – Environmental Asset Subcategories

Environmental Asset Subcategory	Description
Protected	Flora, fauna and ecological communities that are listed as a: • Critically Endangered, Endangered or Vulnerable species under the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cth) (<i>EPBC Act 1999</i>) (including associated critical habitat). • Critically Endangered, Endangered or Vulnerable species under Schedule 1 of the <i>Wildlife Conservation Act 1950</i> (WA). • Critically Endangered, Endangered or Vulnerable ecological community under the <i>EPBC Act 1999</i> (Cth). • Critically Endangered, Endangered or Vulnerable Threatened Ecological Community (TEC) endorsed by the Minister for Environment (WA). • Fauna protected under international conventions. • RAMSAR wetlands of international importance.
Priority	Flora, fauna and ecological communities that are a: • Priority species listed on the Priority Flora or Priority Fauna Lists held by P&W (Priority 1-5). • Priority Ecological Community (PEC) (Priority 1-5). • Wetlands of national or state importance.
Locally Important	Species, populations, ecological communities or habitats that the local community or independent scientific experts consider important for the area and for which there is some scientific evidence that protection would be beneficial. Wetlands of local importance.

Note: Priority and protected marine, aquatic and migratory species are outside the scope of the BRMP.



6.3 Considering the Minimum Fire Threshold

The list of species and communities within a local government may be varied and extensive. As fire is a natural part of the landscape, many of the environmental assets identified in the BRMP may rely on fire, used at the appropriate intervals and intensity, to remain healthy. The minimum fire threshold refers to the shortest period of time that fire should be excluded from an asset to avoid any localised decline or loss of species from excessive burning.

Before including an environmental asset in the BRMP, consider the following:

- Does the species, population, community or habitat have a minimum fire threshold?
- If so, when was the area where the species, population, community or habitat occurs last burnt?
- Is the time since fire less than the recommended minimum fire threshold?

Environmental assets only need to be included and assessed in the BRMP if the time since fire is less than the minimum fire threshold for the asset. Advice relating to fire thresholds for particular species, populations, communities or habitats can be sought directly from P&W.

6.4 Identifying Environmental Assets

When an economic asset is identified, enter the asset details into BRMS and capture the asset on the GIS Map, as per the procedure outlined in Chapter 3.

Note: Local governments are encouraged to seek advice from P&W regarding the list of environmental assets to be included in the BRMP.

6.5 Completing the Risk Assessment for Environmental Assets

6.5.1 Rating the Likelihood

To determine the likelihood rating for an asset, the following is considered:

- Do fires occur frequently?
- If a fire occurs, is it expected to spread and reach the asset?

Based on the inputs selected, BRMS will automatically calculate the likelihood rating for the asset (*refer Section 3.7.1 for further information*).

6.5.2 Rating the Consequence

To determine the consequence rating for an environmental asset, the following information is considered:

- **Vulnerability**

The vulnerability of the asset, based on its conservation status and geographic extent; and

- **Potential Impact of Fire**

The potential impact of a bushfire event or fire regime on the asset.

6.5.3 Vulnerability

The vulnerability of an environmental asset to an impact from bushfire is based on its conservation status and geographic extent.

6.5.3 (a) Conservation Status

The conservation status describes the relative importance of an environmental asset for protection. There are three categories for conservation status: threatened, priority or local conservation.

Table 20 – Conservation Status Categories

Category	Description
Threatened	Threatened species and communities listed as Critically Endangered, Endangered or Vulnerable under Commonwealth and/or Western Australian legislation. Critically Endangered, Endangered or Vulnerable Threatened Ecological Communities (TEC) endorsed by the Minister for Environment (WA). Fauna protected under international conventions. RAMSAR wetlands of international importance.
Priority	Priority species listed on the Priority Flora or Priority Fauna Lists held by P&W (Priorities 1-3). Priority Ecological Communities (PEC) (Priority 1-5). Wetlands of national or state importance.
Local Conservation	Priority species listed on the Priority Flora or Priority Fauna Lists held by P&W (Priorities 4-5). Locally important species, communities and values. Wetlands of local importance.

6.5.3 (b) Geographic Extent

The geographic extent describes the distribution of an environmental asset. Unique or rare environmental assets will have a highly restricted geographic extent and therefore warrant a higher level of protection than species or communities occurring more frequently. There are three categories of geographic extent: Highly Restricted, Restricted and Widespread.

Table 21 – Geographic Extent Categories

Category	Description
Highly Restricted	The species or community is found in one location state-wide or is severely fragmented.
Restricted	The species or community is found in two to five locations state-wide.
Widespread	The species or community is found in more than five locations state-wide.

Based on the categories selected for conservation status and geographic extent, BRMS will automatically calculate the vulnerability rating for the asset.

Table 22 – Vulnerability Ratings for Environmental Assets

Conservation Status Geographic Extent	Local Conservation	Priority	Threatened
Highly Restricted	Moderate	High	Very High
Restricted	Low	Moderate	High
Widespread	Low	Low	Moderate

6.5.4 Potential Impact of Fire

The potential impact of fire describes the long-term effect a fire regime may have on a vegetation type and the characteristics associated with each category.

Table 23 – Potential Impact of Fire Categories

Fire Regime Category	Fire Ecology Characteristics	Typical Fire Behaviour
Fire Sensitive - Exclude Bushfire	Most species in 'Fire Sensitive' vegetation types do not require fire for the maintenance of their ecological values. In this category, vegetation types that do require fire, only require fire at very long intervals (100+ years). Fire can damage these vegetation types and recovery takes many years. When fires occur too frequently in these vegetation types ecological values are lost and the vegetation may be replaced by other vegetation types.	Generally only burn under extreme fire conditions or following prolonged drought conditions. May act as a natural firebreak. Generally very difficult to burn under typical prescribed burning conditions.
Fire Influenced - Restrict Bushfire	Many, but not all, species in 'Fire Influenced' vegetation types require fire to maintain their ecological values and species diversity, however fire is generally only required at long intervals. These vegetation types can tolerate fire and will recover, however recovery takes longer than in 'Fire Dependent' vegetation types. Repeated relatively frequent burning in these vegetation types is likely to compromise ecological values and may change the vegetation to another vegetation type. Consider fragmented areas of native vegetation, where mosaic burning is required due to the inability of native flora and fauna to recolonize from adjacent areas.	May support high fuel hazard but only become available to burn under higher Fire Danger Index conditions or during drier periods. Generally more difficult to burn than 'Fire Dependent' vegetation types.
Fire Dependent - No Conditions	Many species in 'Fire Dependent' vegetation types are fire cued and require fire relatively frequently for their regeneration and persistence. In the absence of fire these vegetation types are likely to decrease in species diversity and may change to another vegetation type. These vegetation types recover quickly following a fire. They can tolerate relatively frequent burning without compromising ecological values.	Generally burns readily under a wide range of weather conditions. Fuels generally dry out faster in these vegetation types than others. Well suited to prescribed burning.

6.5.5 Consequence (Automatically Calculated)

BRMS will automatically calculate the consequence rating for an environmental asset, based on the vulnerability and potential impact categories selected for the asset. There are four categories for consequence: Minor, Moderate, Major and Catastrophic.

Table 24 – Consequence Ratings for Environmental Assets

Potential Impact of Fire \ Vulnerability	Low	Moderate	High	Very High
Fire Sensitive - Exclude Fire	Moderate	Major	Major	Catastrophic
Fire Influenced - Restrict Fire	Minor	Moderate	Moderate	Major
Fire Dependent - No Conditions	Minor	Minor	Minor	Moderate

6.6 Risk Rating (Automatically Calculated)

The risk rating will be automatically calculated by BRMS once the likelihood and consequence assessments are complete.

6.7 Priority (Automatically Calculated)

The priority will be automatically calculated by BRMS, based on the risk rating.

Chapter 7 – Cultural Assets

7.1 Assessment of Cultural Assets

This section describes how to identify, map and assess cultural assets that are potentially at risk from bushfire. Risk is a product of likelihood and consequence. When considering cultural assets, the methodology used to assess the level of bushfire risk will be based on the following:

- **Likelihood Rating**

The chance of a bushfire igniting, spreading and reaching the asset; and

- **Consequence Rating**

The outcome or impact of a bushfire event on the asset, measured by the threat posed by the hazard vegetation and the vulnerability of the asset.

7.2 Asset Definitions – Cultural Assets

Table 25 describes the four subcategories for cultural assets.

Table 25 – Cultural Asset Subcategories

Cultural Asset Subcategory	Description
Aboriginal Heritage	Places of indigenous significance identified by the Department of Aboriginal Affairs (DAA) or the local community. DAA has established the Aboriginal Heritage Inquiry System (AHIS) as per the <i>Aboriginal Heritage Act 1972</i> . The register holds the details of all known Aboriginal cultural heritage places and objects within Western Australia. <i>Additional sites may become known through discussions with local Aboriginal communities or other people and can be included in the BRMP and referred to DAA for possible inclusion in the AHIS.</i>
Recognised Heritage	Non-indigenous heritage assets afforded legislative protection through identification by the National Trust, State Heritage List or Local Planning Scheme Heritage List. Non-indigenous heritage assets are generally those places or items of significant cultural value arising from the early occupation of Western Australia by European or non-indigenous settlers and pioneers.
Local Heritage	Assets identified in a Municipal Heritage Inventory or identified by the local community as being significant to local heritage.
Other	In some areas, the local community values other cultural assets. These may include community halls, churches, clubs and recreational facilities.



7.3 Identifying Cultural Assets

When a cultural asset is identified, enter the asset details into BRMS and capture the asset on the GIS Map, as per the procedure outlined in Chapter 3.

7.4 Completing the Risk Assessment for Cultural Assets

7.4.1 Rating the Likelihood

To determine the likelihood rating for an asset, the following is considered:

- Do fires occur frequently?
- If a fire occurs, is it expected to spread and reach the asset?

Based on the inputs selected, BRMS will automatically calculate the likelihood rating for the asset (*refer Section 3.7.1 for further information*).

7.4.2 Rating the Consequence

To determine the consequence rating for a cultural asset, the following information is considered:

- **Threat**
The threat posed by the hazard vegetation; and
- **Vulnerability**
The vulnerability of the asset.

7.4.3 Calculating the Bushfire Threat

The bushfire threat is calculated in BRMS using relevant information about the hazard vegetation, slope and separation distance between the vegetation and the asset. There are four threat categories: low, medium, high and very high.

Note: The level of bushfire threat for an asset is calculated within BRMS using a quantified bushfire threat assessment model. The model uses the methodology set out in *AS3959-2009 Construction of buildings in bushfire-prone areas* that is used to undertake a Bushfire Attack Level (BAL) assessment. The methodology is based on a set of bushfire behaviour and radiant heat flux prediction models, incorporating bushfire research findings.



Low Threat Exclusion

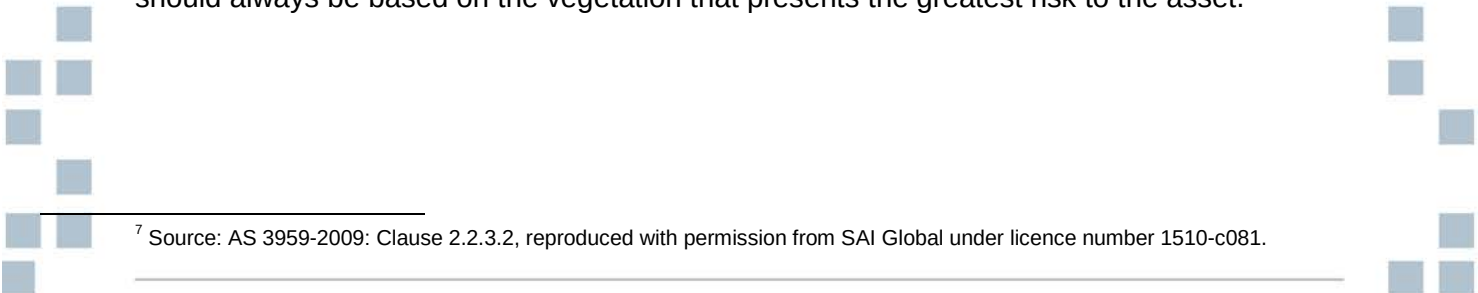
If the hazard vegetation being assessed in relation to an asset meets one or more of the following criteria⁷, the bushfire threat will automatically be rated as **LOW**.

- **More than 100 metres from the asset**
Vegetation of any type that is more than 100 metres from the asset.
- **Single area less than 1 hectare**
Single areas of vegetation less than 1 hectare in area and not within 100 metres of other areas of vegetation being classified.
- **Multiple areas less than 0.25 hectares each**
Multiple areas of vegetation less than 0.25 hectares in area and not within 20 metres of the asset or each other.
- **Strips of vegetation with a width less than 20 metres**
Strips of vegetation less than 20 metres in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of the length and not within 20 metres of the asset or each other or other areas of vegetation being classified.
- **Non-vegetated areas**
Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.
- **Low threat vegetation**
Including grasslands managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.
Note: Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, recognisable as short cropped grass to a height of 100 millimetres.

Where the vegetation being assessed is not excluded as low threat, the following information is used to calculate the bushfire threat.

7.4.3 (a) Vegetation Class

Select the vegetation class that best describes the vegetation being assessed as the greatest risk to the asset. This may or may not be the vegetation located closest to the asset. In some circumstances, more than one vegetation class may be present. Assessments should always be based on the vegetation that presents the greatest risk to the asset.



⁷ Source: AS 3959-2009: Clause 2.2.3.2, reproduced with permission from SAI Global under licence number 1510-c081.

Note: Accurate fuel age data and local knowledge will be valuable during this part of the assessment. Classification of vegetation should not be based solely on the edge of the vegetation as edges may be invaded by weeds. Where there is more than one vegetation type present, classify each type separately and apply the worst case scenario (the worst case scenario may not be the predominant vegetation).

7.4.3 (b) Vegetation (Fuel) Age and Canopy (%)

Select the age (in years) of the vegetation (fuel) being assessed as the risk to the asset and the estimated percentage of canopy cover.

7.4.3 (c) Separation Distance

The separation distance is defined as the distance between the asset and the vegetation identified as the hazard. The separation distance is measured from the closest part of the asset, such as a house, to the nearest edge of the hazard vegetation. It is not measured from the property boundary or fence line to the vegetation. Select the separation distance category which best suits the asset, or group of assets.

Table 26 – Separation Distance Categories

Separation Distance
≤10
>10 - ≤20 metres
>20 - ≤30 metres
>30 - ≤40 metres
>40 - ≤50 metres
>50 - ≤60 metres
>60 - ≤70 metres
>70 - ≤80 metres
>80 - ≤90 metres
>90 - ≤100 metres
>100 metres

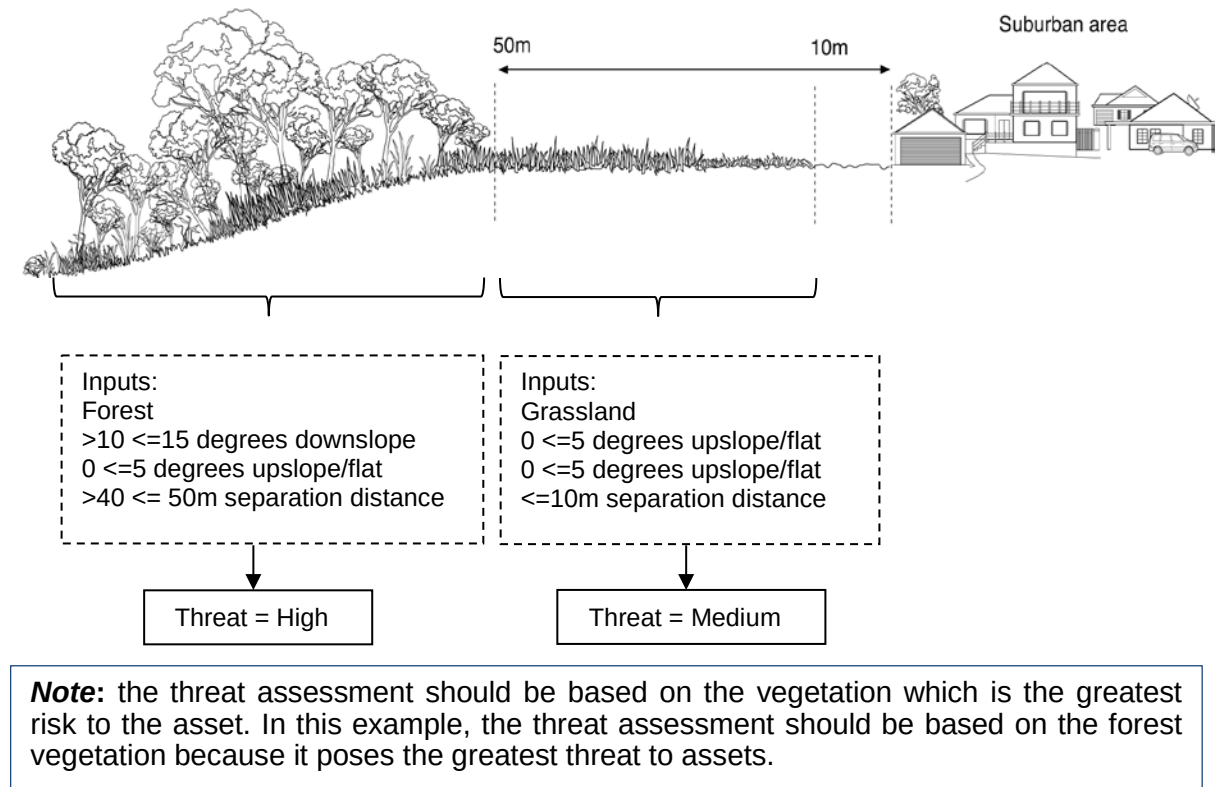


Figure 11 – Selecting the Hazard Vegetation for Assessment

7.4.3 (d) Slope

Slope is the angle of the ground's surface measured from the horizontal. Slope will dramatically affect a fire's forward rate of spread, and therefore intensity, when burning upslope or downslope.

The threat assessment uses two slope measurements to calculate the bushfire threat to an asset. They are described as the:

- **Slope Under Vegetation**
The effective slope in the land under the hazard vegetation; and
- **Slope from Asset to Vegetation**
The slope of the land between the asset and the hazard vegetation.

To measure the slope, determine whether the slope is upslope, flat or downslope and the angle of the slope in degrees.

A slope analysis can be conducted in BRMS using the GIS Map. Alternatively, the slope can be measured manually using the contour lines on a topographic map or assessed in the field.

Table 27 – Slope Categories

Degrees	Slope Type	Description of degrees
0 degrees	Flat land	No degrees.
>0-5 degrees	Upslope or downslope	Level ground.
>5-10 degrees	Upslope or downslope	Easy to walk, but cycling is difficult – moderate to walk, too steep for cycling.
>10-15 degrees	Upslope or downslope	Moderate to walk, too steep for cycling – hard climb, limit of 2WD roads.
>15 degrees	Upslope or downslope	Difficult to climb.

7.4.3 (e) Upslope, Flat or Downslope

For the threat assessment, slope is always measured in relation to the asset. If standing at the asset and looking uphill at the vegetation, then the slope is upslope. If standing at the asset and looking downhill at the vegetation then the slope is downslope. Figure 12 provides a number of examples to demonstrate how slope is measured.

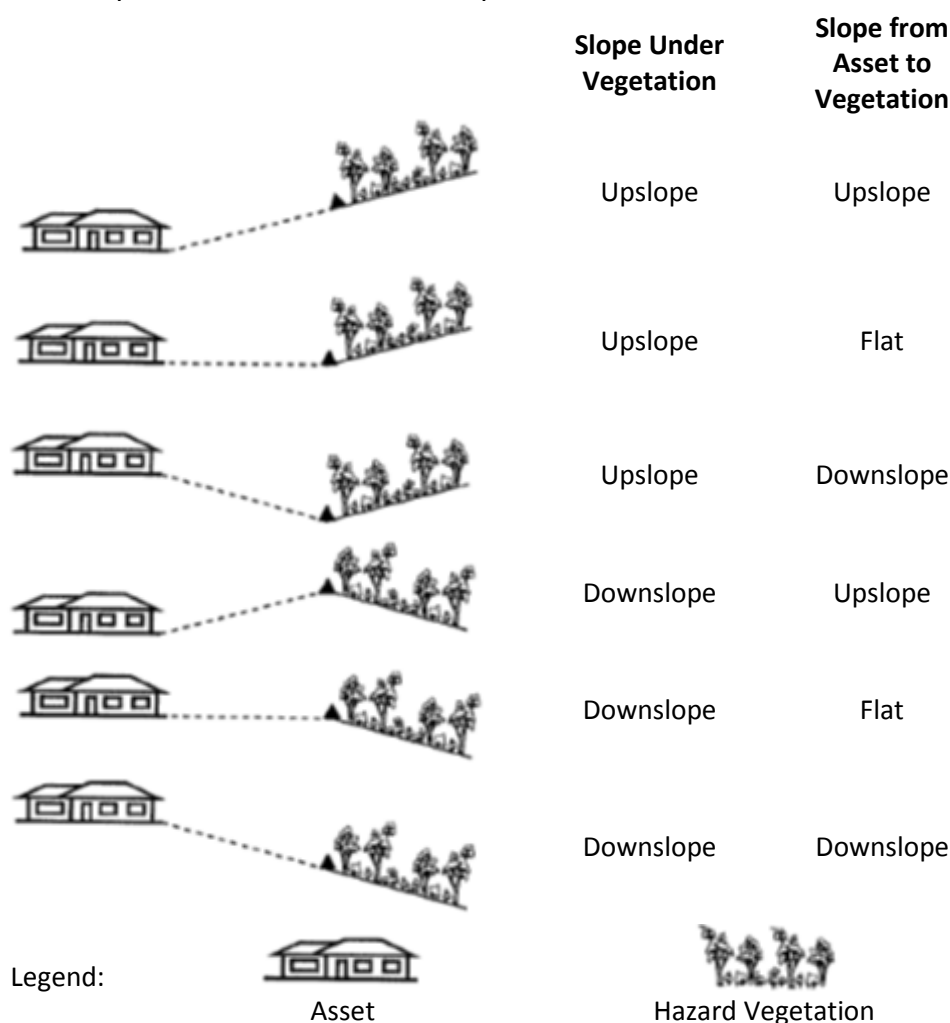


Figure 12 – Examples of Upslope and Downslope⁸

⁸ Source: AS 3959-2009: Figure 2.2 (partial), reproduced with permission from SAI Global under licence number 1510-c081.

7.4.4 Vulnerability

The vulnerability of a cultural asset describes the susceptibility of the asset to the adverse effects of a bushfire. There are three categories of vulnerability for cultural assets: Low, Moderate and High. To complete the risk assessment, select the vulnerability category which best describes the estimated vulnerability of the asset.

Table 28 – Vulnerability Categories for Cultural Assets

Category	Description	Cultural Asset Examples		
Low Vulnerability	The asset is likely to withstand most bushfires and/or post fire remediation is possible.	Aboriginal Heritage	Aboriginal grinding grooves Water holes Artefact Stone arrangement	Archaeological deposit Ceremonial Dreaming site Burial Conflict site
		Recognised Heritage	Stone buildings Stone bridges	Cemetery Stone ruins
		Local Heritage	Stone, brick or concrete buildings with no windows or roof penetrations (e.g. evaporative a/c)	
		Other	Community centres, recreation and club facilities built to AS3959:2009.	
Moderate Vulnerability	The asset is likely to be partially damaged by a bushfire. Post-fire remediation not possible	Aboriginal Heritage	Aboriginal hearth Aboriginal art	Ceremonial ring
		Recognised Heritage	Mud brick and daub buildings Historic homesteads	
		Local Heritage	Mud brick and daub buildings Historic homesteads	
		Other	Community centres, recreation and club facilities built to traditional construction standards (not AS3959:2009) Local art galleries or collections	
High Vulnerability	The asset is likely to be destroyed by bushfire.	Aboriginal Heritage	Aboriginal habitation structure Modified tree	
		Recognised Heritage	Historic homesteads (involving wooden material) Timber buildings and structures Wooden bridges	
		Local Heritage	Timber buildings and structures	
		Other	Timber buildings and structures	

7.4.5 Consequence (Automatically Calculated)

BRMS will automatically calculate the consequence rating for a cultural asset, based on the bushfire threat and vulnerability category selected for the asset. There are four ratings for consequence: Minor, Moderate, Major and Catastrophic.

Table 29 – Consequence Ratings for Cultural Assets

Vulnerability \ Threat	Low	Medium	High	Very High
High Vulnerability	Minor	Moderate	Major	Catastrophic
Moderate Vulnerability	Minor	Moderate	Moderate	Major
Low vulnerability	Minor	Minor	Moderate	Moderate

7.5 Risk Rating (Automatically Calculated)

The risk rating will be automatically calculated by BRMS once the likelihood and consequence assessments are complete.

7.6 Priority (Automatically Calculated)

The priority will be automatically calculated by BRMS, based on the risk rating.

Chapter 8 – Risk Evaluation and Treatment

8.1 Purpose of Risk Evaluation

The purpose of evaluating risk is to:

- Confirm that the risk ratings for each asset are appropriate;
- Identify treatment priorities; and
- Identify which assets require treatment.

8.2 Confirming Risk Ratings are Appropriate

Review the risk rating for each asset against the initial consequence descriptions to ensure:

- The rating for each asset reflects the relative seriousness of the bushfire risk to the asset;
- Likelihood and consequence ratings assigned to each asset are appropriate; and
- Local issues have been considered.

Check for error in the likelihood and consequence assessments to confirm the correct information has been entered into BRMS. If any new information or data has been identified, then another risk assessment can be completed for the asset.

8.3 Treatment Priority

No organisation has unlimited resources to deal with risk. It is therefore necessary to prioritise risks for treatment. Consider areas of extreme risk for treatment first, before addressing risks with a lower risk rating.

The treatment priority will be automatically assigned by BRMS, based on the asset's risk rating. Table 30 shows how likelihood and consequence combine to give the risk rating and subsequent treatment priority for an asset.

Table 30 – Treatment Priorities

Consequence Likelihood	Minor	Moderate	Major	Catastrophic
Almost certain	3D (High)	2C (Very High)	1C (Extreme)	1A (Extreme)
Likely	4C (Medium)	3A (High)	2A (Very High)	1B (Extreme)
Possible	5A (Low)	4A (Medium)	3B (High)	2B (Very High)
Unlikely	5C (Low)	5B (Low)	4B (Medium)	3C (High)



Within the matrix, the risk ratings are identified numerically from one to five, with priorities from highest (1A) to lowest (5C). This allows for assets to be prioritised within a risk rating. For example, a 2A asset is a higher priority for treatment than a 2C asset, even though both assets have the same risk rating - very high.

In some cases it may be necessary to further prioritise assets for treatment. Where assets have the same priority considers the bushfire response priorities, as follow:

1. Protect life;
2. Protect property;
3. Protect critical infrastructure;
4. Protect the environment.

Using the above priorities, a 1A human settlement asset can be prioritised over a 1A environmental asset, as the protection of life and property is favoured over environment.

8.3.1 Prioritising Assets with Existing Treatments

The risk assessment process used to determine an asset's risk rating means that some assets with existing treatments could be assessed as a lower risk and subsequently, have a lower treatment priority. Recognising that the risk to these assets would increase without continued treatment, such assets should not be considered an acceptable risk based solely on their low risk rating. Review existing treatments in light of other priorities for their ongoing appropriateness and include them in the Treatment Schedule.

8.3.2 Resource Allocation

Local governments and other land owners and managers are encouraged to allocate resources (including funding) to treatments that address higher priority risk, in the first instance, before resourcing treatments for lower priority risk. This applies to the allocation of current resources and when seeking funding for additional resources.

8.4 Risk Acceptability

It is not possible, or practical to treat all bushfire risks. Some risk may be acceptable without the need for specific treatment. Assets with a low to moderate risk rating are likely to be adequately managed through routine controls, so committing resources to further reduce the risk may not be justifiable.

When considering risk acceptability, keep in mind the availability of resources, capacity to undertake treatments, budget constraints and the practicality of implementation. These factors will heavily influence the ability of land owners and managers to treat risk.

Ultimately, it will be at the discretion of the local government, together with DFES and the relevant land owner, to determine the most appropriate course of action for a particular asset. However, general actions for each risk rating are suggested in Table 31.

Table 31 – Risk Acceptability and Course of Action

Risk Rating	Criteria for Acceptance of Risk	Course of Action
Extreme (Priorities 1A, 1B, 1C)	Only acceptable with excellent controls. Urgent treatment action is required.	Routine controls are not enough to adequately manage the risk. Immediate attention required as a priority. Specific action is required in first year of plan.
Very High (Priorities 2A, 2B, 2C)	Only acceptable with excellent controls. Treatment action is required.	Routine controls are not enough to adequately manage the risk. Specific action will be required during the period covered by the plan.
High (Priorities 3A, 3B, 3C, 3D)	Only acceptable with adequate controls. Treatment action may be required.	Specific action may be required. Risk may be managed with routine controls and monitored annually.
Medium (Priorities 4A, 4B, 4C)	Acceptable with adequate controls. Treatment action is not required, but risk must be monitored regularly.	Specific action may not be required. Risk may be managed with routine controls and monitored periodically throughout the life of the BRMP.
Low (Priorities 5A, 5B, 5C)	Acceptable with adequate controls. Treatment action is not required, but risk must be monitored.	Need for specific action is unlikely. Risk will be managed with routine controls and monitored as required.

Local government and land owners are strongly encouraged to implement asset-specific treatment strategies for risks rated high or above.

Where a risk is deemed acceptable, record “treatment not required” against the asset in BRMS and allocate a date for the risk to be re-assessed. Risks should be monitored regularly so that any changes to the risk profile can be identified and addressed immediately.

8.5 Risk Treatment

The purpose of risk treatment is to reduce the likelihood of a bushfire occurring and/or the potential impact of a bushfire on the community, economy and environment. This is achieved by implementing treatments that modify the characteristics of the risk, the community or the environment.

There are many strategies available to treat bushfire risk. The treatment strategy (or combination of treatment strategies) selected will depend on the level of risk and the type of asset being treated. Not all treatment strategies will be suitable in all circumstances.

Treatment strategies are divided into two broad categories - local government-wide controls and asset-specific treatments.



8.6 Local Government-wide Controls

Local government-wide controls are activities that reduce the overall bushfire risk within the local government. These treatments are undertaken as part of normal core business or due to legislative requirements. These types of treatments are not linked to specific assets within BRMS, instead they are applied across all or part of the local government, such as:

- *Bush Fires Act 1954* Section 33 notices, including applicable fuel management requirements, firebreak standards and annual enforcement programs;
- Declaration and management of Prohibited Burning Times, Restricted Burning Times and Total Fire Bans for the local government;
- Public education campaigns and the use of P&W and DFES state-wide programs, tailored to suit local needs;
- State-wide arson prevention programs developed in conjunction with WA Police and DFES;
- State planning framework and local planning schemes, implementation of appropriate land subdivision and building standards in line with DFES, WAPC and Building Commission policies and standards;
- BRMP performance monitoring and reporting annually to the local government council and OBRM; and
- Other practices and programs undertaken by local government or state agencies that contribute to bushfire risk management within the local government, including controls under state government policies, agreements or memorandums.

8.6.1 Review of Existing Local Government-wide Controls

Development of the BRMP provides a timely opportunity for local government and state agencies to review current local government-wide controls to ensure they are relevant, effective and adequately manage risk. Data collected during risk assessment can be used to target key messages and focus community programs in areas of high risk. The adequacy of current firebreak notices, permits and annual inspection and infringement processes can also be reviewed. Where appropriate, consider documenting control processes, procedures and policies and review any key performance indicators or annual targets that may exist.

Assess identified controls to determine whether or not the current risk management efforts are successful (that is, that the controls are operating as intended).

The Control Rating Table (Table 32) provides a qualitative assessment that can be applied to determine if existing controls are reasonable. When assessing controls, consider if the control is:

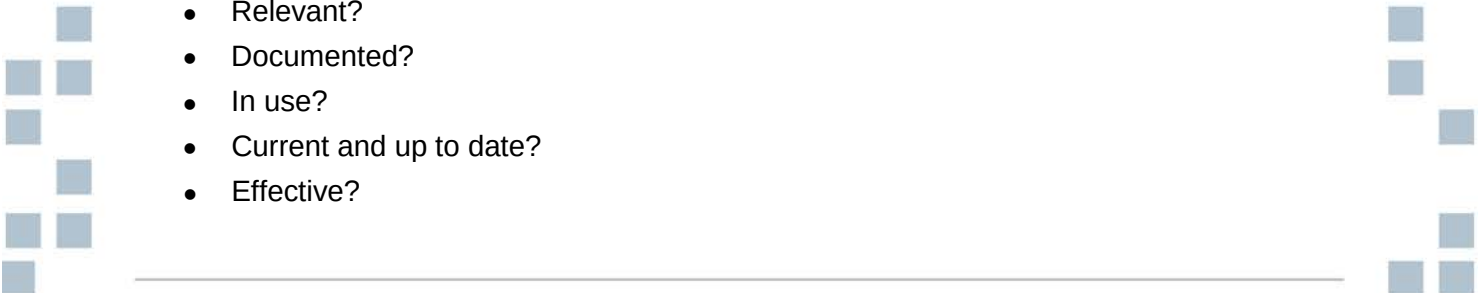
- Relevant?
  - Documented?
  - In use?
  - Current and up to date?
  - Effective?
- 

Table 32 – Control Rating Table

Level	Descriptor	Description	Detail
E	Excellent	Doing more than what is reasonable under the circumstances	Controls fully in place and subject to continuous maintenance and monitoring. Protection systems are in place and continuously reviewed. Procedures are in place and regularly tested and reviewed.
A	Adequate	Doing what is reasonable under the circumstances	Controls are in place and subject to periodic maintenance and monitoring. Protection systems are in place and are periodically reviewed. Procedures exist only for given circumstances and are periodically tested and reviewed.
I	Inadequate	Not doing some or all of the things that would be reasonable under the circumstances	Little or no action being taken. No protection systems exist or they have not been reviewed for some time. No formalised procedures exist.

Note: Where risks are subject to the action of several controls, identify and assess each control individually. However, it is the combined effectiveness of the controls that will determine whether risk management efforts are effective.

If the control rating is deemed to be inadequate, identify how the control could be improved and plan the work required to address the issues.

8.6.2 Documenting Local Government-wide Controls

Development of the BRMP provides a unique opportunity to identify all bushfire risk management activities and programs occurring within the local government and align them to the outcomes of the BRMP. Many different agencies undertake activities to reduce bushfire risk, but these activities many not be linked to protection of a specific asset. In order to capture the full extent of work occurring within the local government, consider documenting a multi-agency plan that outlines all the controls in place. Any plans to improve or develop new controls can also be included. A template for documenting local government-wide controls is available from DFES.



8.7 Asset-Specific Treatment Strategies

Asset-specific treatments are implemented to protect an individual asset or group of assets, identified and assessed in the BRMP as being at risk from bushfire. Asset-specific treatments are recorded and managed within BRMS. There are six asset-specific treatment strategies:

- **Fuel management** - Treatment reduces or modifies the bushfire fuel through manual, chemical and prescribed burning methods;
- **Ignition management** - Treatment aims to reduce potential human and infrastructure sources of ignition in the landscape;
- **Preparedness** - Treatments aim to improve access and water supply arrangements to assist firefighting operations;
- **Planning** - Treatments focus on developing plans to improve the ability of firefighters and the community to respond to bushfire; and
- **Community Engagement** - Treatments seek to build relationships, raise awareness and change the behaviour of people exposed to bushfire risk.
- **Other** - Local government-wide controls will be used to manage the risk. Asset-specific treatment is not required or not possible in these circumstances.

8.8 Selecting the Treatment Strategy

Selecting the most appropriate treatment strategy or combination of treatment strategies for an asset involves balancing the costs of implementing treatments against the benefits derived. In general, the cost of managing the risk needs to be proportionate to the benefits obtained.

Local government and land owners are encouraged to assign at least one asset-specific treatment strategy to all assets with a risk rating of extreme or very high.

The criteria provided in Table 33 can assist when deciding if a particular treatment strategy is appropriate.

Note: Appropriate strategies will include a mix of treatments that are undertaken in both close proximity to the asset and in the wider landscape.

Table 33 – Criteria for Assessing the Suitability of a Treatment

Criteria	Question
Acceptability	Is this option likely to be accepted by relevant stakeholders?
Administrative efficiency	Is this option easy to implement or will its application be neglected because of difficulty of administration or lack of expertise?
Capacity to undertake	Is the option achievable within the life span of the plan?
Compatibility	How compatible is the treatment with others that may be adopted?
Continuity of effects	Will the effects be continuous or short term? Will the effects of this option be sustainable? At what cost?
Cost effectiveness	Is this option the most cost effective or could the same results be achieved using a lower cost alternative?
Economic and social effects	What will be the economic and social impacts of this option?
Effect on cultural assets	What will be the impact on cultural assets? Is there an alternative method that will have less impact on the asset? Is the impact likely to be so high as to prevent hazard reduction from being undertaken?
Effect on the environment	What will be the environmental impact of this option? Is there an alternative method that will have less impact on the environment? Is the environmental impact likely to be so high as to prevent hazard reduction from being undertaken?
Equity	Are risks and benefits distributed fairly?
Individual freedom	Does the option deny or impede on any basic right of an individual or organisation?
Jurisdictional authority	Does this level of organisation or government have the authority to apply this option? If not, can higher levels be encouraged to do so?
Leverage	Will the application of this option lead to further risk reducing actions by others?
Regulatory	Does the treatment (or lack of treatment) breach any regulatory requirements?
Political acceptability	Is it likely to be endorsed by the relevant government authority? Will it be acceptable to communities?
Public and community interest group reaction	Are there likely to be adverse reactions to implementation of this option?
Risk creation	Will this treatment introduce new risk?
Timing	Will the benefits be realised quickly?



8.8.1 Responsibility for Treatment

Land owners are ultimately responsible for treatments implemented on their own land. This includes any costs associated with the treatment and obtaining the relevant approvals, permits or licences to undertake an activity. Where agreed, another agency may manage a treatment on behalf of a land owner. However, the onus is still on the land owner to ensure treatments detailed in the BRMP are completed.

The BRMP process is founded on the notion that...

“Those that own the land, own the risk.”

8.9 Recording Asset-Specific Treatments

Asset-specific treatments are recorded and managed within BRMS. To enter a treatment against an asset, capture the treatment area on the GIS Map and enter the treatment details into BRMS.

8.9.1 Treatment Strategy

The treatment strategy describes the broad approach that will be used to modify the risk to an asset, such as fuel management, ignition management and community engagement. Each treatment strategy relates to several different types of activities (treatment types) that all share the same purpose.

8.9.2 Treatment Type

The treatment type describes the specific treatment activity that will be implemented to modify the risk to an asset, such as prescribed burning, mechanical works and bushfire ready groups.

8.9.3 Treatment Objective

The treatment objective is a detailed description of the treatment to be implemented. It describes the specific aim to be achieved, or action to be undertaken, in order to complete the treatment. Treatment objectives should be specific and measurable.

8.9.4 Treatment Manager

The treatment manager is the agency or organisation responsible for coordinating and/or implementing the treatment. Often the treatment manager will be the land owner, but in some cases another agency may agree to act as the treatment manager on the land owner's behalf.

8.9.5 Bushfire Management Zone

Bushfire Management Zones (BMZs) identify the fire management intent and treatment objectives for a specific area. Treatments strategies that aim to achieve the fuel load requirements for each bushfire management zone are encouraged. **The BMZ does not influence the priority of a treatment.** An effective treatment plan will ensure that treatments implemented in different BMZs are complementary and balance the objectives of each BMZ across the landscape. Table 34 describes the three Bushfire Management Zones: Asset Protection Zone, Hazard Separation Zone and Land Management Zone.

Table 34 – Bushfire Management Zones

Zone	Description	Objectives	Fuel Load Requirements
Asset Protection Zone (APZ)	Land within a 20m buffer of an asset.	To protect human life, property and highly valued public assets. Zone enables the safe use of direct attack suppression strategies within the zone and improves the chances of defensive firefighting techniques. Zone minimises bushfire impacts on undefended assets.	Fuel load to be reduced and maintained at 2 tonnes per hectare (t/ha).
Hazard Separation Zone (HSZ)	All land within 80m of the outer edge of the Asset Protection Zone.	To provide strategic areas of reduced fuel, which improve fire protection of assets by reducing the intensity and rate of spread of bushfires within the zone. Zone will improve the likely success of parallel attack and indirect attack suppression strategies in high to very high weather conditions within the zone. Zone will reduce the likelihood of crown fires developing and spot fire ignition potential within the zone.	Fuel load to be maintained at 5-8 t/ha for jarrah/marri forest and woodland, 12-15 t/ha for mallee heath and <15 t/ha for karri forest.
Land Management Zone (LMZ)	All vegetated areas >5ha outside the Hazard Separation Zone	To meet the relevant land management objectives of the area and complement treatment works undertaken in the APZ and HSZ. Suppression objectives are as per the land management and fire protection objectives of the responsible land management agency. To undertake mosaic burning to reduce the likelihood of fires spreading.	No specific fuel load requirements. Land is managed in accordance with the land management objectives to reduce the risk of large-scale, high intensity bushfires (for example, broad-scale mosaic burning).

“The BMZ does not influence the priority of a treatment.”

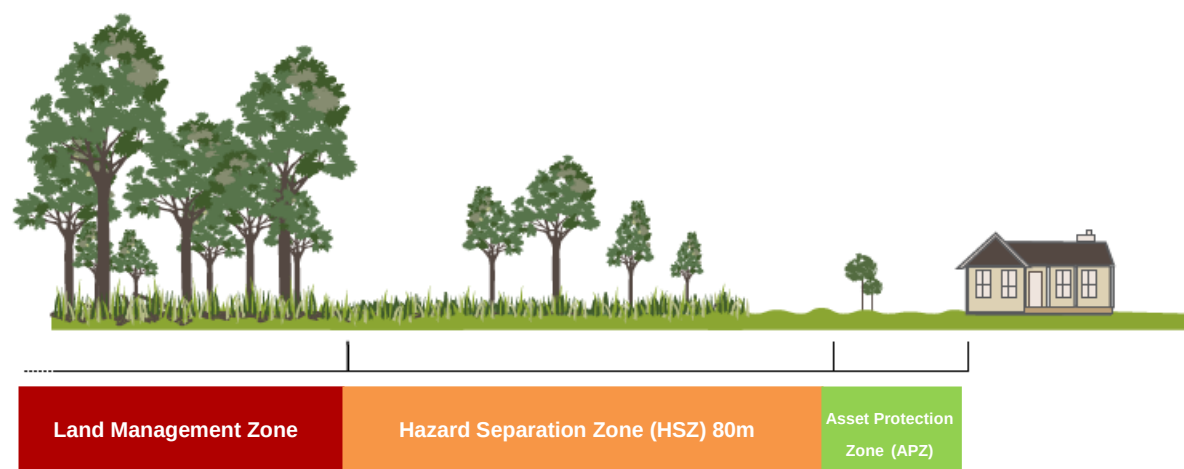


Figure 13 – Bushfire Management Zones

Note: Identifying the BMZ is only relevant for treatments that physically modify the vegetation (that is, to reduce or manage fuels).

8.9.6 Bushfire Management Plans

Bushfire Management Plans (BMP), formerly known as Fire Management Plans (FMP), are used to document a range of activities associated with the management of fire prone land, including the use of fire to meet land management goals and objectives. BMPs are often a subset of a larger plan or may be developed for a specific area. For example, a subdivision, settlement, town site, Remote Indigenous Community (RIC), plantation, pastoral station, nature reserve or other vegetated area where specific fire management objectives must be achieved. BMPs may outline ongoing responsibilities for fire management activities and associated works.

Where an asset-specific treatment is part of a BMP, the treatment should be included in the BRMP. A reference to the original BMP can be recorded against the treatment in BRMS.

8.9.7 Responsible Person

The responsible person is accountable for all aspects of a treatment, including planning, coordinating, implementing, evaluating and reporting progress in BRMS. This role is assigned to a specific person, not to an organisation.

8.9.8 Party Performing Treatment

In some cases, the treatment manager may contract another party to physically perform the treatment. Where treatment activities are carried out by an external contractor, service provider, agency or organisation, the information can be recorded against the treatment in BRMS.



8.9.9 Scheduled Date

The scheduled date is the date the treatment is scheduled to commence. If the precise scheduled date is unknown at the time a treatment is entered into BRMS, an estimated month or season can be nominated by entering the last day of the month or season as the treatment's scheduled date.

8.10 Rescheduling Treatments

Many factors can potentially affect timely implementation of the treatments listed in the Treatment Schedule. Factors such as fuel accumulation, weather, opportunity or resource availability will result in treatments being rescheduled for completion on an earlier or later date than the original scheduled date recorded in BRMS.

In the first instance, all attempts should be made to reschedule a treatment that has not been completed. If a treatment is unable to be rescheduled, or in circumstances where there is no longer the requirement to implement a treatment, then a reason should be clearly documented in BRMS.

8.11 Unplanned Event

An unplanned event is any unforeseen event that significantly changes the risk profile of an asset, to the point that the planned treatments are no longer required. For example, an unplanned bushfire occurs and burns through an area of vegetation where a prescribed burn was planned for the following season. If the fuel has already been reduced to an adequate level by the unplanned event, then implementing the prescribed burn is no longer required.

In these circumstances record the date and a description of the unplanned event in BRMS. Keep in mind that further treatments may need to be scheduled as a result of the unplanned event, for example, chemical or mechanical treatments to control weeds in the following year.

8.12 Completing a Treatment

After a treatment has been implemented, the treatment record will need to be updated within BRMS. To ensure the information within BRMS remains current and accurately reflects the status of treatments listed in the Treatment Schedule, information should be input at the earliest convenience. To complete a treatment within BRMS, the following information is required:

8.12.1 Actual Start Date

The actual start date is the date the treatment work commenced.

8.12.2 Actual Completion Date

The actual completion date is the date the treatment work was completed.

8.12.3 Planned Date for Treatment Evaluation

When completing a treatment in BRMS, the planned date for evaluation of the treatment will need to be scheduled.

8.12.4 Treatment Evaluation Assessor

The treatment evaluation assessor is the person responsible for reviewing performance of the treatment against the objective(s) and recording the evaluation details in BRMS.

8.13 Evaluating the Treatment

Treatments implemented under the BRMP aim to modify the characteristics of the risk, the community or the environment in order to reduce the likelihood of a bushfire occurring and/or the potential impact of a bushfire on the community, economy and environment. To measure the success of a treatment, an evaluation is performed against the treatment objective(s).

When evaluating a treatment, consider the following:

- Did the treatment achieve the desired outcome or benefit?
- Has the treatment been implemented to the level and standard required?
- Were there any unanticipated outcomes (positive or negative)?
- Was the activity cost effective in terms of time and resources?
- Is there any further work required?

Figure 14 describes the treatment evaluation process. If the treatment meets the objective(s) set, the risk is scheduled for reassessment. If the treatment does not meet the objective(s), then a decision must be made as to whether the outcome will be accepted, or further work will be undertaken in order to meet the treatment objective(s) (retreatment).

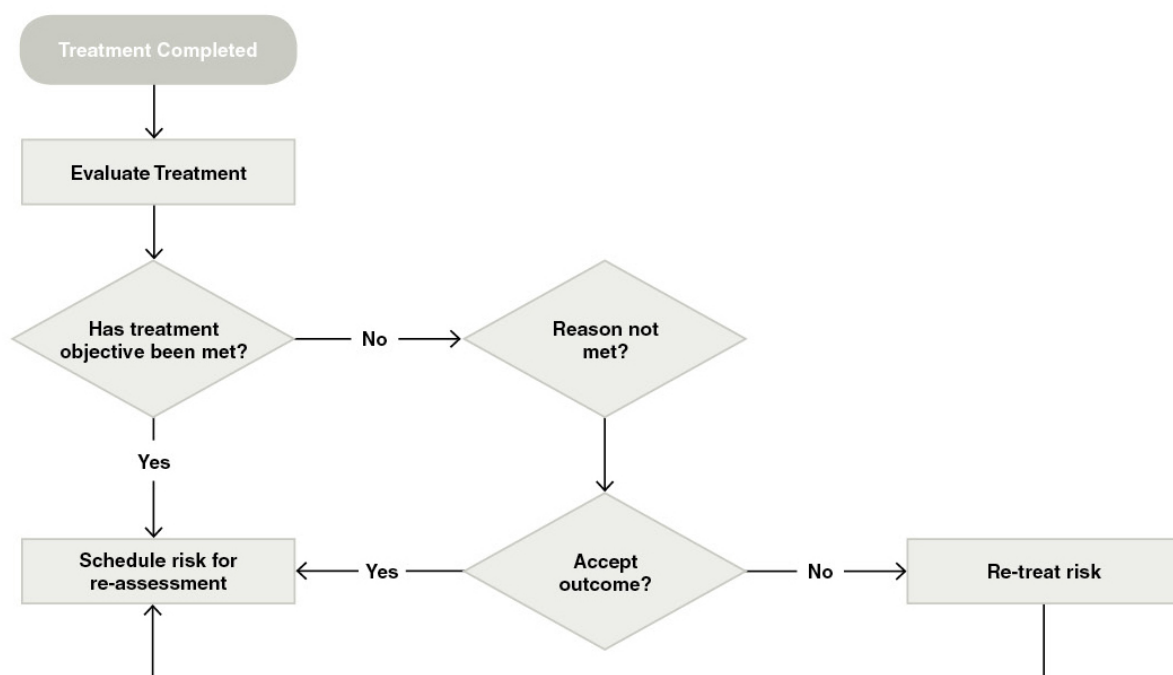


Figure 14 – Treatment Evaluation Process



8.14 Retreatment

In some circumstances the initial application of a treatment may not meet the treatment objective(s) and to be effective the treatment must be re-done. For example, a firebreak is installed but it does not meet the nominated height and width requirements set by the objective(s). A decision can be made to accept the outcome of the treatment in its current state, or to redo the treatment to the standard required (retreatment).

The decision to accept a treatment that does not meet the treatment objective(s) will depend on a number of factors, including the type of treatment, the circumstances that led to non-achievement of the objective, the availability of resources for retreatment and the benefit already provided by the treatment work completed to date.

8.15 Recording Treatment and Evaluation Costs

Costs associated with implementing a treatment and conducting a treatment evaluation should be recorded in BRMS against the relevant treatment. The information recorded should include:

8.15.1 Treatment Costs

- **Effort Hours**
The total number of hours taken to complete the treatment (actual hours of effort).
- **Hourly Rate**
The total hourly rate for all persons involved in completing the treatment, excluding on-costs.
- **Total Cost**
The total cost associated with completing the treatment. Where effort hours and hourly rate are entered, BRMS will automatically calculate the total cost.

8.15.2 Evaluation Costs

- **Effort Hours**
The total number of hours taken to complete the treatment (actual hours of effort).
- **Hourly Rate**
The total hourly rate for all persons involved in completing the treatment, excluding on-costs.
- **Total Cost**
The total cost associated with completing the treatment. Where effort hours and hourly rate are entered, BRMS will automatically calculate the total cost.



8.16 Completing a Post-Treatment Risk Assessment

After completing a treatment or suite of treatments, a post-treatment risk assessment is undertaken to measure any change to the asset's risk rating and determine the requirements for further treatment. The post-treatment risk assessment uses the same methodology applied in the initial risk assessments.





Chapter 9 – Approval, Monitoring, Review and Reporting

9.1 The Approval Process

As the BRMP is a local government plan, it is appropriate for the local government council to be the mechanism for approval. Prior to seeking council approval, OBRM will review the draft BRMP for consistency with the Guidelines. Figure 15 details the BRMP approval process.

9.1.1 Locking the BRMP

Once the Draft BRMP has been finalised and all identified assets and risk assessments are complete, the BRMP can be 'locked' in BRMS. Locking the BRMP establishes a baseline for reporting by recording a copy of the data entered in BRMS at a particular point in time. As treatments are implemented and risks change over time, data is measured against the baseline (or locked) data to track and report progress.

Additional assets and treatments can be entered into BRMS at any stage, even after a BRMP is locked. Likewise, locked assets or treatments can be edited, archived, un-archived or deleted after a BRMP is locked.

The BRMP should be locked prior to submission to OBRM for review.

9.1.2 Submitting the BRMP to the Office of Bushfire Risk Management

OBRM will review the Draft BRMP for consistency with the Guidelines, prior to approval by the local government council. **Appendix C** provides a checklist for submitting a Draft BRMP to OBRM, along with the key criteria that will be assessed.

Once OBRM is satisfied that the Draft BRMP is consistent with the Guidelines, the local government will be advised in writing. At this point the BRMP is considered final and local government council approval is to be sought.

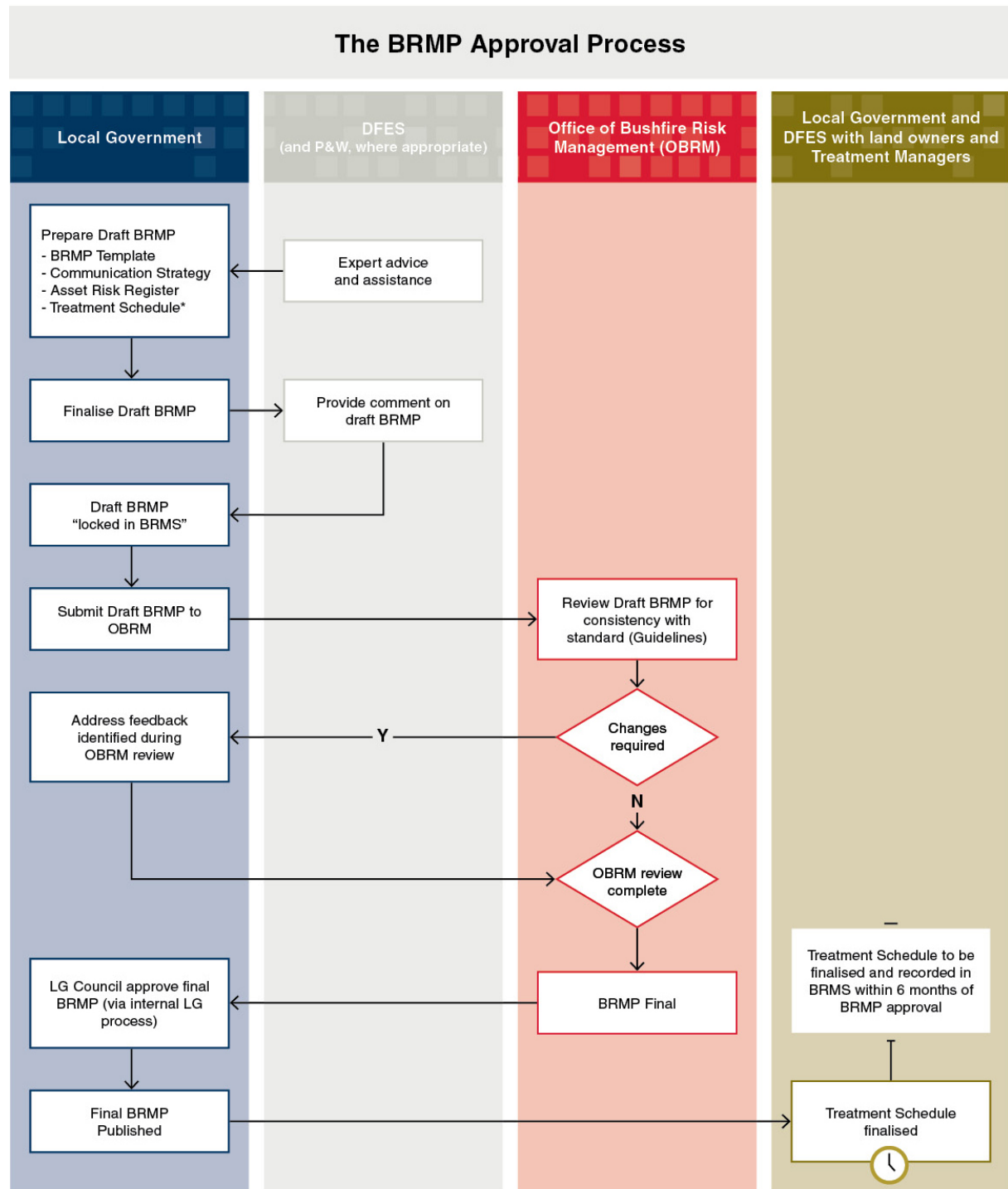
9.1.3 Local Government Council Approval

The local government council is the mechanism for approval and formal adoption of the BRMP. The relevant internal local government procedure should be used to seek council approval of the BRMP.

Note: The Treatment Schedule does not need to be completed at this stage. In approving the BRMP, the local government council is acknowledging the assets that have been identified and the risk ratings and treatment priorities assigned. Approval of the plan is a commitment by local government to work with land owners and managers to address unacceptable risk within their community. It is not the local government committing to a program of treatment works to be implemented by others, or an acceptance of responsibility for risk occurring on land that is not owned or managed by the local government.

9.1.4 Finalising the Treatment Schedule

Efforts should be made to finalise the Treatment Schedule within six months of the BRMP being approved. OBRM are to be notified when the Treatment Schedule is finalised and has been entered into BRMS. Treatments may be added, edited, rescheduled or deleted from the Treatment Schedule at any stage. Where treatments are rescheduled or deleted, a reason for the change will need to be recorded in BRMS.



* The Treatment Schedule does not need to be completed at this stage.

Figure 15 – The BRMP Approval Process

9.2 Dispute Resolution

All attempts should be made to negotiate an acceptable solution to an issue at the local level. If this course of action is unsuccessful, then the matter may be referred to the regional or State level for resolution. Table 35 shows the parties involved at each level of dispute resolution.

All attempts should be made to resolve issues at the earliest opportunity.

Table 35 – Levels of Dispute Resolution

Level of Dispute Resolution	Parties Involved
Local	DFES (local management) Local government Agencies (local management)
Regional	DFES (regional management) Local government Agencies (regional or senior management)
State	DFES (senior management or FES Commissioner) Local government Agencies (Director General or Chief Executive Officer) <i>Optional - OBRM (independent review or advice)</i> <i>Optional - Minister (where appropriate)</i>

9.3 Publishing the BRMP

Local governments are encouraged to publish the BRMP. Promotion of the BRMP to the wider community may raise the level of risk awareness and help private land owners understand how they can contribute to reducing bushfire risk on their own land.

9.4 Annual Reporting

Local governments are responsible for preparing and submitting an annual report on the BRMP to OBRM at the end of each financial year. The annual report is a standard report generated within BRMS. Comments can be included in the report to provide further context.

To ensure the annual report accurately reflects the status of identified risks and treatments, treatment managers and other stakeholders will need to report progress in BRMS in a timely manner.

9.5 Reviewing the Bushfire Risk Management Plan

The BRMP is to undergo a comprehensive review at least once every five years, from the date of approval. New assets identified within the local government can be included as, and when, they are identified. Achievement against the Treatment Schedule should be recorded in BRMS on an ongoing basis.

Glossary

Asset	A term used to describe anything of value that may be adversely impacted by bushfire. This may include residential houses, infrastructure, commercial, agriculture, industry, environmental, cultural and heritage sites.
Asset Category	There are four categories that classify the type of asset – Human Settlement, Economic, Environmental and Cultural.
Asset Owner	The owner, occupier or custodian of the asset itself. Note: this may differ from the owner of the land the asset is located on – for example, a communication tower located on leased land or private property.
Asset Register	A component within the Bushfire Risk Management System used to record the details of assets identified in the Bushfire Risk Management Plan.
Asset Risk Register	A report produced within the Bushfire Risk Management System that details the consequence, likelihood, risk rating and treatment priority for each asset identified in the Bushfire Risk Management Plan.
Bushfire	Unplanned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires both with and without a suppression objective. ⁹
Bushfire Management Plan	A document that sets out short, medium and long term bushfire risk management strategies for the life of a development. ¹⁰
Bushfire Risk	The chance of a bushfire igniting, spreading and causing damage to the community or the asset(s) they value.
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 Threat	The threat posed by the hazard vegetation, based on the vegetation category, slope and separation distance.
Consequence	The outcome or impact of a bushfire event.
Draft Bushfire Risk Management Plan	The finalised BRMP submitted to OBRM for review. Once the OBRM review is complete, the BRMP is called the 'Final BRMP' and can be progressed to local government council for approval.
Emergency Risk Management Plan	A document (developed under <i>State Emergency Management Policy</i> 2.9) that describes how an organisation(s) intends to undertake the activities of emergency risk management based on minimising risk. These plans help inform the ongoing development of Local Emergency Management Arrangements (LEMA) and Westplans.
Geographic Information System (GIS)	A data base technology, linking any aspect of land-related information to its precise geographic location. ¹¹

⁹ Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne.

¹⁰ Western Australian Planning Commission 2015, *State Planning Policy 3.7: Planning in Bushfire Prone Areas*, WAPC, Perth.

¹¹ Landgate 2015, *Glossary of terms*, Landgate, Perth.

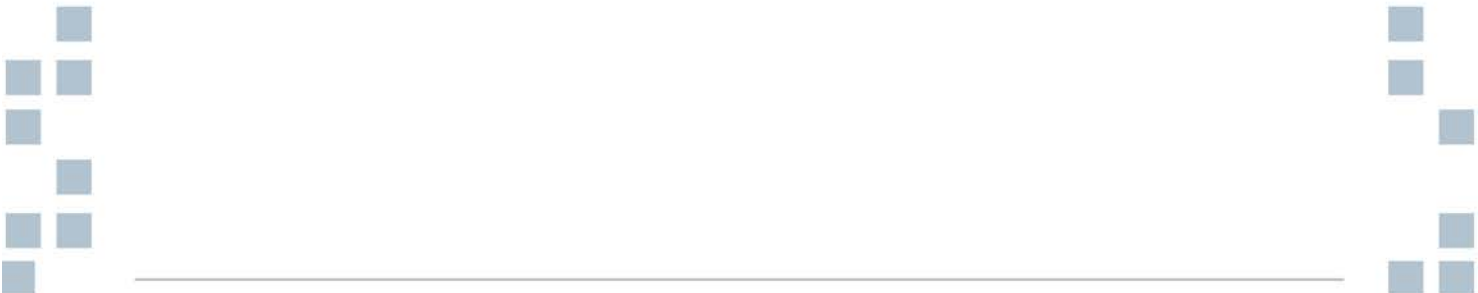
Geographic Information System (GIS) Map	The mapping component of the Bushfire Risk Management System. Assets, treatments and other associated information is spatially identified, displayed and recorded within the GIS Map.
Land Owner	The owner of the land, as listed on the Certificate of Title; or leaser under a registered lease agreement; or other entity that has a vested responsibility to manage the land.
Likelihood	The chance of something occurring. In this instance, the chance of a bushfire igniting, spreading and reaching the asset.
Locality	The officially recognised boundaries of suburbs (in cities and larger towns) and localities (outside cities and larger towns).
Planning Area	A geographic area determine by the local government which is used to provide a suitable scale for risk assessment and stakeholder engagement.
Priority	See Treatment Priority.
Recovery Cost	The capacity of an asset to recover from the impacts of a bushfire.
Responsible Person	The person responsible for planning, coordinating, implementing, evaluating and reporting on a risk treatment.
Risk acceptance	The informed decision to accept a risk, based on the knowledge gained during the risk assessment process.
Risk analysis	The application of consequence and likelihood to an event in order to determine the level of risk.
Risk assessment	The systematic process of identifying, analysing and evaluating risk.
Risk evaluation	The process of comparing the outcomes of risk analysis to the risk criteria in order to determine whether a risk is acceptable or tolerable.
Risk identification	The process of recognising, identifying and describing risks.
Risk Manager	The organisation or individual responsible for managing a risk identified in the Bushfire Risk Management Plan, including review, monitoring and reporting.
Risk Register	A component within the Bushfire Risk Management System used to record, review and monitor risk assessments and treatments associated with assets identified in the bushfire risk management planning process.
Risk treatment	A process to select and implement appropriate measures undertaken to modify risk.
Rural	Any area where residences and other developments are scattered and intermingled with forest, range, or farm land and native vegetation or cultivated crops. ¹²
Rural Urban Interface (RUI)	The line or area where structures and other human development adjoin or overlap with undeveloped bushland. ¹³
Slope	The angle of the ground's surface measured from the horizontal.

¹² Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne.

¹³ Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne.



Tenure Blind	An approach where multiple land parcels are consider as a whole, regardless of individual ownership or management arrangements.
Treatment	An activity undertaken in order to modify risk, such as a prescribed burn.
Treatment Objective	The specific aim to be achieved or action to be undertaken, in order to complete the treatment. Treatment objectives should be specific and measurable.
Treatment Manager	The organisation, or individual, responsible for all aspects of a treatment listed in the Treatment Schedule of the Bushfire Risk Management Plan, including coordinating or undertaking work, monitoring, reviewing and reporting.
Treatment Priority	The order, importance or urgency for allocation of funding, resources and opportunity to treatments associated with a particular asset. The treatment priority is based on an asset's risk rating.
Treatment Schedule	A report produced within the Bushfire Risk Management System that details the treatment priority of each asset identified in the Bushfire Risk Management Plan and the treatments scheduled.
Treatment Strategy	The broad approach that will be used to modify risk, such as fuel management.
Treatment Type	The specific treatment activity that will be implemented to modify risk, such as a prescribed burn.
Vulnerability	The susceptibility of an asset to the impacts of bushfire.



Common Abbreviations

AFAC	Australasian Fire and Emergency Services Authorities Council
APZ	Asset Protection Zone
BMP	Bushfire Management Plan
BRMP	Bushfire Risk Management Planning (or Plan)
BRMS	Bushfire Risk Management System
CALD	Culturally and Linguistically Diverse
DEMC	District Emergency Management Committee
DFES	Department of Fire and Emergency Services
P&W	Department of Parks and Wildlife
ERMP	Emergency Risk Management Plan
FFDI	Forest Fire Danger Index
GFDI	Grassland Fire Danger Index
GIS	Geographical Information System
HSZ	Hazard Separation Zone
JAFFA	Juvenile and Family Fire Awareness
LEMA	Local Emergency Management Arrangements
LEMC	Local Emergency Management Committee
LG	Local Government
LMZ	Land Management Zone
OBRM	Office of Bushfire Risk Management
SEMC	State Emergency Management Committee
SLIP	Shared Location Information Platform
WAPC	Western Australian Planning Commission

Appendix A – Vegetation Categories

Table 36 – Classification of Vegetation¹⁴

Vegetation Classification	Vegetation Type	Figure No.	Description
A Forest	Tall open forest Tall woodland	01 02	Trees over 30 metres high; 30-70% foliage cover; may include understorey ranging from rainforest and tree ferns to low trees and tall shrubs. Found in areas of high reliable rainfall. Typically dominated by eucalypts.
	Open forest Low open forest	03 04	Trees 10-30 metres high; 30-70% foliage cover; may include understorey of sclerophyllous low trees and tall scrubs or grass. Typically dominated by eucalypts.
	Pine plantations	Not shown	Trees 10-30 metres in height at maturity generally comprising Pinus species or other softwood species, planted as a single species for the production of timber.
B Woodland	Woodland Open woodland	05 06	Trees 10-30 metres high; 10-30% foliage cover dominated by eucalypts; understorey low trees to tall shrubs typically dominated by Acacia, Callitris or Casuarina.
	Low woodland Low open woodland Open shrubland	07 08 09	Low trees and shrubs 2-10 metres high; foliage cover less than 10%. Dominated by eucalypts and Acacias. Often have a grassy understorey or low shrubs. Acacias and Casuarina woodlands grade to Atriplex shrublands in the arid and semi-arid zones.
	Closed heath Open heath	10 11	Found in wet areas and/or affected by poor soil fertility or shallow soils. Shrubs 1-2 metres high often comprising of Banksia, Acacia, Hakea and Grevillea. Wet heaths occur in sands adjoining dunes of the littoral (shore) zone. Montane heaths occur on shallow or water-logged soils.
C Shrubland	Low shrubland	12	Shrubs <2 metres high; greater than 30% foliage cover. Understoreys can contain grasses, Acacia and Casuarina often dominant in the arid and semi-arid zones.
	Closed Scrub	13	Found in wet areas and/or areas affected by poor soil fertility or shallow soils; >30% foliage cover. Dry heaths occur in rocky areas. Shrubs >2 metres high. Typical of coastal wetlands and tall heaths.
D Scrub	Open Scrub	14	Shrubs greater than 2 metres high, 10-30% foliage cover with a mixed species composition.
	Tall Shrubland	15	Vegetation dominated by shrubs especially eucalypts and acacias with a multi-stemmed habit; usually greater than 2 metres in height; <30% foliage cover. Understorey of widespread to dense low shrubs (Acacias) or sparse grasses.
F Rainforest	Tall closed forest Closed forest Low closed forest	16 17 18	Trees 10-40 metres in height; >90% foliage cover; understorey may contain a large number of species with a variety of heights.
	Low open Shrubland Hummock grassland Closed tussock grassland Tussock grassland Open tussock Sparse open tussock Dense sown pasture Sown pasture Open herbfield Sparse open herbfield	19 20 21 22 23 24 25 26 27 28	All forms including situations with shrubs and trees if the overstorey foliage cover is less than 10%.
Notes: Overstoreys of open woodland, low open woodland, tall open shrubland and low open shrubland should be classified to the vegetation type on the basis of their understoreys, others to be classified on the basis of their overstoreys. Vegetation height is the average height of the top of the overstorey.			

¹⁴ Source: AS 3959-2009: Table 2.3, reproduced with permission from SAI Global under licence number 1510-c081.

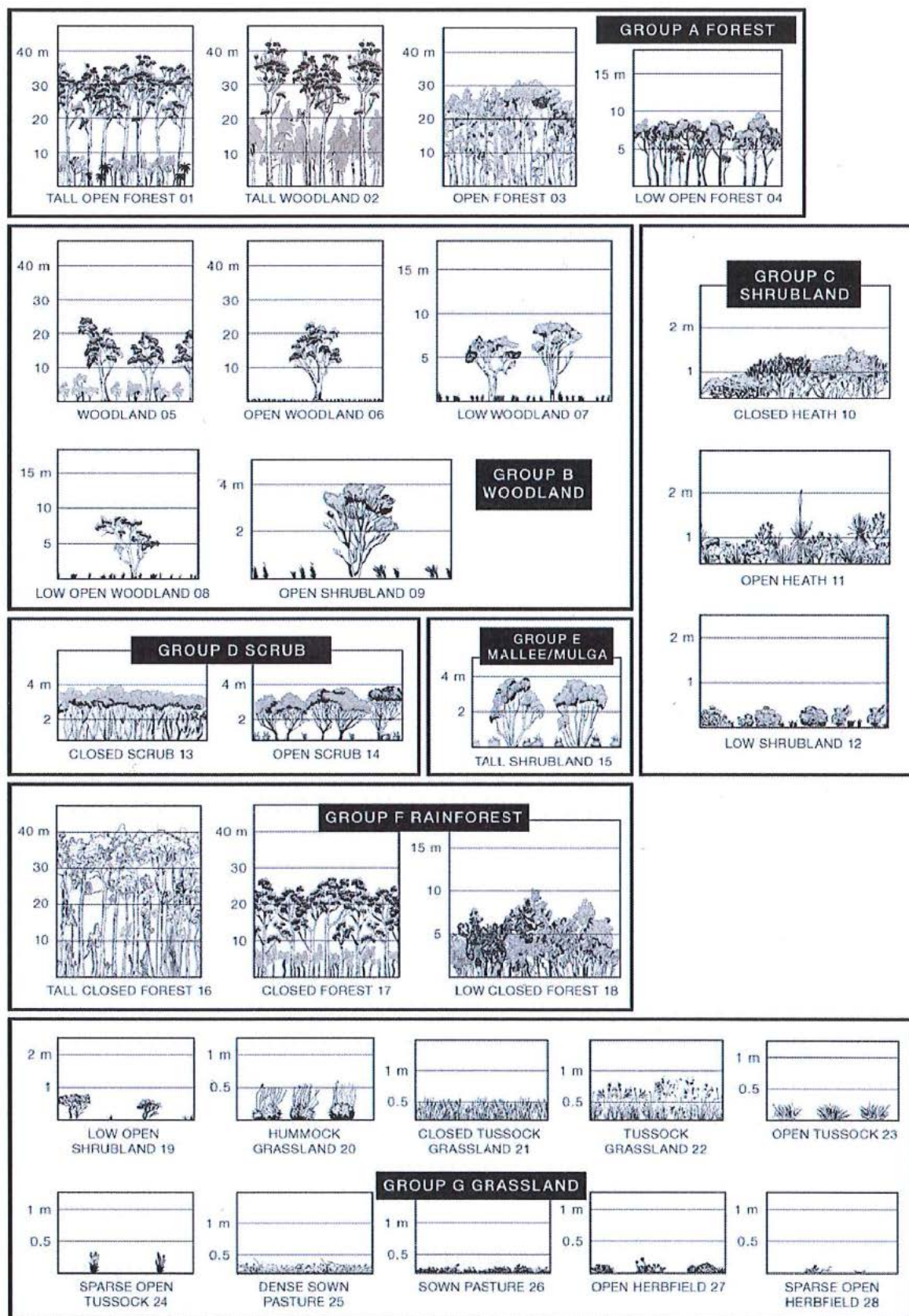


Figure 16 – Classification of Vegetation Summary¹⁵

¹⁵ Source: AS 3959-2009: Figure 2.3, reproduced with permission from SAI Global under licence number 1510-c081.

Appendix B – Planning Area Assessment Tool

Table 37 – Planning Area Assessment Tool

Risk Factor (Circle those that are applicable but use the highest score)	Low	Medium	High	Very High	Extreme
1. % of LGA Population in BRPA	0-10%	10-25%	25-50%	50-75%	75-100%
Score	20	40	80	160	320
2. Fuel Structures	Predominantly large areas of low fuels (for example, vineyards and orchards, irrigated pastures, bare dunes, or lakes)	Mostly large areas of low fuels interspersed with scattered areas of vegetation	Some large areas of mixed vegetation types, small pockets of vegetation and some low fuel areas	Mainly large areas of continuous vegetation with some areas of low fuels	Heavy fuels over a large proportion of the area, heavy tall forests with a full understorey
Score	20	40	60	80	100
3. Assets	Only local assets in the area	Local assets plus one or two Regional assets in the area	Local assets plus a few or more Regional assets in the area	Local assets plus a large number of Regional assets in the area	State assets in the area
Score	20	40	60	80	100
4. Urban Residential interface	Very few areas of urban-bushland interface, small number of rural residential subdivisions with no bush blocks	Few areas of urban-bushland interface, small number of rural residential subdivisions with very few number being bush blocks	Some areas of urban-bushland interface, a moderate number of rural residential subdivisions with some being bush blocks	A reasonable area of urban-bushland interface, a large number of rural residential subdivisions with many being bush blocks	Large areas of urban-bushland interface, large number of rural residential subdivisions with high number being bush blocks
Score	20	40	60	80	100
5. Suppression response times - ground	Immediate response with resources able to be at the incident within 15 minutes	Good response time with resources able to be at the incident within 15-30 minutes	Medium response times with resources able to be at the incident within 30-60 minutes	Poor response time with resources able to be at the incident within 1-6 hours	Long response time with resources able to be at the incident in excess of 6 hours
Score	20	40	60	80	100
6. Suppression strategies	No restrictions on the ability to employ all bushfire-fighting strategies	Minimal restrictions on ability to employ all bushfire-fighting strategies	Some restrictions on ability to employ all bushfire-fighting strategies	Considerable restrictions on ability to employ all bushfire-fighting strategies	Significant restrictions on ability to employ all bushfire-fighting strategies
Score	20	40	60	80	100

Appendix C – Assessment Criteria

Assessment Criteria

Table 38 – Assessment Criteria

Assessment Criteria	How the Criteria will be Assessed
Plan Preparation – General	
Does the plan follow the format of the DFES <i>BRMP Template</i> and have all sections been addressed?	Review BRMP ☐ DFES template has been used (<i>preferred</i>) ☐ All sections have been addressed ☐ Section numbering and order consistent with template
Have all required appendices been attached to the BRMP?	Check Appendices ☐ Communication Strategy ☐ Multi-agency local government-wide controls table ☐ Asset Risk Register ☐ Treatment Schedule ☐ Location and Boundaries Map ☐ Vegetation Map ☐ Communities Map ☐ Planning Area Map
Communication Strategy	
Has an appropriate Communication Strategy been developed?	Review Communication Strategy ☐ DFES template has been used (<i>preferred</i>) ☐ All sections have been addressed ☐ Scope and outcomes have been set ☐ Range of stakeholders identified ☐ Key messages developed ☐ Communications Plan developed
Context	
Has an appropriate context for risk assessment been set?	Review context ☐ Correct sources of data used in each section ☐ Link to corporate or strategic framework established ☐ Relevant information included at each section
Are the planning areas identified and prioritised in the BRMP?	Review BRMP ☐ Planning areas named and listed ☐ Planning Area Assessment Tool applied or ☐ Alternative method for asset identification and assessment

Asset Identification and Assessment	
Have assets been identified in all planning areas?	Review Asset Risk Register ☐ Assets identified in all planning areas
Have assets been identified across all asset categories?	Review Asset Risk Register ☐ Human settlement assets identified ☐ Economic assets identified ☐ Environmental assets identified ☐ Cultural assets identified
Have P&W assisted with the identification and assessment of environmental assets?	Review BRMP and Communications Plan ☐ Evidence of P&W consultation
Have risk assessments been completed and recorded for all assets identified?	Review Asset Risk Register ☐ Risk assessment recorded for each asset
Risk Evaluation	
Is the level of risk acceptability documented in the BRMP?	Review BRMP ☐ Course of action table complete
Risk Treatment	
Have the local government-wide controls been identified, reviewed and documented in the BRMP?	Review BRMP ☐ Local government-wide controls listed in BRMP ☐ Local government-wide controls have been reviewed ☐ Multi-agency local government-wide control table identifies actions, timeframes and responsibilities
Does the Treatment Schedule include any treatments known at time of submission?	Review Treatment Schedule ☐ Known treatments listed
Does the Communication Strategy identify planned activities to engage land owners and treatment managers in development of the Treatment Schedule?	Review Communication Strategy ☐ Communication activities planned and identified in Communication Strategy
Draft BRMP submission	
Has the BRMP been 'locked' in BRMS?	Review locked date ☐ Locked date is recorded
Has the self-assessment checklist been completed and attached to the submission?	Review Checklist ☐ Checklist attached ☐ Contact person nominated
Has a cover letter from the local government been attached to the submission?	Review cover letter ☐ Cover letter attached
Has an electronic and hardcopy version of the submission been provided?	Review submission ☐ Electronic (MS word or PDF) ☐ Hardcopy

Self-Assessment Checklist

Table 39 – Self-Assessment Checklist

Draft BRMP submission

To be completed and attached to the Draft BRMP submission.

- ☐ Cover letter from the local government submitting the Draft BRMP to the Office of Bushfire Risk Management (OBRM) for review attached
- ☐ Submission is provided in hardcopy and electronically
- ☐ All sections of the DFES BRMP Template have been addressed (OBRM preference that the DFES Template has been used)
- ☐ Communication Strategy attached
- ☐ Maps attached
- ☐ Context section complete
- ☐ Planning areas have been identified in Draft BRMP in order of priority
- ☐ Assets at risk of bushfire have been identified and assessed
- ☐ Evidence of consultation with P&W regarding environmental assets included (if relevant)
- ☐ Asset Risk Register attached
- ☐ BRMP has been 'locked' in BRMS
- ☐ Local government-wide controls are identified and recorded
- ☐ Treatment Schedule attached

The contact person in regards to this submission is:

Name:	
Position:	
Organisation:	
Postal address:	
Contact No.:	
Email:	

Submissions to be forwarded to:

Office of Bushfire Risk Management
Department of Fire and Emergency Services
Street address: 20 Stockton Bend, COCKBURN CENTRAL WA 6164
Postal Address: PO Box P1174 PERTH WA 6844
Email: obrm@dfes.wa.gov.au

