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Australian Institute for
Disaster Resilience



EMERGENCY RISK MANAGEMENT APPLICATIONS GUIDE

Manual 5



Archived

**AUSTRALIAN EMERGENCY
MANUALS SERIES**

**EMERGENCY RISK MANAGEMENT
APPLICATIONS GUIDE**

Manual 5

Emergency Management Australia

© Commonwealth of Australia 2004

First published 2000

Second edition published 2004

ISBN: 0 975 0474 7 7

Published by Emergency Management Australia

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The Australian Emergency Manual Series

The first publication in the original AEM Series of mainly skills reference manuals was produced in 1989. In August 1996, on advice from the National Emergency Management Principles and Practice Advisory Group, EMA agreed to expand the AEM Series to include a more comprehensive range of emergency management principles and practice reference publications.

The Australian Emergency Manual Series has been developed to assist in the management and delivery of support services in a disaster context. It comprises principles, strategies and actions, compiled by practitioners with management and service delivery experience in a range of disaster events. The series has been developed by a national consultative committee, representing a range of State and Territory agencies involved in the delivery of support services and sponsored by Emergency Management Australia (EMA).

The manuals are available in full text on the EMA website at <http://www.ema.gov.au> under Publications. Limited print copies are distributed to state and territory emergency management organisations, community organisations and relevant government agencies. These manuals are also available free of charge on CD. Please send requests to ema@ema.gov.au.

The emergency services skills series (skills and training management topics) are issued as training guides to state agencies through each state and territory emergency service.

Australian Emergency Manual Series Structure and Content

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FOREWORD

The Emergency Risk Management - Applications Guide was first published in 2000 to provide a comprehensive explanation about how emergency risk management (ERM) can be applied, mainly at the community level.

This revised Guide is timely as it follows publication of the 2004 Risk Management Standard AS/NZS 4360, on which ERM is based, and includes the growing body of experience in the application of ERM.

The Guide also includes feedback from the emergency management community around Australia. Examples from the field include risk evaluation criteria and risk register databases, the benefits of using the process, justifying the relationships between sources of risk and elements at risk, documentation processes, the customisation of consequence and likelihood tables (and even of the risk level matrix!), and tools to maintain and facilitate the 'monitor and review' process - such as unique identifier numbers.

In 2000 the ERM process was in its infancy and therefore the Guide was theoretically based. Now ERM is a proven and accepted process, this revision has a user-friendly structure and reflects the latest in emergency management thinking and practice.

This Guide is a living document which Emergency Management Australia (EMA) believes will further enhance implementation of ERM across the emergency management environment. In revising the guide, EMA is also conscious of increasing community and business interests in risk assessment and treatment options including critical aspects of business continuity.

The Guide can be downloaded from EMA's web site <http://www.ema.gov.au>.



David Templeman

Director General
Emergency Management Australia

December 2004

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Acknowledgements

Joint Technical Committee OB-007 - Risk Management

This document is based on the AS/NZS Standard 4360:2004 Risk management. Joint Technical Committee OB-00-Risk Management has reviewed this second edition of the Emergency Risk Management Applications Guide and endorses it as an appropriate derivation of AS/NZS 4360.

The following interests are represented on this committee:

Association of Risk and Insurance Managers of Australasia

Australian Computer Society

Australian Customs Service (Commonwealth)

Australian Institute of Risk Management

CSIRO Atmospheric Research

Department of Defence (Australia)

Emergency Management Australia

Environmental Risk Management Authority New Zealand

Institute of Chartered Accountants in Australia

Institution of Engineers Australia

Institution of Professional Engineers New Zealand

Insurance Institute of New Zealand

Massey University

Minerals Council of Australia

Ministry of Agriculture and Forestry New Zealand

Ministry of Economic Development (New Zealand)

NSW Treasury Managed Fund

New Zealand Society for Risk Management

Safety Institute of Australia

Securities Institute of Australia

University of New South Wales

Victorian WorkCover Authority

Water Services Association of Australia

Additional information contained in this document has been adapted from a number of state/territory documents on emergency risk management and emergency risk management projects.

This document was developed under the guidance of a steering committee.

1. Introduction

1.1 What is emergency management?

The emergency management function incorporates a wide range of measures to manage risks to communities and the environment. These measures may be implemented across Commonwealth, state/territory and local government through legislation, regulation or education. They cover fields as diverse as state and local government legislation, community development, emergency response, urban development and land use management and community recovery.

Emergency management addresses the potential occurrence of major emergency situations requiring a whole-of-government approach: events such as floods, bushfires, cyclones, the consequences of acts of terrorism or the release of hazardous materials. These situations are usually characterised by the scope of their impact being community-wide, with medium- to long-term effects. Because they do not occur very often there is frequently a lack of social preparedness.

Although minor and routine events, such as drink-driving, substance abuse and domestic violence, also threaten public safety, they do not fall within the scope of emergency management.

Emergency management aims to strengthen communities to make them safe, sustainable and resilient, helping them to avoid emergencies or minimise and recover from their effects.

1.2 What is emergency risk management?

Emergency risk management (ERM) is a process which involves dealing with risks to the community arising from emergency events. It is a systematic method for identifying, analysing, evaluating and treating emergency risks. Risk treatments include prevention and preparedness as well as provision for response and recovery should an emergency event occur. Local government is a key stakeholder in the ERM process because it is usually the first level of support for communities in emergencies.

The ERM process can improve outcomes by:

- establishing a decision-making process
- focusing on the opportunities to reduce or manage the risk-rather than on the response to emergencies that may result from the risk
- engaging a wide range of individuals and communities
- promoting partnerships and enhancement of relationships
- fostering resource sharing and mutual aid arrangements
- providing auditable and credible means of reducing risk
- using a language that is common to decision-making in both the public and private sectors.

The model that underpins the process (outlined in detail in the next section of this publication) is based on the Australian/New Zealand Standard AS/NZS 4360: 2004 *Risk management*. It incorporates an iterative process with well-defined activities, leading to implementation of effective risk-treatment strategies.

The five major activities of the process: establishing context, identifying risks, analysing risks, evaluating risks and treating risks are supported by two *enabling activities* - communicating and consulting, and monitoring and reviewing-which apply to each of the major activities of the process, ensuring relevance of outcomes and decisions. In addition, documentation occurs throughout the process.

1.3 History of the ERM concept

In 1995 a risk management standard was developed by Standards Australia and Standards New Zealand: AS/NZS 4360:1995 *Risk management*. It emphasised the management of *risk* rather than the management of *hazards*.

Risk management involves managing to achieve an appropriate balance between realising opportunities for gains while minimising losses. It is an integral part of good management practice and an essential element of good corporate governance. It is an iterative process consisting of steps that, when undertaken in sequence, enable continuous improvement in decision-making and facilitate continuous improvement in performance.

from Standards Australia and Standards New Zealand: AS/NZS 4360:2004 Risk management

This approach was then applied to community emergency management, focusing on reducing risk by modifying aspects of the source of risk, the community or the environment. It encouraged development of strategies relating to prevention and mitigation of emergencies -reducing and managing the risks - rather than being solely concerned with enhancing response capability (and the associated need to increase resources and budgets).

In the late 1990s the states and territories recognised the benefits of the ERM approach. As a result, the *Emergency risk management application guide* was developed in 2000.

This publication (2004) is a revised and updated version of the guide. It has been developed in response to changes to the AS/NZS Standard, feedback on implementation of the process, and the focus on risk assessment in the Council of Australian Governments' 2004 report *Natural disasters in Australia-reforming mitigation, relief and recovery arrangements*.

Tasmanian Emergency Management Policy No.3

Emergency Risk Management

Originally issued 7 September 1999

Revised 21 October 2003

Aim

The aim of this policy is to provide guidance and direction on key responsibilities for a consistent approach to the management of major risks that impact, or are likely to impact, upon public safety in Tasmania.

Authority

This policy is authorised by the State Disaster Committee under the provisions of the Emergency Services Act 1976.

Background

In 1995, Standards Australia and Standards New Zealand published AS/NZS 4360 *Risk management...*

Responsibilities

Application of the emergency risk management process to major risks will occur at the local, regional or State level...

Then follows the responsibilities of:

- Municipal Emergency Management Committees;
- Region Disaster Planning Groups;
- State Disaster Committee;
- Local Government organisations, etc.;
- Regional Industry groups, etc.; and
- State Government organisations, etc.

Natural Disaster Relief and Mitigation Arrangements

Includes Natural Disaster Relief Arrangements (NDRA) and Disaster Mitigation Australia Package (DMAP) information.

1.4 Who participates in the ERM process?

Traditionally, emergency services personnel were involved in emergency management activities, with little community involvement. The ERM process seeks to ensure community values are reflected in emergency management. Risk management is complex and it is important to involve a wide range of people including community representatives, local government officers and officials, emergency services personnel, and representatives from other stakeholder groups, who work together to understand how a hazard or source of risk can affect them and their environment, and how this risk can be reduced.

Communities are complex: they can be a group of people linked together by a shared location, experience or function. People may belong to more than one group.

Examples of communities:

- people living in a neighbourhood
- residents of a city council area
- people working in the same area or organisation
- a school's parents, teachers and students
- river users-commercial, recreational, scientific researchers
- people working in and using an airport

Within a group there may be a range of opinions and views. This means that a broad cross-section of stakeholder views should be represented in the ERM process. Their understandings of risks and benefits, together with underlying reasoning, should be identified and documented, so that an unbiased and holistic view is achieved.

Where appropriate, local emergency management committees may be used as the basis of an ERM committee or consultative group. A representative of the organisation or department responsible for treating the risk (the "risk owner") should also be involved so that they can understand the rationale for decisions about necessary actions.

Examples of stakeholders in emergency risk management

Tasmanian Emergency Risk Management Project

- community representatives
- local government officers/officials
- emergency management officers
- state government representatives
- police officers
- welfare representatives
- fire service officers
- risk owners/managers
- ambulance service officers
- technical specialists
- utility operators
- industry association representatives
- port operators
- tourism operators

1.5 What training is needed?

Stakeholder group representatives will need training to ensure an effective and productive ERM process. Facilitators should have skills in leading and influencing groups as well as a thorough understanding of emergency risk management, and participants should be provided with sufficient information so that they can contribute fully.

Emergency Risk Management Training

...in any future emergency risk management projects, consideration should be given to incorporating emergency risk management training for the principal operatives early in the project or delaying the project to enable early training.

(adapted from the first of the Future Process Recommendations arising from the Emergency Risk Management Project conducted by the Bunbury Wellington Group of Councils, WA)

Example of training stakeholder groups: Tasmania

A comprehensive education and training program is to be prepared by the SES State Education and Training Officer. This program is to be developed in consultation with the Emergency Management Australia Institute (EMA), the Executive Officer to the State Disaster Committee and the Executive Officers of the Region Disaster Planning Groups. The program is to take account of the training needs of all stakeholder groups, including:

- State Government Department Heads;
- Local Government Mayors and General Managers;
- Region Disaster Planning Group members;
- specific regional working groups, if formed;
- Municipal Emergency Management Planning Committees; and
- key industry groups and Statewide organisations.

In addition to the above, the program is to take account of the following issues:

- training and development needs associated with the project, including consultancies;
- the number of Introduction to Emergency Risk Management workshops and briefing sessions required within Tasmania;
- the number of personnel required to attend interstate emergency risk management courses at the EMA;
- Regional Project Plans; and
- ongoing education and training requirements during and upon completion of the project.

1.6 Why is a committee needed?

The establishment of an ERM committee or consultative group is required for the following reasons:

- members can reflect a broad range of perspectives
- members can rapidly and efficiently gather diverse information
- the input of subject experts is required, as no single person is expert in everything
- emergency risk management is more likely to be taken seriously if there is commitment from all relevant players.

1.7 What are the benefits of ERM?

Typical benefits of using the ERM process are that it provides opportunities for:

- community commitment to managing risk
- a focus on risk rather than hazard
- an improved understanding of risks and the benefits of risk reduction activities
- a focus on prevention rather than response
- a reduction in the levels of risk to a community
- a reduction in the cost from the impact of emergencies
- better positioning for Australian Government financial assistance
- minimisation of impact of litigation
- improved decision-making about risks and allocation of resources
- improved knowledge of risk assessment across government, the emergency management industry and communities
- informed emergency planning.

1.8 What are the challenges of ERM?

Before starting the ERM process, there should be commitment at the highest possible level, particularly where whole-of-community or whole-of-government support is required. All participants should have a well-developed understanding of national, state/territory and local legislation and organisational policies which will impact on the process.

These policies may include:

- the authority to conduct ERM
- resourcing of ERM
- the standards for, or key focus of, the application of ERM
- information inputs to the ERM process
- the level of documentation required throughout the ERM process
- the support and expertise available to assist those responsible for managing risks
- the frequency of reviewing risk treatment progress.

1.9 How is ERM planned and managed?

Like any project such as building a house or organising a conference, emergency risk management must be carefully planned and managed. Preparing a project management plan for the ERM process will help to make the process easier so that people will continue to actively participate.

This plan should include:

- project definition (aim, objectives, scope and authority, stakeholders, ERM training, relationship of the project to other projects)
- project planning (tasks, responsibilities, timetable, resources, performance indicators)
- project implementation (communication, consultation, performance, monitoring and review).

So that the progress of the project can be easily monitored, completion dates for key steps, or milestones, should be established at the project planning stage. Performance indicators should also be established at this stage, so that success of the project in meeting its aims and objectives can be evaluated. These indicators should measure effectiveness of the project, efficiency and success of the project, timeliness in achieving the outcomes, and cost effectiveness of treatment strategies.

It is also important that the aim and objectives in the project plan provide guidance on the nature and extent of the project, and describe the envisaged outcomes.

Examples of aims and objectives

Tasmanian Emergency Risk Management Project

Aim

To utilise the Emergency Risk Management Guidelines to produce a risk assessment and risk treatment/mitigation study of risks arising from natural and technological hazards, for the three regions of Tasmania, based on community input. (adaptation)

Objectives

- gain a whole-of-community commitment to the project;
- conduct an assessment of major risks within Tasmania at regional level;
- allocate risk treatment strategies to appropriate organisations;
- promote risk management as a process of community development and organisational management; and
- monitor implementation of the risk treatment strategies.

Purpose

The Shire of Irwin is working to create a safer Community in conjunction with the Community, Emergency Services and other stakeholders to create a holistic Community Risk Based Emergency Management Plan, which addresses risks that may affect the Community, property and the environment.

Objective

The objective of the project will be to create a safer Community by identifying, analysing, evaluating risks and recommending treatment options based on Emergency Management Australia's Emergency Risk Management Applications Guide.

1.10 About this applications guide

What is its purpose?

The purpose is to provide a generic overview of the ERM process.

Because a wide range of communities and contexts exist in Australia, these guidelines should be adapted for the specific circumstances in which they are used. A situation which has very significant effects on one community may be adequately dealt with by another. Also, values can vary between and within communities. Protection and preservation of life, property and the environment are held in high regard by most communities, but other less tangible elements valued by the community, such as social networks, continuity of essential services, community wellbeing and quality of life, may also be considered to be highly significant.

The generic nature of these guidelines allows them to be customised or adapted as required. Their use may also be complemented by:

- the facilitator's guide Implementing emergency risk management (Emergency Management Australia 2001).
- the Critical infrastructure emergency risk management and assurance handbook. (Emergency Management Australia. 2nd edn. 2004)
- the Standard AS/NZS 4360:2004 Risk management and companion volume Risk management guidelines HB436:2004.

States and territories are encouraged to develop supporting materials based on this publication, containing case studies and other relevant tools suited to their jurisdictions.

Who are they for?

These guidelines are for the use of people in communities and in government organisations (at local, regional/district, state/territory and Australian Government levels) who are involved emergency risk management. Note that a glossary is included as an appendix to this publication, as terminology use may differ between fields and organisations.

What is their scope?

The scope of these ERM guidelines encompasses major risks to community safety that require whole-of-community or multi-organisational attention.

An essential activity in the ERM process is to clearly specify the scale and scope of the risks being considered, as well as any constraints or limitations relating to the process or outcomes. This scope must then be incorporated into the establish context phase, which will drive all elements of the ERM process.

Examples of emergency risk management scoping

Tasmanian Emergency Risk Management Project

The project scope includes all major risks to the community resulting from natural and technological disasters across all 29 municipal areas of Tasmania, (with major risks defined as risks to public safety that may cause emergencies/disasters and that require multi-organisational or whole of community attention).

Victoria's Community Emergency Risk Management Workbook

The terms of reference for the Municipal Emergency Management Planning Committee are to identify and consider treatments for risks that have the potential to become emergencies that:

- require action of more than one agency; and/or
- threaten the people, property and the environment; and/or
- have the potential to be protracted or to escalate so as to seriously affect the community.

Shire of Irwin, WA Emergency Risk Management Projects

The Shire of Irwin recognises that the risk based emergency management planning process may lead to suggested risk treatments that may affect or be an effect of social, political, economic and environmental aspects of the Community and that risk treatment recommendations may be affected by the reality of political and financial constraints.

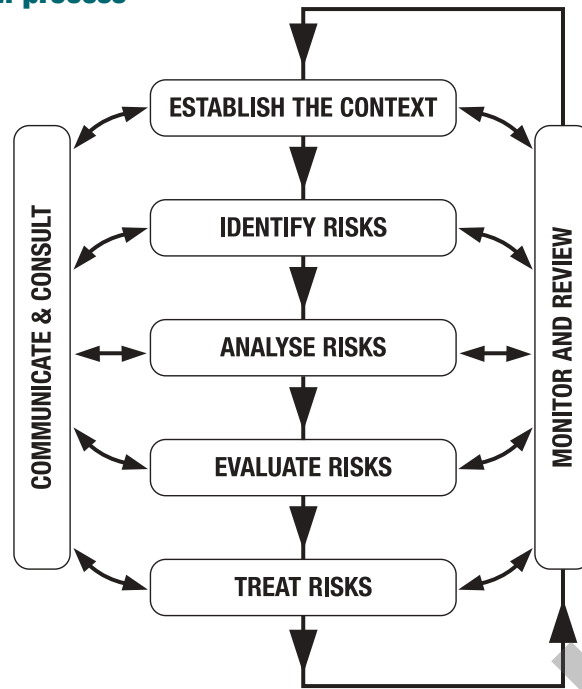
Although these emergency risk management guidelines have been developed primarily for communities, they can readily be modified to address risks impacting organisations and the environment, where ERM approaches are appropriate. The *Critical infrastructure emergency risk management and assurance handbook*, which complements this publication, shows application of ERM within organisations. Risks which are not considered suitable for ERM approaches should be dealt with using standard procedures or Standard AS/NZS 4360:2004 *Risk management*.

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Overview of the ERM process

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2. Overview of the ERM process



2.1 The enabling activities

Two important enabling activities underpin the major activities.

These are:

Communicate and consult

Monitor and review

2.2 The major activities

The five major activities in the ERM process are:

Establish the context

Identify risks

Analyse risks

Evaluate risks

Treat risks

2.3 Documentation

In addition to these activities is documentation which should take place throughout the ERM process.

Because the views of stakeholders can significantly influence decisions, it is important to record discussions and deliberations and integrate them into the decision-making process. For a decision to be successfully implemented, the process outcomes should engender ownership and commitment from all parties.

As well as providing an “audit trail”, documentation can also show evidence of a systematic approach to ERM, demonstrating to stakeholders that the process has been conducted properly. Documentation is also important in the review of process and treatment plans, especially if circumstances change. Even when there is a decision that risks do not require treatment, the reasoning should be documented.

Arrangements for documentation throughout the ERM process should be clearly recorded in writing. All aspects of the ERM process should be recorded. Assumptions, methods, data sources, analyses, results and reasons for decisions should all be documented in minutes, progress reports and final reports, or through using software.

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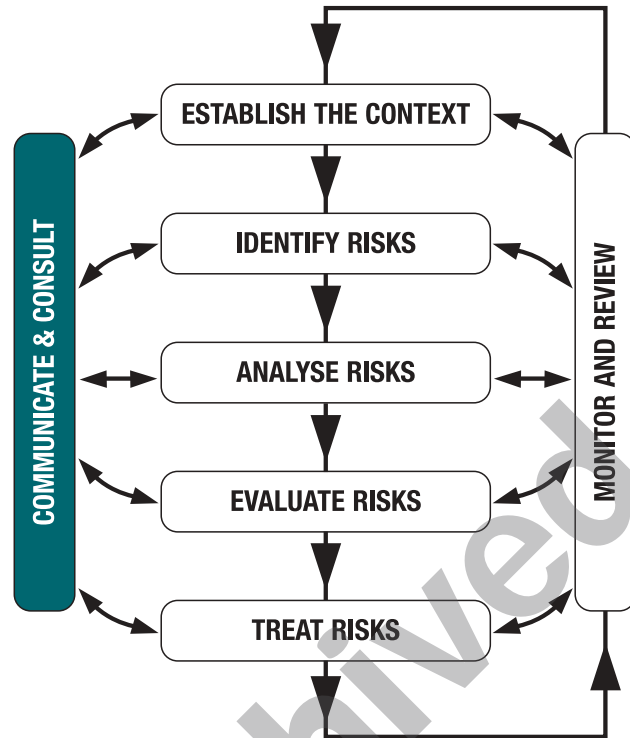
The ERM process activities

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3. The ERM process activities

Each of the activities of the ERM process is described in detail below. Firstly the two enabling activities are outlined, followed by the five *major activities*. The ways in which the enabling activities and documentation relate to each of major *activities* is also detailed.

3.1 Communicate and consult



Communication and consultation are intrinsic to the process of risk management and should be considered at each step. An important aspect of 'establishing the context' is to identify stakeholders and seek and consider their needs. A communication plan can then be developed. This plan should specify the purpose or goal of the communication, who is to be consulted and by whom, when it will take place, how the process will occur, and how it will be evaluated.

p21 HB 436:2004 *Risk management guidelines 2004*

Because emergency risk management deals with events which do not happen very often, communication and consultation are essential components.

Because of the types of risk dealt with in the ERM process there should be a process of consultation and dialogue. The ERM project is more likely to be successful when stakeholders understand each other's perspectives and are actively involved in decision-making.

Effective communication and consultation will:

- improve people's understanding of risks and the emergency risk management process
- ensure that the varied views of stakeholders are considered
- ensure that all participants are aware of their roles and responsibilities.

Communication

A communication plan should be developed at the start of the ERM process, and ensure representation from the community. It will encourage commitment, participation, and ownership of the process of managing risks.

It is especially important to communicate effectively with key stakeholders. It may also be appropriate to target “champions” who can enable a better community understanding of ERM issues.

These are some of the questions that can be asked to help ensure good communication:

- What are the major issues?
- Who are the relevant focus groups?
- Who are the “champions” within the community?
- How can information be communicated to internal and external stakeholders?
- How can the community’s concerns regarding sources of risk be determined?
- What kinds of information should be distributed?
- How can information be presented in a simple, clear, non-technical way?
- Do different groups of people need different types of information?
- How can concepts such as uncertainty of information, modelling techniques and risk assessment be clearly communicated?
- How can Freedom of Information provision be acknowledged?
- How can communications encourage people to search for more information (e.g. use of the internet)?
- What is the role of the media and how can this be optimised to produce clear and unambiguous messages?

(Based on Queensland Department of Emergency Services 1999, *Disaster risk management*, DES, Brisbane.)

Consultation

Consultation practices need to be planned at an early stage in the ERM process and be tailored to the specific context.

Here are some useful basic principles:

- Make communications clear and timely.
- Allow for input into decision-making about scope, aims and outcomes at each stage of discussion and submissions.
- Provide comprehensive and timely information to encourage fair and informed discussion of issues.
- Support the consultative process by providing information requested by those wishing to provide input.
- Establish clear and realistic timelines sensitive to the available resources of participants.
- Translate technical language into plain language.

- Give practical help to engage participants, mindful of equal opportunity principles.
- Facilitate the inclusion of participants with Languages-Other-Than- English (LOTE) backgrounds.
- Give frequent and relevant feedback (e.g. information about emerging technologies, key outcomes from meetings and consultations, the nature of contributions from interested people, final key recommendations).
- Enable people entering the process at different stages to influence the direction of the process.
- Stimulate conciliatory and constructive exchange of views and genuinely try to address the major issues without prejudice.
- Monitor and evaluate the consultation process during, and after each stage.

Share the responsibilities of effective consultation with participants.

Monitoring and review

As communication and consultation are critical to the success of emergency risk management, these activities should be regularly monitored and reviewed to ensure that those responsible for implementing ERM, and those with a vested interest, continue to be included in the process.

Sometimes it is realised that the inclusion of some key stakeholder groups has been overlooked, and their representatives are therefore invited to enter the ERM project when the process has already begun. When this happens, they should be fully briefed on process activities and decisions to date.

Occasionally an observer can be appointed to critique the committee processes, providing feedback on, for example, the chairperson's effectiveness in managing the committee and compliance with any terms of reference & ground rules or rules of conduct.

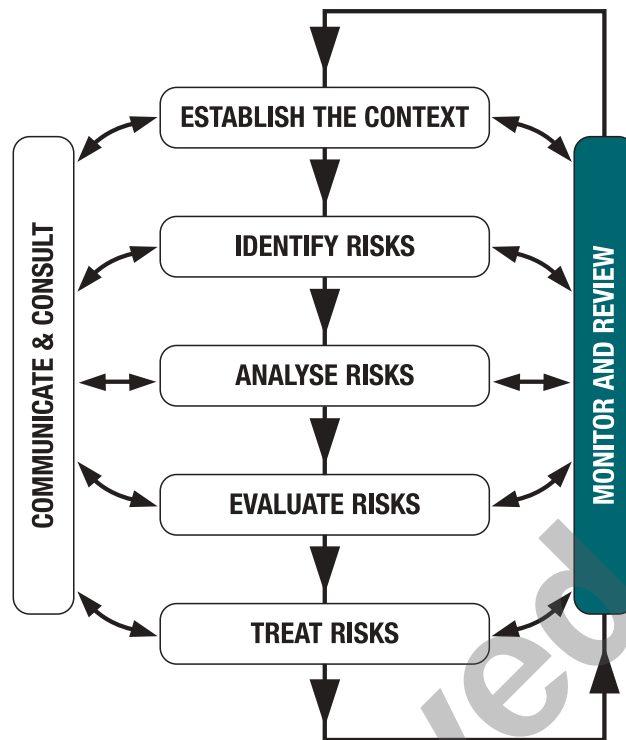
The effectiveness of the communications and consultation plans should also be tested occasionally to check whether appropriate information is flowing to and from stakeholder groups, and the level of their understanding.

Documenting this activity

The documentation associated with communication and consultation may include the following:

- a listing of key stakeholders
- a communication plan or a series of communication strategies
- a consultation plan or a series of consultation strategies
- any formal reporting arrangements and milestones
- agreed rules for the conduct of committee meetings

3.2 Monitor and review



Monitoring and review is an integral part of the risk management system, it also supports continuous improvement.

Few risks remain static. Changing circumstances can affect the need for treatment of risks, alter priorities, or mean that selected treatment methods are no longer effective. This means that there needs to be monitoring of risks, treatment plans and strategies, and the management systems set up to control implementation.

So that progress can be easily monitored, key steps, or milestones, should be identified when an ERM project plan is developed. Performance indicators in measurable units should also be established to clearly demonstrate whether the project is meeting its aims and objectives and how efficiently it is achieving outcomes.

To ensure that the management system remains relevant, it should be reviewed constantly. A process known as environmental scanning may be used for this purpose to identify changes in the environment which may impact on the success of the ERM project.

Factors affecting the likelihood and consequences of an outcome may change, as may the factors that affect the suitability or cost of the various treatment options.

Therefore the risk management cycle should be repeated regularly, especially in relation to significant events such as:

- a Coroner's Court directive
- an operational debrief
- the requirements of a new municipal council
- increased knowledge or experience
- new data emerging.

Clear arrangements for monitoring and review should be made and documented throughout the ERM process. Appropriate systems should be devised and introduced at an early stage, especially where dealing with large numbers of risks and risk treatments. The section in this publication on emergency risk management tools provides an overview of some typical tools used for this.

Communicating and consulting about this activity

When establishing a project plan with associated milestones and performance indicators, there should be consultation with stakeholders to fully understand community expectations and imperatives around emergency risk management.

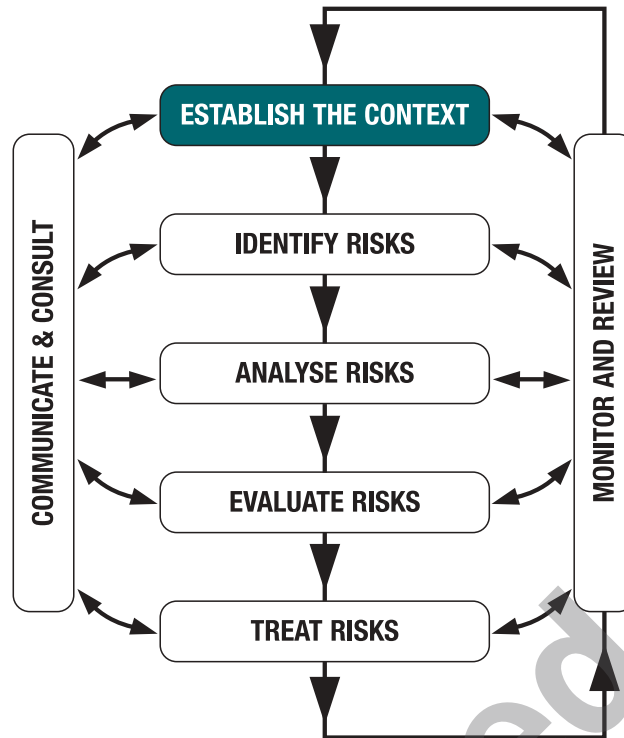
It is also essential to involve stakeholders in understanding and communicating the implementation aspects of the plan. This means that stakeholders can provide feedback on any implementation issues, such as the creation of new risks, or opportunities for enhancing risk reduction potential. Information on emerging risks should also be identified when monitoring and reviewing any stage of the process.

Documenting this activity

Documentation of the monitoring and review element includes:

- regular reports on the application of the process
- regular status reports on the implementation of treatments
- recommended changes to the ERM process itself

3.3 Establish the context



As with all processes in society, ERM occurs within the scope and limitations of established policies, practices and relationships. In establishing the context participants develop a shared understanding of the basic parameters within which risks must be managed, and define the scope of the rest of the ERM process. The state/territory policy framework for ERM is the starting point for this activity. (See section 1.3 above for an example of an ERM policy.)

The shared understanding of the context should be re-examined regularly to check the direction of the project and, if necessary, to make changes.

Establishing the context incorporates the following:

- Define the task
- Establish the ERM framework
- Develop risk evaluation criteria

Each of these is examined in more detail.

Define the task

Task definition defines the boundaries within which the ERM framework can be established. It involves identifying which range of risks should be covered in the project. It is not appropriate to identify possible solutions at this stage.

Establish the ERM framework

This focuses on how the ERM process will be applied to the task, and is done by considering:

- Who are the stakeholders?
- What legislation and policy is applicable?
- What management arrangements are applicable?
- What aspects of the political, economic, social and cultural environment are relevant?

Stakeholders

Identifying the stakeholder groups is central to the ERM process.

Stakeholder groups may include:

- communities
- emergency management agencies
- emergency service organisations
- government
- industry
- industry associations
- essential services
- recovery agencies

(See section 1.4 Who participates in the ERM process? above for other possible groups which may be included.)

Each stakeholder group or organisation should have an endorsed representative who is able to act on their behalf.

Legislation and policy

Because the ERM process is concerned with a wide range of sources of risk and elements at risk, it is affected by a great range of legislation and policies. Therefore stakeholders will need to understand:

- compliance requirements in relation to ERM policies and emergency service regulations in their jurisdictions
- workplace safety, public health and the environment legislation and policy requirements
- liability issues, especially in relation to the timeliness of implementing treatments once risks have been identified.

Management arrangements

Established community structures and arrangements should be used, when possible, in the ERM processes of:

- communicating and consulting
- monitoring and reviewing ERM project work
- identifying emerging risks.

“Champions” and other influential community members can help others gain an understanding of the value of the ERM project. Also, any established emergency management committees or emergency related workgroups can assist the proposed ERM committee.

Political, economic, social and cultural environment

Community scanning should be carried out to identify factors in the political, economic, social and cultural environment which have the potential to impact the ERM project. Typical factors are shown in the table below.

Examples of political, economic, social and cultural factors which may impact ERM	
Political	<ul style="list-style-type: none">• independence of local government elected members• influence of political factions• state/local government partnerships• Australian Government Natural Disaster Mitigation funding
Economic	<ul style="list-style-type: none">• unprecedented tourism growth• stable local government rates base• socio-economic composition• recent loss of business/commercial activity
Social	<ul style="list-style-type: none">• high unemployment• transient population• demographics
Cultural	<ul style="list-style-type: none">• ethnic composition• history of settlement• languages other than English spoken• strong community support

Examples of how political, economic, social and cultural factors may impact ERM

Political

Australian Government Natural Disaster Mitigation funding and established state/local government partnerships should facilitate funding of certain risk treatment strategy implementation.

Economic

Local economy heavily dependent on tourism therefore important to ensure tourists' needs are considered.

Social

High unemployment and a "volunteer mindset" may allow the implementation of low technology/high labour treatment strategies.

Cultural

The multi-cultural background of the community requires education and awareness programs to be presented in several languages.

Develop risk evaluation criteria

The development of risk evaluation criteria will help in making judgements about which risks need to be treated. Based on operational, technical, financial, legal, social, environmental or humanitarian considerations, criteria should reflect community viewpoints and values.

Risk evaluation criteria should be developed in the context definition stage so that they are not unduly influenced or skewed by outcomes from later stages. But further development and refinement may take place when particular risks are identified and as risk analysis techniques are chosen.

Risk evaluation criteria should be monitored and reviewed regularly to make sure that they continue to be relevant.

Example of risk evaluation criteria statements (1)

- Any reasonably preventable accident/incident resulting in loss of life is unacceptable.
- Any reasonably preventable accident/incident resulting in serious injury is unacceptable.
- Any reasonably preventable matter that will affect the health and wellbeing of a community is unacceptable.
- Any reasonably preventable activity or incident that will have a medium- to long-term or permanent effect on the environment is unacceptable.

- Any reasonably preventable activity or incident that will have a long-term or permanent effect on the cultural assets and values of a community is unacceptable.
- Any reasonably preventable activity or incident that will seriously disrupt normal business activity is unacceptable.
- Any reasonably preventable activity or incident that will seriously disrupt community lifelines or services is unacceptable.
- Any reasonably preventable activity or action that could lead to the introduction of exotic diseases or pests to Tasmania is unacceptable.

(North West Regional Workshop, Burnie, Tasmania, 2 July 2001)

Example of risk evaluation criteria statements (2)

Life

- the Cities of Wanneroo and Joondalup want the loss of life per capita, in any statistical category, to be less than the national and State average; and
- the aim is to reduce the loss of life as much as possible from any incident occurring in the Cities of Wanneroo and Joondalup.

Economic

- the Cities of Wanneroo and Joondalup will not exceed sustainable economic loss proportional to the enterprise. (An enterprise being anything from a family unit, to a business, a corporation or a government agency.)

Environment

- no preventable environmental damage is acceptable (e.g. erosion, chemical incident and marine/wetland pollution);
- no future development should add to environmental damage;
- no significant environmental damage is acceptable to wetlands, national parks, council reserves and parks; and
- development, planning and infrastructure to take into account environmental issues (e.g. air quality, visual, noise and aesthetics).

Lifelines

It is considered that the Cities of Wanneroo and Joondalup communities will accept the following as maximum timeframes for the loss of lifeline services as a result of a major incident:

Lifeline service	Maximum timeframe for loss of service
Electricity	8-10 hours
Gas	24 hours
Water	2-4 hours
Sewage	2-4 hours
Rail	24 hours (without alternative public transport available)
Road	2 hours (adequate alternative road routes exist)
Communications	8-12 hours

Social

Maintain or re-establish social and cultural infrastructure (e.g. community groups and sporting groups) following an emergency as a high priority, to assist the community in the recovery from the emergency.

Heritage

- no preventable damage or loss to declared heritage sites is acceptable (e.g. via development, vandalism and neglect); and
- the aim is to maintain and protect the integrity of heritage sites.

(This information forms the basis of risk evaluation criteria for the Cities of Wanneroo and Joondalup, Western Australia)

Cities of Wanneroo and Joondalup, AWARE Project - Stage 1, Emergency Risk Management Report (2004).

Communicating and consulting about this activity

In the establishing context phase, communication and consultation with stakeholders is the best way to gather available information on the emergency risk management project being conducted as well as finding out about the group's expectations and perceptions.

If there is already an existing local emergency management committee, there should be communication and consultation with them. It can be used as the core of any proposed ERM committee.

Especially where the focus of ERM is likely to be restricted by time or other resources, communication and consultation processes can help by ensuring that all stakeholder group representatives have a shared understanding of the scope of the work and the political, economic, social and cultural factors which might impact it.

Communication and consultation are also critical in determining risk evaluation criteria which reflect the values of a broad consensus of people in the community.

Monitoring and reviewing this activity

Because establishing context sets the direction for the whole ERM process, several aspects of this phase need to be monitored and reviewed, including:

- continued relevance of shared understandings
- the appropriateness of stakeholder group representation
- changes to political, economic, social and cultural factors, especially if the project is of medium- to long-term duration

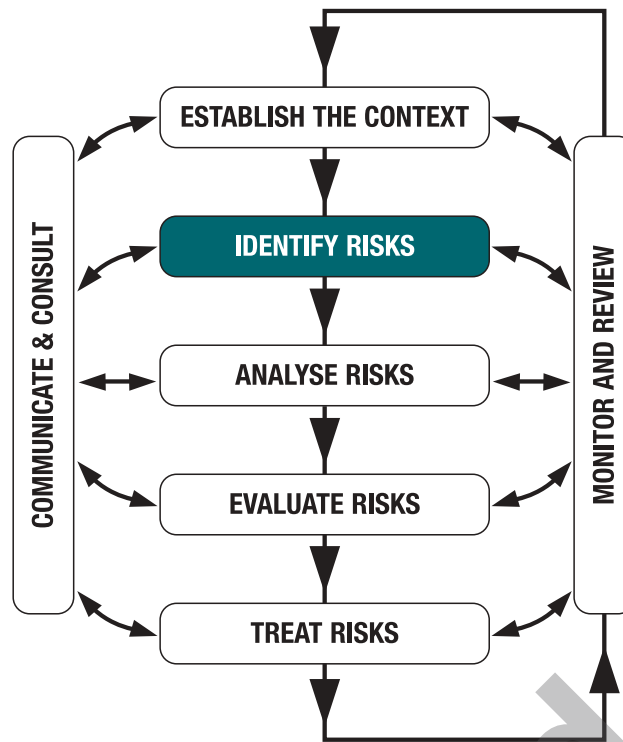
If there are any significant changes in these aspects the ERM process should be reviewed.

Documenting this activity

- a listing of internal and external stakeholders, if not already documented
- any scoping criteria reflecting which risks are to be treated
- a brief description of the basic parameters within which risks are to be managed
- a project plan including a training plan
- the state/territory policy or arrangements relating to emergency risk management
- a list of risk evaluation criteria that will guide future decisions on the risks to be treated
- key decisions/outcomes of discussions at meetings.

Archived

3.4 Identify risks



Risk is generated by the potential for a source of risk to interact with an element of the community and the environment.

The focus of the identify risks activity in the ERM process is to identify and describe the nature of risks within the ERM scope. This is done in the form of risk statements, which are then documented in a risk register.

This identification process must be comprehensive because any area of risk not identified may not be included in the risk analysis and evaluation phases.

Appendix B lists generic community sources of risk, and Appendix C lists generic community elements at risk.

Describing hazards or sources of risk

Identified hazards or sources of risk are described using characteristics gathered from data from a range of sources, for example:

- scientific data and research
- records and accounts of past events..

Example

Source of risk description

A source of risk may be described in terms of:

- intensity (how big, fast, powerful)
- likelihood of occurrence (frequency of the event, not the impact)
- extent (the area that a source of risk may impact)
- timeframe (warning time, duration, time of day/week/year)
- manageability (what can be done about it).

(Based on educational material provided by EMA Institute)

Describing elements at risk

Sources of information (historical and scientific) used as a basis for describing sources of risk can also be used to describe the elements at risk.

Example: Element at risk description

Bridges

The municipality of Newton relies on three bridges as part of its road network, and one rail bridge.

Details of bridges

Name	Construction	Width	Height at which unusable
Smiths Road Bridge	Steel and concrete	2 lanes	4 metres
Centenary Bridge	Steel and concrete	4 lanes	5 metres
Rail bridge	Steel	1 lane	3 metres
Knights Bridge	Timber	1 line	6 metres

(Based on educational material provided by EMA Institute)

Identification of risk relationships

A risk relationship identification matrix, as shown in the table below, can be used to determine whether there is a relationship between a source of risk and an element at risk.

This activity is similar to brainstorming and may be used to encourage all participants to contribute to identifying risk.

Example: Risk relationship identification matrix

Source of risk	Elements at risk					
	Community facilities	Life	Assets	Secondary industry	Environment	Other
Bushfire						
Severe Weather						
Foot-and-mouth animal disease						
Structural fire						
Structural fire						

(Adapted from the Tasmanian Emergency Risk Management Project 2003)

Justification of a risk relationship

After producing a risk relationship identification matrix, it may be useful to review the information to determine if there is a credible or plausible relationship—or relationship worthy of confidence—between a source of risk and an element at risk.

This can be done by identifying a justification for the relationship through expanding the information in the matrix, again drawing on historical information, scientific data and research, and accounts of past events as useful starting points. Local knowledge and the advice of emergency service professionals may also be helpful, especially in relation to emerging risks.

Examples of typical relationship justifications are shown in the table below.

Typical risk relationship justifications

Source of risk	Element at risk	Relationship justification
Bushfire	Community facilities: College of Advanced Education Buildings	Inappropriate siting of timber buildings in bushland setting
	Life	Single access with isolation potential
	Environment: loss of native habitats	Historical evidence has shown that bushfires destroy native habitats
Severe weather	Secondary industry: viability of some hinterland tourism operations	Unexpected snow storms of the past five winters have marginalised some tourism ventures
Foot-and-mouth animal disease	Secondary industry: regional economy	Inferred from United Kingdom experience
Structural fire	Assets: residential properties	Wood-fired winter heating prevalent in the area

(Adapted from the Tasmanian Emergency Risk Management Project, 2003)

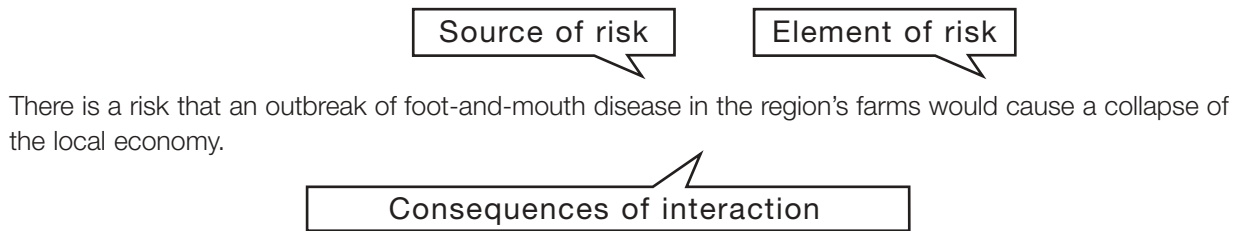
Generate risk statements

For each credible relationship that is established between a source of risk and an element at risk, a risk statement should be generated. This will be used as basis for analysis and evaluation.

Each risk statement should outline:

- the source of risk
- the element at risk
- the consequences of the interaction.

Example of a risk statement



In theory there are an infinite number of risk relationships so it is important to keep the number of risk statements manageable while not losing any important information. For example, there are currently 64 animal diseases classified under the Emergency Animal Disease Response Agreement of the Australian Government's AUSVETPLAN. Sometimes it may be appropriate to relate the risk to one particular disease, but at other times it may be more appropriate to classify the source of risk as animal disease with a *short-term, medium-term or long-term impact, or animal disease impacting or not impacting human health*.

The table below gives examples of different ways jurisdictions have structured their risk statements.

Risk statements-Example 1

- There is a risk that a bushfire within the municipal reserve will cause significant damage to the College of Advanced Education timber buildings.
- There is a risk that a bushfire within the municipal reserve will cause the loss of life of some Wilderness Road residents.
- There is a risk that a bushfire within the municipal reserve will cause the loss of the orange bellied parrots' native habitat.
- There is a risk that severe snow storms will impact the viability of the hinterland tourism ventures.
- There is a risk that a major outbreak of foot and mouth animal disease across the municipality will cause the regional economy to significantly decline.
- There is a risk that structural fire will cause serious damage to the timber houses of the Wilderness Reserve.

Risk statements-Example 2

Different jurisdictions and communities have developed risk statements in different ways. The following examples of risk statements for a Victorian municipality are taken from Victorian *Community emergency risk management workbook*.

- A flash flood resulting from a heavy downpour and rapid inundation could cause flooding of low lying areas followed by closure of roads and flooding of properties. This could result in people being trapped in their cars, isolated in their homes or workplaces and significant water damage to residential and business properties. The environment may be polluted by litter dispersal. Temporary displacement of people and traffic congestion could occur.
- If a terrorist attack occurred in a place where large numbers of people gather, it could result in multiple casualties and fatalities, significant property and infrastructure damage, utility and service disruption, traffic congestion, business disruption and severely impact the local economy. The psychological impact on the public and government could be destabilising and degradation of the community fabric could be significant.
- Alternative approaches are then required for analysing and evaluating risks, but the generation of treatment options, the selection of treatment options and the preparation and implementation of treatment plans remain the same as those documented in this publication.

Communicating and consulting about this activity

Communication and consultation with stakeholder group representatives are critical at this phase so that:

- all areas of risk are identified and sources of risk and elements at risk are accurately described
- appropriate structuring of risks is determined, avoiding an unwieldy number of risk statements but not masking any significant aspect of a risk.

Monitoring and reviewing this activity

Monitoring and review procedures or protocols need to be established in this phase to identify any significant changes which could affect the ERM project. These procedures and protocols should also capture future sources of risk.

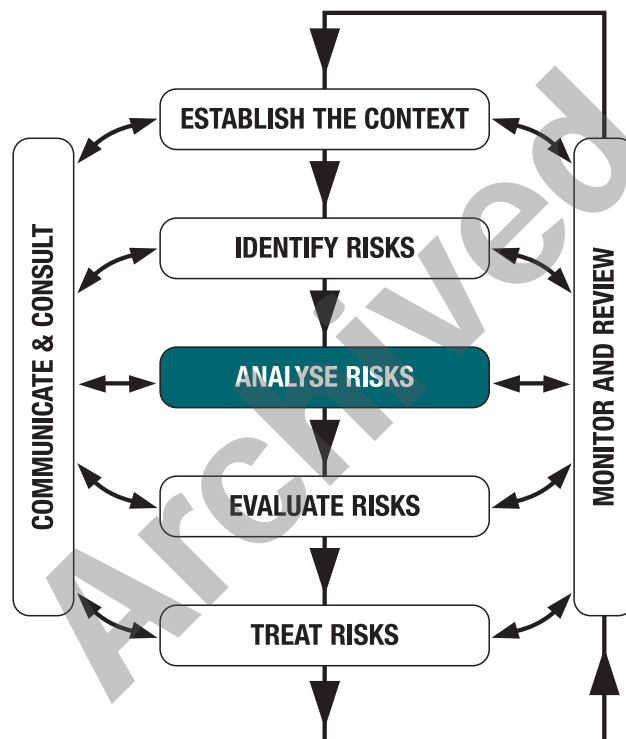
Risk evaluation criteria established in the establish context stage should also be reviewed.

Documenting this activity

The documentation arising from risk identification includes:

- concise descriptions of the sources of risk, the community and the environment
- a risk identification relationship matrix
- justification of credible risk relationships between each source of risk and each element at risk
- risk statements relating each source of risk, the element at risk and the consequences
- key decisions/outcomes from discussions at meetings.

3.5 Analyse risks



Analysing a risk is about developing an understanding of the risk. Through understanding a risk and any existing controls to minimise its impact, the likelihood and expected consequences of a risk can be estimated, allowing a level of risk to be determined.

It is sometimes appropriate to group risks which have the same estimated likelihood, consequence and level of risk. This will minimise the number of risks and risk treatment strategies to be dealt with in the ERM process.

Existing controls

In this first step in the risk analysis process, existing controls-processes, devices or practices that act to minimise risk-are identified. Then their effectiveness in minimising the likelihood and consequences of a risk are assessed.

There are many types of control, including those arising from outcomes of previous risk treatment strategies. Typical controls include land use management, building codes, building use regulations, legislation, community education and awareness, emergency plans, training, emergency plan testing, mutual aid agreements and warning systems.

Examples of existing controls

Risk (see example above for details)	Existing key control measures
<p>Flash Flooding</p>	<p>Storm water drains regularly maintained, with ongoing capacity upgrading</p> <p>Building Codes and enforcement</p> <p>SES units equipped, with procedures, for storm and flooding response</p> <p>Medical Disaster Plan and Ambulance procedures</p> <p>Traffic management procedures</p> <p>Fire Service equipped, with procedures, for rescue and salvage response.</p>
<p>Terrorism</p>	<p>Counter-terrorism budgeting, planning and other arrangements at Commonwealth and state levels</p> <p>Counter-terrorism Coordination Unit coordination, risk management and response strategies</p> <p>Business continuity planning</p> <p>Emergency service organisations' procedures, training and exercises</p> <p>Public education and awareness campaigns</p> <p>Medical Disaster Plan and Ambulance procedures.</p>

(From Victoria's Community emergency risk management workbook)

Consequences and likelihood

Although quantitative modelling can be used to estimate levels of risk for a given scenario, it is useful to carry out a broad qualitative analysis, as an initial form of screening, before committing resources on detailed analysis.

An important concept in emergency risk management is likelihood. Risk analysis involves consideration of the sources of risk, their consequences and the likelihood that those consequences may occur. This term refers to the likelihood of harmful consequences occurring, not to the likelihood of source of risk occurring. Risk analysis will vary depending on the information, data and resources available. An ERM activity may require customisation of the qualitative consequence and likelihood tables (see examples at Appendixes D and E).

The second step in risk analysis is estimating, qualitatively or quantitatively, the likely magnitude of the consequences for each risk, taking into account existing controls.

The third step is estimating, qualitatively or quantitatively, the likelihood of the consequences occurring for each risk.

Level of risk

Next the level of risk should be deduced, using a risk level matrix. See Appendix F for a typical risk level matrix.

Risk analysis will also provide information that feeds in to subsequent evaluation, prioritisation and treatment of risks. Risk analysis will also provide information that feeds in to subsequent evaluation, prioritisation and treatment of risks. Particular care must be taken with risk analysis because likelihood and consequence of many risks in ERM are difficult to estimate. This is because of the poor data and high levels of uncertainty associated with both likelihood and consequences. For example, estimating the likelihood of a significant earthquake in some urbanised parts of Australia compared to say flood modelling in the same area.

Wherever possible, quantitative levels of consequence and likelihood should be used so that subjectivity is reduced in estimating levels of risk. In some situations *"we do not know what we don't know"*. The occurrence of a significant earthquake in 1988 in Tennant Creek was a surprise to scientists who rewrote the record books for that part of Australia.

It is important to strike a balance between the effort required to obtain further information and the value of that information to the decision-making process. The availability of simple-to-use software tools can give the appearance of robust analysis even where the underlying logic is flawed.

Communicating and consulting about this activity

Information on existing controls and their adequacy should be elicited from stakeholder groups through communication and consultation.

Stakeholder groups should also be fully consulted in the development of:

- qualitative measures of consequence and likelihood
- the qualitative risk analysis matrix-level of risk
- to ensure that these are suitable for the project.

Monitoring and reviewing this activity

As quantitative measures of consequence and likelihood become available, the levels of risk should be reviewed to reduce the subjectivity around estimating levels of risk.

It is also important to be aware of the influence of the qualitative risk analysis matrix on the estimation of levels of risk, so the matrix selected should reflect the risks being considered in the project.

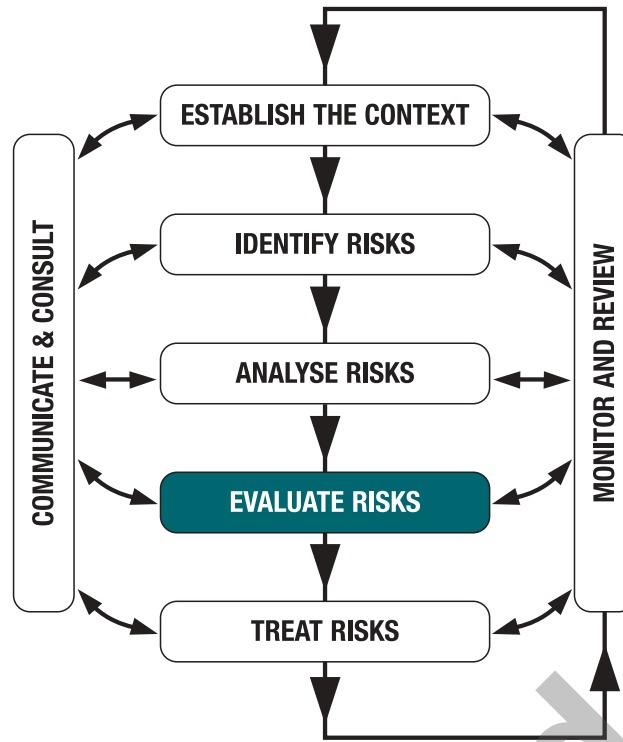
Documenting this activity

For each identified risk, the documentation arising from this risk analysis stage includes:

- a listing of existing controls and an estimation of their effectiveness
- customised qualitative measures of consequence and likelihood
- a customised qualitative risk analysis matrix
- estimates of assigned consequence and likelihood
- an estimated level of risk
- risk analysis methods including assumptions
- sources and quality of information used
- methods and sources of scientific data used, where appropriate
- key decisions/outcomes from discussions at meetings.

It could be useful to document how the decision was made, for example, engineering quantitative data having been used to underpin a decision to determine a qualitative risk level.

3.6 Evaluate risks



The purpose of risk evaluation is to make decisions, based on the outcomes of risk analysis, about which risks need treatment and treatment priorities.

The need for risk treatment

Evaluating a risk means making a decision about whether a risk is being satisfactorily managed or if it requires further treatment. The decision about whether a risk needs to be treated is based on:

- the risk analysis
- risk evaluation criteria.

Even if treatment strategies are not justified, the risk should be listed, as well as information about consequence, likelihood and risk level. Subsequently it should be monitored and reviewed to make sure that the decision not to treat this risk is still appropriate.

Initial prioritisation

Risks needing treatment are prioritised in order of their level of risk, usually in descending order of need of treatment. These priorities should also align with the community's values and expectations.

If risks have the same risk level, the ERM committee should order them by using methods such as:

- rating the consequence level higher than the likelihood level, or
- rating the protection of life higher than protection of property and the environment.

This ordering of risks based on level of risk provides only an initial screening of the priorities for risk treatment. These priorities may need to be confirmed or modified during the Treat risks phase.

Communicating and consulting about this activity

Communication and consultation amongst stakeholder group representatives underpin decisions about risks requiring treatment and their prioritisation.

These decisions should be shared with stakeholders at an early stage to confirm alignment with the community's values and expectations.

Monitoring and reviewing this activity

Because this phase of the process is heavily dependent on the evaluation of a large amount of information and data, and on input from all stakeholder group representatives, ERM committee decision-making processes should be monitored and reviewed. One method for doing this is having an observer critique the processes and provide feedback.

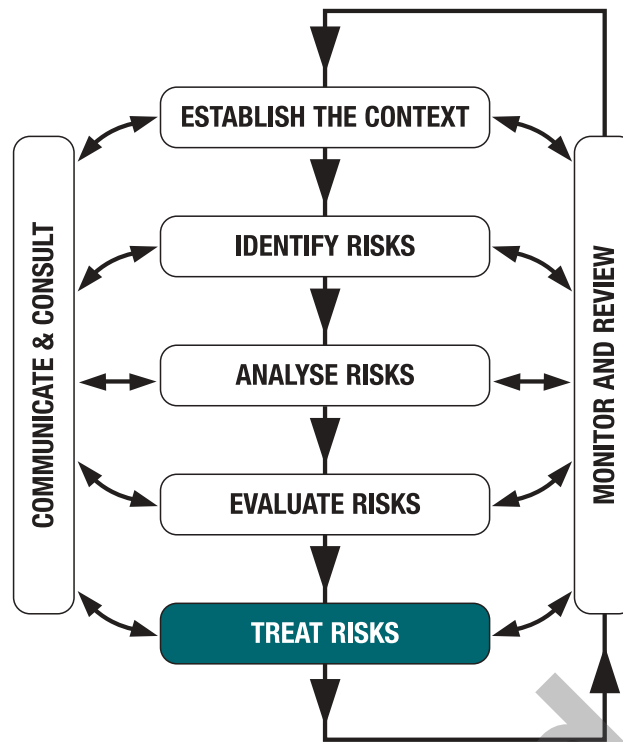
Where it is decided that existing controls are satisfactory and risk treatments are not required, the risk, and the criteria used for making the decision, should be listed in the form of a risk register. This information will greatly assist subsequent monitoring and review to ensure the decision remains appropriate.

Documenting this activity

The documentation arising from this phase includes:

- a listing (i.e. risk statements) of risks not requiring treatment, with associated consequence, likelihood and risk level information
- criteria used in determining which risks to treat and not to treat
- a listing of risks requiring treatment, with associated consequence, likelihood and risk level information, in agreed risk level order (see Appendix G)
- key decisions/outcomes from discussions at meetings.

3.7 Treat risks



Risk treatment involves identifying range of options for treating risks, assessing these options, and the preparation and implementation of treatment plans.

Before appropriate treatment actions can be determined, the analysis of each risk may need to be revisited and extended to draw out the information needed to identify and explore different treatment options. The design of risk treatment measures should be based on a comprehensive understanding of the risks concerned; this understanding comes from an appropriate level of risk analysis. It is particularly important to identify the causes of risks so that these are treated and not just the symptoms.

p72 Risk Management Guidelines HB 436:2004

Identifying treatment options

When treatment options are being identified, legal, social, political and economic considerations need to be taken into account, especially when allocating resources for risk reduction.

A number of approaches can be used for identifying risk treatment options. These include:

- the AS/NZS Standard 4360:2004 *Risk management* treatment options
- prevention/mitigation, preparedness, response and recovery (PPRR)

AS/NZS Standard 4360:2004 Risk management treatment options

The risk management treatment measures outlined in the Standard are:

- avoid the risk: decide not to proceed with the activity likely to generate risk
- reduce the likelihood of harmful consequences occurring: by modifying the source of risk
- reduce the consequences occurring: by modifying susceptibility and/or increasing resilience
- transfer the risk: cause another party to share or bear the risk
- retain the risk: accept the risk and plan to manage its consequence.

Prevention/mitigation, preparedness, response and recovery

The effectiveness of existing arrangements are considered, focusing on prevention/mitigation and preparedness.

Possible prevention/mitigation strategies can include:

- land use management
- building codes
- building use regulations
- relocation
- legislation.

Preparedness strategies which can be considered include:

- community education and awareness
- emergency plans
- training
- emergency plan exercising
- mutual aid agreements
- warning systems.

Response strategies which can be considered include:

- plan implementation
- search and rescue
- mobilization of resources
- activate coordination centres
- warning messages.
- providing public information.

Recovery strategies may include:

- restoring essential services
- financial support and assistance
- temporary housing
- managing public appeals
- counselling program
- reconstruction of damaged public infrastructure

Other approaches

Other ways of considering risk treatment are to be encouraged. The ERM committee should be flexible and innovative in determining which approach is best suited to identifying appropriate risk treatment options.

It should be noted that it is often difficult to completely eliminate or prevent risks and some residual risk will remain following risk treatment. The residual risk may lead to emergencies, which will require some form of emergency response and recovery arrangements.

The table below shows some examples of risk treatment options. They relate to the risk statement examples already shown in the table in the *Identify risks section above*.

Examples of risk treatment options

Risk statements	Treatment options
There is a risk that a bushfire within the municipal reserve will cause significant damage to the College of Advanced Education buildings	Fuel reduction burning/fire break maintenance Fire awareness program for students Fire management strategy Refurbish building in fire resistant materials
There is a risk that a bushfire within the municipal reserve will cause the loss of life of some Wilderness Road residents	Community education program Construct alternative access road Fuel reduction burning
There is a risk that a bushfire within the municipal reserve will cause the loss of the orange bellied parrots' native habitat	Initiate a bush watch program Review fire permit system Enhance tank water supplies
There is a risk that severe snow storms will impact the viability of the hinterland tourism ventures	Deploy snowploughs/road gritting, as appropriate Provide alternative communal four wheel drive transport
There is a risk that a major outbreak of foot and mouth animal disease across the municipality will cause the regional economy to significantly decline	Improve quarantine inspections Random swill feeding audits Community awareness program
There is a risk that structural fire will cause serious damage to the timber houses of the Wilderness Reserve	Promote alternative heating modes (to eliminate use of woodheaters) Enhance tank water supplies

Assessing treatment options

In considering assessment criteria for risk treatment options, it may be necessary to refer to state/territory policy on emergency risk management. It will also be necessary to consider community values and expectations. The criteria to be used are then selected and modified to suit the emergency risk management context.

Some criteria for assessing risk treatment options

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

(adapted from Foster, HD 1980, *Disaster planning*, Springer-Verlag New York Inc., NY)

The most common tool for assessing risk treatment options is cost-benefit analysis, which provides a means of comparing the cost of risk treatment against the benefits that would result from reducing the risk. In general, the cost of managing risks should be less than the costs of the benefits obtained.

Where it is not cost-effective to reduce the risks, it is appropriate to develop response and recovery plans to ensure the community and environment, if affected by an emergency, can return to normal functioning with minimal disruption as soon as possible.

Using the criteria selected and modified by stakeholder group representatives, each risk treatment option is assessed to determine the most appropriate treatment or mix of treatments appropriate to the community and environment.

The importance of involvement of the risk owner or person likely to be responsible for treating the risk is crucial throughout the ERM process, but especially in this activity of assessing risk treatment options.

After selecting one or more of the most appropriate risk treatment options, it is important to gauge whether the residual risk—the risk remaining after treatment—is acceptable to all stakeholders, or whether further treatment is required. If further treatment is required, the risk management cycle is repeated, reassessing the consequences, likelihood, level of risk and adequacy of existing controls.

A holistic approach to treatment

It is sometimes more appropriate to develop a range of treatment options to effectively remove or reduce risks within a community. Therefore, several treatment options may need to be incorporated into a strategy that may span the responsibility of several agencies/organisations and levels of government.

Treatment options that require collective input and implementation require a strategic planning approach. The strategic plan should include goals, objectives, activities and key result areas for each agency/organisation that contributes towards reducing or removing the risk.

Cooperative approaches require a high degree of coordination as well as effective corporate governance to continually monitor and review progress and outcomes of the strategy. Existing management structures and emergency management systems are effective means to achieving an all-agency, collaborative approach to developing safer, more sustainable communities.

Example of a treatment strategy for bushfire

There is a risk that in the dry season bushfire will occur threatening a certain residential area.

A set of treatment options for this risk could be:

- having control burns of surrounding bushland
- ensuring residents clear their properties of debris
- conducting a public education program enabling residents to be aware of bushfire risks in the dry season
- installing a bushfire warning system
- developing an evacuation plan
- developing a recovery management plan.

Because many different agencies/organisations would have responsibility for these treatment options, a coordinated Bushfire risk reduction strategy could be developed, describing the different treatment options and how they will provide a holistic approach to mitigating against the risk of bushfire.

Preparing strategies and plans

At this point risk treatment plans should be made and implemented. These plans should specify:

- responsibilities, schedules, the expected outcome of treatments, budgeting, performance measures and the review process to be set in place
- mechanisms for assessing the implementation of the options against treatment objectives, individual responsibilities and other objectives, and processes for monitoring treatment strategy progress against critical implementation milestones
- how the selected options will be implemented.

Plans should be integrated with management and budgetary processes of any organisation/agency undertaking risk treatments so that ERM is embedded in normal business practice.

A single treatment option can generate a single agency/organisation treatment plan, where implementation is the responsibility of only one agency/organisation.

Communicating and consulting about this activity

Communication and consultation with stakeholder group representatives will be useful in generating risk treatment options, unless these are already guided by state/territory ERM policy. Approaches can include one or more of those shown in the *Identifying treatment options* section above, or the use of innovative, lateral thinking.

Communication and consultation with the community are also important in this phase to ensure that chosen treatment options and priorities for implementation align with community expectations. Even after risk treatments have been implemented, regular contact with the community should be encouraged, especially in relation to incidents arising and remedial actions taken.

Monitoring and reviewing this activity

In this phase, there should be regular monitoring and reviewing of:

- decisions taken - to ensure that risk treatments are the most appropriate
- community expectations - to ensure community acceptance of the residual risk and associated response and recovery arrangements
- implementation plans and the actual implementation program of works - to ensure progress is acceptable to the risk treatment owners and the community.

Third party audit or peer group review can often assist the monitoring and review of the emergency risk management process, by confirming that the aims and objectives of the process have been achieved effectively and efficiently.

Documenting this activity

The documentation arising from this activity includes:

- a listing of the risk treatment options considered
- the basis for assessing and selecting the preferred option or mix of options
- the assigned priorities for implementing the risk treatment options
- the rationale for priorities assigned
- risk treatment implementation plans
- key decisions/outcomes from discussions at meetings.

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Emergency risk management tools

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4. Emergency risk management tools

Because regular monitoring and review is an integral part of the emergency risk management process, systems should be established and maintained to facilitate this process.

Three examples of systems that can be used in this process are detailed below:

- the unique identifier system
- risk register database
- Geographic Information Systems.

4.1 The unique identifier system

This system is based on allocating a unique alphanumeric (letter-number) identifier to each risk. This identifier gives information about the risk location, category or nature of the risk, and the sequential position of the risk within that category. This allows tracking of the risk from the *Identify risk* phase through to the *Treat risks* phase.

Example

In the Tasmanian Emergency Risk Management Project, to keep track of risks arising from natural and technological hazards in Tasmania's 29 municipal areas, a system was devised which allowed a unique identifier to be assigned to each risk statement generated.

The identifier comprised:

- two letters assigned to the municipal area in which the risk occurred
plus
- two digits assigned to the nature of the source of risk
plus
- two digits assigned to the sequential position of the risk, irrespective of the level of risk.

For example:

DC 02.04 relates to a risk occurring in the City of Devonport municipal area, where the risk arises from bushfire and is the fourth bushfire risk in this municipal area.

GT 03.01 relates to a risk occurring in the George Town municipal area, where the risk arises from storm events and is the first storm event risk in this municipal area.

Throughout the project, 2178 natural and technological risks were identified, with 787 risks considered to require treatment. Risks considered by working committees not to require treatment were well documented to enable regular review should there be changes in the risk level, community acceptance or the need for treatment. This unique identifier system greatly assists in the tracking of risks.

4.2 Risk register database

Another system that can be used to facilitate the management of risk treatment and risk review is a computerised database. Proprietary risk register database software is available for this. As well as assisting in the management of risk treatment and review it can help in decision-making, bringing a rigour to the process as well as storing comprehensive background information.

If proprietary risk management database software is used it can provide evidence of a systematic approach to decision-making, retain community and environmental knowledge and improve recording and management of information.

Examples

Risk Assessment Toolbox (RAT)

ERM practitioners in the Environmental Development Services department of Richmond Valley Council, NSW, have developed a Risk Assessment Toolbox (RAT): a very easy-to-use tool using Access database software to assist in the emergency risk management process. It streamlines the hard copy component of ERM, cutting down on the paperwork. Contact Richmond Valley Council, NSW for more details.

Risk register database

The Tasmania State Emergency Service used a risk register database to help them monitor and review the implementation of 787 risk treatments identified in the Tasmanian Emergency Risk Management Project.

4.3 Geographic Information Systems

Geographic information system (GIS) risk-mapping initiatives, incorporating the seamless integration of maps, photographs and other documents, may be beneficial when reviewing risks. They can also enhance understanding of the special distribution of risks.

Simple, effective, low-cost, read-only approaches based on shareware are readily available, as are more expensive web-based interactive solutions which assist comprehensive planning needs of local government and the operational needs of emergency management personnel.

Example

Examples of the simpler approach to GIS are available for the Tasmanian Emergency Risk Management Project and can be viewed on the State Emergency Service website (www.ses.tas.gov.au).

APPENDIX A:

Glossary

Community

a group of people with a commonality of association and generally defined by location, shared experience or function

Consequences

outcome or impact of an event

Control

an existing process, policy, device, practice or other action that acts to minimise negative risk or enhance positive opportunities

Elements at risk

the population, buildings and civil engineering works, economic activities, public services and infrastructure etc. exposed to sources of risk

Emergency

an event, actual, or imminent, which endangers or threatens to endanger life, property or the environment, and which requires a significant and coordinated response

Emergency management

a range of measures to manage risks to communities and the environment.

Emergency risk management

a systematic process that produces a range of measures that contribute to the wellbeing of communities and the environment

Environment

conditions or influences comprising social, physical and built elements which surround and interact with the community

Event

occurrence of a particular set of circumstances

Hazard

a source of potential harm

Likelihood

used as a general description of the probability or frequency

Mitigation

measures taken in advance of a disaster aimed at decreasing or eliminating its impact on society and environment

Monitor

to check, supervise, observe critically or measure the progress of an activity, action or system on a regular basis in order to identify change from the performance level required or expected

Organisation

group of people and facilities with an arrangement of responsibilities, authorities and relationships

Preparedness

arrangements to ensure that, should an emergency occur, all those resources and services which are needed to cope with the effects can be efficiently mobilised and deployed

Prevention

regulatory and physical measures to ensure that emergencies are prevented, or their effects mitigated

Recovery

the coordinated process of supporting emergency-affected communities in the reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing

Residual risk

the risk remaining after implementation of risk treatment

Resilience

a measure of how quickly a system recovers from failures

Response

actions taken in anticipation of, during, and immediately after, an emergency to ensure its effects are minimised and that people affected are given immediate relief and support

Risk

the chance of something happening that will have an impact on objectives

Risk analysis

systematic process to understand the nature of, and to deduce the level of risk

Risk assessment

the overall process of risk identification, risk analysis and risk evaluation

Risk evaluation

process of comparing the level of risk against risk criteria

Risk criteria

terms of reference by which the significance of risk is assessed

Risk management

the culture, processes and structures that are directed towards realising potential opportunities whilst managing adverse effects

Risk management process

the systematic application of management policies, procedures and practices to the tasks of communicating, establishing the context, identifying, analysing, evaluating, treating, monitoring and reviewing risk

Risk register

a listing of risk statements describing sources of risk and elements at risk with assigned consequences, likelihoods and levels of risk

Risk treatment

process of selection and implementation of measures to modify risk

Risk treatment options

measures which modify the characteristics of hazards, communities or environments

Source of risk

source of potential harm

Stakeholders

those people and organisations who may affect, be affected by or perceive themselves to be affected by, a decision, activity or risk

Susceptibility

the potential to be affected by loss

APPENDIX B:

Generic community sources of risk

The following list of generic community sources of risk may be useful in considering risks which might require emergency risk management approaches.

aeronautical and space debris
blizzard/snowstorm
bomb threat
bridge collapse
building collapse
carcinogens/mutagens/pathogens
civil disturbance/riot
cyclone
dam failure
desertification
drought
drugs
earthquake
economic recession/depression
electromagnetic radiation
epidemic (human, animal, plant)
erosion (soil, coastal)
famine
fire (residential, industrial, bush, grass)
flood
fog
frost/extreme cold
hazardous materials
heatwave
industrial accident
infrastructure failure (power, water, communication, gas)
landslide/rock fall/mudflow
mine accident
nuclear hazards
ozone depletion
plague (animal, human, insect, plant)
pollution (chemical, oil, hazardous waste)
resource shortage/depletion
salination
sea level rise
severe storm (electrical, extreme wind, torrential rain, hail storm)
storm surge
subsidence
terrorism
tornado
transport accident (air, rail, road, sea)
tsunami
volcano
warfare (nuclear, conventional, chemical, biological)

APPENDIX C:

Generic elements at risk

The following list of generic elements at risk may be useful in considering risks impacting the community.

Social infrastructure

- essential services
- community facilities
- social networks

Individual wellbeing

- life
- health
- psychology
- assets
- income

Business economy

- primary industry
- secondary industry
- service sector

Environment

- natural resources
- heritage

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APPENDIX D:

Consequence scale

Ideally qualitative measures of consequence should reflect aspects of the specific emergency risk management being conducted. The following table may provide a basis for development of measures appropriate to community applications.

Consequence scale

Descriptor	Description
insignificant	No injuries or fatalities. No displacement of people or displacement of only a small number of people for short duration. Little or no personal support required (support not monetary or material). Inconsequential or no damage. Little or no disruption to community. No measurable impact on environment. Little or no financial loss.
minor	Small number of injuries but no fatalities. First aid treatment required. Some displacement of people (less than 24 hours). Some personal support required. Some damage. Some disruption (less than 24 hours). Small impact on environment with no lasting effects. Some financial loss.
moderate	Medical treatment required but no fatalities. Some hospitalisation. Localised displacement of people who return within 24 hours. Personal support satisfied through local arrangements. Localised damage that is rectified by routine arrangements. Normal community functioning with some inconvenience. Some impact on environment with no long-term effect or small impact on environment with long-term effect. Significant financial loss.
major	Extensive injuries, significant hospitalisation, large number displaced (more than 24 hour's duration). Fatalities. External resources required for personal support. Significant damage that requires external resources. Community only partially functioning, some services unavailable. Some impact on environment with long-term effects. Significant financial loss - some financial assistance required.
catastrophic	Large number of severe injuries. Extended and large numbers requiring hospitalisation. General and widespread displacement for extended duration. Significant fatalities. Extensive personal support. Extensive damage. Community unable to function without significant support. Significant impact on environment and/or permanent damage.

Similarly the following table may provide a basis for development of measures appropriate to organisational settings. These measures of consequence should also reflect aspects of the specific emergency risk management being conducted.

APPENDIX E:

Likelihood scale

As with the qualitative measures of consequence, descriptions of qualitative measures of *likelihood* ideally should reflect aspects of the specific emergency risk management being conducted. The following listing, however, may provide a basis for measures appropriate to some community applications.

Note that the term *event* in the table below relates to the likelihood of *harmful consequences occurring* rather than the likelihood of the source of risk occurring, in keeping with a rigorous application of the emergency risk management process.

Likelihood scale

Descriptor	Description
almost certain	is expected to occur in most circumstances; and/or high level of recorded incidents; and/or strong anecdotal evidence; and/or a strong likelihood the event will recur; and/ or great opportunity, reason, or means to occur; may occur once every year or more
likely	will probably occur in most circumstances; and/or regular recorded incidents and strong anecdotal evidence; and/or considerable opportunity, reason or means to occur; may occur once every five years
possible	might occur at some time; and/or few, infrequent, random recorded incidents or little anecdotal evidence; and/or very few incidents in associated or comparable organisations, facilities or communities; and/or some opportunity, reason or means to occur; may occur once every 20 years
unlikely	is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or no recent incidents in associated organisations, facilities or communities; and/or little opportunity, reason or means to occur; may occur once every 100 years
rare	may occur only in exceptional circumstances; may occur once every 500 or more years

APPENDIX F:

Risk level matrix

The qualitative risk analysis matrix published in the original *Emergency risk management applications guide* is provided below.

In a qualitative assessment of risk levels, descriptors such as low, moderate, high and extreme may be used. The relationship between consequence and likelihood used in each cell of the matrix should reflect a level appropriate to the emergency risk management being conducted.

Risk level matrix: example 1

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
almost certain	high	high	extreme	extreme	extreme
likely	moderate	high	high	extreme	extreme
possible	low	moderate	high	extreme	extreme
unlikely	low	low	moderate	high	extreme
rare	low	low	moderate	high	high

Risk level matrix: example 2 (customised)

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
almost certain	moderate	high	extreme	extreme	extreme
likely	low	moderate	high	extreme	extreme
possible	low	low	moderate	high	extreme
unlikely	low	low	moderate	moderate	high
rare	low	low	low	moderate	high

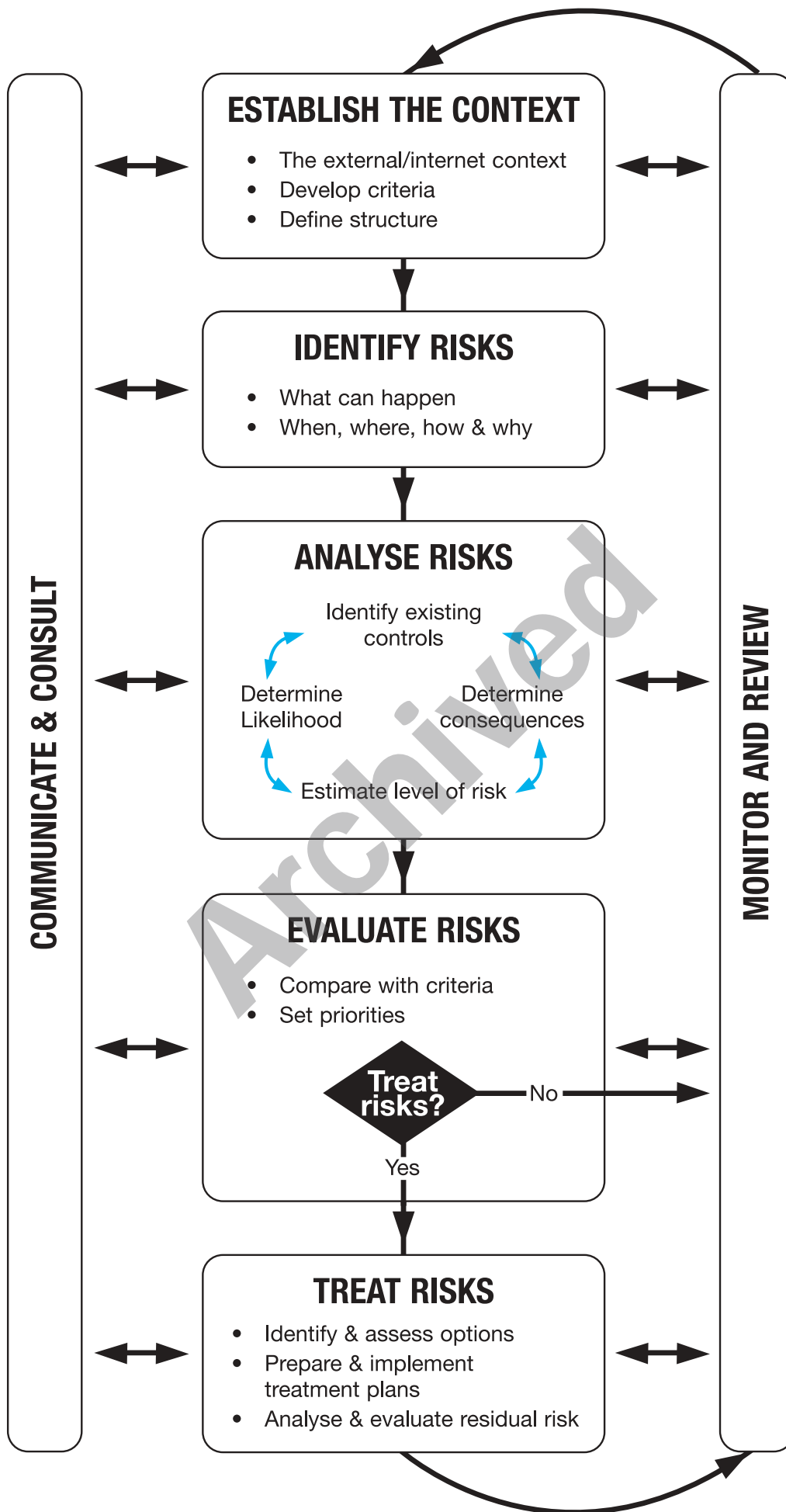
Used by Bunbury Wellington Group of Councils in Western Australia.

APPENDIX G:

Example of a Risk Register

This is adapted from the Tasmanian Emergency Risk Management Project.

Risk ID	Risk statement	Consequences	Likelihood	Level of Risk	Initial Priority
DC 02.01	There is a risk that a bushfire within the municipal reserve will cause significant damage to the College of Advanced Education timber buildings.	moderate	possible	high	3
DC 02.02	There is a risk that a bushfire within the municipal reserve will cause the loss of life of some Wilderness Road residents	major	unlikely	high	1
DC 02.05	There is a risk that a bushfire within the municipal reserve will cause the loss of the orange bellied parrots' native habitat.	minor	possible	moderate	5
DC 04.13	There is a risk that severe snow storms will impact the viability of the hinterland tourism ventures.	moderate	unlikely	moderate	4
DC 08.01	There is a risk that a major outbreak of foot and mouth animal disease across the municipality will cause the regional economy to significantly decline.	major	unlikely	high	2
DC 22.02	There is a risk that structural fire will cause serious damage to the timber houses of the Wilderness Reserve.	minor	possible	moderate	6



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