

## APPENDIX B RISK MANAGEMENT

### B1 Introduction

Floodplain risk management involves balancing the relative costs and benefits of using the floodplain. By applying risk management techniques to an appropriate detailed understanding of the full range of flood behaviour in the location, robust long term management decisions regarding the floodplain can be made with some confidence.

Governor Macquarie recognised the costs and benefits of using the floodplain when, in 1810, for each settler with a farm on the frequently flooded Hawkesbury River flats, he assigned an additional allotment for a dwelling house on relatively high ground in one of the townships.

The correct application of risk management principles is critical to the success of the floodplain risk management process. This approach looks at how often floods will occur, the consequences of floods, the vulnerability of the community and its resilience to recover from flood events (refer Figure B1).

It then seeks answers through management measures such as:

- risk reduction; or
- benefit increase to match the risk; or
- reducing the consequences of flooding.

This appendix provides a general introduction to the risk management approach and its application to the floodplain risk management process. It is not a comprehensive guide to risk management and AS/NZS 4360:2004 Risk Management provides a detailed guide for following a risk management process.

### B2 Terminology

Risk the chance of something happening that will have an impact. It is measured in terms of likelihood and consequences.

Risk exposure arises from the possibility of economic, financial or social loss or gain, physical damage or injury or delay.

Risk analysis is a systematic process of identifying risks, estimating their likelihood and evaluating potential consequences.

Risk consequences are the impacts from the event occurring.

Risk likelihood is the probability of an event occurring.

Risk management is the set of activities concerned with identifying potential risks, analysing their consequences and devising and implementing responses. This involves management of risks associated with natural and built assets and agricultural uses on the floodplain. In the floodplain context this is done so as to ensure optimal use of the floodplain (considering economic, social, environmental and cultural impacts) whilst controlling flood losses to an acceptable level.

### B3 A Risk Management Model

A risk management model involves four interrelated activities:

- Establishing the context of how risk management will be applied to flooding. The floodplain risk management process shown in Figure 2.1 and discussed in Section 2 provides this context.
- Risk identification involves identifying the flood risk to be managed (mainstream

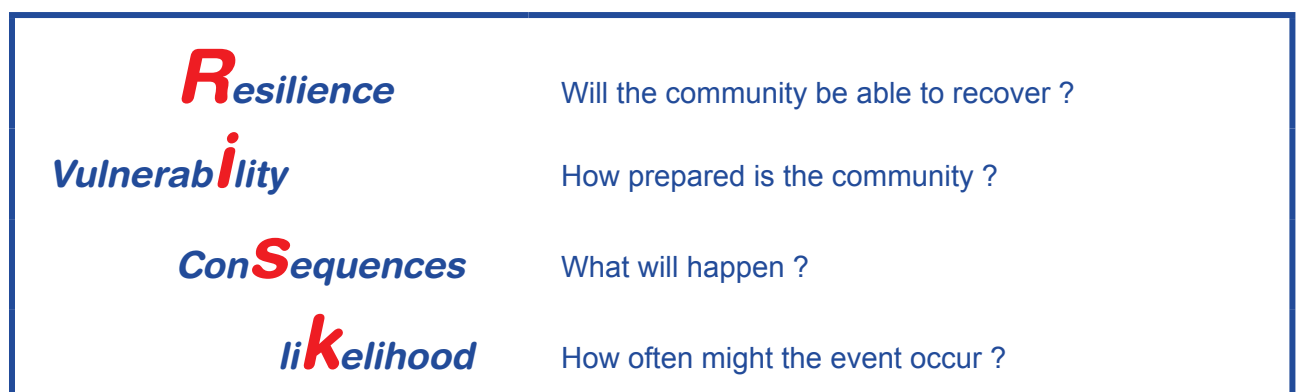


FIGURE B1 - The Risk Management Questions

and/or local overland flooding) and the study area requiring investigation. This is discussed in Section F2.

- Risk analysis is the part of risk management which addresses questions such as “What might go wrong?”, as discussed in Section B4.
- Risk management or treatment looks at the answers to that question, and seeks to resolve the issue, “What should be done about the problem?” Section B5 discusses this further.

The risks involved in floodplain risk management arise because of limited knowledge, experience or information about the future. This may be partly because past events have not been acknowledged or the lessons of those events forgotten.

The risk management approach is aimed at providing a structured way of identifying and analysing potential risks, and devising and implementing responses appropriate to their impact. These responses generally draw on strategies of:

- risk prevention;
- risk (reduction) mitigation;
- risk transfer; or
- risk acceptance.

Within a single project or proposal each of these strategies may have application for different individual risks.

Risk management processes are designed to assist planners and managers to systematically identify and analyse risks and develop measures to address them and their consequences. The aim is to produce more reliable planning, greater certainty about financial and management outcomes and improved decision making.

The New South Wales floodplain risk management process, set out in Section 2, is a particular example of risk management and is in accordance with the guidelines set out in AS/NZS 4360:2004.

#### **B4 Risk Analysis**

There are many risk management issues that are relevant in the preparation of floodplain risk management plans and local flood plans. This appendix presents some of the issues (not a comprehensive list) in question form.

Floodplain risk management has an impact on many different users of the floodplain including:

- residents of and visitors to the floodplain;
- investors and businesses in the floodplain;
- those who depend on the businesses in the floodplain to provide a service or for employment;
- the environment, including native species and ecological communities; and
- those who simply wish to cross the floodplain.

Background studies should provide an estimate of community flood readiness by asking the following questions:

- What is the recent flood history ?
- How many of the residents have experienced a flood ?
- Is there an effective warning system ?
- Is there an effective plan for responding to the flood event ?
- Is there an effective educational program ?

The floodplain risk management study raises the following questions:

- What use of the floodplain is considered desirable ?
- What are the costs of various floodplain risk management measures ?
- What are the benefits from various floodplain risk management options ?
- Will the community support the proposed floodplain risk management measures ?

The risk analysis for existing or proposed uses of the floodplain will include questions such as:

- When will that part of the floodplain be used ?
- Will the site to be used during floods ?
- What inconvenience during floods will the users accept ?
- What risk will the owners or operators accept ?
- Is there an alternative use for this site that is more compatible with the flood risk ?

- Is there an alternative site that is as convenient for users when there is no flood, but is less vulnerable to the effects of flooding ? (ie, that may be more flood risk compatible for this particular land use)
- What limitations and conditions might be applied to the development ?
- What is the chance of a flood larger than that used to derive the FPL occurring ?
- What are the consequences of a flood larger than that used to derive the FPL occurring in relation to both safety of people and property damage ?
- What are the consequences of overbank flow from the creek through the riverside park ?
- What are the consequences of a levee overtopping ?
- What are the consequences of floodwaters entering a residential subdivision ?
- What are the consequences of floodwaters entering a commercial or industrial area, or farmland ?
- What are the consequences of floodwaters cutting roads, or water, sewerage, electricity and telephone services ?
- What is the effectiveness of warning message distribution ?
- How well will warning messages be understood ?
- Will effective action result from the warning messages ?

These questions are relevant for better risk management of existing development in the floodplain and when development of part of the floodplain is being considered. This is not a complete list. The risk analyst will need to ask other questions relevant to the particular floodplain.

Flood events with less chance of occurring in a year than the flood event used to derive the FPL will eventually happen. When they happen the consequences can be very diverse in different

floodplains. The different consequences of major floods are illustrated in Figure B2 with some important considerations being depth of flooding, an ability to provide effective flood warnings and evacuation difficulties.

### ***B5 Risk Assessment and Treatment***

Risk analysis examines both likelihood and the consequences of an event. It should be followed by:

- an assessment of the consequences:  
*Are they acceptable?*
- and treatment:  
*How can the consequences be mitigated?*

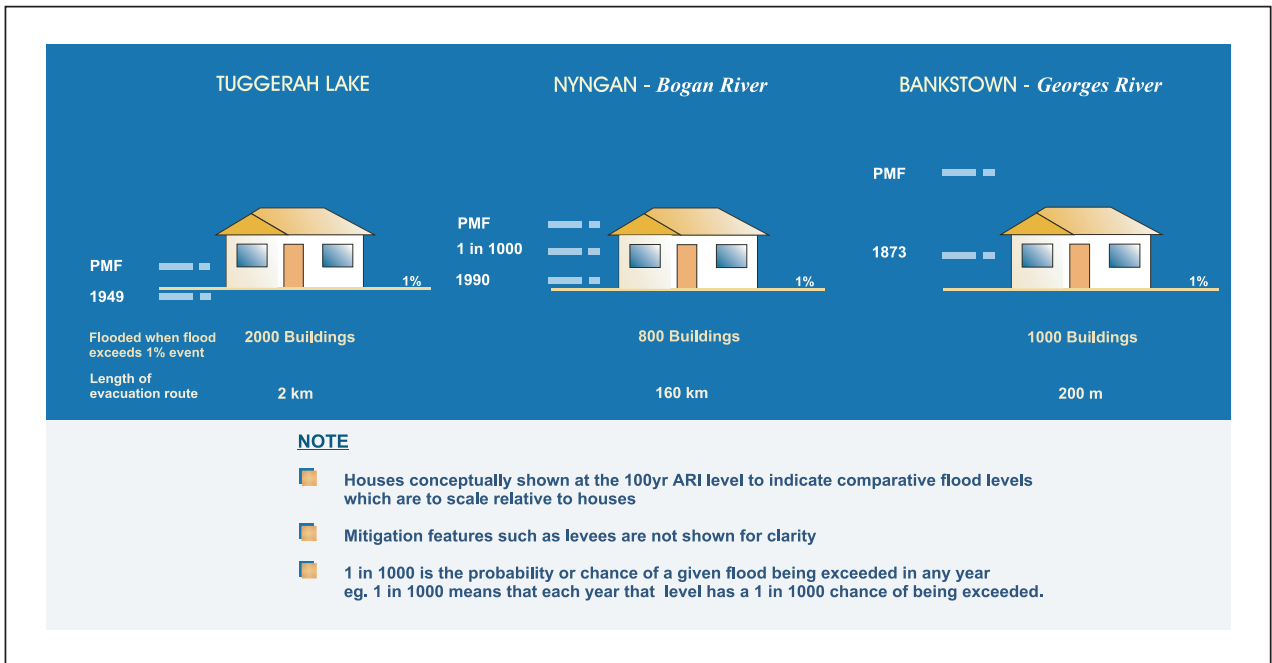
As an example, the consequences of dams overtopping when the design flood is exceeded is generally recognised, and upgrading of dams is carried out to limit losses to more acceptable levels. Application of similar considerations to the floodplain is part of floodplain risk management.

The direct cost of flood damage to a small number of commercial or industrial premises may exceed the direct cost of flood damage to a large number of residential properties. But the commercial and industrial operations may be better able to recover their costs and return to business as usual. The social cost of flooding of residential areas may be orders of magnitude greater than the social cost of floods through a shopping centre or an industrial estate.

### ***B6 Conclusion***

Floodplain risk management is an application of risk management principles. Effective floodplain risk management recognises that floodplains are a valuable natural resource and that their management requires a balance of the costs against the benefits of using the floodplain.

Some communities may decide to accept a greater flood risk, because there are significant benefits from occupying the floodplain. Other communities may see little advantage in remaining at risk to flooding and accept the cost and benefits of management measures including mitigation works.



*FIGURE B2 - The Varying Consequences of a Large Flood*