North East Catchment Management Authority

Regional Floodplain Management Strategy

October 1999

Prepared in association with ID&A Pty Ltd

Gutteridge Haskins & Davey Pty Ltd
ACN 008 488 373
Level 4 380 Lonsdale Street
Melbourne Victoria 3000
Telephone: (03) 9278-2200 Facsimile: (03) 9600-1300 Email: melmail@ghd.com.au

Document Status					
Rev No.	Author	Reviewer	Approved for Issue		
			Name	Signature	Date

Contents

Appendices

Executive Summary

Introduction

Purpose

The purpose of this study is to develop a regional floodplain management strategy for the North East Catchment Management Authority (CMA).

The strategy comprises an integrated program covering the following eight specified sub-programs:

- Asset management;
- Local flood studies and floodplain management plans;
- Statutory Land use planning;
- Emergency response;
- Information management;
- Best Practice, Education and Training;
- Resources - responsibilities, priorities, cost sharing; and
- Performance Monitoring.

The programs define a regional strategic plan which is to provide the CMA with a consolidated works program, all set within a five to ten year planning horizon to facilitate completion of rolling three year business plans.

Description of Region

The North East CMA region covers an area of 19 750 km^2 bounded by New South Wales, the Goulburn Broken CMA area and the East Gippsland CMA area. The region encompasses three major river basins, namely: Ovens River, Upper Murray River and Kiewa River basins. Lake Hume and Lake Dartmouth are two major man-made lakes within the region. Major towns in the region are Wodonga, Wangaratta, Myrtleford, Beechworth, Rutherglen and Bright.

The major floodplains in the region are located along the alluvial flats and terraces of the main river systems, namely:

- Ovens River (Harrietville to the Murray River);
- Buckland River;
- Buffalo River;
- King River (Lake William Hovell to Wangaratta);
- Fifteen Mile Creek, Three Mile Creek and One Mile Creek (to Wangaratta);

- Kiewa River (Mt Beauty to the Murray River);
- Mitta Mitta River (Dartmouth Dam to Hume Dam); and
- Upper Murray River (Bringenbrong Bridge to Lake Mulwala).

Existing Strategies

The Victoria Flood Management Strategy (VFMS) was prepared as a floodplain management reform initiative by the State Flood Policy Committee as a result of the October 1993 floods in Victoria.

The VFMS outlines the reform agenda for floodplain management and provides a framework for the development of regional floodplain management strategies by CMAs in regional Victoria.

The North East Regional Catchment Strategy was prepared in June 1997 by the North East Regional CALP Board. One of the objectives for regional catchment management in the North East region is:

- *To minimise damage to public and private assets from erosion and flooding.*

Several of the other strategic objectives are closely linked to floodplain management activities. Arising from the objectives the North East Regional Catchment Strategy identified the following strategic action:

- *to co-ordinate floodplain management to reduce impacts of flooding and preserve the natural functions of the floodplains.*

Current Floodplain Management Arrangements

Current key floodplain management activities in the North East region include the following:

- Development of a regional strategy;
- Development and implementation of floodplain management plans;
- Manage and maintain specific flood works;
- Collection and collation of flood information;
- Input to land use planning controls;
- Assist in flood warning process; and
- Community education and awareness.

These key activities represent an overview of the current situation. However, the CMA does not have in place a comprehensive regional floodplain management strategy on which to base its future activities. The current activities focus on flood prevention which is the major component of floodplain management. In addition, the CMA is involved in flood response activities by assisting in flood warning/flood monitoring and the development of Municipal Emergency Management Plans. The new arrangements outlined

in the Victoria Flood Management Strategy are being developed at the regional level and are being phased in over the period from 1997 to year 2000.

Regional Floodplain Management Strategy Programs

Overview

The vision developed for the North East region with respect to floodplains is:

> *"With the involvement of the community, maintaining and enhancing the floodplains by implementing flood management measures which reduce flood risk to lives, health and property, and flood damage costs, whilst allowing for natural floodplain storage and enhancing the environmental values of floodplains".*

A set of objectives and targets were developed to form the basis for detailed formulation of the draft strategy programs.

The detailed work programs are given in Section 3 of the draft strategy (refer Tables 3.3, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10 and 3.12).

Priorities for each of the specific actions in the tables are denoted by the following:

- High - requiring action within the 3 year Business Plan;
- Medium - requiring action within 5 years; and
- Long - requiring action within 10 years.

Asset Management

The CMA is currently the responsible agency for several significant authorised levees, namely:

- Markwood levee;
- Harrietville levee (constructed by RWC); and
- Kiewa Valley levees (constructed by previous river improvement trust).

Information on the condition of the levees is not readily available. To determine a long term strategic management program for the floodplain there is a need to undertake a detailed audit of these levees, the outcome of which should be as a priority to determine the age and condition of the levees and their significance in terms of minimising flood damage.

Management of the floodplains needs to be undertaken in such a way as to reduce the future growth of flood risk and flood damages. Proposals for new works on the floodplain which will include private levees, earthworks and buildings, railway, road and irrigation works will require appropriate consultation and referral arrangements between the responsible authorities.

In addition to the above, the issue of "illegal" levees or levees of unclear status needs to be addressed in a comprehensive and effective way. This is a difficult issue as it directly involves landowners who believe they have a right to protect

their own land. Although there appears to be adequate powers for control through municipal planning schemes, municipalities have experienced considerable problems in dealing with this issue at the Victorian Civil and Administrative Tribunal (formally AAT).

Measures to rationalise these levees may need to be implemented as follows:

- Acceptance of some existing levees;
- Modification of some levees or levee systems (to add benefit/value to the system); and/or
- Removal of levees, where they are clearly inappropriate and are detrimental to flood management.

Elements of the process will include an improved knowledge base (levee inventory), education, statutory planning measures, mutual negotiations (which may involve dispute resolution) and enforcement. This process needs to be flexible, with the elements receiving different emphasis depending on the situation. For example, it may be appropriate in some situations to focus attention on dispute resolution.

A basic step would be obtaining co-operation of the landowner in allowing a detailed audit of the relevant levee.

A program would need to comprise the following tasks:

- CMA Floodplain Management Officer convene a Working Group involving the Municipal Council and other relevant stakeholders;
- Prepare a broad strategy plan for the process;
- Develop an Education Program;
- Implement strategic planning measures;
- Consult with local community groups (Landcare, local reference groups etc);
- Seek funding for the Program;
- Implement program for two year period; and
- Review and plan further action on a priority basis.

Local Flood Studies and Floodplain Management Plans

A significant number of flood studies have been undertaken in the North East region over the last twenty years. The focus of the flood studies has generally been in urban areas, except where major events have resulted in significant information becoming available in rural areas (ie extensive aerial photography in 1993 and 1998).

A floodplain management plan has been prepared for Wangaratta and is documented in the report on the Wangaratta Floodplain Management Study - Stage 2 - Final Report (ID&A, 1998). The recommended floodplain

management scheme is soon to be exhibited by the Rural City of Wangaratta. The Myrtleford Floodplain Management Study is currently in preparation and due for completion this year.

With regard to roles and responsibilities in the area of local flood studies and floodplain management plans Councils as the lead agencies have responsibility for urban areas, while the CMA as a lead agency has responsibility for rural areas. However, the distinction between urban/rural areas is not always clear. Therefore responsibility for the lead role has been determined on the basis of the primary focus on the study. It is accepted that the decisions on specific roles, resourcing and cost sharing will have to be made on a project by project basis, based on the principles set out in this strategy.

Prioritised areas for study within the CMA's next 3 year business plan are:

- Ovens River at Bright/Porepunkah (urban flood study)
- Ovens River at Harrietville (urban flood study)
- House Creek at Wodonga (urban flood study)
- Ovens River Basin - Harrietville to Wangaratta (rural flood study)

Statutory Land Use Planning

The Victoria Planning Provisions (VPPs) provide the basis for all statutory land use planning controls in Victoria. The VPPs were finalised in October 1996 and provide a uniform state planning policy and local provisions for flooding.
In terms of applying land use planning measures to provide for effective management of development on the floodplain the following process is proposed for collaborative action by the CMA and Councils:

- Agree on the delineation of the 1% flood extent and floodway;
- Ensure that there is a consistent approach to delineating the flood zones and overlays across the region;
- Review the Municipal Strategic Statements to ensure a consistent approach(agree on changes as required);
- Develop a local policy, which is consistent across the region, to be incorporated into the planning schemes;
- Encourage the development of "local floodplain development plans" to assist assessment of development proposals;
- Investigate the use of schedules to overlays, referral agreements and incorporated documents where deemed appropriate; and
- Initiate a program, to implement at the next opportunity, for reviewing of the planning schemes.

Emergency Response

The Ovens/King River system is a priority area for emergency response planning given the potential flood damage involved and flood risks to Myrtleford and Wangaratta. This priority area is being recognised by the submission of a NHT fund bid for funding to improve the flood warning system for the Ovens/King River system.

The current initiative to gain funds for improving the Ovens/King River system is supported by the work that has been and is being undertaken in the Wangaratta and Myrtleford Floodplain Management Studies respectively. The impacts of the 1993 flood, which is well documented, and the more recent 1998 flood strengthen the priority being given to this initiative. Flood warning systems are considered in general to be an effective means of minimising flood damage.

Additional areas where enhancements to flood warning systems could be considered are:

- One Mile/Three Mile Creek;
- Kiewa River;
- Harrietville to Bright; and

- Upper Murray.

The Victoria State Emergency Services (VICSES) has the lead role in emergency response, supported by the Councils and the Victoria Police. In this context the CMA should aim to facilitate the implementation and enhancement of flood warning systems and emergency response plans through providing advice, establishing priorities for funding and providing appropriate assistance to the VICSES and Councils during the floods. The CMA should also be involved in the process of augmenting the data collection networks for flood warning systems where considered appropriate.

Information Management

Flood information is collected by various authorities which is primarily used in conducting core activities for their own organisation but also provides significant benefits to other organisations such as the North East CMA. The key authorities collecting flood data are:

- Municipal Councils;
- Rural Water Authorities;
- Bureau of Meteorology;
- Department of Natural Resources and Environment; and
- North East Catchment Management Authority.

In the past, the flood mapping and flood level information was held by the DNRE and relevant data is being transferred to the various CMA's. The Flood Data Transfer project being undertaken by DNRE will provide the CMA and Councils with flood information in the form of reports, maps (flood information and flood planning) and data in GIS format. The value of this information to some extent is unknown and data reviews and updates will be required to ensure the information is as accurate as possible.

The CMA's primary role is to maintain, enhance and disseminate flood information and co-ordinate monitoring of significant flood events.

Best Practice, Education and Training

In order for the North East CMA to be an effective floodplain manager in the region, it must facilitate education and training and develop best practice applications for the three key roles of floodplain management (land use planning; flood mitigation; emergency response activities), with the emphasis of raising the level of understanding in the community.

The North East CMA can assist Councils, local groups and individuals to prepare specific flood response and contingency plans for their properties or local area.

Preparing contingency plans for local groups / neighbours will encourage community self-reliance and sharing of resources, and therefore assist in minimising the risk of flood damage to their local area.

The CMA should also endeavour to train and develop staff in the special areas which will assist them in performing their duties. In particular training of staff is needed in best practice on floodplain management activities and specific issues.

The CMA must develop community education programs to explain its role in areas such as:

- Land use planning;
- Flood mitigation; and
- Emergency response.

Resources

Resourcing for the CMA to undertake its floodplain management functions under the Water Act (1989) is currently focussed on short-term issues and recognised in its 3 year Business Plan. Development of the regional strategy on floodplain management will enable a longer term view to be taken on which to base the CMAs next 3 year rolling Business Plan.

The work programs presented in Section 3 of the strategy indicate the specific roles and responsibilities (lead agency/support agency) agreed to on a project by project basis in the development of the strategy, within the context of the principles set out in the VFMS.

Specific cost sharing arrangements should be negotiated and agreed to on a project by project basis between the CMA and key stakeholders, within the context of the principles set out in the VFMS and this strategy. Indicative cost sharing arrangements presented in this strategy (refer Table 3.10) will form the basis for detailed discussion and appropriate actions.

A preliminary budget for the implementation of the regional strategy is given in Table 3.11 of the strategy.

Performance Monitoring

With the development of the regional strategy the North East CMA has an opportunity to establish attainable benchmarks for their floodplain activities against which its performance can be monitored.

The strategy provides the CMA with a specific set of targets against which its performance can be measured and used to report to government, as set out in Table 3.12.

1. Introduction

1.1 Purpose

The purpose of this study is to develop a regional floodplain management strategy for the North East Catchment Management Authority (NECMA).

The strategy comprises an integrated program covering the following eight specified sub-programs:

- Asset management;
- Local flood studies and floodplain management plans;
- Statutory Land use planning;
- Emergency response;
- Information management;
- Best Practice, Education and Training;
- Resources - responsibilities, priorities, cost sharing; and
- Performance Monitoring.

The programs define a regional strategic plan which is to provide the NECMA with a consolidated works program, all set within a five to ten year planning horizon to facilitate completion of rolling three year business plans.

1.2 Study Process

In October 1998, GHD (in association with ID&A) was commissioned by the (NECMA) to prepare regional strategies for floodplain management and rural drainage management. This report deals specifically with the floodplain management strategy, while recognising that strategies for floodplains, waterways and rural drainage are linked.

The development of the regional management strategies for floodplains is being conducted in five stages:

Stage 1: Inception;
Stage 2: Investigation;
Stage 3: Vision, Objectives and Targets;
Stage 4: Draft Strategy; and
Stage 5: Strategy Finalisation.

A draft Inception Stage Report was prepared in December 1998. The Inception Stage report was reviewed by the CMA Steering Committee and an addendum report issued to address the comments received on the draft report.

A Draft Progress Report on the Investigation Stage was prepared and presented on 2 March at the CMA Steering Committee meeting. The report was finalised in October 1999.

The Vision, Objectives and Targets were presented at a key stakeholder workshop held on the 15 March 1999. The report on Vision, Objectives and Targets is currently being finalised taken into account the workshop outcomes and subsequent comments.

The fourth stage of the project, the preparation of a strategy, builds on the information obtained during the earlier stages.

1.3 Structure of Report

The strategy consists of the following components:

- Description of the Region;
- Development of the Strategy;
- Regional Programs;

The Regional Programs include the following sections:

- Asset Management;
- Local Flood Studies and Floodplain Management Plans;
- Statutory Land Use Planning;
- Emergency Response;
- Information Management;
- Best Practice, Education and Training;
- Resources - Responsibilities, Priorities and Cost Sharing; and
- Performance Monitoring.

This strategy report draws upon and summarises the relevant information from previous stages of the strategy development as required.

1.4 Consultation Process

1.4.1 General

An extensive consultation process was followed to develop the regional floodplain management strategy. The process involved several key aspects, namely:

- Steering Committee review;
- Public meetings;
- Key Stakeholder meetings;
- Workshops; and
- Public exhibition.

1.4.2 Steering Committee Review

A Steering Committee was formed by the North East CMA to review and provide comments on the development of the regional management strategies for floodplains (and rural drainage). The Steering Committee members are:

NAME	POSITION	ORGANISATION
John Riddiford	Chief Executive Officer	North East CMA
Roel von't Steen	Floodplain Managment Officer	North East CMA
Ian Gauntlett	Manager Floodplain Management Unit	DNRE
Ian Nicholls	Manager Environment Services	Alpine Shire Council
Ray Henderson	Manager Infrastructure Services	City of Wodonga
Clive Walker	Deputy Manager Technical Services	Indigo Shire Council
David Parker	Manager Technical Services	Towong Shire Council
Malcolm Styles	General Manager Provider Services	Rural City of Wangaratta

The Steering Committee met at regular intervals during the course of the project to review progress, provide input and review draft reports for the various stages of the project.

1.4.3 Public Meetings

A key component in the development of the regional strategies was the holding of four community meetings at locations throughout the CMA region. Details of the meetings are given below:

Location	Date	No. of Attendees
Tallangatta	10 November 1998	5
Wodonga	10 November 1998	20
Bright	11 November 1998	24
Wangaratta	11 November 1998	20

Stakeholders were invited by mail to the meetings. They included relevant state government personnel, local government agencies and established community groups. The community was invited through advertisements placed in the following newspapers:

- Border Mail;
- Wangaratta Chronicle;
- Alpine Times; and
- Benalla Ensign.

The purpose of these meetings was to announce to the community the intention of the CMA to develop floodplain and rural drainage management strategies and to allow the community to identify issues with the region. The meetings also provided the opportunity to raise the community's awareness of the CMA and its roles and responsibilities.

1.4.4 Stakeholder Meetings

Key stakeholders were identified during the initial phases of the project. Discussions were held with these key stakeholders to identify issues and obtain relevant information.

1.4.5 Workshops

Workshops were hold at key stages of the project, namely:

- Stage 3 - Visions, Objectives and Target Stage; and
- Stage 4 - Draft Strategy Stage.

The first key stakeholders workshop was held at Wodonga to review the draft Vision, Objectives and Targets prepared for both the floodplain and rural drainage regional strategies. The workshop was held on 15 March 1999 and involved 19 attendees.

The second key stakeholder workshop was held at Wodonga to review the draft floodplain and rural drainage regional strategies. The workshop was held on 5 May 1999 and involved 18 attendees.

1.4.6 Public Exhibition

The draft strategy for regional floodplain management was released for public comment by the NECMA on 3 July 1999. The community was given about four weeks to provide written comment on the draft strategy. Late submissions were received up to 25 August 1999.

The NECMA received six submissions. Following the exhibition process the Steering Committee met and discussed the submissions.

2. Background

2.1 North East CMA

In July 1997 the State Government announced the creation of nine Catchment Management Authorities (CMAs) to implement Regional Catchment Strategies in each of the existing rural catchment and land protection regions. The CMAs were formed to combine the roles of a number of existing authorities and groups, including:

- Catchment and Land Protection Boards;
- River Management Authorities;
- Salinity Implementation Groups;
- Water Quality Groups; and
- Sustainable Regional Development Committees.

Other roles envisaged for the CMAs on their formation included the identification of priority activities and work programs under the regional catchment strategies, provision of advice to the State and Federal governments on resourcing priorities, and negotiating with the Department of Natural Resources and Environment (DNRE) on regional service delivery. The CMAs were also to have key roles in carrying out floodplain management, waterway management and rural drainage statutory functions.

The North East Regional Catchment Strategy (June 1997), developed by the former Catchment and Land Protection Board, sets out the vision and objectives for land and water management, providing the direction for all catchment management activities in the region. Building on this base, there is the need for more detailed strategies dealing with individual issues, including floodplain management.

The North East CMA consists of a Board of Management which is supported by an appointed Chief Executive Officer (CEO) and a small team of specialist officers and administrative staff. Each Board member is responsible for representing a particular management component of the catchment. This allows an integrated catchment management approach to the management of the catchment.

The CMA is also supported by the following implementation committees:

- Upper Murray / Mitta Mitta Implementation Committee;
- Wodonga, Kiewa, Indigo Implementation Committee; and
- Ovens, King & Black Dog Implementation Committee.

The function of these committees is to develop detailed works programs and oversee on-ground program delivery. The committees will therefore play a key role in implementing the works programs of the floodplain management strategy and monitoring their progress.

2.2 Description of Region

The North East CMA region covers an area of 19 750 km^2 bounded by New South Wales, the Goulburn Broken CMA area and the East Gippsland CMA area. The region encompasses three major river basins, namely: Ovens River, Upper Murray River and Kiewa River basins. Lake Hume and Lake Dartmouth are two major man-made lakes within the region. Major towns in the region are Wodonga, Wangaratta, Myrtleford Beechworth, Rutherglen and Bright (refer Figure 2.1).

The major floodplains in the region are located along the alluvial flats and terraces of the main river systems, namely:

- Ovens River (Harrietville to the Murray River);
- Buckland River;
- Buffalo River;
- King River (Lake William Hovell to Wangaratta);
- Fifteen Mile Creek, Three Mile Creek and One Mile Creek (to Wangaratta);
- Kiewa River (Mt Beauty to the Murray River);
- Mitta Mitta River (Dartmouth Dam to Hume Dam); and
- Upper Murray River (Bringenbrong Bridge to Lake Mulwala).

The general extent of the floodplains in the region is shown in Figure 2.2 based on flood information (land subject to inundation areas) prepared as part of DNRE's Flood Data Transfer project which commenced in 1998.

INSERT FIG 2.1

INSERT FIG 2.2

The North East region supports a population of approximately 176,400 people in key industries such as agricultural systems, food processing, forestry and tourism. The population of the main towns across the region are shown in Figure 2.3. The floodplains in the region have been developed over time to the extent that uses include agricultural activities (grazing, crops etc), rural residential and urban/industrial. Tourism is a major industry in the region and many of the related activities take place on the floodplains. Recreational activities associated with the waterways and floodplains include fishing and camping on most of the rivers in the region. In addition there are significant natural features on the floodplains such as wetlands, native vegetation etc.

Flooding in the region is a major issue in terms of its frequency and impact on urban and rural properties. This is particularly so in the Ovens River catchment, where flooding in and around the City of Wangaratta and town of Myrtleford has been of concern over many years.

Widespread major flooding within the Ovens River Basin was most recently experienced in September 1998.

Severe flooding also occurred in October 1993, caused by a low pressure rainfall system over North East Victoria which generated up to 300 mm of rainfall over an 18 hour period. The highest rainfall occurred in the Mt Buffalo area and followed above average rainfall during the previous month.

Until recently, flooding in the Kiewa valley has been limited to nuisance flooding across the river flats, with flood damage being limited to impacts on private and public infrastructure. The major flood in September 1998 caused significant damage, mainly in terms of damages to streams, river works, rural assets and infrastructure with some flooding of rural residential properties and associated buildings.

The primary river reaches prone to flooding in the Upper Murray are the Mitta Mitta River downstream of Dartmouth Dam and the Murray River from Bringenbrong Bridge to Hume Dam and downstream to Lake Mulwala.

Flooding patterns have been significantly altered by the large reservoirs, with the operation of the reservoirs in terms of release policies the major factor determining the more frequent flooding along the river flats.

The general levels of flood risk along the floodplains of the region are indicated in Figure 2.4. Flood risk is a measure of the likelihood of flooding and its consequences. The flood risk levels shown in Figure 2.4 are based on general flood condition data and subjective judgement. Low flood risk areas therefore would include areas experiencing frequent flooding, but of a minor nature. High flood risk areas generally experience infrequent severe flooding which when it occurs results in extensive flood damage.

INSERT FIG 2.3

FIGURE 2.4

2.3 Existing Strategies

2.3.1 Victoria Flood Management Strategy

The Victoria Flood Management Strategy (VFMS) was prepared as a floodplain management reform initiative by the State Flood Policy Committee.

The objectives of the VFMS are to:

- *Enable effective flood management for the next ten years, by providing a consistent statewide framework for the management of flood related issues by the responsible authorities, agencies and groups;*
- *Set out objectives, provide a statewide policy framework for best practice principles and guidelines, establish priorities for statewide action, and identify roles and responsibilities of key stakeholders;*
- *Provide the statewide context for the development of regional floodplain management strategies, floodplain management plans and specific guidelines; and*
- *Provide a process of continual assessment and improvement for flood management in Victoria, through the implementation and periodic revision of the strategy.*

The VFMS outlines the reform agenda for floodplain management and provides a framework for the development of regional floodplain management strategies by CMAs in regional Victoria.

2.3.2 NE Regional Catchment Strategy

As part of the State Government's initiative for regional catchment management, the North East Regional Catchment Strategy was prepared in June 1997 by the North East Regional CALP Board. The strategic vision for regional catchment management for the North East region is:

> *"Ensuring sustainable natural resource management whilst increasing productivity and community viability for the benefit of the North East Region and the downstream community."*

To fulfil this vision, the strategy identifies the following key objectives:

- *To create a climate for open cooperation, communication and co-ordination to ensure the implementation of sustainable resource management in the Region;*
- *To enhance the overall economic, social and environmental health of the Region;*
- *To maintain the Region as a major source of high quality water in the Murray Darling Basin by ensuring optimal water quality and quantity;*

- *To increase the adoption of best management practices by all land managers;*
- *To control and reduce the spread, and eradicate where possible, priority pest plants;*
- *To control priority pest animal populations on public and private land;*
- *To maintain and enhance biodiversity;*
- *To ensure fire management regimes protect the natural environment, human life and property;*
- *To ensure sustainable resource management principles are incorporated in statutory and other planning documents; and*
- *To minimise damage to public and private assets from erosion and flooding.*

The last objective in the strategy is specific to floodplains. However, several of the other objectives are closely linked to floodplain management activities. Arising from the objectives the North East Regional Catchment Strategy identifies the following strategic action:

- *To co-ordinate floodplain management to reduce impacts of flooding and preserve the natural functions of the floodplains.*

2.4 Current Floodplain Management Arrangements

2.4.1 Key Floodplain Management Activities

Current key floodplain management activities in the North East region include the following:

- Development of a regional strategy;
- Development and implementation of floodplain management plans;
- Manage and maintain specific flood works;
- Collection and collation of flood information;
- Input to land use planning controls;
- Assist in flood warning process; and
- Community education and awareness.

These key activities represent an overview of the current situation. However, the CMA recognises that it does not have in place a comprehensive regional floodplain management strategy on which to base its future activities. The current activities focus on flood prevention which is the major component of floodplain management. In addition, the CMA is involved in flood response activities by assisting in flood warning/flood monitoring and the development of Municipal Emergency Management Plans. It is recognised that the new arrangements outlined in the Victoria Flood Management Strategy are being

developed at the regional level and are being phased in over the period from 1997 to year 2000.

2.4.2 Roles and Responsibilities

The roles and responsibilities of all key agencies involved in management of floodplains must be clarified, if an effective strategy is to be developed and successfully implemented. The Operating Agreement between DNRE and the CMA specifies the roles and responsibilities of the authority with respect to management of waterways and floodplains (Appendix A presents an extract of the relevant parts of the Operating Agreement). As part of this process the CMA will also need to develop ongoing relationships with its partners including: Municipalities, DNRE, water authorities, and emergency management authorities, as well as with stakeholders such as Landcare groups, flood affected communities and the VFF. Therefore the identification of institutional issues is essential to the implementation of the regional strategy.

Key stakeholders are listed below:

- North East CMA
- Department of Natural Resources and Environment
- Alpine Shire
- City of Wodonga
- Indigo Shire
- Moira Shire
- Towong Shire
- Rural City of Wangaratta
- Bureau of Meteorology
- Victoria State Emergency Service
- Goulbourn-Murray Water
- North East Regional Water Authority
- Murray Darling Basin Commission
- Southern Hydro
- Landcare Groups
- Victorian Farmers Federation
- Community

The community primarily refers to those people living on or adjacent to the floodplain. For the purposes of this study the major roles and responsibilities associated with floodplain management can be assigned to a short list of the above as follows:

- North East CMA (NECMA);
- Municipal Councils;
- DNRE;
- Bureau of Meteorology;
- Victoria State Emergency Services;
- Victorian Police;
- Rural Water Authorities; and
- Landowners/community.

Table 2.1 presents a summary of the current state of roles and responsibilities of the above stakeholders in the floodplain management activities.

2.4.3 Funding and Cost Sharing

Funding (and cost sharing) for flood studies, floodplain management plans and flood mitigation schemes (including flood warning systems) has been jointly shared by Commonwealth, State Government and municipalities. Funding by the Commonwealth in recent years has been provided under the National Heritage Trust through the National Landcare Program. The BoM also contributes funding by investment in flood warning services and flood warning systems.

Funds are also provided by the Commonwealth under the National Disaster Relief Arrangements (NDRA) to public bodies suffering flood losses. State Government provides financial assistance via grants for personal hardship relief. The Commonwealth support the State in the area of personal hardship relief on a 50:50 basis. However, Victoria has received very little financial assistance from the Commonwealth in its flood recovery expenditure in recent years, primarily because the threshold levels have not been exceeded.

Commonwealth funding in the future will focus on rural regional flood mitigation programs and new studies to assist risk management strategies, especially flood studies and plans. Funding will come from the Regional Flood Mitigation Program and the NDRA program respectively.

While funding for capital works and flood warning systems is supported by Commonwealth and State Government, the operation and maintenance of those works is viewed as a responsibility of local authorities. Commonwealth funding will have regard for risk management principles being applied to planning for floods and flood mitigation measures to ensure a basis for post flood assistance in the future.

Insert 2.1

Cost sharing is assessed according to the following guidelines:

- User pays;
- Polluter pays;
- Beneficiaries pay; and
- Government pays for public good.

Costs are shared between the Commonwealth Government, State Government, Local Government, other authorities (inc. CMA, water authorities, etc) and private beneficiaries depending on the action. Table 2.2 summarises sources of funding for floodplain management activities as given in the VFMS. An extract on funding arrangements from the VFMS is provided in Appendix B.

Table 2.2: Sources of Funding

Main Component	Activity / Item	Primary Funding Source
Statewide Policies and Strategies	Development and review of the Victoria Flood Management Strategy	Government
	Initial development of the floodplain management component of the regional catchment strategies	Government
	Ongoing review of regional catchment strategies	CMA
Flood Data Management	Establishing baseline data of available information, and flood maps.	Government
	Development of new flood information for significant flood studies	Government/CMA/ Council
	Review and enhancement of flood data and maps	CMA/Council
	Collection of real time flood data for local floods	CMA/Council
	Collection of real time flood data for major floods of regional significance	Government
Flood Studies and Floodplain Management Plans	Development of flood studies and flood management plans	Government/CMA/ Council
Statutory Planning	Establishment of specific baseline flood maps for input to planning schemes	Government
	Implementing Statutory Planning process and reviewing associated floodmaps and controls.	CMA/Council
Asset Management	Initial audit of specific strategic levees for establishing a database	Government
	Ongoing audits of urban/rural levees	Council / CMA
	Approved urban flood mitigation works	Government/Council
	Ongoing management, maintenance and upgrading of existing urban works/assets	Council
	Upgrading of specific existing strategic rural levees	Government/CMA
	Ongoing management, maintenance and upgrading of strategic rural levees	CMA
Flood Warning	Streamflow data collection network for natural resource management	DNRE
	Data collection networks for operating water storages	Rural Water Authorities
	Augmentation of existing networks	CMA
	Implement flood warning systems	Government/Council
	Maintenance of flood warning systems	Council
Research, Education and Training	Development of statewide best practice manuals and guidelines, research, education and training programs	Government

Principles used in assigning cost sharing can be based on the following:

- Established government cost sharing principles;
- Obligations under the Operating Agreement between the CMA and NRE;
- Existing ownership/title to floodplain assets;
- Identification of the beneficiaries of the action/initiative;
- Statutory responsibilities of other agencies; and
- Stated intent/interest in financial contribution.

In addition, cost sharing is developed based on:

- Agreements developed during the consultation process of the regional strategies; and
- Detailed negotiations and agreements between stakeholders at the individual level.

2.4.4 Specific Management Issues

The current floodplain management arrangements depicted in Table 2.1 illustrate several issues:

- A floodplain management strategy is required to provide direction for the CMA's activities, resourcing and setting regional priorities;
- Nearly all groups have significant roles/responsibilities in the activities of flood warning and community awareness;
- The CMA needs to be involved in community awareness and education;
- The land use planning activity needs significant strengthening in terms of the roles/responsibilities of the CMA and the municipalities;
- The CMA currently is involved in managing some of the existing strategic flood mitigation structures;
- Management of private levees is not being addressed;
- The roles/responsibilities of the CMA and municipalities in relation to the preparation and implementation of floodplain management plans is not clear; and
- Funding and cost sharing in relation to the various activities is not addressed.

The above issues are (as far as possible) addressed in the development of the draft strategy as set out in Section 3.

3. Regional Strategy Programs

3.1 Overview

A component in the development of the regional floodplain management strategy was the presentation of the Vision, Objectives and Targets (Stage 3) for the North East region.

The vision for the North East region with respect to floodplains was:

> *"With the involvement of the community, maintaining and enhancing the floodplains by implementing flood management measures which reduce flood risk to lives, health and property, and flood damage costs, whilst allowing for natural floodplain storage and enhancing the environmental values of floodplains".*

This vision formed the basis for the formulation of objectives for regional floodplain management. In order to achieve those objectives, targets were established in the form of actions to be completed in specified timeframes (immediate - 1st year, medium - within 3 years and long - within 10 years) (Refer to Appendix C for the report on visions, objectives and targets).

As referred to in Section 1.1, the regional strategy is presented under the following eight programs:

- Asset management;
- Local flood studies and floodplain management plans;
- Statutory land use planning;
- Emergency response;
- Information management;
- Best Practice, education and training;
- Resources; and
- Performance monitoring.

This section outlines the development of the strategy programs by, in each case, setting out; the current status, key issues, the relevant objectives, specific aspects relating to the strategy program, the role of the CMA and the proposed program. Reference is also made to more detailed information contained in Appendices as appropriate.

Priorities for each of the specific actions are denoted by the following:

- High - requiring action within the 3 year Business Plan;

- Medium - requiring action within 5 years; and
- Long - requiring action within 10 years.

These priority categories differ from those used for the objectives and targets as they are considered more relevant to the work program.

Tables 3.3 - 3.9 describe the elements of each program, including lead agencies, support agency and estimated cost. Table 3.10 provides further details on cost sharing and priorities.

3.2 Asset Management

3.2.1 Current Status

Authorised levees on the floodplain in the North East Region are major floodplain assets. Unauthorised levees can be floodplain liabilities. Development of the strategy has included identification of significant levees on the floodplain, including preparation of an inventory of preliminary details on the levees (condition, ownership, level and area of protection etc). Significant levees can be defined as levees which protect important areas or assets from flooding. They generally protect significant urban areas or large highly productive areas. They can also include levees which protect a small number of properties yet have significant adverse flooding effects on a large number of the properties.

The list of levees is provided in Table 3.1 below (refer Appendix D for details). Given the paucity of available data on levees and the inevitability that not all levees have been identified, there is a need for the preparation of a comprehensive inventory of significant/strategic levees in the region. The information to be provided in the Flood Data Transfer project on levees and their location will provide a sound starting point for such development. An indication of the distribution of levees and other floodplain structures is given in Figure 3.1.

It is likely that levees are in different states of repair, provide different levels of strategic value in the regional floodplains and represent works undertaken with or without appropriate consent. It is also conceivable that while certain levees have not been approved some may prove beneficial to floodplain management.

INSERT FIG 3.1

Table 3.1: List of Identified Significant Levees

LEVEES	WATERWAY	TYPE	OWNERSHIP
North Wangaratta (Parfitt Road levee)	Ovens River	Urban	RCW
Wilson Road	King & Ovens River	Urban	RCW
Griffith	Fifteen Mile Creek	Rural	Private
Laceby Park	King River	"	"
Mc Farland's	Murray River	"	"
Schmidt's	Murray River	"	"
Fishers	Ovens River	"	"
Markwood (Brookfield Levee)	Ovens River	"	CMA
Oxley Flats	Ovens River	"	Private
Harrietville	Ovens River	Urban	CMA
Lower Kiewa River near Finns Creek	Kiewa River	Rural	CMA
Kiewa River	Kiewa River	Rural	Private
Harrington	Ovens River	"	Private
Cheshire	Ovens River	"	"
Kaceen	Barwidgee Creek	"	"
Buffalo River	Buffalo River	"	"
Wallace Drive/Harris Lane	Buckland River	Semi-urban	"
Laspina	Ovens River	Rural	"
Three Chain Road	Black Dog Creek	Rural	"
Merriwa Park	Ovens River	Urban	"
House Creek	House Creek	Urban	Private
Myrtleford	Ovens River	Rural	Private

The CMA is currently the responsible agency for several significant authorised levees, namely:

- Markwood levee;
- Harrietville levee (construction by RWC); and
- Kiewa Valley levees (constructed by previous river improvement trust).

Information on the condition of the levees is not readily available. To determine a long term strategic management program for the floodplain there is a need to undertake a detailed audit of these levees, the outcome of which should be as a priority to determine the age and condition of the levees and their significance in terms of minimising flood damage. The Markwood levee was reconstructed most recently as part of the Markwood - Deep Creek scheme and hence should have a lower priority. The Harrietville levee is significant in terms of the protection it offers to the township and therefore should attract a high priority for review and maintenance.

The levees in the lower reaches of the Kiewa Valley were constructed by the previous River Improvement Trust for waterway protection purposes (avulsion prevention measures) associated with Finns Creek. The levees have minimal

impact on flow distribution and flood levels during high flood flows and as such are more directly relevant to the CMA waterways management strategy.

Other structures on the floodplain which the CMA needs to be aware of in terms of impact, condition, ownership/responsibility are listed in Table 3.2.

Table 3.2: Identified Significant Structures on the Floodplain

STRUCTURE	WATERWAY	OWNERSHIP
Greta West Weir	Fifteen Mile Creek	CMA
Wilson Road Bridge/Road	King River	RCW
Lake Mulwala / Yarrawonga Weir	Murray River	MDBC
Diversion Channel Spillway Weir	One Mile Creek	RCW
One Mile Creek Offtake	One Mile Creek	RCW
Diversion Channel	One Mile Creek to King River	RCW
Whitfield Road Culvert	One Mile Creek/Diversion Channel	RCW
Old Hume Highway (Wangaratta)	Ovens River	VicRoads
Ovens River Bridge	Ovens River	VicRoads
Railway Embankment (Wangaratta)	Ovens River	PTC
Taylors Lane (Wangaratta)	Ovens River	RCW
Gavan Street (Bright)	Stacky Gully	Alpine Shire
Yarrawonga Road Bridge/Road	Three Mile Creek	RCW

3.2.2 Key Issues

Key issues relating to assets on the floodplain have been identified as follows:

- The information base is limited at the present time;
- There are existing levees on private land which have an unknown impact on flood levels and flow distribution;
- Existing private levees of unclear status, legal or otherwise, are a significant concern to many landowners who believe they are adversely affected;
- Existing levees and other structures (such as road embankments, bridges etc) need to be managed appropriately; and
- New earthworks on the floodplains which may impact on flood flows need to be subject to appropriate planning approvals.

3.2.3 Relevant Objectives

Strategy objectives which are primarily related to the Asset Management Program are:

- To use structural measures which are cost effective and locally accepted to reduce existing flood risk and potential flood damage cost, taking into account flood conveyance, flood storage and the environmental values of the floodplains;

- To develop policies and guidelines for management of private and public levees, and procedures that deal with the rationalisation, removal or repair and maintenance of "illegal" levees; and
- To manage and maintain flood mitigation structures that are the responsibility of the CMA.

3.2.4 Management Arrangements

Management of the floodplains needs to be undertaken in such a way as to reduce the future growth of flood risk and flood damages. Proposals for new works on the floodplain which will include private levees, earthworks and buildings, railway, road and irrigation works will require appropriate consultation and referral arrangements between the responsible authorities. It is recommended that the process should include as a minimum two measures, namely:

- Inclusion of Local Policies and Decision Guidelines, and consistent recognition of flood prone areas and issues in the Local Planning Policy Framework of the Planning Scheme for each Council in the Region. This will identify the location of any inappropriate works in relation to the floodplain and will provide for referral to the CMA for advice on development approvals; and
- Development and implementation of a specific Memoranda of Understanding or guidelines with contact arrangements between the CMA Flood Officer and relevant officers in the agencies (eg VicRoads, VicRail, Goulburn- Murray Rural Water) that will negotiate and implement the strategic management objectives for floodplain management, in relation to construction of new works or modifications of existing works.

As referral authority under local and State planning provisions, the CMA will need to develop with the municipalities guidelines and appropriate referral mechanisms and special planning conditions for inclusion in the revised planning schemes. Proposed action in this regard is discussed and detailed in Section 2.4 on Statutory Land Use Planning.

The CMA may also consider the option of having an area declared by the Minister as an "Area of Land Liable to Flooding" under Section 205-211 of the Water Act 1989. Proposed works in a declared area would then be subject to approval by the CMA as the Minister's delegate. If no authority for the works was given then their removal may be ordered under S. 208 -212 by Notice.

In addition to the above, the issue of "illegal" levees or levees of unclear status needs to be addressed in a comprehensive and effective way. This is a difficult issue as it directly involves landowners who believe they have a right to protect their own land. Although there appears to be adequate powers for control through municipal planning schemes, municipalities have experienced considerable problems in dealing with this issue at the Victorian Civil and Administrative Tribunal (formerly the Administrative Appeals Tribunal).

There is a need for alternative approaches to addressing the question of existing levees. Municipalities and the CMA will need to agree on an appropriate action plan and carry it through to completion.

The proposed approach is based on the need to focus attention on the objective of managing the floodplain to ensure the provision of adequate natural flood storage and flood conveyance and maintaining its environmental values. The approach needs to recognise that the existing situation is complex and involves many structures, including both those with and without clear legal status, which may be inappropriate due to their location and detrimental impact on the behaviour of the floodwaters. Measures to rationalise these levees may need to be implemented as follows:

- The acceptance of some existing levees;
- Modification of some levees or levee systems (to add benefit/value to the system); and/or
- Removal of levees where they are clearly inappropriate and are detrimental to flood management.

Elements of the process will include an improved knowledge base (levee inventory), education, statutory planning measures, mutual negotiations (which may involve dispute resolution) and enforcement. This process needs to be flexible, with the elements receiving different emphasis depending on the situation. For example, it may be appropriate in some situations to focus attention on dispute resolution.

Consideration needs to be given to the increased use of Section 173 agreements pursuant to the Planning and Environment Act that allows for a civil agreement between the CMA, responsible authority and a property owner to undertake specific on-site works as part of a development process (including maintenance arrangements). Alternatively, transfer of ownership of levees to the CMA or municipalities might be appropriate for private levees of strategic significance.

A basic step would be obtaining co-operation of the landowner in allowing a detailed audit of the relevant levee.

A program would need to comprise the following tasks:

- Establish Working Group involving the municipal councils and other relevant stakeholders;
- Prepare a broad strategy plan for the process;
- Develop an Education Program;
- Implement strategic planning measures;
- Consult with local community groups (Landcare, local reference groups etc);
- Seek funding for the Program;
- Implement program for two year period; and

- Review and plan further action on a priority basis.

The Working Group proposed for the above program would be convened by the CMA Flood Officer. The Working Group would be responsible for guiding the development of the tasks listed above and producing a systematic process by which CMA/Councils could address the issue of inappropriate levees. The Working Group should be required to report on the project within a period of about twelve months.

3.2.5 Role of the CMA

The CMA's primary role in floodplain management is to ensure that regional flooding issues are managed in an integrated way (VFMS, 1998). The CMA therefore has a responsibility to ensure the upstream and downstream effects of flood management measures are addressed.

The CMA therefore has an umbrella role for all levees, with a lead role in regard to management of significant/strategic rural levees and mitigation structures, supported primarily by municipalities.

With regard to urban levees (eg Wangaratta's levees) these are primarily municipal works and the responsibility of the municipalities.

3.2.6 Proposed Program

Table 3.3 details the actions required in the Asset Management program of the regional strategy.

3.3 Local Flood Studies and Floodplain Management Plans

3.3.1 Current Status

A significant number of flood studies have been undertaken in the North East region over the last twenty years. The focus of the flood studies has generally been in urban areas, except where major events have resulted in significant information becoming available in rural areas (eg extensive aerial photography in 1993 and 1998). The Ovens River from Markwood to Wangaratta is one of the exceptions where a major flood study was undertaken in a rural area (Binnie & Partners and ID&A, 1984).

Since the 1993 flood, significant investigations have been undertaken in several areas. The 1993 flood and its impact was documented by Hydro Technology in 1995. The historical flood extent for the 1993 flood has provided valuable information for flood mapping along the Ovens River/King River floodplain

Monitoring significant flooding in the Kiewa River in September 1998 has provided information (eg aerial photography and peak flood levels) which will be invaluable for flood mapping.

A floodplain management plan has been prepared for Wangaratta and is documented in the report on the Wangaratta Floodplain Management Study - Stage 2 - Final Report (ID&A, 1998). The recommended floodplain management scheme is soon to be exhibited by the Rural City of Wangaratta.

Table 3.3 Asset Management Program

Target Task	Specific Action	Estimated Total Cost	Lead Agency	Support Agencies	Priority
Prepare an inventory of all strategic flood mitigation structures.	Using the Flood Data Transfer information on levees and structures as a basis, define types/categories and establish an inventory of existing flood mitigation structures.	$10 000	CMA	Councils VicRoads, GMW, PTC	High
	Review inventory data and establish priorities and procedures for detailed audits.	$10 000	CMA	Councils VicRoads, GMW, PTC	Medium
Coordinate the management and maintenance of all authorised flood mitigation structures the CMA has (direct or ownership) responsibility for.	Prepare an asset data base from the inventory data.	$10 000	CMA	-	Medium
	Establish an operating system for management and maintenance of CMA assets.	$10 000	CMA	DNRE	Medium
Prepare policies and guidelines for management of private levees, particularly illegal works, and disseminate to appropriate authorities, community schemes and individuals.	Establish Working Group to prepare program.	$5 000	CMA	Councils DNRE	High
	Lobby for legislative review i.e. control over illegal works/studies	$10 000	CMA	Councils DNRE	High
		$20 000	CMA	Councils /DNRE	Medium
	Develop an education program.	$15 000	CMA	Councils/DNRE	Medium
	Consult with landowners via Landcare Groups.				
Undertake periodic audits of all flood mitigation structures.	Detailed audit of Harrietville levee.	$15 000	CMA	Alpine Shire	Medium
	Detailed audit of Kiewa Valley levees	$10 000	CMA	Alpine Shire	Low
	Detailed audit of Markwood levee.	$25 000	CMA	Rural City of Wangaratta	Low

The Myrtleford Floodplain Management Study is currently in preparation and due for completion this year.

3.3.2 Key Issues

Key issues are:

- Identification of priorities areas for local flood studies and/or floodplain management plans;
- The need to develop a program of studies which provides for an equitable balance of resourcing which addresses the concerns of the community and takes account of current and future flood risks;
- The scope of the studies; and
- The roles and responsibilities of agencies and sources of funds and cost sharing.

With regard to roles and responsibilities in the area of local flood studies and floodplain management plans the strategy has developed the broad principle that Councils have responsibility for urban areas, while the CMA has responsibility for rural areas. However, the distinction between urban/rural areas is not always clear. Therefore responsibility for the lead role has been determined on the basis of the primary focus on the study. It is accepted that further decisions on specific roles, resourcing and cost sharing will have to be made on a project by project basis.

3.3.3 Relevant Objectives

Strategy objectives which are primarily relevant to this program are:

- To ensure via local government that statutory planning schemes include land use planning measures which use the best available information to minimise future flood risk, flood damage and preserve the natural function of floodplains;
- To maintain and enhance regional flood information;
- To use structural measures and non-structural which are cost effective and locally accepted to reduce existing flood risk and potential flood damage cost, taking into account the environmental values of the floodplains; and
- To facilitate and co-ordinate monitoring of significant flood events by various authorities/groups.

3.3.4 Role of the CMA

The CMA's role is primarily concerned with prioritising the development of urban and rural floodplain management plans within the region. This role should be a lead role carried out in collaboration with other agencies, particularly the Councils. Furthermore the CMA has the responsibility of incorporating the priority studies/plans in its regional strategy and facilitating the funding of such activities, as well as developing and implementing the studies/plans where it is the lead agency.

3.3.5 Study / Plan Requirements

Identified Study Areas

There are a number of areas in the region where flood studies and/or floodplain management studies could be undertaken to enhance/improve flood information and to develop flood mitigation strategies where appropriate.

Of particular note are the following areas:

- Wangaratta (recently completed as a floodplain management study)
- Myrtleford (currently underway as a floodplain management study)
- Buckland River-Wallace Drive
- Wodonga
- Indigo Creek
- Yackandandah Creek
- Kiewa River
- Ovens River-Myrtleford to Markwood
- Ovens River-Harrietville to Bright
- Ovens River at Harrietville
- Ovens River-Markwood to Wangaratta
- Ovens River-Wangaratta to Yarrawonga
- Upper King River-downstream of William Hovell
- 15 Mile Creek (including One Mile Creek)

Evaluation Approach

DNRE has recognised the need for a rapid appraisal method (RAM) to assist CMAs in assessing the priority areas for flood studies. A project is currently being undertaken by consultants for DNRE to develop such a method. When that project is completed later this year (September 1999), the CMA will need to apply RAM to its strategy projects with respect to priorities, cost sharing and performance monitoring and modify the strategy accordingly.

In the absence of an approved "Rapid Appraisal Method" during the development of this draft strategy, use was made of an assessment technique developed by the Rural Water Commission in 1980. Each proposed flood study was given a score according to the following criteria:

- Risk to life;
- Potential damage;
- Risk to health;
- Environmental benefit;
- Economic benefit; and

- Planning needs.

The scores were added and the studies with the highest scores indicated the highest priorities. Details on the methodology are given in Appendix E. The methodology was used to provide a coarse ranking of studies which were further refined using qualitative information from consultation with key stakeholders.

Prioritised Studies

Table 3.4 shows the potential studies and their adopted priorities.

On this basis the prioritised areas for study within the CMA's next 3 year business plan are:

- Ovens River at Bright/Porepunkah (urban flood study);
- Ovens River at Harrietville (urban flood study);
- House Creek at Wodonga (urban flood study); and
- Ovens River Basin - Harrietville to Wangaratta (rural flood study).

Figure 3.2 shows the location of these studies.

Details on the scope of work for the proposed flood studies are provided in Appendix F.

3.3.6 Proposed Program

The proposed program for the strategy action plan is set out in Table 3.5.

3.4 Statutory Land Use Planning

3.4.1 Current Status

The Victoria Planning Provisions (VPPs) provide the basis for all statutory land use planning controls in Victoria. The VPPs were finalised in October 1996 after a lengthy period of consultation and review. The VPPs provide a uniform state planning policy and local provisions for flooding. All municipal Councils in Victoria were directed by the Minister for Planning and Local Government to revise their Planning Schemes to accord with the VPP's and have them ready for exhibition by the end of June 1997. In reality, new Planning Schemes were exhibited in a more staggered manner, although all have now gone through that process and are now either being implemented, considered by Panels set up to review them and all submissions made in response to their exhibition, or awaiting such review.

Table 3.4 Prioritised Study Areas

Potential Project	Description	Adopted Priority
Wangaratta[1]	Urban floodplain management study	Completed or in Progress
Myrtleford[2]	Urban floodplain management study	
Buckland River - Wallace Drive[3]	Urban flood study	
Ovens River at Bright/Porepunkah	Urban flood study of tributaries	High
Ovens River at Harrietville	Urban flood study	
House Creek at Wodonga	Urban flood study	
Ovens River - Harrietville to Wangaratta	Rural flood study	
Indigo Creek	Flood study	Medium
Kiewa	Rural flood study	
King d/s William Hovell	Rural flood study	
Ovens River- Wangaratta to Yarrawonga	Rural flood study	
Black Dog Creek	Urban flood study re Chiltern	Low
Buffalo River	Rural Flood Study	
Ovens River- Myrtleford to Markwood	Rural flood study	
15 Mile Creek	Rural flood study	
Yackandandah Creek	Flood study	
Mitta Mitta/Upper Murray	Rural flood study	

Note:
1. Urban floodplain management study and water management scheme (flood mitigation) is nearing completion for the Rural City of Wangaratta.
2. Urban and Rural floodplain management study (flood mitigation) is in progress.
3. Semi Urban flood study now completed.

INSERT FIGURE 3.2

Table 3.5 Local Flood Studies and Floodplain Management Plans Proposed Program

Target Task	Specific Action	Estimated Total Cost	Lead Agency	Support Agency	Priority
Undertake flood studies in accordance with identified priorities	Conduct the following flood studies: • Urban flood study for Bright • Urban flood study for Harrietville • Urban flood study for Wodonga (House Creek) • Rural flood study for Ovens R (Harrietville to Wangaratta) • Rural flood study for Kiewa River • Rural flood study for Indigo Creek • Rural flood study for King River (d/s of Lake William Hovell) • Rural flood study for Ovens R (Wangaratta to Yarrawonga) • Rural flood study for Black Dog Creek • Rural flood study for Buffalo River • Rural flood study for Fifteen Mile Creek • Rural flood study for Yackandandah Creek • Rural flood study for Mitta Mitta/Upper Murray	 $25 000 $20 000 $20 000 $50 000 $50 000 $25 000 $50 000 $80 000 $30 000 $40 000 $35 000 $35 000 $80 000	 Alpine Shire Alpine Shire Wodonga City CMA CMA CMA CMA CMA CMA CMA CMA CMA CMA	 CMA/DNRE CMA/DNRE CMA/DNRE Alpine/RCW/DNRE Alpine/Wodonga/DNRE Indigo/DNRE Wangaratta/DNRE Wangaratta/DNRE Indigo/DNRE Indigo/Wangaratta Alpine/DNRE Wangaratta/DNRE Indigo/DNRE Towong/DNRE	 High High High High Medium Medium Medium Medium Low Low Low Low Low
Develop floodplain management plans for priority urban and rural areas in cooperation with stakeholders	Conduct floodplain management studies and produce floodplain management plans identified in the flood studies for: • urban areas. • rural areas	 $100 000 $100 000	 Municipalities CMA	 CMA/DNRE Councils/DNRE	 Medium Medium
Prepare 1% floodplain	Review and enhance 1% floodplain	$50 000	CMA	Councils/DNRE	Medium

Target Task	Specific Action	Estimated Total Cost	Lead Agency	Support Agency	Priority
delineations for all major waterways	delineations prepared in the Flood Data Transfer Project.				
Flood events to be mapped when they occur and floodplain management plans amended accordingly	Map flood events and update existing floodplain management plans after every major flooding.	($20 000/a.)	CMA	Councils/DNRE	As required

Each new Scheme is now made up of a State Planning Policy Framework (SPPF), a Local Planning Policy Framework (LPPF), which comprises the Municipal Strategic Statement (MSS), relevant local policies and controls. The LPPF allows strategic and broad directions to be set, followed by the standard zoning, overlay and other controls that direct land uses and development within each municipality.

The State Planning Policy Framework (SPPF) is a standard section in all new Planning Schemes, and sets out the state planning policies which apply to all land in Victoria. The objective of the SPPF in relation to floodplain management (Clause 15.02-1) is as follows:

"To assist the protection of:

- *Life, property and community infrastructure from flood hazard.*
- *The natural flood carrying capacity of rivers, streams and floodways.*
- *The flood storage function of floodplains and waterways and floodplain areas of environmental significance."*

Achievement of this objective involves taking into account several key issues such as:

- planning controls should be consistent across State;
- flood risks; and
- flood mapping information.

Municipal Strategic Statements together with relevant local policies (where adopted) form the Local Planning Policy Framework. The Municipal Strategic Statement for each Council within the North East Catchment Management area has been sought and reviewed as part of this study.

The SPPF and LPPF or MSS's reflect a move towards a performance led planning system that uses strategic planning principles to guide land use and development.

In the North-East Catchment Management area the Indigo, Alpine, and Wangaratta Planning Schemes are the only Schemes approved by the Minister. However, information on the exhibited Schemes of Towong, Wodonga, Wangaratta and Moira Shire Councils has been gathered and assessed, in anticipation of the forthcoming implementation of these Schemes. These Schemes also include the latest information on flood mapping for the area. This information will be further updated by the flood planning maps currently being prepared for both CMA and Councils. Councils in the region are awaiting the

outcome of this study in order to further revise and refine the floodplain controls in their Planning Schemes.

The main mechanisms of the VPP's with respect to floodplain mapping and control are contained in the following clauses:

- 37.03 Urban Floodway Zone (shown as UFZ on the maps);
- 44.03 Rural Floodway Overlay (shown as RFO on the maps); and
- 44.04 Land Subject to Inundation Overlay (shown as LSIO on the maps).

Related overlay provisions include:

- 42.01 Environmental Significance Overlay; and
- 44.05 Special Building Overlay.

3.4.2 Key Issues

A number of key issues have been identified in relation to statutory land use planning, namely:

- The VPPs have established working relationships between the CMA and Councils, particularly in regard to flood maps referrals;
- Specific local policies and schedules to the standard floodplain management controls can be developed in addition to these state provisions as set out in the VPPs; and
- The ability of the planning process to control earthworks in the floodplain.

3.4.3 Relevant Objectives

Objectives for the CMA in its development of the regional floodplain management strategy are as follows:

- To ensure via local government that statutory planning schemes include appropriate land use planning measures which use the best available information to minimise future flood risk, flood damage and preserve the natural function of floodplains;
- To incorporate up to date flood mapping information into planning schemes; and
- To use regional flood information and risk management principles in responding to referrals on statutory planning, buildings, works and infrastructure management and general inquiries related to floodplains.

3.4.4 Statutory Land Use Planning Requirements

The CMA, when acting as a referral authority for local government (established under the Water Act 1989 Section 202 (A)) in terms of development on

floodplains, should consider the impact that the proposed development will have on:

- Impedance of flood flows;
- Potential to decrease storage of flood waters in the natural floodplain;
- Effects on communities upstream and downstream of waterways;
- Safety, threat to life and property;
- Exacerbating flood damage to property; and
- The environment.

Decision guidelines should be developed with local government to ensure notification of proposed developments in the floodplain such as the following:

- Subdivision of land;
- Residential development (including rural and standard residential);
- Major tourist attractions which will attract people to the area; or
- Works such as levee banks or roads on the floodplain and which have the potential to control the direction of floodwaters and hence affect upstream or downstream communities; and
- A schedule of "developments" that are either exempt or discretionary for referral to the CMA.

The general approach is set out in the flow chart shown in Figure 3.3.

Decision guidelines would form the local floodplain development plan referred to in the VPPs.

In terms of applying land use planning measures to provide for effective management of development on the floodplain the following process is proposed for collaborative action by the CMA and Councils:

- Agree on the delineation of the 1% flood extent and floodway;
- Ensure that there is a consistent approach to delineating the flood zones and overlays across the region;
- Review the Municipal Strategic Statements to ensure a consistent approach(agree on changes as required);
- Develop a local policy which is consistent across the region, to be incorporated into the planning schemes;

Insert figure 3.3

- Encourage the development of "local floodplain development plans" to assist the assessment of development proposals;
- Investigate the use of schedules to overlays, referral agreements and incorporated documents where deemed appropriate; and
- Initiate a program, to be implemented at the next opportunity, for reviewing the planning schemes.

The development of a local policy would involve the following:

- Establish objectives, which should be applicable to all floodplains across the Councils;
- Establish a consistent policy basis;
- Establish decision guidelines which could include an agreed set of uses and developments to be used in determining whether the proposal is appropriate; and
- Establish agreements between the CMA and Councils for planning referral exemptions.

It should be noted that decision guidelines/schedules and local floodplain development plans may need to be area specific between and within LGAs. Development of the decision guidelines will need to be a project undertaken by a specialist planning consultant in conjunction with the CMA/Council.

The issue of inappropriate levees is addressed in Section 3.2 in terms of a process for proper management of levees on the floodplain.

Apart from floodplain zones and overlays, the CMA must also consider areas of archaeological, geological or natural significance.

Information regarding significant aboriginal sites is available from Aboriginal Affairs Victoria.

The aboriginal site type statistics within the CMA area are given in the following table.

Site Type	Frequency (No.)	Frequency (%)
Isolated artefact	75	24.3
Burial/human remains	2	0.6
Rock Shelter/Cave	12	3.9
Other site type	1	0.3
Exposure in Bank	1	0.3
Fish trap	1	0.3
Art site	13	4.2
Quarry/stone source	1	0.3

Site Type	Frequency (No.)	Frequency (%)
Rock arrangement	3	1.0
Surface scatter	70	22.7
Scarred tree	124	40.1
Rock well	2	0.6
Literature reference only	4	1.3

The total number of sites registered is 295 with the possibility of a site including more than one site type.

It is recommended that if the CMA requires detailed information relating to the Aboriginal cultural heritage of these areas, a qualified heritage consultant be used to gather this information as part of a 'desk-top' study. Such a study will produce recommendations which can then be applied to the management of Aboriginal cultural heritage values within these areas. Such recommendations may include the necessity to conduct archaeological surveys prior to any development works that may be proposed by the CMA within these areas.

Heritage sites contained within the region can be obtained from Heritage Victoria.

3.4.5 Role of the CMA

The role of the CMA in statutory land use planning is to collaborate with the municipal councils in development of the planning schemes as they relate to flooding by:

- Operating as a referral agency for developments on the floodplain; and
- Undertaking Water Act declarations where appropriate.

3.4.6 Proposed Program

The proposed program for statutory land use planning is set out in Table 3.6.

3.5 Emergency Response

3.5.1 Current Status

The Ovens/King River system is a priority area for emergency response planning given the potential flood damage involved and flood risks to Myrtleford and Wangaratta. This priority area is being recognised by the submission of a NHT fund bid for funding to improve the flood warning system for the Ovens/King River system. In terms of flood warning there is a high priority need for improved flood warning for the Harrietville/Bright/Porepunkah areas as well as for Myrtleford and Wangaratta. The current proposal for the Ovens/King River system, if successful, would generally meet that need.

Table 3.6: Statutory Land Use Planning Program

Target Task	Specific Action	Estimated Total Cost	Lead Agency	Support Agencies	Priority
The CMA collaborates with local government and contributes to statutory planning schemes based on their local flood knowledge.	Include up to date information on 1% flood extents, floodway zones and overlay areas in planning schemes	$50 000	CMA	Councils DNRE DOI	High/ongoing
	CMA negotiate with Councils to develop an agreed local policy and set of decision guidelines including local floodplain development plans, to help assess development proposals and to clarify the need for referrals.	$50 000	CMA	Councils DNRE	High
The CMA operates as a referral authority to local government for developments on the floodplain.	CMA establish appropriate procedures for handling referrals from Councils including consultation/liaison procedures.	$5 000	CMA	Councils	High
The CMA undertake Water Act declarations where appropriate.	CMA review the need to declare flood areas and flood levels under the Water Act where planning scheme controls are inadequate.	$20 000	CMA	Councils DNRE	As required

The flooding that occurred in the Kiewa valley in 1998 has caused increased concern within the valley. The availability of aerial photography of the event will improve the definition of the floodplain. Flood warning in the Kiewa valley appears to need improvement to assist farmers to protect their stock and equipment where possible. Some urban development in the lower reaches at Kiewa can also be affected by flooding, as can Mt Beauty. Yackandandah township can also be affected by flooding from the Yackandandah Creek.

Discussions with the Victorian Regional Office of the Bureau of Meteorology indicated that the Kiewa flood warning service is limited and in terms of statewide priorities has a low priority. However, from a regional viewpoint the Kiewa would appear to have a higher priority.

At the very least flood warning for the Kiewa River should be reviewed to assess the need for improvements and to identify the most efficient way to improve the existing system in terms of data collection (eg rainfall) and interpretation and dissemination. Such a study would be relatively inexpensive (in the order of several thousand dollars) and would be a necessary first step.

The Mitta Mitta River downstream of Lake Dartmouth is an area where flood warning has been reviewed. Flooding in the valley affects farms but no urban development is at risk. The Towong Shire has developed a Flood Plan as a sub plan of its Municipal Emergency Management Plan, including draft flood response guidelines for the Mitta Mitta valley downstream of Lake Dartmouth. This Flood Plan has been integrated with the emergency response arrangements developed and implemented by the Towong Shire. The Plan takes into account the flood warning system information services provided by the Bureau of Meteorology. Some improvement in flood warning in the Upper Murray has been achieved by the Bureau with the development of a preliminary flood routing model. Towong Shire has identified a need for additional rainfall information in the Upper Murray catchment to assist with road closures on tributaries affected by flooding.

3.5.2 Key Issues

Key issues identified in the area of emergency response are:

- Priority setting for funds at the State/regional and local level;
- Clarification of the support role of the CMA in flood warning and emergency response; and
- Development of a CMA flood response action plan.

3.5.3 Relevant Objectives

The objectives for flood emergency response measures are as follows:

- To contribute local knowledge and facilitate the development of local flood warning systems and emergency response procedures to minimise the risk to life, health and property and the residual damage costs of floods;

- To facilitate and co-ordinate monitoring of significant flood events by various authorities/groups; and
- To promote awareness of flood warning systems and emergency response procedures in the community.

3.5.4 Emergency Response Priorities and Arrangements

The current initiative to gain funds for improving the Ovens/King River system is supported by the work that has been and is being undertaken in the Wangaratta and Myrtleford Floodplain Management Studies respectively. The impacts of the 1993 flood, which is well documented, and the more recent 1998 flood strengthen the priority being given to this initiative. Flood warning systems are considered in general to be an effective means of minimising flood damage.

Additional areas where enhancements to flood warning systems could be considered are:

- One Mile/Three Mile Creek;
- Kiewa River;
- Harrietville to Bright; and
- Upper Murray.

Recent improvements have been made to flood warning in the upper Murray with development of a preliminary flood routing hydrological model of the Murray upstream of Hume to provide improved flood forecasts at Jingellic (BoM).

While the Ovens/King River system is identified as the priority area for flood warning improvements, there is local dissatisfaction regarding information available for local flood warnings in the One Mile/Three Mile Creek area at Wangaratta.

Consideration of flood warning improvements for the Harrietville/Bright area should also be examined in the light of the current proposals and any future flood study.

Flood warning in the Kiewa River is based on a very limited network of hydrological monitoring stations and as such is a basic network. Given the impact of flooding in the recent 1998 flood in the Kiewa and the difficulties the mainly rural community had in responding to the flood, the benefits in improving the flood warning system need to be assessed.

3.5.5 Role of the CMA

The VICSES has the lead role in emergency response, supported by the Councils and the Victoria Police. In this context the CMA should aim to facilitate the implementation and enhancement of flood warning systems and emergency response plans through providing advice, establishing priorities for funding and providing appropriate assistance to the VICSES and Councils

during the floods. The CMA should also be involved in the process of augmenting the data collection networks for flood warning systems where considered appropriate.

In order to enable the CMA to prepare for and respond to flood emergencies, the CMA should develop its own flood response action plan. NRE is currently preparing a generic CMA action plan, which will be adapted by all CMAs to suit their specific regional requirements. The action plan will include a number of component plans for flood assessment, communication, operations, data collection and resources. It will address CMA response activities which relate to its core function, as well as activities which will assist other agencies.

3.5.6 Proposed Program

A proposed program on emergency response is set out in Table 3.7.

Table 3.7: Emergency Response Program

Target / Task	Specific Action	Estimated Total Cost	Lead Agency	Support Agencies	Priority
Data Management In co-operation with local government and the VICSES, collect, collate and disseminate local knowledge relevant to flood warning systems.	Review data needs and identify future requirements Prepare a program to improve data collection and source funds. Ensure relevant information from flood studies etc is introduced into emergency response planning.	$15 000	CMA CMA CMA	DNRE, Councils G-MRWA, VICSES, BoM “ “	Medium Medium Medium
Data Interpretation Assist VICSES and local government in monitoring flood levels during significant flood events and interpreting flood warnings.	Monitor and interpret flood levels		CMA	Councils, BoM	Annually
Education Educate the community about flood risks and accessing information by establishing an educational campaign about emergency response procedures, with local government and the VICSES.	Develop an education package to increase the community’s awareness, understanding of and preparedness for floods. Collaborate with relevant agencies to promote the education campaign.	$30 000 $10 000	CMA CMA	Council DNRE, VICSES, GMRWA	Medium Medium
Response Establish emergency response procedures for CMA core activities and support other emergency agencies.	Develop CMA flood response action plan Assist Councils in preparing Flood Response Plans by providing advice and up-to-date information. Identify specific roles for CMA staff during flood events in terms of strengthening the systems. Provide resources during flood events as determined in relevant systems/plans. Support the BoM, VICSES and other agencies in ensuring flood warning systems are current. Priorities risks and assist in developing recovery plans.	$10 000 $30 000 $5 000 - ($20 000) $15 000	CMA CMA CMA CMA CMA CMA	VICSES, Councils, CFA, GMRWA VICSES, Councils, CFA, GMRWA Councils CMA CMA, VICSES GMRWA, Councils VICSES, Councils, GMRWA Councils, VICSES	Medium High Medium As required Annually Medium

3.6 Information Management

3.6.1 Current Status

Flood information is collected by various authorities which is primarily used in conducting core activities for their own organisation but also provides significant benefits to other organisations such as the North East CMA. The key authorities collecting flood data are:

- Municipal Councils;
- Rural Water Authorities;
- Bureau of Meteorology;
- Department of Natural Resources and Environment; and
- North East Catchment Management Authority.

Flood data is required for the activities described in the VFMS (1998) as follows:

- Policy development;
- Regional strategy development;
- Priority setting and investment decisions;
- Community awareness;
- Statutory planning decisions;
- Hydrologic and hydraulic modelling;
- Floodplain management plans;
- Flood management works and measures;
- Infrastructure asset management;
- Flood warning systems; and
- Flood emergency plans.

In the past, the flood mapping and flood level information was held by the DNRE and relevant data is being transferred to the various CMA's. The Flood Data Transfer project being undertaken by DNRE will provide the CMA and Councils with flood information in the form of reports, maps (flood information and flood planning) and data in GIS format. The value of this information to some extent is unknown and data reviews and updates will be required to ensure the information is as accurate as possible.

3.6.2 Key Issues

A clear understanding of the responsibilities of each authority, in relation to flood data collection and enhancement, is required to ensure there are no gaps or overlaps of information.

Information should be stored in a standard format which is widely accessible (where practicable) to ensure it can be shared by the key stakeholders/authorities to update their relevant databases and plans.

3.6.3 Relevant Objectives

The relevant strategy objective in relation to information management is:

- To maintain and enhance regional flood information.

3.6.4 Information Management Needs

The types of flood information required (see Appendix D2-Victoria Flood Management Strategy) are:

- Meteorologic rainfall data;
- Hydrographic streamflow data;
- Topographic ground level data;
- Flood flows and frequencies;
- Flood levels and flood depths;
- Flood extent;
- Flood flow velocities;
- Flood damage data;
- Flood photography;
- Soil, geology and geomorphology maps;
- Land uses (zonings, commercial and agricultural assets);
- Demographic data (population and community statistics);
- Natural resource assets (wetlands, flora and fauna habitats; and
- Sites of geological, archaeological and landscape significance.

3.6.5 Role of the CMA

The CMA's primary role is to maintain, enhance and disseminate flood information and co-ordinate monitoring of significant flood events.

3.6.6 Proposed Program

The proposed program for information management is set out in Table 3.8.

The program as set out comprises a wide range of specific actions all of which need to be addressed on an annual basis as required. The estimated cost of this program is $50 000 per year.

Table 3.8 Information Management - Proposed Program

Target Task	Specific Action	Lead Agency	Support Agency
The CMA collates relevant flood information in an accessible format and provides that information to local government, other authorities and the community.	Obtain and analyse rainfall data after significant flood events for use in flood studies. Determine the Average Recurrence Interval (ARI) using flood frequency analysis.	CMA	BoM
	Obtain streamflow and flood level data.	CMA	Rural Water Authorities Hydrographic Services
The CMA continually updates flood information with as high a level of accuracy as practicable.	Collect, obtain and review flood levels and flood depths after each minor / moderate / major flood and update CMA information	CMA	Rural Water Authorities, Councils
	Determine / review flood extent and floodplain delineations after each minor / moderate / major flood events	CMA	Councils
	Obtain and review flood damage data	CMA	Insurance companies, Councils
	Coordinate flood photography (including aerial photograph) and review floodplain delineations	CMA	Councils DNRE
	Obtain and review soil, geology and geomorphology maps for flood studies	CMA	DNRE
	Obtain and review land use data (zonings, commercial and agricultural assets) for input to land use zones.	Councils	CMA
	Obtain and review demographic data (population and community statistics) and incorporate into floodplain management plans	Councils	CMA Dept of Census and Statistics
	Obtain and review natural resource assets (wetlands, flora and fauna habitats) and incorporate into floodplain management plans.	CMA	DNRE
	Obtain and review sites of geological archaeological and landscape significance and incorporate into floodplain management plans.	CMA	Councils, Aboriginal Affairs of Victoria, Natural Heritage Trust
	Survey and store construction details of new assets.	CMA	Councils, PTC, Rural Water Authorities, VicRoads
	Conduct programmed structural assessment of CMA assets	CMA	

Note: The above actions need to be undertaken on an ongoing basis or as required. Estimated total cost for this component of the Strategy is $50 000/year.

3.7 Best Practice, Education and Training

3.7.1 Current Status

In order for the North East CMA to act as an effective floodplain manager in the region, it must facilitate education and training and develop best practice applications for the three key roles of floodplain management (land use planning; flood mitigation; emergency response activities), with the emphasis of raising the level of understanding in the community.

An informed, trained and prepared community during a major flood event will ensure reduced harm to life and property.

Currently, development, education and training is not coordinated across the North East CMA catchment to provide a standard approach of informing the community by the various authorities.

To provide a standard approach to floodplain management, various government departments and agencies are currently preparing best practice manuals and guidelines, tabulated below:

Manual / Guidelines	Organisation
Victorian Floodplain Management Manual of Best Practice	DNRE
CMA Flood Response Actions Plans	DNRE
Guidelines for Whole Farm Plans	DNRE
Hydrology and Hydraulics Courses	DNRE
Best Practice Guidelines for Floodplain Management, Australia	SCARM
VPP Planning Practice Note - Land Liable to Flooding	DOI, DNRE, MW
Managing the Floodplain	EMA
Flood Preparedness	EMA
Flood Response	EMA
Flood Warning	EMA

Source: VFMS Appendix D4

3.7.2 Key Issues

It is not possible to protect the community against every possible flood event, therefore residents in key flood affected areas need to be informed of their risk to flooding and the emergency management procedures to be followed for safety and to minimise damage to their property.

The North East CMA can assist Councils, local groups and individuals to prepare specific flood response and contingency plans for their properties or local area.

Preparing contingency plans for local groups / neighbours will encourage community self-reliance and sharing of resources, and therefore assist in minimising the risk of flood damage to their local area.

The CMA should also endeavour to train and develop their staff in the special areas which will assist them in performing their duties.

3.7.3 Relevant Objectives

Strategy objectives in relation to best practice, education and training are:

- To use structural measures which are cost effective and locally accepted to reduce existing flood risk and potential flood damage cost, taking into account the environmental values of the floodplains.
- To contribute local knowledge and facilitate the development of local flood warning systems and emergency response procedures to minimise the risk to life, health and property and the residual damage costs of floods.
- To improve available information and the understanding in the community of the risk of flooding and its impact on property, the environment, community well being, health and safety.
- To support community education programs and community involvement in flood management.
- To involve the community in decisions relating to development of floodplain management plans, level of flood protection, response during flood events, recovery after flood events and cost sharing.

3.7.4 Development, Education and Training Needs

The CMA must develop community education programs to explain its role in areas such as:

- Land use planning
- Flood mitigation; and
- Emergency response.

The CMA should also facilitate and support education programs for the community in the general aspects of flood management and the roles of the stakeholders.

In addition, training of staff is needed in best practice on floodplain management activities and specific issues.

3.7.5 Role of the CMA

The North East CMA will facilitate community awareness of floodplain management issues and co-ordinate the provision of information services to the community. This will be carried out as a collaborative effort between the CMA, Councils and other relevant authorities, with the CMA adopting the lead role.

3.7.6 Proposed Program

The proposed program for development, education and training is detailed in Table 3.9.

Table 3.9 : Best Practice, Education and Training - Proposed Program

Target Task	Specific Action	Estimated Total Cost	Lead Agency	Support Agency	Priority
Establish an education campaign which assists the community to contribute to informed decision making with regard to floodplain management	The CMA to encourage and provide feedback and support to local community groups (eg. King River group, Wangaratta group, Markwood Levees group).	$5 000	Community Group	CMA Councils	Medium
	The CMA to attend local community group meetings when invited.		Community Group	CMA Councils	Medium
	Facilitate public information sessions on planning zones, including floodplains and appropriate development. Support curriculum development for schools	 $10 000	Councils CMA	CMA DNRE Teacher groups	Medium Low
"Best practice" in floodplain management and flood warning methods are monitored and implemented.	The CMA to produce newsletters (with community input) for the community which would include floodplain issues such as flood warning updates, works completed and advice on floodplain issues.	$5 000	CMA	Council / VICSES / BoM / DNRE / Rural Water Authorities / Police	- Low
	Support a flood warning and flood recovery training session once a year (in August) for the community	$5 000	VICSES	CMA / Council /BoM	Medium
	Conduct public debriefing sessions after major flood event (causing flood damage), which would include key stakeholders and the community.		VICSES	Council / CMA / BoM / DNRE / Rural Water Authorities / Police	As required
	Facilitate training and development of CMA staff in the special areas which will assist them in performing their duties. Conduct a management workshop to define "best practice" in floodplain management techniques.	$10 000 $25 000	CMA CMA	DNRE DNRE	Medium Medium
The CMA coordinates and integrates community involvement in decisions relating to floodplain management through implementation committees, and community consultations.	Broaden the scope of the implementation committees to include floodplain issues such as planning, developments, flood warning, community education and feedback.		CMA	Council/VICSES/BoM/ DNRE/Rural Water Authorities/Police	Medium

3.8 Resources

3.8.1 Current Status

Resourcing for the CMA to undertake its floodplain management functions under the Water Act (1989) is currently focussed on short-term issues and recognised in its 3 year Business Plan. Development of the regional strategy on floodplain management will enable a longer term view to be taken on which to base the CMAs next 3 year rolling Business Plan.

3.8.2 Key Issues

The main issues in terms of resourcing are:

- Clarification of roles and responsibilities for all the CMAs floodplain management activities:
- Identification of available funding sources;
- Cost sharing of resources from commonwealth and state governments and local contributions (especially financial), which will be the basis for the CMA the proposed work program; and
- Setting priorities for work program tasks and projects.

3.8.3 Relevant Objectives

The strategy objective which relates to the resourcing program is:

- To lead relevant stakeholders in resourcing, cost sharing, prioritising, implementing and monitoring of the programs in the regional strategy on floodplain management.

3.8.4 Roles and Responsibilities

The VFMS provides guidance on roles and responsibilities. However, the development of the regional floodplain management strategy provides the opportunity to clarify roles and responsibilities and in particular obtain agreement with the relevant stakeholders in the region. Roles and responsibilities for the CMA's floodplain management activities as set out in the VFMS are presented in Section 2.4.

The work programs presented in Section 3 indicate the specific roles and responsibilities (lead agency/support agency) agreed to on a project by project basis in the development of the strategy, within the context of the principles set out in the VFMS.

3.8.5 Priority

The priorities set out in Table 3.10 were established by consultation and the methodology outlined in Section 3.3.5. The CMA will need to apply the Rapid Assessment Methodology (RAM) to re-assess priorities when the methodology becomes available later this year.

3.8.6 *Cost Sharing Arrangements*

Cost sharing will be based on the cost sharing principles detailed in Section 2.4. Specific cost sharing arrangements should be negotiated and agreed to on a project by project basis between the CMA and key stakeholders, within the context of the principles set out in the VFMS and this strategy. Indicative cost sharing arrangements presented in this strategy (refer Table 3.10) will form the basis for detailed discussion and appropriate actions.

3.8.7 *Budget*

A preliminary budget for the implementation of the regional strategy is given in Table 3.11.

Table 3.11: Estimated Strategy Costs

	Year						
Authority	**1**	**2**	**3**	**4**	**5**	**6 to 10**	**Totals**
CMA	$ 15,000	$ 12,000	$ 17,000	$ 30,000	$ 35,000	$ -	$ 109,000
Councils	$ 50,000	$ 52,000	$ 92,000	$ 85,000	$ 96,000	$ 74,000	$ 449,000
Government	$ -	$ 31,000	$ 71,000	$ 150,000	$ 164,000	$ 181,000	$ 597,000
Other	$ -	$ 5,000	$ 10,000	$ -	$ 25,000	$ 15,000	$ 55,000
Totals	$ 65,000	$ 100,000	$ 190,000	$ 265,000	$ 320,000	$ 270,000	$1,210,000

Note: The above costs exclude an estimated cost of $50,000 per year required for the information management program on an as required basis as outlined in Table 3.8 (Section 3.6.6).

3.8.8 *Proposed Program*

The proposed program for the strategy is represented in the programs referred to in the other sections and consolidated into high and medium priority actions over a 5 year period and low priority actions for years 6 to 10 in Table 3.10.

Table 3.10: Strategy Actions, Priorities and Cost Sharing

Strategy Program	Specific Action	Priority	Year of Implementation	Proposed Source of Funds				
				CMA	Councils	Government	Other	Total
Asset Management	Establish working group to prepare program for management of assets on floodplain	H 1	1	$2,000	$3,000			$5,000
Asset Management	Lobby for legislative review re illegal works	H 2	1	$3,000	$7,000			$10,000
Statutory Land Use Planning	Include up to date flood information into planning schemes	H 3	1	$10,000	$40,000			$50,000
	Develop agreed local policy and set decision guidelines	H 4	2	$10,000	$40,000			$50,000
	Establish appropriate procedures for handling referrals	H 5	2	$2,000	$3,000			$5,000
Asset Management	Establish an inventory of existing flood structures	H 6	2			$10,000		$10,000
Local Flood Studies	Urban flood study for Bright	H 7	2		$9,000	$16,000		$25,000
Emergency Response	Develop CMA response plan	H 8	2			$5,000	$5,000	$10,000
Local Flood Studies	Urban flood study for Harrietville	H 9	3		$6,000	$14,000		$20,000
	Urban flood study for Wodonga (House Creek)	H 10	3		$6,000	$14,000		$20,000
	Rural flood study for Upper Ovens	H 11	3		$17,000	$33,000		$50,000
Emergency Response	Preparation/enhancement of Flood Response Plans	H 12	3	$5,000	$10,000	$10,000	$5,000	$30,000
Asset Management	Develop an education program re illegal levees	M 1	3	$2,000	$13,000		$5,000	$20,000
Local Flood Studies	Confirm and enhance 1% flood extent and flood level data from Flood Data Transfer project	M 2	3	$10,000	$40,000			$50,000
Asset Management	Establish priorities and procedures for detailed audits	M 3	4	$5,000	$5,000			$10,000
	Prepare asset data base from inventory	M 4	4	$10,000				$10,000
Local Flood Studies	Rural flood study for Kiewa	M 5	4		$17,000	$33,000		$50,000
Asset Management	Consult with landholders etc	M 6	4	$5,000	$10,000			$15,000
	Undertake detailed levee audit of Harrietville levees	M 7	4			$15,000		$15,000
	Establish operating procedure for O&M of assets	M 8	4	$10,000				$10,000
Local Flood Studies	Rural flood study for Indigo Creek	M 9	4		$9,000	$16,000		$25,000
	Rural flood study for King River (d/s Lake William Hovell)	M 10	4		$17,000	$33,000		$50,000
	Rural flood study for Oven River (Wangaratta to Yarrawonga)	M 11	4		$27,000	$53,000		$80,000
	Develop floodplain management plans for urban areas	M 12	5		$33,000	$67,000		$100,000
	Develop floodplain management plans for rural areas	M 13	5		$33,000	$67,000		$100,000
Best Practice, Training and Education	Support a flood warning & flood recovery training session	M 14	5				$5,000	$5,000
Emergency Response	Develop an education program to increase community awareness and collaborate with agencies to implement	M 15	5	$10,000	$10,000	$10,000	$10,000	$40,000
	Identify CMA staff roles during flood events	M 16	5	$5,000				$5,000
	Prioritise risks and assist in developing of recovery plans	M 17	5	$5,000	$5,000	$5,000		$15,000
	Review data needs and identify future requirements	M 18	5	$5,000	$5,000	$5,000		$15,000
Best Practice, Training and Education	Encourage and provide feedback and support to local groups	M 19	5				$5,000	$5,000
	Conduct a management workshop to define "best practice in floodplain management	M 20	5	$5,000	$5,000	$10,000	$5,000	$25,000
Best Practice, Training and Education	Facilitate training of CMA staff	M 21	5	$5,000	$5,000			$10,000
Asset Management	Detailed audit of Kiewa Valley levees	L 1	6 to 10			$10,000		$10,000
	Detailed audit of Markwood levees	L 2	6 to 10			$25,000		$25,000
Local Flood Studies	Rural flood study for Black Dog Creek	L 3	6 to 10		$10,000	$20,000		$30,000
	Rural flood study for Buffalo River	L 4	6 to 10		$13,000	$27,000		$40,000
	Rural flood study for Fifteen Mile Creek	L 5	6 to 10		$12,000	$23,000		$35,000
	Rural flood study for Yackandandah Creek	L 6	6 to 10		$12,000	$23,000		$35,000
	Rural flood study for Mitta Mitta/Upper Murray	L 7	6 to 10		$27,000	$53,000		$80,000
Best Practice, Training and Education	Support curriculum development for schools	L 8	6 to 10				$10,000	$10,000
	CMA produce newsletters	L 9	6 to 10				$5,000	$5,000
	Total			$109,000	$449,000	$597,000	$55,000	$1,210,000

3.9 Performance Monitoring

3.9.1 Current Status

The North East CMA was established by Government in mid 1997 and is undertaking performance monitoring in accordance with the DNRE Operating Guidelines and Business Planning Guidelines for CMAs.

Although there have been various authorities in the past that have dealt with functions that are now the responsibility of the North East CMA, standard benchmarks were not established & performance monitoring was rarely conducted, for floodplain management.

With the development of the regional strategy the North East CMA has an opportunity to establish attainable benchmarks for their floodplain activities against which its performance can be monitored.

3.9.2 Key Issues

The strategy needs to provide the CMA with a specific set of targets against which its performance can be measured and used to report to government.

3.9.3 Relevant Objectives

The relevant strategy objective for performance monitoring is :

To assist relevant stakeholders in the monitoring of the programs in the Regional Floodplain Management Strategy which are:

- Asset Management;
- Local Flood Studies and Floodplain Management Plans;
- Statutory Land Use Planning;
- Emergency Response;
- Information Management;
- Best Practice, Education and Training;
- Resources - Responsibilities, Priorities and Cost Sharing; and
- Performance Monitoring

3.9.4 Performance Monitoring Standards

Performance monitoring is about meeting short and long term floodplain management targets, consistent with the Victoria Flood Management Strategy.

3.9.5 Proposed Program

The proposed performance monitoring program is detailed in Table 3.12. NRE's RAM project will also address performance indicators. This will enable the CMA to review its performance monitoring program when it applies the RAM to the strategy.

Table 3.12 - Performance Monitoring

Target	Specific Action Asset Management	Performance Indicator
Prepare an inventory of all flood strategic mitigation structures.	Using the Flood Data Transfer information on levees and structures as a basis, establish an inventory of existing flood mitigation structures. Review inventory data and establish priorities and procedures for detailed audits.	Establish inventory in year 1 Review inventory and priority audits in year 4.
Coordinate the management and maintenance of all flood mitigation structures the CMA has (direct or authorised ownership) responsibility for.	Prepare an asset data base from the inventory data. Establish an operating system for management and maintenance of CMA assets.	Complete database in year 4. Establish an operating system in year 4.
Prepare policies and guidelines for management of private levees, particularly illegal levees, and disseminate to appropriate authorities, community schemes and individuals.	Establish Working Group to prepare program. Lobby for legislative review. Develop an education program. Consult with landowners via Landcare Groups.	Establish working group in year 1 Undertake in year 1 Develop education program and consult with landowners by year 3. Consult by year 4
Undertake periodic audits of all flood mitigation structures.	Detailed audit of Harrietville levee. Detailed audits of Kiewa Valley levees and Markwood levee	Complete audits and report on specified levees by end of year 4. Complete in years 6 - 10

Target	Specific Action	Performance Indicator
Local Flood Studies and Floodplain Management		
The CMA undertakes flood studies in accordance with identified priorities.	Conduct flood studies according to priorities previously specified.	Conduct high priorities in years 2 to 3
Develop floodplain management plans for priority urban and rural areas in cooperation with stakeholders	Conduct floodplain management studies and produce floodplain management plans identified in the flood studies.	Conduct in year 5.
Prepare 1% floodplain delineations for all major waterways	Confirm 1% floodplain delineations prepared in the Flood Data Transfer Project for: • Ovens River • Kiewa River • King River • Mitta Mitta River • Upper Murray River • Fifteen Mile Creek • One Mile Creek	Complete delineations for specified waterways in year 3.
Flood events to be mapped when they occur and floodplain management plans amended accordingly	Map flood events and update existing floodplain management plans after every major flooding.	Conduct as required.

Target	Specific Action Statutory Land Use Planning	Performance Indicator
The CMA collaborates with local government and contributes to statutory planning schemes based on their local flood knowledge.	Include up to date information on 1% flood extents, floodway zones and overlay areas for inclusion in planning schemes CMA negotiate with Councils to develop an agreed local policy and set of decision guidelines to include local floodplain development plans, help assess develop proposals and to clarify the need for referrals.	Provide information in year 1 Agreed policy within 2 years.
The CMA operates a referral authority to local government for developments on the floodplain.	CMA establish appropriate procedures for handling referrals from Councils including consultation/liaison procedures.	Procedures to be developed within 2 years.
The CMA undertake Water Act declarations where appropriate.	CMA review the need to declare flood areas under the Water Act where planning scheme controls are inadequate.	Conduct review as required.

Target	Specific Action Emergency Response	Performance Indicator
In co-operation with local government and the VICSES, collect, collate and disseminate local knowledge relevant to flood warning systems.	Review data needs and identify future requirements Prepare a program to improve data collection and source funds. Ensure relevant information from flood studies etc is introduced into emergency response planning.	Conduct review in year 5. Conduct yearly review/update Yearly review
Assist VICSES and local government in monitoring flood levels during significant flood event, and interpreting flood warnings.	Monitor and interpret flood levels.	Report on action
Educate the community about flood risks and accessing information by establishing an educational campaign about emergency response procedures, with local government and the VICSES.	Develop an education package to increase the community's awareness, understanding of and preparedness for floods. Collaborate with relevant agencies to promote the education campaign.	Develop a training and education within 5 years. Promote the package within 5 years.

Target	Specific Action Emergency Response	Performance Indicator
Establish emergency response procedures for CMA core activities and support other emergency agencies.	Develop CMA flood response action plan Assist Councils in preparing Flood Response Plans by providing advice and up-to-date information. Identify specific roles for CMA staff during flood events in terms of strengthening the systems. Provide resources during flood events as determined in relevant systems/plans. Collaborate with the BoM, VICSES and other agencies in ensuring flood warning systems are current. Prioritise risks and assist in developing recovery plans	Complete in year 3 Assist in preparing flood response plans in year 3. Conduct review of roles for CMA staff yearly and when roles change. Provide resources as required. Meet yearly with key stakeholders to discuss flood warning issues. Complete in year 5

Target	Specific Action Information Management	Performance Indicator
The CMA collates relevant flood information in an accessible format and provides that information to local government, other authorities and the community.	Obtain and analyse rainfall data after significant flood events for use in flood studies the Average Recurrence Interval (ARI) using flood frequency analysis.	Complete within 3 months after flooding.
	Obtain streamflow and flood level data.	Complete within 3 months after flooding.
The CMA continually updates flood information with as high a level of accuracy as practicable.	Collect, obtain and review flood levels and flood depths after each minor / moderate / major flood and update CMA information	Complete within 3 months after flooding.
	Determine / review flood extent and floodplain delineations after each minor / moderate / major flood events	Complete within one year after flooding.
	Obtain and review flood damage data	Complete within 6 months after flooding.
	Coordinate flood photography (including aerial photograph) and review floodplain delineations	Conduct during flooding.
	Obtain and review soil, geology and geomorphology maps for flood studies	Obtain as required.
	Obtain and review land use data (zonings, commercial and agricultural assets) for input to land use control.	Obtain as required.
	Obtain and review demographic data (population and community statistics) and incorporate into floodplain management plans	Obtain as required.
	Obtain and review natural resource assets (wetlands, flora and fauna habitats) and incorporate into floodplain management plans.	Obtain as required.

Target	Specific Action Information Management	Performance Indicator
	Obtain and review sites of geological archaeological and landscape significance and incorporate into floodplain management plans.	Obtain as required.
	Survey and store construction details of new assets.	Survey and file in 3 months of completed asset.
	Conduct programmed structural assessment of CMA assets	Conduct assessment of assets as programmed.

Target	Specific Action	Performance Indicator
Best Practice, Education and Training - Proposed Program		
Establish an education campaign which assists the community to contribute to informed decision making with regard to floodplain management	The CMA to encourage and provide feedback and support to local community groups (eg. King River group, Wangaratta group, Markwood Levees group).	Conduct by year 5.
	The CMA to attend local community group meetings when invited.	Attend as required.
	Facilitate public information sessions on planning zones, including floodplains and appropriate development.	Conduct once a year and as required.
	Support Curriculum development for schools	Report annually on progress.
"Best practice" in floodplain management and flood warning methods are monitored and implemented.	The CMA to produce newsletters for the community which would include floodplain issues such as flood warning updates, works completed and advice on floodplain issues.	Produce newsletters at least 2 times a year by year 6.
	Support a flood warning and flood recovery training session once a year (in August) for the community	Conduct once a year from year 5 onwards.
	Conduct public debriefing sessions after major storm event (causing flood damage), which would include key stakeholders and the community.	Debrief within 2 months of flooding.

Target	Specific Action	Performance Indicator
Best Practice, Education and Training - Proposed Program		
	Facilitate training and development of CMA staff in the special areas which will assist them in preforming their duties.	Review staff training requirements once a year from year 5 onwards.
The CMA coordinates and integrates community involvement in decisions relating to floodplain management through implementation committees, and community consultations.	Broaden the scope of the implementation committees to include floodplain issues such as planning, developments, flood warning, community education and feedback.	Implement within year 1.
Resources - Responsibilities, Priorities and Cost Sharing		
Memoranda of understanding are established with stakeholders to ensure equitable cost sharing arrangements and agreed priorities in consultation with the community.	Project cost sharing arrangements and priorities are established between key stakeholders and the community.	Establish for each project.
Working relationships with stakeholders are established with clear roles and responsibilities.	Project specific details and responsibilities are clarified with key stakeholders.	Conduct for each project.
The CMA holds a register of flooding issues within the region with respect to priority.	Review priorities of registered flooding issues.	Review once a year and as required (eg after flooding).

Target	Specific Action Performance Monitoring	Performance Indicator
The CMA facilitates appropriate benchmarks for flood management.	Develop appropriate benchmarks for floodplain management in consultation with key stakeholders.	Develop benchmarks in 12 months.
	Review floodplain management benchmarks.	Review at the beginning of each business planning period (3 years).
The regional floodplain management strategy is reviewed at the end of each business cycle.	Review the regional floodplain management strategy, and report on progress.	Review at the end of each business planning period (3 years).
	Make recommendations of any amendments to the strategy.	Amend as required.

Appendix A

Roles and Responsibility of CMA re Management of Waterways and Floodplains

(extract from DNRE's Operating Agreement)

Appendix B

Funding Arrangements

EXTRACT FROM VICTORIA FLOOD MANAGEMENT STRATEGY

(DNRE, 1998)

COST SHARING

Funding Sources

In regional Victoria the cost of implementing structural and non structural flood management measures is usually met through a combination of funding sources from the Commonwealth, State and Local Governments. The Commonwealth Government may provide funding through the NHT (formerly National Landcare Program) for approved projects which must be matched from State Government sources plus a local contribution.

In the Melbourne metropolitan area, MW generates funds for implementation of flood management schemes through the drainage rate and, for new development areas, through development contributions. However, cost sharing arrangements will need to be developed for some specific non-urban areas under MW's control where drainage rate revenues are not adequate to deal with the flood protection needs of the local communities.

Other than for flood warning, cost sharing is therefore an issue which relates predominantly to regional Victoria and is addressed in this Section within the context of regional Victoria. Flood warning arrangements for the metropolitan area will be developed as part of the review of the Port Phillip region in 1998.

Natural Resource Management Guidelines

Efficient priority setting procedures also require equitable and efficient cost sharing arrangements. The State Government's natural resource management guidelines (Victoria Government, 1997) for cost sharing are set out below and apply to investment in flood management.

General

- Detailed cost sharing arrangements are negotiated as part of the regional catchment planning process (See Section 4.6f, Regional Floodplain Management Strategies.
- At the broadest level cost sharing arrangements are based on a combination of polluter pays and beneficiary pays principles.

Duty of care

- All natural resource users and managers have a duty of care to ensure that they do not damage the natural resource base. The users should be responsible for making good any damage incurred as a result of their actions.

Beneficiary Pays

- When it is not possible to identify causes of damage then primary beneficiaries should pay.

Government Contributes for Public Benefit

- Government contributes primarily for activities which produce public benefits. Users, both existing and future, are expected to pay for activities which provide private benefit.
- Government may agree to contribute to land and water management activities that produce private benefits where the cumulative uptake of these activities provides significant public benefit.

Economic Viability

- Before Government will contribute to any land and water management activity, the activity must be technically sound and the benefits must justify the costs.

Statewide Policy and Monitoring

- Government will meet the cost of statewide planning, statewide resource monitoring and assessment, and research and investigation, where they are crucial to sustainable resource management.

Cost Sharing Principles

Cost sharing principles for regional Victoria are based on the above natural resource management guidelines and on the roles and responsibilities outlined in Section 4.6. Cost sharing principles apply to the following flood management activities in relation to:

- Commonwealth Government contribution, eg DPIE, BoM
- State Government contribution, eg DNRE
- local contribution, eg municipal council, CMA, rural water authority (RWA)

Statewide Policy and Strategies

- Government will fund the preparation and ongoing review of the Victoria Flood Management Strategy.
- Government will fund the initial development of the floodplain management component of regional catchment strategies. Local contributions (CMAs) will fund the ongoing review of these strategies.

Flood Data Management

- Government will fund the establishment of a baseline flood data base of available information, including flood maps.
- Government will contribute to the development of new flood information undertaken as part of a significant flood study. Local contributions (council, CMA) will be determined on the basis of distribution of benefits and will be at least one third of these costs.
- Local contributions (council, CMA) will totally fund the ongoing review and enhancement of flood data and flood maps, including collection of real time flood data for local floods.
- Government will contribute to the collection of real time flood data for major floods of State significance.

Flood Studies and Floodplain Management Plans

- Government will contribute to the development of flood studies and floodplain management plans. Local contributions (council, CMA) will be determined on the basis of distribution of benefits and will be at least one third of these costs. Local contributions will fund all of the ongoing cost of review of studies and plans.

Statutory Planning

- Government will fund the establishment of specific baseline flood maps, using available information, for use by municipal councils in their planning schemes.
- Local contributions (council, CMA) will totally fund the cost of implementing the statutory planning process and of reviewing planning scheme flood maps and associated controls.

Asset Management

- Government will fund the initial audit of specific existing strategic public levees at the local and regional level, in view of the public benefit associated with establishing a base-line database of location, condition and upgrading needs. Local contributions (council, CMA) will totally fund ongoing audits.
- Government will contribute to the implementation of approved local flood mitigation works (including levees) which protect existing urban development, where the works are shown to be cost effective and address a significant flood risk. Local contributions (council) will be determined on the basis of distribution of benefits and will be at least one third of these costs. Local contributions (council) will fund all of the cost of ongoing management, maintenance and upgrading of these works.
- Government will in some cases provide a "one-off" contribution to the upgrading of specific existing strategic public levees at the regional level to previously adopted standards. Local contributions (CMA) will fund all of the cost of ongoing management, maintenance and upgrading of strategic public levees at the regional level.

Flood Warning
Cost sharing is based on the following principles:

- At the statewide level Government (DNRE) is responsible for the streamflow data collection network for the purpose of natural resource management.
- At the regional level, RWAs are responsible for data collection networks for the purpose of operating their water storages, and CMAs will augment existing networks, where appropriate.
- At the local level, municipal councils are responsible for flood warning systems required to meet local community needs.
- At all levels real time free access to data will be provided to network stations for flood warning.

In the Melbourne metropolitan area, flood warning costs are principally met by MW with a small contribution from the BoM. Detailed flood warning responsibilities will be prepared by the VFWCC in its document "Arrangements for Flood Warning Services in Victoria".

Research, Education and Training

- Government will fund the development of statewide best practice manuals and guidelines, research, education and training programs for flood management, which are crucial to sustainable resource management.

Appendix C

Report on Strategy, Vision, Objectives and Targets

Appendix D

Levee Inventory

Appendix E

Evaluation Methodology for Flood Studies

Appendix E

General

DNRE has initiated a consultancy to develop a Rapid Appraisal Methodology (RAM) for application to floodplain management projects. The outcome from this consultancy was not available for this project. As a result, an alternative approach was needed. An assessment procedure derived in 1980 (Rural Water Commission of Victoria) was adopted as a preliminary assessment procedure. In the absence of a more rigorous approach, results from the preliminary assessment procedure were qualitatively reviewed and the priorities adopted for the strategy modified accordingly. The preliminary assessment procedure is described below.

Assessment Procedure

The priority rating of a particular project is dependant upon many individual factors that contribute to its importance. To effectively quantify a project's importance, only the most influential factors are analysed. For example, it has been assumed that the damaging effect of flood duration is less significant in comparison to that of flood depth and velocity. For this reason, the depth and velocity of a flood are considered and flood duration is not. With increasing depth and velocity, the damaging potential of a flood is greater and hence works for that area are considered more important.

It is recognised that in rural areas, flood duration could lead to significant economic and social damages due to the possible destructive impact on farming activities. Generally, however, flood duration is interdependent upon flood height and velocity, which further reduces the need to consider flood duration as an individual indicator in the preliminary assessment.

The factors that are therefore considered the most influential in determining the urgency of works are:

- Flood depth and velocity;
- Number of properties damaged;
- Benefits of works compared with the cost of works;
- Effects of works on the environment;
- Adequacy of flood planning currently in place;

These five factors form the criteria for the final priority rating of a project. Each project receives a score for every criteria. The score reflects a measurement of the criterion in a 1:100 year flood event. For example, if the depth of a flood was estimated at 2 m and the velocity estimated as 0.5 m/s, then the factor would be 1 (flood depth, 2 x flood velocity, 0.5). The score for a factor of 1 is 4, based on the score ranging from 1 to 12.

The scores are based on linear relationships with the minimum and maximum scores as shown below:

Criterion	Factor	Factor/ Minimum Score	Factor/ Maximum Score
Life and safety	velocity x depth	0/1	4/12
Potential damage	velocity x depth + no. of properties	0.1+100/1	4+>500/6
Risk to health	no. of properties	0/2	500/6
Environmental	Impact		+6
Economic benefit	Benefit/cost ratio	0/0	1.5/12
Planning	Qualitative assessment	a/4	c/12

The ranking of each project is then determined by summing the scores. The project with the highest score is given priority "1", indicating that this is the most important project based on this assessment.

Priorities

A preliminary list of possible projects for the CMA to include in the regional strategy is given in Table E.1.

The list includes several flood studies relating to both urban and rural areas. Urban areas are considered to have higher priority, with attention to the rural areas at a lower priority. The possible studies/actions have been categorised in terms of high, medium and low priority.

The evaluation technique was applied to the flood studies. Other projects/tasks were assessed subjectively and discussed in the consultation process.

Re-Assessment

When the DNRE RAM project is completed later this year, the new methodology can be used to re-assess project priorities, cost sharing and performance monitoring and to modify the strategy accordingly.

Table E1- Priority Projects

Potential Project	Description	Modelled Indicative Priority
Wangaratta[1]	Urban floodplain management study	1
Myrtleford[2]	Urban floodplain management study	2
Buckland River - Wallace Drive[3]	Urban flood study	3
Ovens River at Bright/Porepunkah	Urban flood study of tributaries	4
Ovens River at Harrietville	Urban flood study	5
House Creek at Woodonga	Urban flood study	6
Ovens River - Harrietville to Wangaratta	Rural flood study	7
Indigo Creek	Flood study	8
Kiewa	Rural flood study	9
Upper King d/s William Hovell	Rural flood study	10
Ovens River- Wangaratta to Yarrawonga	Rural flood study	11
Black Dog Creek	Urban flood study re Chiltern	12
15 Mile Creek	Rural flood study	13
Yackandandah Creek	Flood study	14
Mitta Mitta/Upper Murray	Rural flood study	15

Note:
1. Urban floodplain management study and water management scheme (flood mitigation) is nearing completion for the Rural City of Wangaratta.
2. Urban and Rural floodplain management study (flood mitigation) is in progress.
3. Semi Urban flood study now completed.

Appendix F

Details on Scope of Work for Flood Studies

Appendix F - Proposed flood Studies

HIGH PRIORITY

Bright

The Bright township is affected by flooding from the local Ovens River tributaries, in addition to the flooding from the Ovens River. Flood extent and flood level information is available through the Flood Data Transfer project.

A study is required to investigate the hydrology of the tributary catchments to determine the 1% flood extents, to assess the potential flood damage, to identify possible flood mitigation measures and to determine the need and scope for further investigations.

Estimated cost of study is $25 000.

Harrietville

Harrietville is affected by flooding in the Ovens River. The township is located at the base of the mountains and flooding occurs with limited warning. Information on the flood extent at Harrietville is limited and requires improved definition. In addition, the level of protection provided by the existing levee along the Ovens River needs assessment.

A study is required to investigate the hydrology of the Ovens River catchment upstream of Harrietville to determine the 1% flood extent through the town, to assess the potential flood damage, to identify possible flood mitigation measures and to determine the need and scope for further investigations.

Estimated cost of study is $20 000

Wodonga

Flood studies have been undertaken for all the waterways flowing through the Wodonga urban and industrial area except for House Creek. Urban development along part of House Creek has occurred with the benefit of a levee designed and constructed by the development firm. However, the extent of the floodplain needs to be further delineated to enable appropriate planning of further developments under the planning scheme.

A flood study is therefore required to provide improved definition of the 1% flood extent for planning purposes. The study would involve investigating the hydrology of the House Creek catchment to the Murray River, determining the 1% flood extent through the existing and potential development areas, assessing the potential for flood

damage, identifying possible flood mitigation measures and determining the need and scope for further investigations.

Estimated cost of the study is $20 000

Upper Ovens River

The potential for flooding in the upper reaches of the Ovens River between Harrietville and Wangaratta has been quantified by documentation of flood events and by specific flood studies (eg the current Myrtleford Floodplain Management Study and the Wangaratta Floodplain Management Study). Further flood information on flood extents at specific town locations (Harrietville, and Bright) will be derived from the urban flood studies referred to above. There is a recognised need for improved definition of the floodplain along the Ovens River including the delineation of the floodway area.

A rural flood study is proposed to fill in the gaps in flood information along this reach of the Ovens River. The study would include investigating the hydrology of the total Ovens catchment, determining the 1% flood extent through the existing and potential development areas by broad scale hydraulic modelling, assessing the potential for flood damage, identifying possible flood mitigation measures and determining the need and scope for further investigations.

Estimated cost for the study is $50 000.

MEDIUM PRIORITY

Indigo Creek

The potential for flooding along Indigo Creek is not well documented. There is a need for improved definition of the floodplain along the creek, including the delineation of the floodway area.

A rural flood study is proposed to fill in the gaps in flood information along the creek, particularly the lower reaches. The study would include investigating the hydrology of the creek catchment, determining the 1% flood extent through the existing and potential development areas by broad scale hydraulic modelling, assessing the potential for flood damage, identifying possible flood mitigation measures and determining the need and scope for further investigations.

Estimated cost for the study is $25 000.

Kiewa River

The potential for flooding along the Kiewa River between Mt Beauty and the Murray River has been quantified by documentation of the 1998 flood event and to a limited extent by specific flood studies (eg minor flood studies for specific planning issues).

There is a recognised need for improved definition of the floodplain along the Kiewa River including the delineation of the floodway area. The potential for flood damage is unknown.

A rural flood study is proposed to fill in the gaps in flood information along this reach of the Kiewa River. The study would include investigating the hydrology of the total Kiewa catchment, determining the 1% flood extent through the existing and potential development areas by broad scale hydraulic modelling, assessing the potential for flood damage, identifying possible flood mitigation measures and determining the need and scope for further investigations.

Estimated cost for the study is $50 000.

King River (d/s of Lake William Hovell)

The potential for flooding in the middle to lower reaches of the King River downstream of Lake William Hovell has been quantified by documentation of flood events. Specific flood studies (eg the Wangaratta Floodplain Management Study and the Wangaratta Floodplain Management Study) provide relevant information in the lower reaches near Wangaratta. There is a recognised need for improved definition of the floodplain along the King River including the delineation of the floodway area.

A rural flood study is proposed to fill in the gaps in flood information along this reach of the King River. The study would include investigating the hydrology of the total King River catchment, determining the 1% flood extent through the existing and potential development areas by broad scale hydraulic modelling, assessing the potential for flood damage, identifying possible flood mitigation measures and determining the need and scope for further investigations.

Estimated cost for the study is $50 000.

Ovens River (Wangaratta to Yarrawonga)

The potential for flooding in the lower reaches of the Ovens River between Wangaratta and Yarrawonga has been quantified by documentation of flood events. There is a need for improved definition of the floodplain along this reach of the Ovens River including the delineation of the floodway area.

A rural flood study is proposed to fill in the gaps in flood information along this reach of the Ovens River. The study would include investigating the hydrology of the total Ovens catchment, determining the 1% flood extent through the existing and potential development areas by broad scale hydraulic modelling, assessing the potential for flood damage, identifying possible flood mitigation measures and determining the need and scope for further investigations.

Estimated cost for the study is $80 000.

LOW PRIORITY

Black Dog Creek, Buffalo River, Fifteen Mile Creek, Yackandandah Creek and Mitta Mitta/Upper Murray River

The potential for flooding in the above rivers has been quantified by documentation of flood events to varying extents. There is a recognised need for improved definition of the floodplain along the reaches of these rivers including the delineation of the floodway area.

Rural flood studies are proposed to fill in the gaps in flood information along these rivers. The studies would generally include investigating the hydrology of the catchments, determining the 1% flood extent through the existing and potential development areas by broad scale hydraulic modelling, assessing the potential for flood damage, identifying possible flood mitigation measures and determining the need and scope for further investigations.

Estimated cost for the studies range from $30 000 to $80 000, with a total cost of $220 0000.