

RESOLVING PROBLEMS WITH FLOOD MITIGATION INFRASTRUCTURE – RESPONDING TO COMMUNITY NEEDS

M Edwards

Department of Sustainability and Environment, Melbourne, Victoria.

Abstract

From September 2010 to June 2012 many parts of Victoria experienced severe flooding. This led to a parliamentary inquiry into flood mitigation infrastructure in Victoria and a separate review into flood warning systems by Mr Neil Comrie, a former Chief Commissioner of Police.

A number of significant issues that have direct relevance to flood mitigation were identified, including:

- uncertainty about the ownership and management arrangements for levees and waterways
- how community views, which may not always be technically correct, can be valued and considered
- legal, social and other impediments that prevent progress from being made.

This paper addresses some of the main issues, concerns and recommendations expressed by the parliamentary committee. The views of agencies and a wide sector of the broader community who made submissions, gave presentations or provided advice were taken into account.

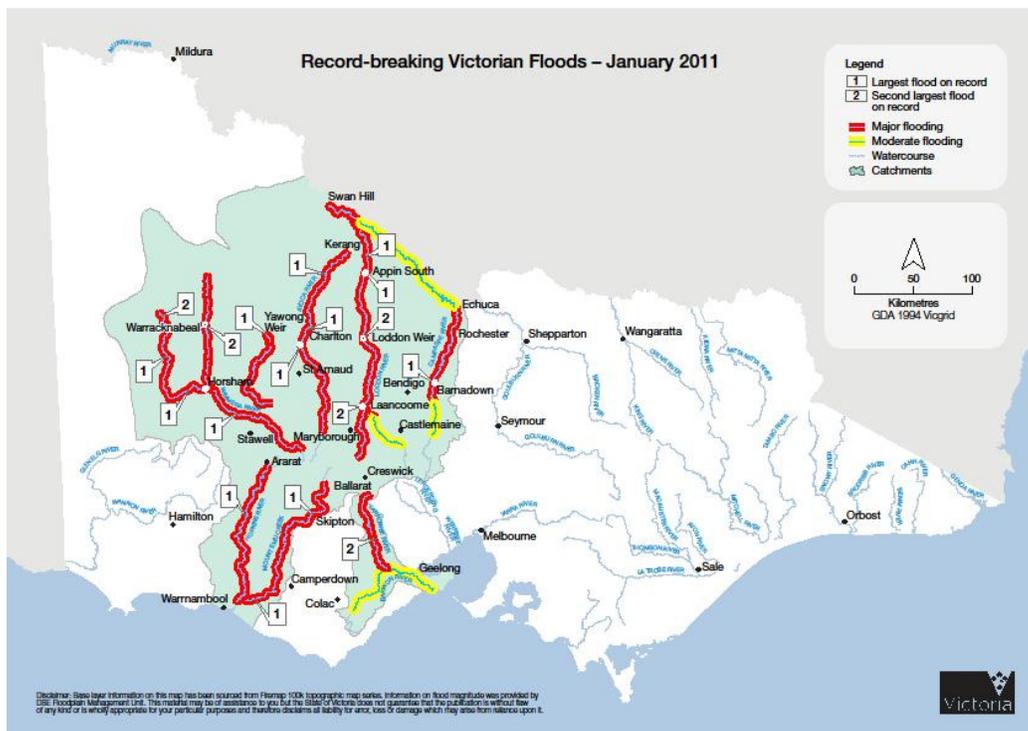
The parliamentary committee recommendations and supporting information provide direction for strengthening flood mitigation management in Victoria, and potentially provide lessons for other states and territories contemplating expanding flood mitigation activities.

Introduction

From September 2010 to March 2011, on the back of a prolonged, state-wide drought, many parts of Victoria experienced some of the worst flooding on record. There were seven significant rainfall events, each affecting one to seventeen municipalities. The largest flood occurred in January 2011 and affected more than 3,500 properties (see Figure 1).

The total cost of the floods was estimated to be around \$1.3 billion, taking into account costs to individuals, local government, catchment management authorities, government departments, agricultural losses, repair and restoration costs and other recovery measures. One fatality was reported near Shepparton.

Figure 1. Areas affected by January 2011 flooding



(Source: Department of Sustainability and Environment)

The Victorian government called for two major inquiries. The first was a review of the 2010-2011 flood warnings and response, led by Neil Comrie AO APM - the Victorian Floods review. It is not the main focus of this paper.

This paper focuses on the second inquiry, which was a parliamentary inquiry into flood mitigation infrastructure in Victoria by the Environment and Natural Resources Committee (ENRC), with membership from the major political parties. The terms of reference of the committee are provided in Appendix 1.

To fully understand the implications of the ENRC recommendations ENRC sought to build on existing institutional arrangements. The catchment management authorities and Melbourne Water have statutory functions for waterway management, floodplain management and regional drainage under the *Water Act 1989*. Those functions are enabling and they must prioritise what they do.

Local government authorities do not have specified floodplain management or waterway management functions but they do administer the planning schemes, and they traditionally manage and contribute to the cost of flood studies and works. They also have a significant role in flood response and recovery.

So in effect flood mitigation (and associated drainage and waterway management activities) is a shared responsibility.

Key Themes

ENRC was particularly keen to hear the views of the community and sought to be informed by organisations with knowledge about the issues raised. The methods that the Committee used for information included briefings, public hearings, information from the Victorian Floods Review and 103 written submissions.

In responding to the terms of reference ENRC divided its report into nine chapters, six of which focus on the following key themes:

- Levees: ownership, management and maintenance responsibilities – 19 recommendations.
- Legal issues around liability to public authorities for repairing old levees – 1 recommendation.
- Waterways: ownership, management and maintenance approaches – 11 recommendations.
- Water storages – 2 recommendations.
- Flood Monitoring infrastructure – 4 recommendations.
- Local knowledge, community engagement and education – 3 recommendations.

Levees

Of the estimated 4000 km of urban and rural levees in Victoria, about 98% are rural levees. Approximately 80% of these have been privately constructed, either to protect an individual property or to protect a number of farms. The remaining rural levees were constructed with some government involvement, mostly 60 to 100 years ago. This involvement included direct construction by an agency (to reasonable standards), or funding contributions (e.g. unemployment relief) where there was inadequate control over design and construction standards.

The rural levees are located on both private and public land, and often on the natural river bank, which severely confines the passage of floodwaters and increases the likelihood of failure. The rural levees are not being regularly maintained, although some have been repaired after major floods (see Figure 2).

There are a number of urban levees constructed before 1980, and the standards and management obligations for these older levees are unknown. Other urban levees were built by local government authorities after 1980, to reasonable standards, often as approved schemes under the *Water Act 1989*. The cost of design and construction was substantially subsidised by state and federal governments, in return for the local government agency agreeing to manage the levee.

Figure 2. Levee breach Lower Loddon, February 2011



Source: North Central Catchment Management Authority

Some of the key issues that emerged out of the public hearings and submissions included the following:

Lack of clear government direction on roles and responsibilities

The considerable range of views and opinions expressed about levees pointed out a lack of clarity around who was responsible for levees and under what circumstances. This was particularly evident for a small number of rural levees on public land, or on a mix of public and private land, where there was a perception among some stakeholders that the state government should have responsibility for all rural levees of this type.

This lack of clarity creates a range of separate problems, such as:

- Conflicting requirements for managing public land. Many rural levees are located entirely or partially on public land and do not benefit the public land. Logically they should be relocated to privately owned land but this is expensive and is not usually supported by the community.
- Where a levee system straddles public and private land it is difficult to create a consistent and equitable system for managing the levee.
- Many rural levees were partially funded by or constructed by authorities or agencies that no longer exist.
- There are situations in which landowners are legally prevented from entering public land on which a levee is situated to repair a levee. There are also situations in which emergency management agencies have been impeded when entering private land to repair or cut a levee to alleviate flooding.
- There are significant legal issues associated with levee performance or failure. ENRC was satisfied that the legal system in Victoria currently provides affected landholders with rights of redress and opportunities to seek compensation for flood damage caused by unreasonable or negligent private levee construction. However legal liability was seen to be an impediment to public authorities maintaining and repairing levees, particularly if their construction standard was unknown or poor.

Lack of government direction on management arrangements

Levee management in Victoria has been an evolutionary process and this has created a legacy of management issues, as a result of poor planning. Most of the problem levees for government are those that were constructed prior to modern understandings of floodplain management, so that there were usually no arrangements or agreements over who maintained the levee, where it should be located, the design requirements, the level of protection or the standard of construction. Under such circumstances there is a reluctance from the authorities to touch them.

Some of the problems associated with this gap are:

- Those receiving the benefits of levee protection expect others to pay for levee maintenance and repair.
- The community does not understand that even if a levee is well maintained it can still fail, creating a financial and social burden to the beneficiaries.
- Where levees have not been maintained adequately they require upgrading to their former condition. This is expensive.
- Standards and management arrangements for levees in New South Wales are different to those in Victoria.

Upgrading rural levees may not be cost effective and financial resources are prohibitive. For example if one assumes a rate of \$50/m to upgrade approximately 800 km of rural levees that have some history of government involvement, the cost is \$40 million. Upgrading them to a reasonable standard is likely to cost much more. Ad hoc investment is not likely to represent value for money and may exceed the capacity of all levels of government to meet the cost of new levees or to upgrade the existing levees.

Lack of guidance material

Some of the concerns of ENRC and the community were about inefficient processes, and a lack of technical guidance. For example:

- There is a lack of guidance on managing levees in emergencies, during and after a flood event.
- There are no published criteria for assessing the ongoing viability of ad hoc temporary levees constructed immediately prior to a flood.
- There are gaps in technical guidelines for levee design, construction and maintenance that need to be addressed. The guidelines were published in 2002.
- The approvals processes for conducting works on levees are complex, time consuming and costly. This provides little incentive to maintain the private levees.

Key recommendations from ENRC

ENRC made 20 recommendations in relation to levees, including one on legal issues. The main ones can be paraphrased as:

Policy

- Clarify the principles, roles and responsibilities for the ownership of, responsibility for the ownership, management and maintenance of all levees in a revised *Victoria flood management strategy*. This was last published in 1998 and it provides the broad framework for flood management in Victoria.
- Broadly align responsibilities for managing and maintaining the levees outside Melbourne to:
 - local government for urban levees

- catchment management authorities for rural levees, where the beneficiaries have agreed to pay for maintenance and to be rated for this service
- private landowners where privately built on private land.
- Include a strategic framework for the management and ongoing maintenance of Victoria's levees, including criteria for a consistent state-wide approach to prioritising levees for future management and investment.
- In revised regional floodplain management strategies prepared by catchment management authorities, identify and prioritise levees, with prioritisation underpinned by the beneficiary pays principle.
- Consider enacting legislation to protect public authorities from legal liability if they undertake works on priority levees in good faith, but not if they have acted negligently.
- Give landowners the option of being able to manage and maintain a levee on public land where there is no agreement from an authority to manage the levee on their behalf.

Management arrangements

- Use the beneficiaries pays principle to determine ownership and management arrangements, not land tenure or prior government involvement.
- For priority public levees (urban and rural) formalise management arrangements, documenting roles and responsibilities, beneficiaries, standards for performance and maintenance, and where appropriate, the rationale for rating beneficiaries.
- Where relevant arrange for legal access by the public authority onto private land to manage the levee.
- Where a levee has been identified as low priority, and the beneficiaries are not willing to contribute to its maintenance, inform the beneficiaries that public authorities will not fund the repair of the levees in the future.
- Identify and remove (over time) non-priority levees where such removal can be justified (e.g. if the levee prevents a significant wetland from receiving water).
- Reduce red tape that acts as a deterrent to maintaining private levees or to allowing landholders to maintain levees on public land.
- Establish an appropriately represented floodplain management committee and develop a floodplain management strategy for the Murray River. Seek agreement by both states in relation to improved appeals processes, levee heights and maintenance regimes.
- Consider using temporary levees as an alternative to permanent structures and consider sharing of temporary levees for different areas.
- Consider contributing government funding to upgrade high priority levees managed by a public authority (to enable them to be in a reasonable condition for beneficiaries to afford the cost of ongoing maintenance).
- Audit and regularly inspect and maintain all levees managed by an authority.

Guidelines

- Develop guidelines to streamline the approvals process for conducting works on levees, and review technical guidelines for design, construction and maintenance of levees.
- Develop guidelines for the management of levees in emergencies, including criteria for assessing the ongoing viability of ad hoc levees constructed shortly before a flood, and examine a more effective means for local government to remove illegal levees.

Key Lessons and Issues for Government

The Victorian Government is likely to delay its response to the recommendations of the ENRC Inquiry into flood mitigation infrastructure until at least June 2013, which is when ENRC completes a separate inquiry into rural drainage. However ENRC has identified some key lessons with regard to levees.

- Roles and responsibilities for managing levees, and the process for deciding future management arrangements, need to be better clarified. This will be through the update to the *Victoria flood management strategy*.
- Roles and responsibilities for managing levees regionally, along with priorities for any works, will need to be defined in regional floodplain management strategies. These are developed by catchment management authorities and include consultation processes.
- The legacy of old levees – what to do with them and how to get them managed sustainably – is far more significant than newer levees, which can be controlled through planning schemes, regulations and guidance. It is therefore much better to use best practice floodplain management principles to put in sustainable management arrangements rather than create a problem for future generations.
- Rural levees should be located on private land and urban levees should be located on land specifically reserved for a levee. Many of the issues that ENRC looked into could have been avoided if authorities had not allowed levees that benefit private landowners to be constructed on public land.
- The approved scheme process that has been utilised since the 1980s or thereabouts has provided reasonably robust arrangements for managing urban levees. In terms of current arrangements, this results in a council being responsible for implementing the scheme and maintaining any works. The investigation phase will justify the need for works, consider options and demonstrate the cost effectiveness of the recommended solution. Subsequent works are implemented as a separate phase when funding is available. Usually the cost of the scheme is subsidised.
- For the older, rural levees the broad principles are:
 - Treat each levee system as a whole, irrespective of where the levee is located and the past history
 - Work with stakeholders to determine its value to the community
 - The government should not subsidise levee improvements unless the beneficiaries are identified and they agree to pay for maintenance
 - If sustainable arrangements cannot be put in place to maintain the levees they should be left to deteriorate or managed privately.

Issues to government are:

- How to decide which levees will be supported by the beneficiaries, whether it should invest in upgrading high priority levees to a reasonable standard, and how to introduce management arrangements that are sufficiently robust to deal with the different circumstances for each levee.
- What the best arrangements are for allowing beneficiaries to access public land to maintain or repair levees that aren't going to be managed by an authority on their behalf.
- How best to provide legal protection for authorities taking on or managing levees in good faith, without taking away the right to sue for negligent actions. The government is likely to address this through a separate review of the *Water Act 1989* that is currently underway.

Waterway management

Victoria has approximately 128,000 kilometres of waterways. ENRC received a considerable number of submissions seeking improved management of vegetation in waterways to alleviate flood risk.

ENRC made a number of findings and recommendations around waterway management, which included the related topic of rural drainage. This paper does not address rural drainage which is the subject of a separate ENRC inquiry into rural drainage that is currently underway.

The value of waterway management to flood mitigation - Perception vs reality

By managing vegetation appropriately waterways can provide flood mitigation benefits, in a number of ways. At a catchment scale, dense vegetation in the waterway can delay the passage of floodwater moving into and along the waterway, reducing the peak flow downstream, and arguably providing more time to respond to floods. Vegetation can also stabilise river banks, making them more resilient to the effects of future flooding (see Figure 3). This includes reducing erosion, which can lead to changes in a river's course or alter the shape of the waterway, thereby affecting the depth and velocity of floodwaters

Figure 3. Paired site assessment for Black Range Creek, north east Victoria



The section on the left experienced erosion during a flood event. A revegetated section incurred only minor channel change in the same event. Source: Alluvium 2011

ENRC found that there were strong community concerns about whether vegetation can also aggravate flooding locally. Debris mobilised during a flood can build up against critical infrastructure such as culverts and bridges, and vegetation can choke the waterways. Both ways force water out onto the floodplain.

These effects may be felt by local communities if the local floodplain happens to be occupied by houses or if the local bridge or culvert is washed away. However the effects of measures to reduce local flooding are often exaggerated.

These impacts can be modelled. A flood study can help clarify how much flood levels increase as a result of a choked waterway or debris build up, rather than rely on inferences that because a waterway was obstructed this caused the flooding.

Roles and responsibilities

ENRC made the following observations:

- The catchment management authorities and Melbourne Water have enabling powers under legislation but this does not oblige them to carry out these powers. Their ability to undertake their functions is dependent on the funding available. Unlike Melbourne Water, catchment management authorities do not rate for flood mitigation or waterway management.
- Local government has a traditional role in flood mitigation planning but its powers in relation to waterway management are not defined in the *Local Government Act 1989*. This may create confusion to local government if options for flood mitigation includes waterway management aspects.
- There is considerable uncertainty between the catchment management authorities, Melbourne Water, local government and the public about what they can and can't do, and the regulations required.

ENRC therefore made the following recommendations:

- Ensure the revised *Victoria flood management strategy* clarifies roles and responsibilities clearly
- Catchment management authorities are the responsible authority for the management and ongoing maintenance of waterways for the purposes of flood protection
- CMAs will negotiate with landholders, councils and other authorities and conduct agreed flood mitigation works on the basis of beneficiary pays.
- The role of flood risk management planning rests with CMAs and Melbourne Water and is a shared responsibility with local government. This should be consistently reflected in government policy.

Current approaches and practices

In Victoria, catchment management authorities play a crucial role in managing waterways. They must balance conflicting views in their decision making, for example deciding to remove native vegetation to improve river capacity to safeguard local interests in one area while working with other sectors of the community in other areas on works to promote revegetation in to improve river health overall.

Some of the observations reported by ENRC included:

- The Victorian Farmers Federation felt that long term neglect of waterways through 12 years of drought caused significant damage to environmental and constructed assets.
- A submission from two landholders pointed to parts of the Avoca River being a disgrace, with fallen trees and uncleared debris left to lie and block the waterway
- The Carisbrook Disaster Recovery Committee submitted that:

There is a golden thread that runs through every one of these submissions...that in flood mitigation terms there is an extensive and validated concern of community that all of the rivers, creeks, streams and waterways in these two particular areas.... have been adversely affected by the accumulation of debris and vegetation that ought not to be growing in the stream way, the creek bed and the river bed of a properly managed waterway system.

(Parliament of Victoria 2012a - pg. 115,116).

- There were conflicting opinions about choked waterways near towns increasing local flood levels. Local observers tended to directly associate the flooding that they experienced with the choked waterways and debris build-up. One submission stated that, even if clearing a waterway had no benefit in reducing flood impacts, it would still give a positive message to the community that something was being done to help the community.
- The catchment management authorities and Melbourne Water regulate waterway management activities by requiring a works on waterways permits to undertake works.
- If the works involve the removal of vegetation the land manager must also comply with any requirements of a municipal planning scheme. If biodiversity values are involved approval may also be required through the federal *Environmental Protection Biodiversity Conservation Act 1999*, or the Victorian *Flora and Fauna Guarantee Act 1988*. Cultural heritage legislation also needs to be considered. These processes are cumbersome and expensive, and can take six months or more to obtain.

ENRC therefore recommended that:

- The *Victoria flood management strategy* should clearly articulate the policy guidelines for managing waterways for flood protection purposes.
- Regional strategies prepared by catchment management authorities should identify specific reaches of rivers and reaches that require ongoing vegetation management and maintenance, and to be subject to a revised permitting system.
- Each catchment management authority should develop:
 - an in-stream management policy to clarify responsibilities for waterway management, including vegetation management
 - agreements with local councils where appropriate.
- DSE should:
 - develop better guidelines and processes around streamlining red tape associated with the multi-approvals process
 - develop a code of practice on the removal of vegetation around critical assets in consultation with councils, catchment management authorities and asset managers.
 - review woody debris removal practices of catchment management authorities and develop new management guidelines.
- Significant modification of waterways in urban areas should only be considered through the completion of a flood risk management process.

Flood debris

ENRC observed that the flood recovery aspects of waterway management (e.g. removing flood debris from waterways – see Figure 4) were not clear and were inconsistent in the various documents that address this issue (e.g. *Emergency management manual Victoria*, *Victoria flood management strategy*, *Regional flood response action plans*).

Some Councils were concerned about the potential for stockpiled woody debris, or logs that had been deliberately placed in the river bank, to mobilise during future floods and aggravate flooding or threaten downstream infrastructure.

ENRC recommended that the revised *Victoria flood management strategy*:

- Clearly identify authorities and assign responsibilities for stream blockage and debris removal in waterways posing a high risk to public infrastructure.
- Facilitate better guidelines and policies around this issue.
- Require better engagement practices between catchment management authorities and their stakeholders (e.g. councils and landholders) prior to any large scale removal of woody weeds.

Figure 4. Debris build up behind Yellow Creek bridge, Great Alpine Road, September 2010



Source: North East Catchment Management Authority

Local knowledge

It was clear to ENRC that some elements of the community were seeking greater input into, and influence over, decision-making about waterways. There were many views expressed about the adequacy and limitations of community consultation and engagement processes.

ENRC therefore recommended that:

- Local knowledge on the management and ongoing maintenance of waterways, including vegetation clearing and debris removal, should be incorporated in the development of regional flood mitigation strategies and local flood plans.

Key lessons for waterway management

Some key lessons can be drawn from the waterway management part of the ENRC inquiry:

- Waterway management is a valid method of reducing the flood risk to communities, just as levees are. It is therefore logical to look at waterway improvement as part of the flood risk planning process, and for the beneficiaries to pay for the services received, irrespective of who manages the flood mitigation scheme.

- The environmental approvals process is complex and cumbersome and it involves a number of agencies (including local government) working from different perspectives. Sometimes the agencies have competing objectives. It is therefore imperative for the agencies to work out a reasonable balance between protecting sensitive ecosystems and providing flood mitigation benefits. If agencies are on the same page then red and green tape can be streamlined, allowing decision making to occur in a timely manner.
- Regional or local plans that document what has been agreed to can provide clarity and transparency to the process.
- Regardless of the approvals processes, it is unlikely that large scale clearing of rivers and streams for flood mitigation is economically viable.

Other Themes

ENRC looked at three other themes, and while these are not addressed in detail it is pertinent to make the following observations.

Water storages

Victoria's water storages are not primarily designed for flood mitigation. Changing their operating rules would require agreement by those paying for the water stored and is not feasible. ENRC found that more could be done to address misunderstandings by educating nearby communities of the level of protection storage infrastructure can provide. Therefore it recommended improvements to water authorities notifying and making local communities aware of dam operations and how much impact a storage may make in terms of flood impacts.

Flood monitoring infrastructure

The effectiveness of flood warning is reduced if there are insufficient river and rain gauges or if they cannot be monitored during a flood. ENRC recommended improvements to the flood gauge network, including cost sharing arrangements and that the knowledge of local people, including flood wardens, be better utilised to read river gauges and predict flood heights and impacts.

Local knowledge, community engagement and education

ENRC considered that the community's understanding of local flood behaviour was not being consistently used. Flood wardens in particular were regarded as a resource that could be better utilised. ENRC recommended that:

- local knowledge be considered by those making floodplain management decisions
- roles and responsibilities of flood wardens be made clearer
- the state government provide core, ongoing funding for FloodSafe community education and to improve community resilience to flooding.

Conclusion and likely government response

ENRC has comprehensively examined a broad range of views and opinions in relation to deficiencies in flood mitigation infrastructure in Victoria. This has led to 40 recommendations for improvements. While ENRC has sometimes been quite specific in how the issues can be addressed it has also been mindful of the need to achieve a workable solution that is based on having a good policy framework and a beneficiary pays approach.

While it is not possible to pre-empt the Victorian government's response to the recommendations, it is likely that:

- The Government will consider recommendations relevant to state and regional policy setting through the *Victoria flood management strategy* and regional floodplain management strategies.
- There are ENRC recommendations that can be implemented fairly quickly, should the government accept. There are others that will take longer or require consultation. These are likely to be supported in principle but some of the methods and processes may differ to that proposed by ENRC.
- Recommendations of a legal nature will be dealt with through a separate update of the *Water Act 1989*.
- Improvements to the policy framework for regional drainage will be considered through a subsequent inquiry by ENRC into rural drainage.

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Victorian Government 2012c: *Victorian emergency management reform white paper*, Victorian Government, Melbourne.

Appendix 1 - Parliamentary Inquiry Terms of Reference

These are as follows:

That under s 33 the *Parliamentary Committees Act 2003*, the Environment and Natural Resources Committee is required to inquire into, consider and report no later than 30 August 2012 matters relating to flood mitigation infrastructure in Victoria, with particular reference to:

- a) identifying best practice and emerging technology for flood mitigation and monitoring infrastructure including river gauges
- b) the management of levees across Victoria, including ownership, responsibility and maintenance on both public and private land
- c) waterways management, including the nature and extent of vegetation clearing activities within waterways and their general maintenance
- d) identifying those entities and individuals having ownership of waterways and the responsibility for their clearing and their maintenance
- e) the extent to which, if any, local knowledge of residents is employed in effecting waterways clearing and maintenance.