

Designing, constructing and implementing new flood mitigation infrastructure

Guidance Note 17.3

Introduction

This Guidance Note is intended to help Local Government Authorities (LGAs) to lead the processes for determining and implementing new flood mitigation infrastructure. It does this by:

- defining the challenges associated with determining new flood mitigation infrastructure
- reiterating the current policies surrounding the management of such infrastructure
- reiterating the government's investment criteria for new flood mitigation infrastructure
- outlining a process for satisfying the government investment criteria.

The challenges associated with determining new flood mitigation infrastructure

Each new piece of flood mitigation infrastructure is unique. It needs to respond to a complex system of interactions between the economic, environmental, and social factors involved in managing flood risks. The processes for designing, constructing, and implementing flood mitigation infrastructure must therefore be codified in ways that consider a diversity of views and understandings. The social, environmental, and economic benefits of the proposed new arrangements will need to exceed the costs to attract government investment. The infrastructure will also need to be maintained in working order.

Current Policy

Under Accountability 17a of the Victorian Floodplain Management Strategy, LGAs (outside Melbourne Water's region) are accountable for:

- leading the processes to determine and implement new flood mitigation infrastructure, through flood studies and Water Management Schemes
- the ongoing maintenance and management of new infrastructure through flood studies and Water Management Schemes.

Catchment Management Authorities (CMAs) are accountable for:

- supporting LGAs to lead the processes to determine and implement, through flood studies and Water Management Schemes (where appropriate), the assessment of new flood mitigation infrastructure.

Under Policy 17a of the Victorian Floodplain Management Strategy:

- All new large-scale flood mitigation infrastructure outside Melbourne Water's region will be implemented as Water Management Schemes under the Water Act 1989.
- The costs of designing and constructing new large-scale flood mitigation infrastructure that meets the government investment criteria will be shared equally between the Australian and Victorian Governments and the relevant LGAs.
- The maintenance and management of new flood mitigation infrastructure under formal arrangements will be funded by beneficiaries (through relevant LGAs) and will be subject to third-party auditing arrangements to ensure it continues to be maintained.

While Water Management Schemes are the Victorian Government's preferred arrangement for flood mitigation infrastructure, page 74 of the Victorian Floodplain Management Strategy flags that there may be instances where alternative arrangements are demonstrably more appropriate.

It is therefore open to LGAs to propose more appropriate arrangements, but as outlined on page 65 of the strategy, Water Management Schemes offer LGAs benefits that alternative arrangements under the *Local Government Act 1989* do not. In particular, they offer the potential to share any liability for the effects a scheme that has been implemented through these processes may have on the flow of water.

Water Management Schemes also provide clear steps for:

- community ownership of the decision-making process, through a community-based committee
- information gathering, through investigations
- community engagement, through the public display of proposed schemes
- applications for reviews by affected persons to the Victorian Civil and Administrative Tribunal
- Ministerial determinations of the final scheme.

Government investment criteria

As outlined in section 17.2 of the Victorian Floodplain Management Strategy, the Victorian Government is guided by the following principles when deciding whether or not to co-invest in large-scale flood mitigation infrastructure:

- Due process – communities will be consulted so that their concerns, their local knowledge and their ideas about flood mitigation options can be considered.
- Due diligence – decision-making processes will set clear objectives, be evidence-based and will examine all reasonable options to mitigate flood risks.
- Cost effectiveness – the three tiers of government will only invest in building or upgrading flood mitigation infrastructure if the benefits are greater than the total costs (including both capital and ongoing costs).
- Supporting analysis – this will include consideration of the economic value of flood mitigation infrastructure to local economies, including local industries and businesses.
- Community benefits – the three tiers of government will only invest in building or upgrading flood mitigation infrastructure where the primary benefits are the protection of:
 - human life and safety
 - community safety, by ensuring major evacuation routes are maintained
 - community welfare, by ensuring the continuity of social services, particularly those provided by public infrastructure

– existing dwellings, where it is only feasible to protect them through collective action.

- Accountability for ongoing management – the three tiers of government will only invest in building or upgrading flood mitigation infrastructure if the accountability arrangements for ongoing management, maintenance and assurance are agreed and clearly documented. These arrangements should allow for measurable outcomes to be established, evaluated and reported.

While not ruling out the potential for rural levees to satisfy these criteria, in practice, it is easier to demonstrate a prima facie case for these community benefits for urban areas than it is for rural areas.

A process for satisfying the government investment criteria

The practical implications of the investment criteria can be distilled down into a series of principle-based steps that an LGA would need to lead, with the active support of the relevant CMA and the Victoria State Emergency Service, in order to be eligible for co-investment with the Victorian and Australian Governments. These are:

1. Engage early with the community affected by the flood mitigation infrastructure.
2. Conduct a detailed flood risk evaluation of options (flood study).
3. Evaluate mitigation options.
4. Demonstrate the community benefits of the preferred option.
5. Commit to an appropriate asset management system.

To the extent possible these steps should be done in parallel rather than in sequence. Each is explored in more detail below.

Engage early with the community affected by the flood mitigation infrastructure

Community members play an important role in influencing the design, construction and ongoing management of flood mitigation infrastructure. Without the involvement of local landholders, both those who may be affected by the infrastructure and the wider community, the infrastructure may not meet the community's expectations.

The community should be consulted about the need, purpose, location and aesthetics of the infrastructure

from the flood study to construction. Engaging with the affected community enhances their understanding and therefore their support for the infrastructure.

Conduct a detailed flood risk evaluation (flood study)

As outlined in section 11 of the Victorian Floodplain Management Strategy, detailed risk evaluations, in the form of flood studies, can fill gaps in knowledge and help communities consider flood management options. Their usefulness depends on their technical rigour. High standards apply for complex flood situations with high – and potentially increasing – risk exposure. Less detailed assessments are used in areas of lower population density and where average annual damages are low.

Flood studies are not just an assessment of flood behaviour, they also analyse risk treatment options. Even if it turns out there are no viable flood mitigation infrastructure options, the improved understanding of flood risk determined from flood studies will serve the community by helping to improve education, improve awareness and bolster emergency response planning.

CMAs are accountable for supporting LGAs in this process. They can provide expertise in helping to select suitably qualified practitioners to conduct detailed flood risk evaluations.

Evaluate mitigation options

If the flood study reveals a need to construct flood mitigation infrastructure, there are several steps involved in moving from the flood study to on-ground action. In practice, the challenge is to determine how much of this work can and should be done in parallel rather than in sequence. This varies with the degree of difficulty involved in securing:

- viable risk management options
- consistency with legislation and with the policies of the partners involved
- integration with statutory and strategic planning
- community support
- priority in capital funding programs
- ongoing funding for management and maintenance
- inter-agency commitment to seeing the action plan implemented.

As a general rule, the process should be condensed as much as practicable. It is important to capitalise on community receptiveness to flood mitigation options (including planning controls) – especially if the planning

is being done soon after a flood. If the process drags out too long, the risk is that essential community support will diminish.

CMAs are accountable for supporting LGAs in this process. They can provide expertise in helping to select suitably qualified practitioners to evaluate flood mitigation options.

Demonstrate the community benefits of the preferred option

The government investment criteria make it plain that the three tiers of government will only invest in building or upgrading flood mitigation infrastructure where the primary benefits are the protection of:

- human life and safety
- community safety, by ensuring major evacuation routes are maintained
- community welfare, by ensuring the continuity of social services, particularly those provided by public infrastructure
- existing dwellings, where it is only feasible to protect them through collective action.

The business case to implement the preferred option for restoring or upgrading existing flood mitigation must therefore be able to demonstrate some or all of these sorts of benefits.

Commit to an appropriate asset management system.

Overview

An asset management system embraces a range of practices, processes, documents and information systems used to organise, direct and control asset management activities. These span the asset lifecycle, covering planning and decision making to procurement and delivery, operation and maintenance and the eventual disposal at end of life.

Key areas of an asset management system include:

- governance and accountability arrangements
- asset planning processes and documents
- asset decision making processes
- procurement processes
- asset condition and performance information systems
- monitoring and reporting processes

- processes for managing assets at the end of their design life.

Local Government Victoria's (LGV) *Better Practice Guide on Local Government Asset Management* provides LGAs with guidance on establishing and using an appropriate asset management system¹. In the pursuit of better practice, LGV sought to align its guidance with the Institute of Public Works Engineering Australasia (IPWEA) *National Asset Management Strategy* (NAMS). The IPWEA NAMS Framework is aligned with the International Standards Organisation (ISO) 55000 series of asset management standards and has been adopted by many local governments across Australia.

In the development of flood mitigation infrastructure, asset management systems generally include the following phases:

- approvals and design phase
- construction phase
- operations and maintenance phase.

Approvals and design phase

The approvals and design processes interact, so the design process should be understood as being iterative. Preliminary concept designs provide a basic tool for landholder negotiations and consultation with agencies about statutory approvals. LGAs will be familiar with many of the statutory approvals processes, such as cultural heritage, planning permits, native vegetation retention controls and the like. They will also be aware that Crown land managers' consents will be required for proposed works on Crown land, and that CMAs will issue permits for works on waterways.

DELWP's recent experience with major infrastructure projects, such as the modernisation of the Goulburn-Murray Irrigation District, highlights the benefits of early collaboration. Very early in the approvals and design phase, and regularly from then on, the designers should sit down jointly with experienced practitioners from all agencies responsible for approvals. Together they should discuss options for designing, constructing and operating the infrastructure in ways that will meet all statutory requirements. This will build an atmosphere of trust; it will also ensure that all agencies understand the

full suite of trade-offs involved in developing a workable design.

It is important to note that those discussions, negotiations, and debates will not guarantee that the preferred options will be approved once they are formally submitted, but it will offer more certainty that they will at least be capable of being approved, perhaps with more modification. This process mitigates the risk of having a design rejected so comprehensively that the design process would need to be started again.

Early and close engagement with Traditional Owners is particularly important, since it is likely that most flood mitigation infrastructure will trigger the need for a Cultural Heritage Management Plan. Under section 52 of *the Aboriginal Heritage Act 2006*, if a Cultural Heritage Management Plan is required, no other statutory approvals can be granted until the plan is completed. Therefore, it is important to start consultation early in the process and to allow the time necessary for an appropriate assessment of cultural heritage impacts.

Consultation with relevant government departments may also be necessary to determine whether an Environmental Effects Statement is required or if there are potential water or soil contamination issues. Contact details are available through the websites of relevant organisations.

The relevant CMA will also provide guidance in this phase about positioning new flood mitigation infrastructure so as to avoid high-energy flows, in accordance with the Victorian Waterway Management Strategy. The things that influence the health of waterways are not always obvious for someone designing flood mitigation infrastructure.

Flood mitigation infrastructure, particularly levees, can affect the condition of waterways. For example, locating a levee too close to a waterway confines flows and can cause erosion and a loss of vegetation. It also isolates the waterway from its floodplain. These things have a significant impact on water quality and biodiversity.

Locating a levee on or close to a waterway also carries a risk that the riverbank may not be strong enough to bear the weight of the new infrastructure. The designer may require laboratory testing to verify that the levee will be stable. Other long-term problems that may arise

¹ <https://www.localgovernment.vic.gov.au/council-innovation-and-performance/financial-and-asset-management> (Accessed on 20 May 2021).

are bank erosion and instability of the bed of the river as a result of changes in the flow velocities.

Design solutions may be available to counteract these problems, but it may be preferable to locate levees away from the riverbank to avoid costly bank stabilisation works and increased maintenance.

Generally, flood mitigation infrastructure should be:

- designed and located to avoid increasing erosion
- fenced to protect riparian vegetation
- managed to avoid isolating significant wetlands
- designed to prevent adverse hydraulic impacts to adjacent properties and assets (public and private).

Construction phase

Constructing flood mitigation infrastructure is often complex; it involves a number of activities and requires coordination. The work itself is usually undertaken by contractors and supervised by a construction manager (reporting to the client) who is responsible for the tendering processes, contract administration, and the supervision of tasks. Depending on project complexity, a site supervisor might be engaged to ensure that the work is carried out in accordance with the relevant drawings and specifications. Usually, the site supervisor will report to the construction manager.

In addition to the main construction activities, support services may include:

- Surveys to set out the location of the works.
- Post-construction records. For a levee this would include its height and cross section at fixed intervals along the levee.
- Geo-technical tests of the in-situ soil moisture content and the amount of compaction of earthworks.
- Installation of special components such as demountable levees and flood gates.

When construction is complete, site remediation is also required.

Operations and maintenance phase

To satisfy the investment criteria, government must be assured about the LGA's accountability for ongoing management and maintenance of the infrastructure.

The investment criteria make it plain that the three tiers of government will only invest in building or upgrading flood mitigation infrastructure if the accountability arrangements for the LGA's ongoing management, maintenance and assurance are agreed and clearly documented. These arrangements should allow for measurable outcomes to be established, evaluated and reported in an appropriate asset management system that includes provision for auditing.

Guidance on how to provide such assurance, through an appropriate asset management system, is set out in LGV's *Better Practice Guide on Local Government Asset Management*².

Flood mitigation infrastructure needs to be looked after. Having a system to monitor performance, and to keep the infrastructure working in the manner it has been designed for, is crucial.

After the works have been completed, a record of post construction plans, specifications, operations and maintenance manuals (for special components like demountable levees and flood gates) and detailed design drawings should be kept. If locked gates are required to restrict public access, records need to be kept of their location and where access keys may be obtained. This information may need to be drawn upon for emergency management planning, as well as providing a baseline record of information.

An appropriate asset management system must include third-party audits to provide assurance that the flood mitigation infrastructure is being kept in good condition and that it would be operable in the event of a flood. A quality assurance system should contain a description of, and location plans for, key assets. It should also record the level of protection provided and a record of inspection and maintenance activities.

A logbook or similar system is used to document inspections, tests of special equipment and maintenance activities. Inspection activities can be divided into regular visual inspections (say once per year) that can be followed up with low skill maintenance (such as lawn mowing and removal of saplings in a levee) and less regular, more detailed surveys and visual inspections to ascertain potential weaknesses that will need to be rectified.

² <https://www.localgovernment.vic.gov.au/council-innovation-and-performance/financial-and-asset-management> (Accessed 20 May 2021).