

Draft position paper for consultation

February 2019

Improving Levee Bank Management in South Australia



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1 Introduction

The draft position paper for **Improving Levee Bank Management in South Australia** has been developed to address concerns about levee banks in South Australia and in response to the failure or near failure of levees during the spring of 2016.

The draft position paper proposes a number of initiatives to improve levee bank management in South Australia for discussion. Some initiatives may require legislative change, in kind community and stakeholder contributions or may increase costs to community and stakeholders, and therefore will require your input to help refine them before they are finalised and implemented.

The draft position paper is one of three papers which are concurrently being released for feedback. The other two are:

- **Improving Dam Management in South Australia**
- **Priorities for Improved Flood Management in South Australia**

Feedback on this document can be provided by responding to the questions and provide any additional input and suggestions using the following Survey Monkey link: <https://www.surveymonkey.com/r/PJ78KWW>

Alternatively, you can respond via email to Ingrid Franssen, A/Manager, Flood Management, Department for Environment and Water: Ingrid.Franssen@sa.gov.au

Any response needs to be received by **15 April 2019**.

2 Background

Levee banks are one type of flood mitigation infrastructure and can be broadly described as artificially raised or constructed embankments or walls built or modified for the purpose of regulating water levels and reducing the likelihood of flooding.

In some council areas, levee banks are a major flood mitigation measure however there is no clarity on their maintenance status and performance during a flood, and therefore uncertainty whether they are ‘fit for purpose’ and can provide the flood risk mitigation for which they were originally constructed. Levee bank failure along the Gawler River in 2016 contributed to the significant economic costs of the floods in the horticultural area north of Adelaide. The management of levee banks is a long standing issue in South Australia.

The lack of clarity on roles and responsibilities for maintaining levee banks causes uncertainty about their performance during extreme events. This creates an unnecessary large flood response burden for the South Australian State Emergency Service (SASES) to manage levee banks that are failing or threatening to fail during flood events. Impacts of floods resulting from levee bank failure are inevitably high because communities are often not prepared for flood in those areas as they assumed the levee bank would protect them.

The benefits of well-managed flood mitigation infrastructure were demonstrated at Nuriootpa in the Barossa Valley, where a combination of permanent and temporary levees were used to effectively control potential flooding during the 2016 event.

2.1 Scope

The levee banks proposed to be in scope for this paper are outlined in table 1.

In Scope	Out of Scope
Levee bank construction and maintenance designed to protect multiple properties	Flood mitigation infrastructure other than levee banks, unless it has a levee bank component
Additional maintenance requirements for roads and other infrastructure that act as levee banks even though it is not the primary function	Maintenance of levee bank that protect individual properties
Maintenance of levee banks where failure could impact on multiple properties	Construction of coastal levee banks

Table 1: Scope of proposed levee bank management policy in South Australia

Flood mitigation infrastructure other than levee banks is out of scope for the purpose of this paper, unless it includes a levee bank component. The proposed elements concern levee banks that provide flood protection for multiple properties, where there is a need to manage the structure for a broader community benefit. The maintenance of a levee bank to protect an individual property or land parcel is out of scope for this paper.

There are other types of infrastructure that act as levee banks, such as roads and railway lines. In that case, the responsibility for management rests with the manager of the road/railway. There may be a need to ensure that the infrastructure is maintained to ensure it continues to fulfil its flood protection function, even though that is not its primary function. These requirements may go beyond the general maintenance requirements of the infrastructure and are within scope for this policy.

Construction of coastal levee banks are out of scope as they are managed under the *Coast Protection Act 1972* and the Coast Protection Board will consider proposals for coastal levee banks. However, arrangements for management of existing levee banks could equally apply to coastal levee banks.

2.2 Current regulation of construction

The construction of new levee banks is authorised under the *Natural Resources Management Act 2004* (NRM Act) with a water affecting activity permit, unless the levee bank is classified as development under the *Development Act 1993* (Development Act) (to be replaced by the *Planning Development and Infrastructure Act 2016*) and receives development approval¹.

The development application for such levee banks will also be assessed against the water affecting activity policies in the regional Natural Resources Management (NRM) Plan or water allocation plan through a referral of the development application to the authority issuing the permits.

¹ Activities classified as development include:

- construct a levee or mound with a height greater than 3 metres from the natural surface as per Schedule 2(4) of the *Development Regulations 2008*; or
- construct a levee or mound in a Watercourse Zone, Flood Zone or Flood Plain delineated by the relevant Development Plan, or in any other zone or area shown as being subject to flooding or inundation in the relevant Development Plan, as this activity is classified as development as per Schedule 2(3) of the *Development Regulations 2008*.
- construct a levee or mound that involves excavation and filling of greater than 9 cubic metres of material within a prescribed zone and use defined in Schedule 2(1) of the *Development Regulations 2008*.
- deposit a material in the River Murray Floodplain Area as per Schedule 2(7)(1)(b) of the *Development Regulations 2008*.

There is a need to consider both watercourse management and flood management when approving new levee banks. NRM Plan criteria for assessing applications for levee bank construction consider matters such as whether the levee bank could:

- cause or increase the risk of upstream or downstream flooding;
- impact the natural flow of a watercourse or lake including restricting or increasing the natural flow to a water dependent ecosystem;
- impact the natural flow between the floodplain and a watercourse;
- impact the migration of native fish or aquatic biota;
- cause significant erosion or increase the risk of erosion;
- risk public safety or damage property and infrastructure.

The South Australian Planning Policy Library provides guidance on levee banks including:

Development, including earthworks associated with development, should not do any of the following:

- *impede the flow of floodwaters through the land or other surrounding land*
- *increase the potential hazard risk to public safety of persons during a flood event*
- *aggravate the potential for erosion or siltation or lead to the destruction of vegetation during a flood*
- *cause any adverse effect on the floodway function*
- *increase the risk of flooding of other land*
- *obstruct a watercourse.*

Construction of new levee banks or upgrades of existing ones are sometimes considered as part of a stormwater management plan. As part of this process, consideration needs to be given to the flood risk to be mitigated, the potential consequences of flooding and whether a levee bank is the appropriate mechanism to manage the risk identified.

2.3 Current maintenance arrangements

There is a lack of clarity on roles and responsibilities for maintaining levee banks and this causes uncertainty about their performance during extreme events. There is limited documentation of the location, design or maintenance status of levee banks.

Levee banks can be situated on crown land, local government owned land and private land. The issue of access for the purpose of maintenance is very similar to that for urban watercourses.

Both the NRM Act (section 31) and the *Local Government Act 1999* (schedule 1A, section 21) provide identical powers to an NRM Board or a council respectively to enter onto private land for the purposes of undertaking stormwater management or flood mitigation works. The powers in section 21 of schedule 1A of the Local Government Act may only be exercised by councils where there is a Stormwater Management Plan approved by the Stormwater Management Authority and gazetted.

Permanent infrastructure construction or works can be carried out under an agreement with the property owner subject to that property owner's consent, and if the property owner agrees to undertake ongoing care, control and management of the works. Where the NRM Board or council retains ongoing responsibility for care, control and management of the permanent works, then the NRM Board or council must acquire an easement or other appropriate interest over the land (e.g. acquisition of land).

Roles and responsibilities for levee bank maintenance are sometimes set out in stormwater management plans. Levee banks along the Lower Murray River that are on Crown land are maintained by the Department for Environment and Water (DEW), because they support River Murray operations. Levee banks that form part of the South Eastern Drainage network are maintained by the South Eastern Water Conservation and Drainage Board. The responsibility of landholders for (portions of) levee banks on their properties is not specified.

2.4 Outcomes sought

The draft policy position outlines proposed elements of a levee bank management policy for discussion, to deliver improved levee bank management.

The following levee bank management outcomes are sought:

- Roles and responsibilities for levee bank management are clearly articulated, agreed and understood by all relevant parties and can be implemented (subject to funding).
- There is clarity on how levee banks can be factored into flood risks and flood response as there is confidence in their location, function and performance.
- There is a strategic approach to levee bank construction and management of existing levee banks which considers flood mitigation as well as water resource management outcomes.

3 Proposed elements of a levee bank management policy

The proposed elements of a levee bank management policy are based on the recommendations from the South Australian Levee Bank Management Issues Paper (DEWNR, 2015) and the approaches and experiences in managing levee banks interstate. In developing the proposed elements, alignment between levee bank management, stormwater management, coastal management and watercourse management has been sought, to streamline processes and reduce red tape.

Resolving responsibilities for maintenance of levee banks that extend beyond individual properties has similarities to resolving responsibilities for watercourse management in South Australia. Resolving watercourse management is out of scope for this paper, however a number of principles apply to both situations:

- Relying on individual landholder responsibilities to maintain sections of levee banks (or watercourses) on their property, does not deliver effective maintenance, in particular where maintenance actions require specific skills, equipment or expertise;
- Effective maintenance requires assignment of responsibility to one entity, with access to the complete levee bank (or watercourse).

There are several conceptual elements for the proposed levee bank management framework. The proposed elements are listed below and illustrated in Figure 1:

1. Documentation of existing levee banks, including their location, land ownership, maintenance status, flood mitigation standard and governance arrangements.
2. A planning process to identify priority levee banks and determine formal management arrangements.
3. Development of a robust business case for construction, remediation or upgrade of priority levees.
4. Access arrangements for construction, remediation and maintenance of levee banks, including clarification of responsibilities of landowners in relation to levee banks on their land that are managed by a third party.
5. Guidelines relating to the siting, design, construction, modification and maintenance of levee banks that consider both water resource management impacts and flood risks and/or options to regulate these requirements.
6. Clarification and improvement of the approval process for siting, design, construction and modification of levee banks to avoid gaps, duplication or inconsistencies between land use planning and water resource management requirements.
7. Management arrangements for non-priority levee banks.

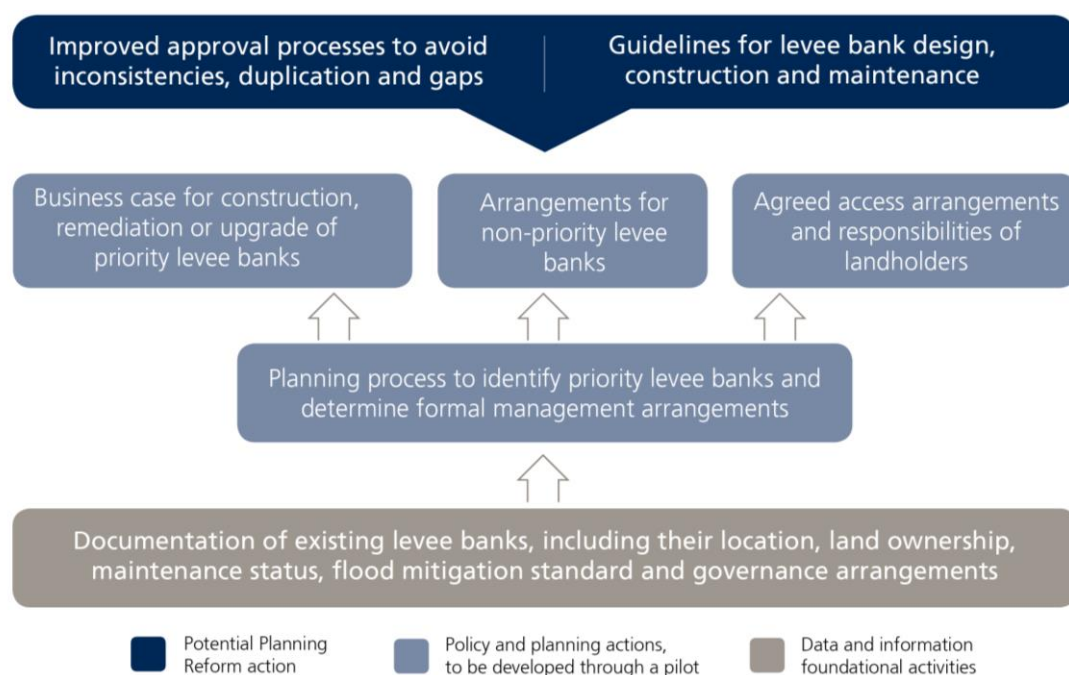


Figure 1: Proposed levee bank management policy elements

Each element is discussed in more detail below.

3.1 Documentation of existing levee banks, including their location, land ownership, maintenance status, flood mitigation standard and governance arrangements

This element aims to develop a state-wide authoritative spatial database that can be used for multiple purposes, including stormwater management, flood prevention and emergency response planning, business development and development planning. This project will require significant resourcing, and is a foundational element for other components of the proposed levee bank management policy.

The documentation process should include:

- an assessment of the location and condition of the infrastructure and its standard of protection, based on the best available information derived from flood studies
- an assessment of land ownership and presence of easements or management agreements in relation to access to the levee banks
- current roles and responsibilities for levee bank management
- development of a spatial dataset for this information

DISCUSSION QUESTION:

1. ***Who should have access to what parts of a levee bank database, and is there any other information which needs to be stored?***

Eg. Landholders: limited access, Local Councils: full access, Department for Environment and Water (DEW) full access, etc.

3.2 A planning process to identify priority levee banks and determine formal management arrangements

A planning process is proposed to determine priority new and existing levee banks and determine formal management arrangements. The following criteria and process elements are proposed, which will need to be tested using one or more pilots:

- 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.
- Risk based approach – the level of protection to be provided will be informed by an assessment of flood risk: the likely flooding frequencies, and the potential impacts on the environmental, social and economic values in the local area.
- Effectiveness and efficiency – The benefits in reduction in flood risk (likelihood and consequence) achieved by the levee bank are outlined and compared to the cost (including both capital and ongoing costs) as well as costs and benefits of alternative solutions.
- Community benefits – The levee bank should have primary community benefits in terms of 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
 - other priority assets identified as having broader community value.
- Environmental impact – The effect on the environment, such as impeding the normal flow of the watercourse or the flow across the floodplain, will need to be considered as part of the process.

As a general principle, the construction of levee banks to facilitate new urban development on flood prone land is not a preferred approach and such levee banks will not be considered to meet the criteria for priority levee banks.

The planning process for existing levee banks should include:

- consideration of options to upgrade the infrastructure to contemporary design standards;
- identification, in consultation with the benefiting community, the most cost-effective option in keeping with the community's willingness and ability to pay for ongoing management and maintenance;
- the benefits, costs and establishment of ongoing management arrangements including access arrangements to enable restoring and maintaining the infrastructure to a reasonable standard of protection;
- the costs and benefits of alternative solutions.

These elements could be built into the guidelines for stormwater management plans or seen as part of NRM planning, regional/ local development or infrastructure planning or as a stand-alone planning process.

There are a number of options for leading, contributing and overseeing this planning process and the optimal arrangement may vary on a case-by-case basis as outlined in Table 2.

Leading development	Contribution	Oversight
local government ² NRM/Landscape Boards DEW	local government NRM/Landscape Boards SASES DEW Department for Planning, Transport and Infrastructure (DPTI) Coast Protection Board External experts Commonwealth government Regional Development Authorities Department for Primary Industries and Regions SA (PIRSA)	Stormwater Management Authority DEW External experts

Table 2: Options for leading, contributing and overseeing a levee bank planning process

Trials of this process could include a location with levee banks that have had recent investment and with recent information on their effectiveness (for example Nuriootpa) as well as old historical levee banks with no recent information on function and effectiveness (for example Wasleys). Another option may be to align a pilot with work being undertaken by the Gawler River Flood Management Authority for the Gawler River.

DISCUSSION QUESTION:

2. ***Can you suggest any alternative approaches to the proposed planning process as an effective pathway to resolve levee bank management issues?***

² Including authorities set up under the Local Government Act, such as the Gawler River Flood Management Authority

3.3 Development of a robust business case for construction, remediation or upgrade of priority levees

The documentation and planning process will provide the information necessary to develop a business case for remediation/upgrade of existing priority levee banks or construction of new priority levee banks. It will outline the costs and benefits of the proposal compared to alternative solution, the risk mitigation to be achieved and community's/beneficiary's willingness to pay. It will identify the cost to ensure access arrangements for ongoing operation and maintenance.

As mentioned in Section 3.2, flood mitigation should be a last resort action, after avoidance and adaptation have been considered. This principle should be reflected in the assessment of any proposed new levee banks, and may also need to be considered when assessing plans for remediation or upgrades of existing levee banks.

There are a number of options for who would lead the process of construction, remediation or upgrades of levee banks, as outlined in Table 3. The costs of designing and constructing new priority levee banks or upgrading existing levee banks should be shared between State and local government. Access to Commonwealth government funding will need to be actively pursued where possible to reduce the cost burden for State and local government.

Different arrangements for cost-sharing design, construction or upgrades of levee banks may be negotiated on a case-by-case basis, for example contributions by third parties such as developers or major asset holders to the construction or upgrade of levee banks.

The maintenance and management of priority levee banks under formal arrangements should be funded by beneficiaries, with funds raised going to the entity responsible for ongoing operation and maintenance. There are a number of options for responsible entities for ongoing operation and maintenance as outlined in Table 3.

Construction, remediation, upgrade	Operation and maintenance
DPTI DEW local government ³ NRM/Landscape Boards Developers	DPTI DEW local government NRM/Landscape Boards

Table 3: Options for responsibility of levee bank management

DISCUSSION QUESTIONS:

3. **Are there any other contributors not yet identified in table 3.**
4. **Is it reasonable to apply the beneficiary pays principle for ongoing operation and maintenance of levee banks?**

³ Including authorities set up under the Local Government Act, such as the Gawler River Flood Management Authority

3.4 Access arrangements for construction, remediation and maintenance of levee banks, including clarification of responsibilities of landowners

Levee banks that protect multiple properties require one authority for ongoing management. That managing authority needs to have access to the entire levee bank, regardless of the current ownership of the land the levee bank was built on

The acquisition of land provides the highest level of certainty that the relevant authority has access to the levee bank for ongoing maintenance. The South Eastern Water Conservation and Drainage Board is responsible for managing the drains and associated embankments in the South East NRM region and has ownership for approximately 75-80% of the land on which that infrastructure is located and access for much of the upper south east network through easement.

Creation of an easement to cover the levee bank also provides certainty of access for the party responsible for ongoing operation and maintenance. As an easement is attached to the property title, it continues after a property has been transacted and is essentially perpetual unless revoked by agreement by both parties.

Easements can be procured by agreement or compulsory acquisition. Acquisition by agreement would be the preferred approach. The cost of acquiring easements or land will need to be factored into the business case for the levee bank.

It is also important that responsibilities of landholders are clear and can be enforced to ensure levee bank structures are not damaged or modified without the consent of the authority responsible for operation and maintenance.

DISCUSSION QUESTIONS:

- 5. Do you see any alternatives to the acquisition of land or easements to ensure access to levees?**
- 6. How can landholders be made accountable for damage or unauthorised changes to levee banks?**

3.5 Guidelines relating to the siting, design, construction, modification and maintenance of levee banks

Current regional NRM Plan and South Australian Planning Policy library assessment criteria already cover many aspects of levee bank siting and focus on third party impacts and watercourse management aspects.

Assessment criteria currently do not cover levee bank design from a hydrological or engineering perspective. Victoria's approach has been to provide guidelines for design, construction, management, upgrade, renewal and decommissioning. Adapting these guidelines for the South Australian context is recommended to provide more guidance on levee bank management.

The level of flood protection to be provided by levee banks should not only be guided by the likelihood of flood occurrence but should consider the consequence of flooding and what is considered an acceptable level of risk. Other factors such as access, isolation and evacuation, depth and velocity of water during a flood will all play a part in assessing the level of protection required.

Designing and building controlled flooding pathways in case the levee bank is overtopped is important as it will aid in emergency response and predictability of flooding patterns.

DISCUSSION QUESTION

- 7. Are there any other priority issues to be covered in the guidelines?**

3.6 Clarification and improvement of the approval process for siting, design, construction and modification of levee banks

It is proposed to clarify and improve assessment processes for levee banks with regard to development approval and water affecting activity permits.

Clearer definitions and boundaries that determine when a levee bank is considered development are needed. The reference to watercourse zone, flood zone or floodplain delineated by the relevant Development Plan is unhelpful if these zones are not clearly defined in the relevant development plan. The generic 3 metre height limit also needs review, as this is considered too high in many cases.

The NRM Act simply refers to a levee bank being located on the floodplain of a watercourse, but again, the floodplain may not always be clearly defined. Therefore there is significant uncertainty about whether or not a levee bank requires development approval or a water affecting activity permit and under which circumstances.

This could be considered further as part of the input into Planning reform and development of the Landscapes SA legislation.

DISCUSSION QUESTION

8. *What currently works well and what does not in terms of the approval process for levee banks?*

3.7 Management arrangements for non-priority levee banks

Levee banks that are identified as non-priority may still be approved to be constructed or upgraded but will not receive state government funding. Approval of privately funded levee banks will be dependent on satisfying environmental and downstream impact considerations and arrangements for accountability for ongoing management, maintenance and assurance that are agreed and clearly documented. These arrangements should allow for measurable outcomes to be established, evaluated and reported.

Non-priority existing levee banks can be removed or modified to ensure “controlled failure”, unless a third party takes responsibility for their maintenance. The option to leave existing non priority infrastructure unmanaged and unmaintained or only maintained to a low standard can be considered, but requires an assessment of risks, costs and benefits.

DISCUSSION QUESTION

9. *Are there any other management arrangements needed for non-priority levee banks?*

FINAL DISCUSSION QUESTION

10. *Is there anything more you wish to add in regard to the draft policy for Levee Bank Management in South Australia?*