
Dams Safety NSW

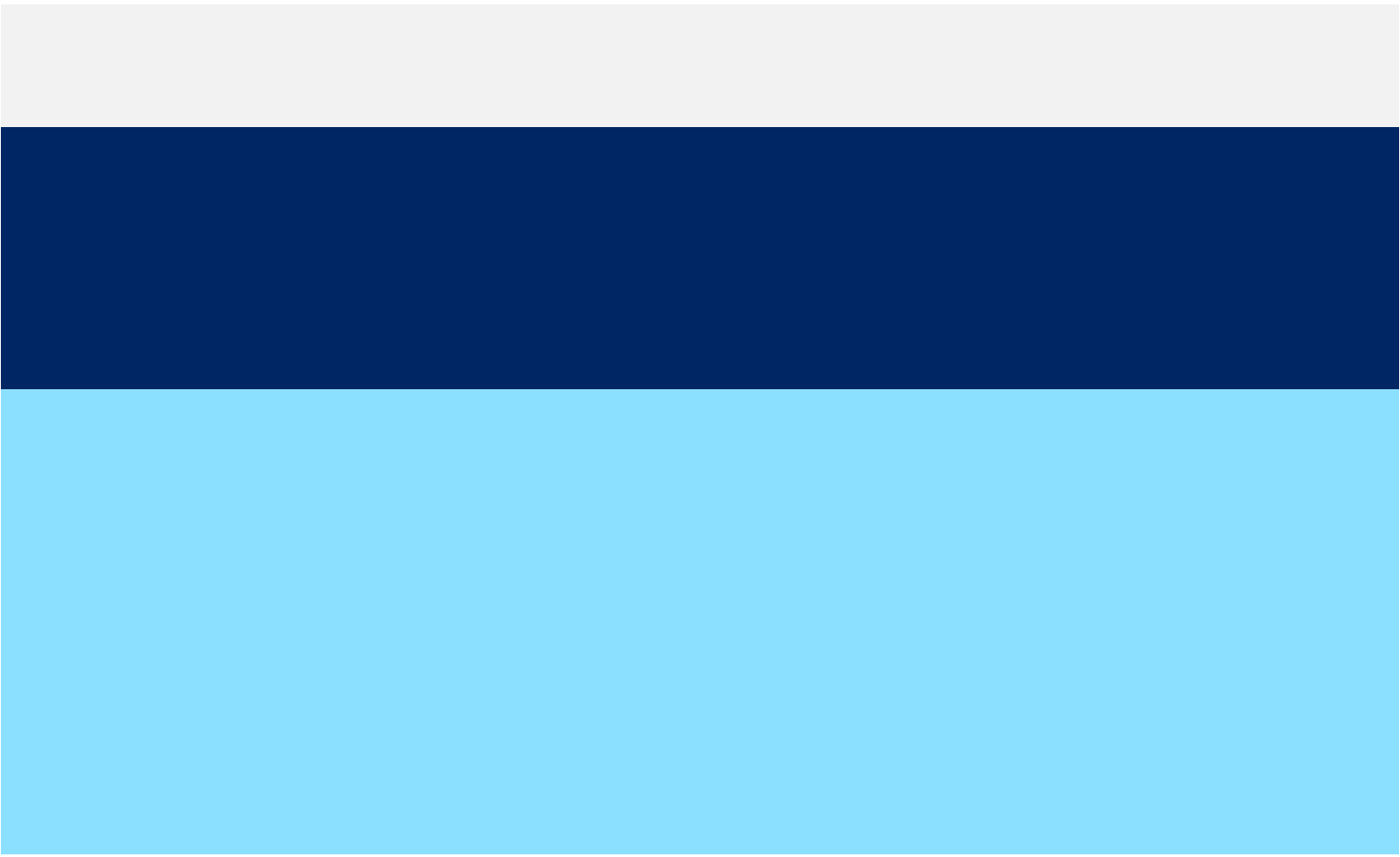
www.damsafety.nsw.gov.au



DSNSW's regulatory approach to dams with controlled spillways

Policy Paper

July 2024





Acknowledgement of Country

Dams Safety NSW acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

www.damsafety.nsw.gov.au

DSNSW's regulatory approach to dams with controlled spillways

Contents

Acknowledgement of Country2

Contents 3

The purpose of this policy paper 4

The issue..... 4

DSNSW policy position 5

Discussion..... 5

Legislative background 7

The purpose of this policy paper

This paper recommends a policy position and rationale for Dams Safety NSW's (DSNSW's) regulatory approach to declared dams with controlled spillways. Controlled spillways include spillways with gates (including fuse gates) and spillways with fuse plugs (ie. erodible embankments).

The issue

The reliable operation of controlled spillways is critical to the safety of many dams where they are required to release flood waters such that the integrity of the dam is not threatened. The failure of controlled spillways to operate as designed/planned has the potential to cause unexpected situations to occur and serious consequences both upstream and downstream of a dam.

Controlled spillways are designed to operate:

1. to protect a dam from failure (using gated spillways and/or fuse plug spillways).
2. to regulate the flow of water in a river catchment, or for flood mitigation in flood conditions (using gated spillways).

The operation of spillway gates, in particular fuse gates and fuse plugs, can lead to a sudden rise in downstream river levels. This may, in some circumstances, appear to the community to be a 'dam failure'.

This policy describes DSNSW's role in the regulation of declared dams with respect to controlled spillways.

DSNSW policy position

DSNSW policy position:

DSNSW's regulatory role focuses on ensuring: (a) a declared dam's controlled spillways operate as designed; and (b) the dam owner's controlled spillway operating rules do not increase the risk of dam failure.

For the avoidance of doubt, the routine operation of controlled spillways is a matter for the owner of a declared dam. This includes the downstream impacts at any time from the operation of controlled spillways including floods through the dam and engaging with emergency services and communities affected by such an event.

Discussion

Oversight of the operation of controlled spillways

The operational release of flood water through a controlled spillway is not deemed to be a failure of the safe functioning of the dam because the dam is operating in accordance with its design.

DSNSW is concerned with the prevention of dam failure. The operation of a controlled spillway is designed to prevent dam failure and mitigate the risk of impacts on public safety, the environment and economic assets from such a failure.

The normal operation of controlled spillways (for example, to regulate the flow of water in a river catchment, or for controlled releases to anticipate flood conditions) are a dam owner's responsibility. Some dam owners with controlled spillways are authorised for the operation of the dam to achieve flood mitigation objectives. DSNSW is not responsible for the regulation of these types of controlled releases from a dam¹.

¹ See the Dams Safety ACT 2015 Second Reading speech, <https://www.parliament.nsw.gov.au/bills/Pages/bill-details.aspx?pk=421> which refers to the 'Review of the Dams Safety Act 1978 and Dams Safety Committee, September 2013', https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0003/477174/KPMG-final-report-review-of-dam-safety-act-and-committee-2013.pdf, which exclusively mentions dam failure risk only; the Second Reading speech states: 'The New South Wales Liberal-Nationals Government's number one objective remains protecting the community from the risk of dam failure'; the ANCOLD guidelines include the identification and treatment of dam failure risks only.

To maintain safe conditions, a controlled spillway must operate when, and how, it is designed:

- it must not operate prematurely causing unexpected early discharge (for example, a sunny day failure of a fuse plug or opening of a spillway gate where the fuse plug/gate retains water at full supply level)
- it must fail or operate at the time/moment it is designed to (for example, a late failure or non-failure of a fuse plug, or late opening or non-opening of a spillway gate during a flood event).

Because controlled spillways are designed to protect the dam from failure and must operate as intended, DSNSW regulates their design, operation and maintenance, and DSNSW's audit processes include elements to address these aspects (refer to Dams Safety Regulation 2019 clause 9 (1) (a) and 9 (c), and clauses 23 and 24)².

Considerations that are important in DSNSW's oversight include:

- reliability of operation of spillway gates is a fundamentally important matter and should be considered by a dam owner in risk assessments
- the following factors can impact on the reliability and/or proper operation of a controlled spillway: poor maintenance, incorrect procedures, poor management decisions, human error, lack of operator training, equipment failure, poor design, communication deficiencies, inadequate testing and exercising
- changes to the flood hydrology for a dam may result in the existing design or planned operation of controlled spillways no longer being the most appropriate for preventing flood failure of a dam and may increase the potential for loss of life.

Other matters to consider

1. Controlled spillway operation affects downstream flooding

To ensure the dam does not fail in flood conditions, the operation of a controlled spillway requires the release of a significant amount of the flood water temporarily held behind the dam wall. Planned operation of spillway gates or fuse plugs may result in risks to public safety, the environment or economic assets. These risks are not due to a failure of a gate or fuse plug to fulfill its design purpose but due to their intended mode of operation³.

While the evacuation of a downstream population during a flood event large enough to trigger a fuse plug spillway would effectively prevent the life loss due to the spillway operation⁴, some dam

² DSNSW's audit processes have included the audit of a dam's controlled spillways since establishment of the agency in November 2019.

³ ANCOLD 'Guidelines on risk assessment' section G11-11

⁴ See section 2.1.4 of the 'Hawkesbury-Nepean Valley: NSW SES Dam Emergency Arrangements', Annex G to the Hawkesbury-Nepean Flood Plan https://www.nsw.gov.au/sites/default/files/2021-07/SubPlan-HNV-AnnexG-Dam_Emergency_Arrangements.pdf

safety risk analyses have shown the operation of fuse plug spillways may cause a potential loss of life.

A dam owner with a controlled spillway, which could cause an incremental loss of life, should inform emergency response agencies (primarily the NSW SES) and affected communities of the potential consequences of a controlled spillway's operation, and should appropriately alert them to its impending operation during a flood event. The design of fuse plugs and their trigger levels should be such that the adverse impacts are minimised so far as is reasonably practicable.

DSNSW ensures the owners of declared dams with controlled spillways liaise closely with the NSW SES so emergency agencies respond appropriately to the consequences of spillway operation.

2. The operation of a controlled spillway may appear to the community to be a dam failure

Controlled spillways must release flood waters to protect its structural integrity during flood events. On some occasions their operation may appear to the public to be 'uncontrolled', as they can result in faster rising downstream flood levels. This is exacerbated by inaccurate media reporting and images⁵. As a result, communities affected by a dam misunderstand why, and how, a dam's controlled spillway works.

Therefore, public education and engagement by dam owners would be beneficial to explain why and how their dam's controlled spillways operate, the consequence of their operation and the fact that controlled spillways do in fact mitigate maximum flood level rises downstream.

DSNSW encourages dam owners to educate the downstream population to increase community understanding and acceptance of controlled spillway operation.

Legislative background

Dams Safety Act 2015

3 Objects of Act

The objects of this Act are as follows —

⁵ An example: 'Aussie towns inundated by 'wall of water' as dam overflows: 'So frightening': <https://au.news.yahoo.com/towns-inundated-huge-wave-record-spills-nsw-dam-000255110.html>

(a) to ensure that any risks that may arise in relation to dams (including any risks to public safety and to environmental and economic assets) are of a level that is acceptable to the community...

16 Operations and maintenance plans for declared dams

(1) The owner of a declared dam must prepare and implement an operations and maintenance plan for the dam that complies with the requirements specified in the regulations.

Dams Safety Regulation 2019 (The Regulation)

9 Operations and maintenance plans

(1) An operations and maintenance plan under section 16(1) of the Act for a dam must set out the following —

(a) the operating procedures for the dam with a concise description of the procedures and limits (operator controls) of plant and equipment used in the operation of the dam...

(c) the maintenance (comprising corrective and preventive) that will be carried out on the dam, the times at which that maintenance will be carried out and who is responsible for the maintenance,...

(2) The operations and maintenance plan must —

(a) set out how the matters in subclause (1) will apply in normal, abnormal and extreme loading operation conditions, and...

23 Certain work to be carried out by person subject to quality management system

(1) The owner of a declared dam must ensure that work involving designing, constructing, commissioning or decommissioning the dam or a major modification to the dam is only carried out —

(a) in accordance with the risk management framework forming part of the dam safety management system for the dam, and

(b) by a person who is subject to a quality management system.

(2) The quality management system must be in accordance with Australian and New Zealand Standard AS/NZS ISO 9001:2016, Quality Management Systems — Requirements.

24 Independent competent persons must review work involving dam design

(1) The owner of an extreme or high consequence dam, other than a high C consequence dam, must ensure that relevant design work for the dam is reviewed by a panel of at least 2 independent

competent persons.

(2) The owner of a high C consequence dam must ensure that relevant design work for the dam is reviewed by an independent competent person.