Basic Details

Publish Date

02 September 2025

Case ID#

3253

Title

Erosion from overflowing of flood storage reservoir on embankment not designed to spill

Nation

England

Regulator Reference No.

514

Legal Status

Statutory

Reservoir Type

Non-impounding

Reservoir Capacity

10 - 24,999m3

Year of Construction

1950 - 1969

Main Construction Type

Earth fill embankment

Dam Height

5 - 9.99 metres

Dam Flood Category

A

Hazard Class

High-risk reservoir

Reservoir Use

- Flood risk management

Owner Type

Public body

Incident Details

Date & Time of Incident

10 October 2024 - 12:00

Date Incident Closed

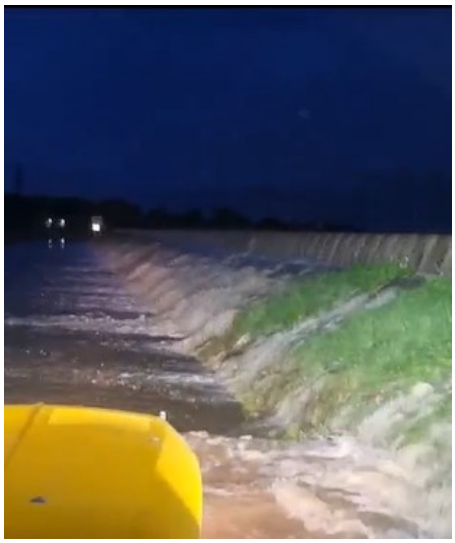
Observations that Caused the Incident to be Declared

- Dam or embankment overflowing or overtopping

Describe the Incident

During Storm Babet, a river next to the dam overflowed the dam and caused erosion to the dry side of the bank. The embankment topsoil eroded down to the core material in various locations along the 600m length. The core is homogeneous and of good cohesive material, preventing further deterioration. The reservoir is an offline reservoir used to receive the tributary flow from a nearby beck. In an extreme flood event on the river, the reservoir can fill by overtopping the piled river defence. It acts as an unintended but high-level spill point. The piled river defences retain the upper 600mm of flood defence level. The piles are beyond their original design life and their length is thought to be around 5m long. The riverside exposed pile length is greater than the landward side by 2m. ?If the fill material was eroded away from the reservoir side, the piles would likely fail. Therefore, the embankment profile must be maintained to act as designed in a composite manner. This overtopping previously occurred in 2007. It caused minor scour at the piles interface with the embankment then. The undertakers constructed a splash pad post-2007 to alleviate the issue occurring again. In this incident, broad leaf plants such as docks and thistles worsened the erosion. Thistles and other stalks can cause micro-turbulence, exacerbating the erosive forces. The undertaker completed immediate temporary repairs once the flood flow had receded. During the incident, the local authority emergency response team closed a road to enable the emergency works. A QCE and the supervising engineer provided recommendations for short-, medium- and long-term repairs. The undertaker is looking to action these recommendations.

Supporting Photos



Erosion from overflowing of flood storage reservoir on embankment not designed to spill - Incident Image

Causes and Impacts

Natural Processes which Initiated or Contributed to the Incident

- Flood - within dam design capability

Main Contributing Factors to the Incident Occurring

Dam Factors

- Deterioration of materials

External Factors

- Excessive or damaging vegetation (not trees)

Shortcomings

- Design shortcoming
- Maintenance shortcoming

Root Cause of the Incident

Impacts on the Reservoir

- External erosion

Supporting Photos

Erosion from overflowing of flood storage reservoir on embankment not designed to spill - Cause Image

Supporting Contributions and Studies

Human Factors which Influenced the Incident

Post flood actions were undertaken to carry out emergency temporary repairs to the embankment. The SE, also a QCE, was liaised with to ensure the temporary works design was appropriate should another flood event cause further overtopping. The On Site Plan was effectively put into action and appropriate personnel and resources deployed to action a recovery plan. The recovery plan involved liaison with professional partners to enable emergency road closures to undertake the temporary repair works. The main materials used were sandbags and bentonite geotextile fabric to act as robust erosion protection to the areas of scour.

Instrumentation at the Reservoir

There is no instrumentation available for this scenario. Instrumentation is available for levels within the washland. Requests have been made to install new telemetry to provide information on levels to inform when overtopping from the river is occuring. Until new telemetry is approved and installed, site observation through patrols is the current option.

Was Instrumentation Effective?

No

Assistance by External Parties and Impacts on Downstream Population

The incident was part of a larger area flood incident so emergency services were made aware through the tactical co-ordination group of local authorities and emergency services. No assistance from the emergency services were required or called upon. The local council were liaised with and worked in partnership to provide an emergency road closure and the traffic management to enable emergency repairs to be undertaken immediately post flood event. For context: when the reservoir is in operation the roads within the reservoir are closed, as they become submerged, this is standard operating procedure in this flood storage reservoir. The impacts on the local population were an additional 2 days period of road closure with an extensive diversion route in place, to enable emergency repairs. The permanent repair carried out at a later date also had a weeks road closure in place.

Summary of Studies or Investigations Undertaken

The QCE and SE has provided recomendations. These were immediate, short and long term. The asset in question is on the Medium Term Plan for upgrade and improvement. The repairs undertaken temporary and now permanent have reinstated the asset to the pre-flood condition. Until the asset is upgraded this may occur again but a reactive approach is the mechanism to manage until asset upgrade occurs.

Lessons Learnt

Lesson 1

- Emergency response
- General design and construction

A similar event occurred in the past where the bank was damaged from an overflow. If an embankment not designed to overflow has overflowed in an event, it can be assumed this will happen again. It is important to investigate the root cause of incidents and try to fix them from the start. The previous repair was designed to minimise the damage from the issue reoccurring which was not successful.

Lesson 2

- General design and construction

Ensuring the design standards for inflows at flood storage reservoirs is appropriate is important to ensure they operate as designed.

Lesson 3

- Operation and maintenance

Quality vegetation management on auxiliary grass spillways is an important asset management activity.

Lesson 4

Closing Comments

Third-party video footage was available of the incident, which was useful to review what happened. Having evidence of incidents happening is useful for reviewing incidents.

Supporting Photos

Information provided has been sent from reservoir owners and engineers, and cleansed of personal information by the enforcement authority. We cannot guarantee the accuracy of the data, but if you find an error please contact the relevant enforcement authority.