Basic Details

Publish Date

19 January 2026

Case ID#

3344

Title

Flood storage reservoir operated prior to grass establishment following works leading to erosion.

Nation

England

Regulator Reference No.

532

Legal Status

Statutory

Reservoir Type

Non-impounding

Reservoir Capacity

1M - 10M m3

Year of Construction

Unknown

Main Construction Type

Earth fill embankment

Dam Height

2 - 4.99 metres

Dam Flood Category

C

Hazard Class

High-risk reservoir

Reservoir Use

- Flood risk management

Owner Type

Public body

Incident Details

Date & Time of Incident

30 September 2024 - 12:00

Date Incident Closed

10 October 2024

Observations that Caused the Incident to be Declared

- Slope or face deformation (slippage, cracking, slumps, mounds, depressions)

Describe the Incident

The reservoir is currently undergoing MIOS works which include the realignment and reprofiling of the spillway which is both an inlet and outlet spillway. The construction was completed in September 2024 which had a grass face however there had not been sufficient time (approx. 1 month) for the grass to fully establish to provide the required protection. Erosion on the upstream face of the spillway occurred a total of 10 times over the winter 24/25 with first event occurring on the 30/09/2024-01/10/2024. Erosion was due to the river level rising and water flowing into the reservoir (not out of the reservoir). No immediate action was taken as water was spilling into the reservoir (and not out). It caused erosion on the upstream face, washing out the topsoil and eroding some of the clay underneath which almost scoured back to the concrete crest cut off beam. The reservoir is an offline reservior and was well below top water level. The spillway was not expected to act as an outlet spillway within the next week or more of the incident. . The QCE for the MIOS works attended site and assessed the damage and risk of the Cat D structure. The primary root cause was identified as lack of grass establishment on the upstream spillway face and possible issues with design assumptions made. The design did not take into consideration possible backing up effects of the weir downstream, telemetry and data accuracy for historic levels as well as the shorter sharper storm durations rather than the modelled 'critical storm duration'. These items may have increased depth of water over the weir providing greater velocities over the upstream face than expected.

Supporting Photos

No images provided.

Causes and Impacts

Natural Processes which Initiated or Contributed to the Incident

- Flood - beyond dam design capability

Main Contributing Factors to the Incident Occurring

Dam Factors

- Deterioration of materials
- Other dam factors (describe below)

External Factors

- Not provided

Shortcomings

- Design shortcoming
- Process or procedural shortcoming

Root Cause of the Incident

The primary root cause was identified as lack of grass establishment on the upstream spillway face and possible issues with design assumptions made. The design did not take into consideration possible backing up effects of the weir downstream, telemetry and data accuracy for historic levels as well as the shorter sharper storm durations rather than the modelled 'critical storm duration'. These items may have increased depth of water over the weir providing greater velocities over the upstream face than expected.

Impacts on the Reservoir

- Deterioration of face protection
- External erosion

Supporting Photos

No images provided.

Supporting Contributions and Studies

Human Factors which Influenced the Incident

The on site team immediately highlighted the issue to the QCE and begun enacting the contingency plans which included putting tarpaulins over the eroded sections of spillway.

Instrumentation at the Reservoir

Was Instrumentation Effective?

Yes

Assistance by External Parties and Impacts on Downstream Population

Summary of Studies or Investigations Undertaken

The designers reviewed the previous design works carried out as well as analysing historic flood events that occurred each winter for the last 20 years. Although the review stated that the current design was deemed tolerable there was still uncertainties. This included how to how to get 'good' grass establishment within the tight programme and yearly expected overtopping events and the incorporation of the possible data accuracy issues.

Supporting Photos

No images provided.

Lessons Learnt

Lesson 1

- General design and construction

Design for temporary protection measures should be considered when the spillway relies on grass establishment for performance.

Lesson 2

- General design and construction

More credence should be given to different types of storms events and data accuracy checked and accounted for in the design.

Lesson 3

- Emergency response

Develop and agree robust mitigation plans in advance of works commencing in case of damage (or operation of flood storage reservoirs). Ensure you consider all possible conditions on site to ensure the plan is appropriate. In this case, the initial contingency plans using tarpaulins did not work well. The tarpaulins where not strong enough and not weighted down sufficiently to stop both tearing from wind and overflow. After another two overtopping events new tarpaulins, recompaction of material, dumpy bags, anchors and a cargo net was used. This provided a much more robust solution that did not tear and remained in place providing protection during the next overtopping events. It was also difficult to enact the contingency plan due to soft ground condition and risk of making the spillway worse if using larger plant.

Lesson 4

Closing Comments

Supporting Photos

No images provided.

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.