

## Scientific Advisory Group for Emergencies (SAGE)

### Potential Breach of Toddbrook Reservoir

#### Summary of Teleconference

06 August 2019, 10am

#### List of attendees

##### Chair

Patrick Vallance Government Chief Scientific Adviser (GCSA)

##### Science experts

Chris Binnie Exeter University  
Ian Boyd DEFRA Chief Scientific Adviser  
Hannah Cloke Reading University  
Andrew Curran Health and Safety Executive Chief Scientific Adviser  
Andy Hughes Dams and Reservoirs Ltd  
Peter Kelham ARUP  
David Potts Imperial College London

##### Attending

Simon Bamford Canal and River Trust (CRT)  
Emma Griffiths GO-Science  
Will Hall Cabinet Office  
Samantha Harris GO-Science  
Simon Lewis Environment Agency (EA)  
Ben Lukey Environment Agency  
Marsha Quallo-Wright DEFRA  
Richard Parry Canal and River Trust  
John Perkins Strategic Coordination Group  
Andrew Price GO-Science  
Luke Reynolds GO-Science  
Richard Robson Mott MacDonald, Independent Panel Engineer  
Rachel Swann Strategic Coordination Group  
Doug Wilson Environment Agency

##### Secretariat

Andrew Kaye GO-Science  
Mausmi Juthani GO-Science  
Olivia Harris GO-Science  
Arianna Sorba GO-Science

## **Welcome**

GCSA welcomed participants to the SAGE meeting – its purpose to offer an independent science/engineering view on whether the CRT report on ensuring the safety of the dam is sufficient for the needs of Gold Command to determine whether residents can return home.

Attendees were advised that content from SAGE meetings is to be treated as confidential. GCSA asked that participants declare any conflicts of interest to the SAGE secretariat following the conference call.

## **Situation update**

At the time of the meeting, the water level in the reservoir was 8.13m below the top of the dam; the reservoir was at 24% holding capacity. There is significant pumping capacity in place to continue to reduce the water level. EA is working with CRT to model scenarios of further heavy rain with different likelihoods, to be completed by lunchtime on August 7. Heavy rain, potentially in excess of the amount which caused the initial damage, is forecast for the coming weekend.

## **Discussion of CRT report**

SAGE heard about work done to protect the clay core and reduce water levels to below the damaged section of the dam – and about intentions to carry out further investigations and repairs, and to maintain the low water level. It was estimated that it could take two to three years to fully repair the reservoir.

SAGE agreed that the risk of dam failure is significantly reduced by maintaining lower water levels in the reservoir, but SAGE advised that the structural integrity of the dam remains unclear. This is not an immediate cause of concern while water levels are low. However, geotechnical analysis should be conducted in due course to understand the stability of the dam, including the impact of rapid draw down of water on the structure; the impact of adding foreign materials to the original structure and how materials might interact; whether evidence of local slips indicates distress within the dam structure; and how the factor of safety has changed following damage to the dam. The CRT report to Gold Command would benefit from increased geotechnical content.

SAGE advised that the additional hydrological modelling underway is necessary to understand the risk posed by heavy rain and the rates at which the reservoir could refill. This modelling involves quantifying the weather event which caused the damage and evaluating the ability of the dam to withstand various volumes and durations of rainfall. It will help to clarify what represents a safe water level in the reservoir and what long-term pumping capacity is needed. Until this risk is better understood, SAGE considers it premature to draw conclusions about whether it is safe for residents to return to their homes.

Action: Environment Agency to consult Hannah Cloke on its current modelling work. EA to provide its modelling to CRT and GOLD as soon as possible to enable decisions to be made.

SAGE advised consideration of deploying rain gauges – to enable earlier warning of potential hazard and faster evacuation of residents if necessary.

## **Summary of actions**

Environment Agency to consult Hannah Cloke on its current modelling work. EA to provide its modelling to CRT and GOLD as soon as possible to enable decisions to be made.