

## **The Black Knight of New England Dams - Mendums: Monitoring its Deficiencies, the Ensuing Drawdown and Reconstruction**

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ABSTRACT: The New Hampshire Department of Environmental Services (NHDES) has owned and operated Mendums Pond Dam in Nottingham since 1955 for recreational purposes. The dam is classified as a high hazard structure, is 32 feet in height and was constructed around 1840. It was originally built as an earthen embankment between two vertical dry masonry walls to impound water for downstream industrial purposes. Since the turn of the 20<sup>th</sup> century, several measures were taken attempting to increase its stability as well as reduce seepage and leakage through it. These measures included lining the upstream face and sluiceway with concrete, buttressing the downstream masonry wall with a partial rockfill slope, and installing three steel tie backs through the cross-section of the dam to stabilize the downstream wall.

In 2015 the upstream concrete sluiceway was dewatered for maintenance purposes, at which time leakage through the downstream masonry walls visibly increased, carrying soil material with it. Upon further investigation, multiple voids directly upstream of the dam were discovered in the impoundment bottom. NHDES conducted dye tracer tests and started daily monitoring of all identified points of leakage through the masonry walls as well as seepage at the toe of the dam. Based on those results, NHDES determined the dam was in unsatisfactory condition and notified the public of a complete drawdown.

During the 2015/2016 winter, investigations along the face of the dam occurred to better characterize subsurface conditions in anticipation of designing and constructing a partial, upstream seepage cutoff. Several seepage cutoff approaches were considered including a downstream embankment and filter system, upstream slurry trench, sheet piles and a geomembrane liner. At present, the partial cutoff, as well as a new outlet works, has been completed and the impoundment has refilled. This paper presents the series of events that led to the drawdown of the pond, results from diagnostic testing before and during the drawdown, interpretation of the subsurface exploration program, design work for reconstruction and recommendations for future monitoring and modeling.