An innovative solution for emergency filter installation to minimise piping failure risk

K. Bartlett¹ and J. Barlow²

1. Director Asset Management, Department of Natural Resources Mines and Energy, Brisbane Queensland 4000. Email: Kevin.Bartlett@dnrme.qld.gov.au
2. Senior Engineer, Department of Natural Resources Mines and Energy, Brisbane Queensland 4000. Email: Joe.Barlow@dnrme.qld.gov.au

ABSTRACT

The installation of filters on dams to protect against the possibility of failure by piping is common practice. For those dams constructed without filters retrofitting of filters can be quite expensive and extremely difficult to construct, especially in an emergency. DNRME’s Technical Services is responsible for operating and maintaining a number of abandoned tailings dams which have been constructed without filters.

Recently DNRME’s Technical Services was required to install an emergency filter at a seepage location at one of the sites where an embankment constructed of dumped rockfill and tailings had a concentrated seepage. In early 2019 it was noted that one of these seeps was not behaving as expected and a filter was required to be installed to protect against piping within a short period of time. The site and nature of the seep as well as budget limitations meant that an innovative solution was required in order to ensure the wall was protected against piping.

A retaining structure was constructed using HDPE piles and sheet in order to ensure its longevity in an environment which is known to corrode stainless steel and reduce conventional concrete to rubble in relatively short periods of time. The retaining structure was sized to allow for the placement of a 2 staged sand filter with a gravel finger drain at the seepage location. It is acknowledged that the acidity and high dissolved solids content of the seep is likely to degrade the sand filter over time so the filter structure was designed for ease of removal and replacement of the filter medium within a short time.

The filter installation included installation of monitoring equipment to provide early indication of the degradation of the filter medium.

Construction was completed successfully in September 2019 and the filter is the subject of ongoing monitoring for seepage quantity and water quality.