ABSTRACT
With ongoing catastrophic mine tailings dam failures, the hindsight revelation of poor safety records, and an increasing prevalence of public scrutiny and attention of mining operations, there is an immediate call for enhanced safety provisions of tailings dams. It is estimated that each 1/3 century the potential risk of tailings dam failure increases by 20 fold; to address increasing demands on waste volume, tailings storage facilities must be bigger, built faster, and to be longer lasting. Today, challenges arise in identifying and utilising the ability of monitoring systems to understand the complex performance and rapid behaviours of these dams, in turn reflecting on the system’s ability to be able to forecast deterioration before failure occurs. On top of this challenge, is no single one-size-fits-all monitoring solution for different environments.

This project aims to identify the different monitoring and instrumentation suggestions for tailings dams in different Australian mining environments. Collaboration with suppliers was utilised to discover the most advanced systems enabling monitoring of different failure modes and mechanisms, and to ensure safe work methods. This research engaged with a number of different mine site locations, differing from one another based on climate and commodity in the Australian setting. Following an understanding of the different conditions under which the tailings dam is constructed and operated, instrumentation and monitoring suppliers were engaged to tailor a monitoring strategy to the different sites. Collating the information, these guidelines present general monitoring requirements applicable to the different conditions. It is hoped that mine operators and tailings dam practitioners across Australia (and broader) will be able to refer these guidelines to increase their understanding of the most appropriate instrumentation and technologies to their specific site, and in turn be more informed when implementing a system that can aid in the forecasting and mitigation of tailings dam failure.