Strength in Waste: Innovative Tailings Utilization at the Kara Mine

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Keywords: Case Study, Tailings Re Use, Embankment Material, Embankment Design, Construction, Tailings Management.

# ABSTRACT

Tasmania Mines operates the Kara Mine, a magnetite and scheelite mining site located approximately 35 km south of Burnie in North West Tasmania. The mine produces around 400,000 tonnes of tailings annually, characterized as coarse material comprising 60–80% sands, 7–19% silts, and 12–21% clays, and classified as Non-Acid Forming (NAF).

The most recent Tailings Storage Facility (TSF) began construction in 2014, with the starter dam completed in 2019 across two distinct construction phases to meet evolving storage requirements. Tailings are deposited sub-aerially via spigots, with water managed using electric pumps. Originally, the facility design included 13 meters of upstream raises. However, investigations revealed the tailings' susceptibility to post-seismic liquefaction, prompting a shift to modified centreline raises.

Due to their NAF classification and high-strength characteristics, tailings were deemed suitable for use as embankment material. Comprehensive investigations and testing confirmed their viability, providing several advantages over conventional materials. Tailings could be sourced directly adjacent to the work site, reducing transportation costs and time. Additionally, utilizing tailings for embankment construction created extra storage capacity within the TSF, effectively extending the facility’s lifespan.

To date, the embankment has been successfully raised by four meters, with an additional two-meter raise currently underway. While construction has been largely successful, several unique challenges and lessons were identified during the use of tailings.

This paper presents a detailed case study of the Kara TSF, focusing on the innovative use of tailings as embankment material. It explores the TSF’s design philosophy, the investigations and testing processes, the benefits of tailings utilization, and the embankment’s performance during deposition, offering valuable insights into the application of tailings in mining infrastructure.