

The Design and Construction of Kargu Dam

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SYNOPSIS. Kargu Reservoir is located within the Andulau Forest Reserve in Brunei Darussalam and was constructed to regulate low flows in the Sg¹ Belait. Raw water is abstracted from Sg Belait for domestic and industrial supply and a high level of reliability under drought conditions is required. The reservoir has a gross storage volume of 14.3Mm³ and will be used to increase Sg Belait yield by 110MI/day for downstream abstractions at the 1 in 100 year low flow event.

The earthfill embankment dam is 27m high above foundation level and 440m long at crest level, incorporating 1.2Mm³ earthfill. The valley floor comprised thick peat / soft alluvial clay overlying silty-fine alluvial sand and weak sandstone, with colluvium covering the hill slopes. The main focus of the ground investigation was on the valley floor alluvium and liquefaction potential under seismic loading. A comprehensive ground investigation was carried out and various sampling and testing methods were carried out to characterise the nature of the alluvium for stability and liquefaction assessment.

A key aspect of the design of the dam was the removal of large quantities of peat and soft alluvial clays present over the valley floor at depths of up to 12m below ground level. A deep well dewatering scheme was installed comprising 105 deep wells each sunk to 30m depth, with airlift pumps used to draw down groundwater levels and facilitate excavation and filling operations.

The waterproof element of the dam was formed by a central rolled clay core and long upstream clay blanket. The clay core material was processed mainly from weathered and fresh mudstone requiring significant conditioning to produce a satisfactory cohesive fill.

This paper describes the field investigation, design aspects and construction of the dam and performance during first filling of the reservoir.

¹ Sg: Sungai - river or stream