

Bentofix® X, Secutex®

Base Lining System in Dam

- **Project Name**
Dam Rehabilitation (Mamak & Pernek), Indonesia
- **Year constructed**
2022 - 2023
- **Supplier & installer**
PT. Indramas Enviro Karya - Tangerang, Indonesia
- **Consultant**
PT. Raya Konsult - Bandung, Indonesia
- **Product**
Bentofix® X2 NSP 4900
Secutex® MR 1201





The tropical nation of Indonesia receives over 600mm of rainfall in its mountain regions per year, resulting in an infrastructure of over 200 dams currently in operation (Ministry of Public Housing and Public Works / PUPR Indonesia, 2022). More than 70 of those are located in West Nusa Tenggara (NTB) Province, giving the highest concentration of dams in the nation. Dam construction peaked in the '90s and '00s, meaning today, the operation has been running for 20 to 30 years.

Challenge

To increase the safety and functionality of the existing dam network, PUPR Indonesia received funding from both the World Bank and Asian Infrastructure Investment Bank to carry out repair, maintenance, and reinforcement by financing the “Dam Operational Improvement and Safety Project Phase II.”

Environmental and geotechnical assessment starts with a geo-radar survey conducted in most NTB dams.

Leakages were found in parts of some operating dams. Measures to remediate the leakages and rehabilitate the sealing of the dam had to be taken. The traditional approach required either the dams to be completely reconstructed using a compacted clay core or localised remediation using compacted clay needed to be installed on the embankment side slope. Both options presented challenges regarding excessive cost and installation time, combined with additional CO₂ emissions and truck movement which would endanger that the project meets the sustainability requirement of the AIIB funding conditions.

Solution

Naue worked together with the consultant, PT. Raya Konsult, and our partner, PT. Indramas Enviro Karya, to propose a multicomponent geosynthetic clay liner (GCL) Bentofix® X as part of a composite lining system with 2mm HDPE as a sealing element at the side slope of the dam embankment. The characteristic of Naue Bentofix® GCL allows rapid installation and a unique, self-healing PE-coated GCL to prevent water seepage from entering the embankment body should the primary liner fail. On top of the Bentofix® X multicomponent GCL and 2mm HDPE geomembrane, a nonwoven geotextile Naue Secutex® is installed to act as a protection layer against deformation of the lining system by coarse soil particles.

The state-of-the-art design of the HDPE geomembrane and Bentofix® X GCL as the lining system provides a groundbreaking solution to rehabilitate the earth-fill dam. The method reduces costs and environmental impact of the works whilst offering a fully supervised quality of manufacturing and installation of lining system components. It also allows the transfer of a similar design into new earth-fill dam construction. Using geosynthetics in these projects led to faster and easier construction than traditional methods while at the same time reducing emissions and traffic, contributing towards a more effective and sustainable practice in dam remediation projects.

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