



Consulting Engineers

MOZAMBIQUE - MUDA DAM

MBB designed and supervised the construction of an earthfill dam with a wall height of 32m, that impounds 56,5 million m³ of water.

Project Details

The dam was constructed as a joint project between the Government of Mozambique and Açucereira de Moçambique, a sugar company based at Mafambisse.

The primary purpose of the dam is the provision of irrigation water for the sugar cane development at Lamego South. The dam also has a provision for the storage of raw water for domestic use.

The dam is situated in the Sofala province of Mozambique, at latitude 19°23'17"S and longitude 34°01'35"E.



The dam was designed by the South African consulting engineering firm MBB Consulting Services (PMB) (Pty) Ltd. In addition to the design, MBB carried out site supervision of the construction of the dam.

Construction of the dam started in May 2006 and was completed in May 2008, after the control valves were installed at the outlet.

Although linked, the Muda Dam can be considered as two embankments: the main embankment, closing off the Muda River, and the second being the saddle embankment spanning the adjacent saddle.

Supervision

MBB had an engineer based on site to monitor the construction of the dam for the duration of the construction. In addition to this, regular site visits were undertaken by specialists from MBB to monitor progress.

Site visits were also carried out by Dr Maud, the engineering geologist, for foundation assessment and for the positioning of the grout curtain.

Materials

Suitable materials for the construction of the dam and most importantly, the core, were sourced immediately up and downstream of the embankment.

Compaction testing was carried out on all layers and no failures were accepted. Areas that did not pass the compaction tests were reworked. It is estimated that over 3 000 density tests were carried out.

The Core

Good quality clays for the core were sourced from within 800m of the embankment. As the dam started filling before the embankment could be completed, additional downstream borrow areas had to be found, as the original borrows were now flooded.



An emergency closure plug has also been designed, constructed and tested for emergency upstream closures.

Some of the items, such as the valves, took far longer to manufacture than expected, due to the difficulties experienced in Zimbabwe at the time of construction.

Outlet pipe

The 1200Ø steel outlet pipe is founded on rock along its length and is encased in reinforced concrete.

A 900Ø sleeve valve and a 350Ø needle valve have been fitted as control valves while a 1 000Ø gate valve has been installed for emergency situations and for maintenance purposes.



Filters and Drains

A chimney filter was installed on the downstream side of the core and extended from the top of the core to the bottom of the core trench.

A blanket filter was also placed with finger drains guiding seepage water away from the filter to the toe drains, running along the length of the main embankment.

To allow for the monitoring of any seepage, inspection chambers have been installed at the junctions between the finger drains and the toe drains.

Spillways

The spillways were designed to have three different levels. Both the primary and secondary spillways have hard rock across their width.

Concrete sills have also been installed in all three of the spillways, so as to minimize possible erosion.



Emergency measures

With the start-up delays experienced, the construction of the dam extended into the wet season.

To protect the works from possible flood damage a 60m wide emergency spillway was excavated and the front face of the main embankment was built up to provide 3m of freeboard.

This then allowed the contractor to work safely on the rear section of the embankment and would allow flood waters to pass through the emergency spillway.



Construction Stats

Construction Stats

Access Roads	=> 21 km
Earth Works	=> 700 000m ³
Drain Sand	=> 6 600m ³
Concrete	=> 1 000m ³
Rebar	=> 32 ton's
Density Tests	=> 3 000
Concrete Cube Tests	=> 250

Plant Used

Bulldozers	=> 6
Excavators	=> 6
ADT	=> 11
Compactors	=> 4
Water Bowers	=> 2
Lighting Plants	=> 6
Stone Crusher	=> 1
Fuel used	=> 1,116 million litres
Machine Hours	=> 53 000
Man Hours	=> 353 000



...MUDA DAM



Financial

At a cost of \$ 4,5 million to construct, the cost versus storage is \$ 0.08 per 1000 litres. This is an extremely cost efficient dam.



MBB Consulting Services (South) (Pty) Ltd.
+27 21 8871026 johanv@mbsouth.co.za

MBB Consulting Services (Pmb) (Pty) Ltd.
+27 33 3453530 info@mbbpmb.co.za

MBB Consulting Services (Eastern Cape) Inc.
+27 46 6227223 mbbpje@imaginet.co.za

MBB Consulting Services (Nelspruit) (Pty) Ltd.
+27 13 7528213 jvr@mbbnel.co.za

ACER (Africa) Environmental Management Consultants
+27 35 3402715 info@acerafrica.co.za

