

Muhazi Dyke Project

A. Background

Muhazi Lake is fed by 870 km² watershed and spans over around 38 km. It is drained by the Nyabugogo River. At the outlet of the lake there is an earth fill dam of 225m long, 4m height, 5 m crest width, with 2/1 side slope on the upstream side of the dyke and 3/2 side slope in the downstream side of the dyke.

The dyke was constructed in 1999 as emergent solution, when it was observed that the lake was drying due to uncontrolled outlet;

The existing earth fill dam is unstable and prone to overtopping during the rainy season due to its reduced freeboard. The instability of the dyke is characterized by the breakings on some parts of the dyke, differential settlement making the change of the dyke shape, water seeping to the parts of the dyke etc. Different attempt to fix the dyke issues have been done since 2013 up to date. The recent attempt is the use of sandbag to limit the overtopping in April-May,2020.

If the dam breaks it has the potential of flooding Nyabugogo area which is a commercial hub in Kigali town, and may cause significant damages of properties and lives.

A Pre-feasibility study carried out in 2019 has shown that the cost and the difficulties involved in the rehabilitation of the existing dam are higher than building a new dyke downstream.

The feasibility Study and Detailed design completed in June, 2019 has shown that the foundations of the potential sites are all made of a 7 to 12 m deep layer of peat up to the bedrock. No alternative site has been found in the area. The Downstream axis was chosen for having shorter section on peat.

Peat has been described as one of the poorest foundation material due to its high compressibility, low density, weak strength and commonly high permeability. Consequently, building a dyke on peat entails specific knowledge to propose adapted design and construction methods.

The comparison between the homogenous embankment and concrete gravity dyke has been carried out and it was proven that homogeneous embankment is feasible with proper design for stability.

The designed dyke will be 6.5m high, with crest elevation of 1437.5m. a free board of 0.6m will be provided on Muhazi lake having 328.8 million cubic meters and area of 38.5 km². Upstream and downstream side slope will be 1:3, dyke crest 7m, while the excavation depth is set at 1.5m in general and 4m on the upstream side where cut off drain will be built. Use of geogrid was proposed for stabilizing unsuitable soil.

A.1. Location of Muhazi

