

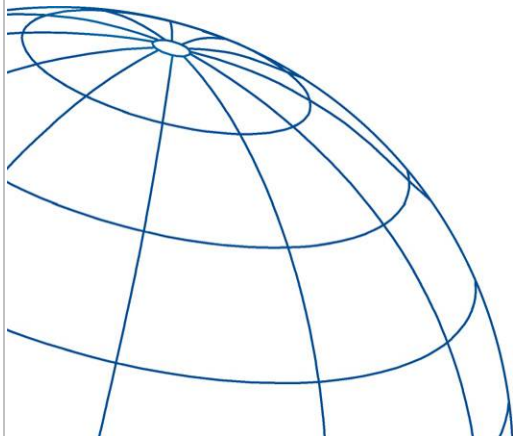
Millennium Challenge Account Malawi

Power Sector Revitalization Project

Environmental and Natural Resource Management Sub-Activity

Design, Supply, Installation, Testing and Commissioning of Trash
Diversion Barrier and its auxiliary for Nkula Reservoir and Provide
Training

Pre-Bid Meeting
19th May 2017, Nkula



CONSULTING & IT



ENERGY



ENVIRONMENT



WATER & INFRASTRUCTURE

Outline

- **Project Description**
- **Scope of Supplies**
- **Design Criteria / Particular Specifications**
- **Interfaces with other Projects**

Project Description

Current Situation

- Aquatic weed grows and accumulates in lagoons upstream of Liwonde Barrage and is flushed downstream at rising water levels
- Debris and weed block power intakes growing at tributaries downstream of Liwonde Barrage and arriving / accumulating at reservoirs
- Heavy trash and timber arriving at reservoirs and damaging trash racks

Current Management Strategies

- At Liwonde Barrage
 - Mechanical control by weed harvesters
 - Physical control by trash boom
- At Power Plants
 - Mechanical control by trash rakes
 - Physical control by screens and diversion

Project Description

Project Objectives

- Improvement of aquatic weed management at Nkula
 - reduction of outage times for hydropower plants
 - increase power plants' reliability
 - increase energy production
- ➔ Supply and installation of physical weed management equipment at Nkula reservoir



Scope of Supply

Scope of Supply

- Three (3) floating trash diversion barriers (incl. trash screens)
- Fixation on the weir structure by heavy duty I-beam sliders (incl. any civil works required)
- Fixation in the reservoir and the reservoir banks as required by the Supplier's design
- Intermediate fixations and anchors as required by the Supplier's design
- Training of EGENCO's personal
- Documentation
- Spare parts for minimum 5 years operation

Scope of Supply

Supplier shall be responsible for (not limited to):

- Design off all equipment (incl. all anchoring),
- Manufacturing,
- Shop testing,
- Packing,
- Transportation to Site,
- Handling,
- Execution and supervision of installation works,
- Site testing
- Commissioning.

Design Criteria / Particular Specifications

Water Velocities (rectangular to barriers)

- mean average velocity: up to 1 m/s.
- design velocity for barriers and anchors: min. 2 m/s

Reservoir Water Levels

The trash diversion barrier shall operate at all operating water levels:

- maximum operating water level 377.1 masl
- minimum operating water level 374.5 masl.

Design Criteria / Particular Specifications

Type of Trash

The trash diversion barriers shall block and divert the trash that is predominant on Shire River:

- water hyacinth, *Eichhornia crassipes* (Pontederiaceae);
- hippo grass, *Vossia cuspidate* (Poaceae); and
- grass reed, *Phragmites mauritianus* (Poaceae).
- water lettuce, *Pistia stratiotes* (Araceae), is present but at low densities.
- heavier and larger obstacles as wood, timber or limbs

Handling of the Trash Barrier

- Easily detachable and to be reinstalled.
- Tenderer shall clearly explain how the trash barriers can be detached and reinstalled and what measures and tools are required for such operations.

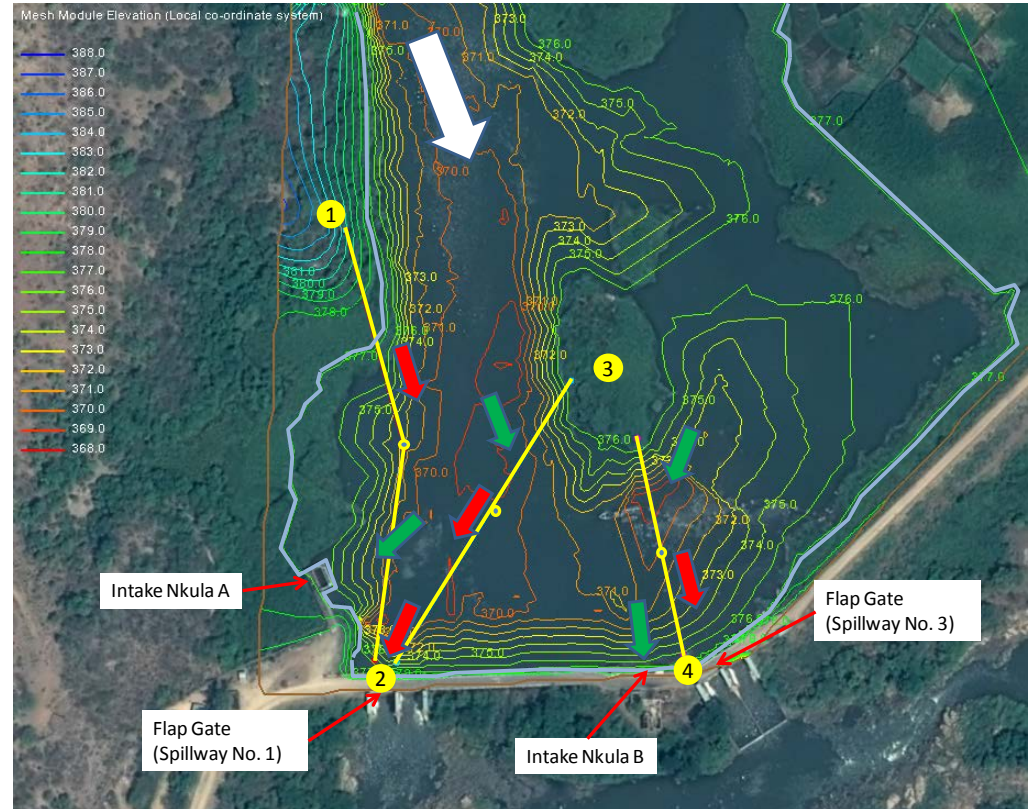
Design Criteria / Particular Specifications

Concept of Alignment

- Prevent trash from reaching Nkula A and Nkula B power intakes
- Diversion towards the two spillway gates equipped with flap gates

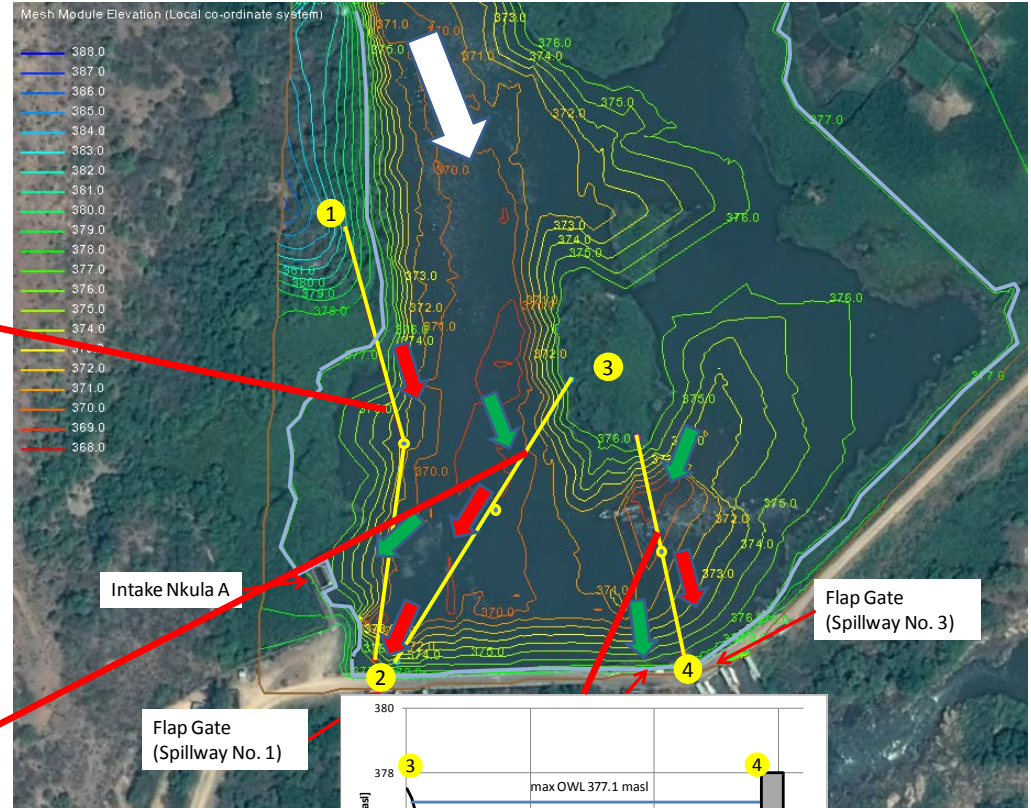
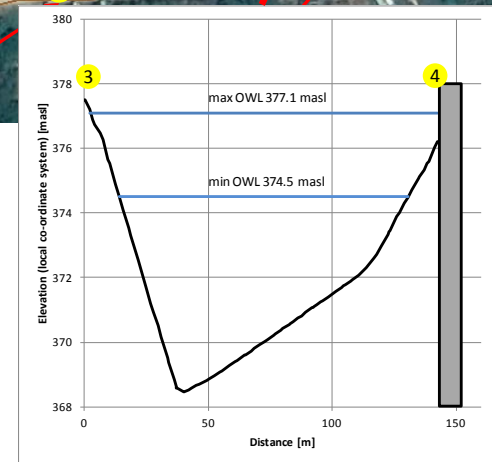
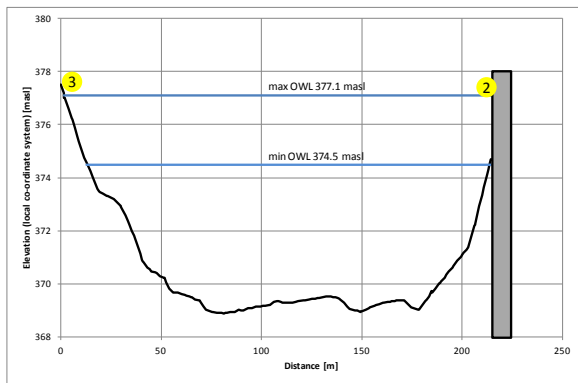
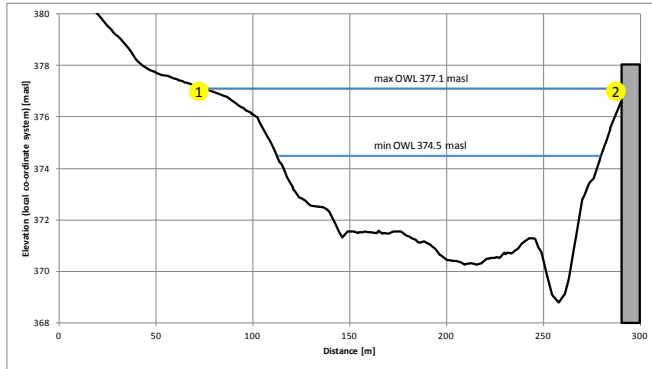
Arrangement of Trash Barriers

- Full responsibility of Supplier
 - stated lengths and proposed anchoring is to be verified by the Supplier according to his design and to be stated in the Tender.
 - preferably small angles between the main direction of flow and the barriers in case of flushing
 - intermediate supports (if required)
 - easy dismantling to let vessels pass



Barrier	Location	U/S Anchoring	D/S Anchoring	Approx. Length
A	1-2	Steel beam	Concrete (Spillway)	250 m
B	2-3	Rock/ Clay	Concrete (Spillway)	215m
C	3-4	Rock/ Clay	Concrete (Spillway)	165m

Design Criteria / Particular Specifications



Design Criteria / Particular Specifications

Design Requirement for Trash Diversion Barrier

- Floating type
- Modular
- Heavy-duty and rigid design
- Block and divert floating debris, trash, wood and timber
- At deep reservoir sections barrier shall be equipped with trash screens

Design Requirement for Fixation Points

- Design of the fixations is the full responsibility of the Supplier
- Tenderer shall include a preliminary layout of all fixation types
- Allow the barrier to follow the actual reservoir level (vertical movement)
 - no debris can overtop at high reservoir water levels
 - no debris can pass below the barrier at low reservoir levels
- Easy and manually detachable to allow vessels need to pass

Design Criteria / Particular Specifications

Training of ENGenco Personnel

- Extensive on site training by Supplier, covering minimum:
 - special skills necessary for maintenance and repair
 - removal and reinstallation of the barriers.

Spare Parts

- List of recommended spare parts to be included
- Spare parts shall ensure a proper maintenance of all barriers for minimum 5 years.
- The final scope of spare parts shall be decided by the Purchaser based on the provided priced list.

Time Schedule

- Detailed time schedule covering all project phases shall be provided with the Tender

Design Criteria / Particular Specifications

Document Approval and Progress Reporting

- All required technical documents in support of the equipment to be provided by the Supplier (including design drawings, O&M manuals, etc.)
- Bi-monthly progress reports to be provided by the Supplier (duly filled progress sheets, main issues and events, schedule, current and future areas of concern, risk analysis, etc.)

Interfaces with other Projects

Ongoing Projects at / in Nkula Reservoir

- Rehabilitation and Upgrade of Nkula A (incl. Intake structure and construction of related temporary cofferdamm)
- Supply and installation of new Cutterhead Suction Dredging Spread for Nkula reservoir
- → Fixation points shall be defined and located to not interfere with the temporary cofferdam
- → In case the temporary cofferdam at the Nkula A intake is still in place at the time intended by the Supplier to install trash diversion barrier 1-2, all preparatory works (e.g. finalization of fixation points) shall be carried out by the Supplier to allow for direct installation of the diversion barrier. The Barrier 1-2 shall be supplied and handed-over to EGENCO (will be installed by EGENCO afterwards according to the procedures defined by the Supplier).