

1 SCOPE OF WORK

1.1 General

The Works includes site investigation and preparation, load relocation, detail design, supply, construction, test and commissioning for completion of the works.

The contractor shall relocate the load and all necessary equipment while clearing the site for refurbishment and extension of the substation.

The contractor shall access to site and propose a detail design for mechanical, civil and electrical refurbishment.

The works shall include supply, installation and commissioning of the 33/11 kV 8 MVA transformer which will increase the capacity of the existing transformer and it must be meant to prepare all conditions for these to work in parallel.

The works will be presumed and not limited to following:

- Underground cable into 33kV cable supporter and terminals – two sets
- 33 kV Transformer surge arrestors – two sets
- 33kV panels – cubicles totally equipped (One incoming, one transformer feeder, one for auxiliary transformer, one out going and one spare)
- One 50 KVA auxiliary transformer
- Six cubicles 11KV indoor switchgear (one incoming 11 kV, four out going and one spare)
- From the secondary side 11kV, the feeders shall be provided with appropriate 11kV cables to the indoor switchgear.

1.2

Background and Access to Site

The town of Bilene is located on the main North-South National Highway of Mozambique is gifted by nature with a beautiful sprawling lagoon, ringed by islands rich in natural scenic beauty. Bilene is preferred by tourists and permanent settlers as an ideal place for living & holidaying. The area is rich with fertile soil, abundant sweet water and consequently; it is fast developing as a commercial, industrial, tourist and horticulture hub.

Supply of electricity to the town is from 110 kV Sub-Station Macia through a Single Circuit 33 kV line and an old 33 / 11 kV Sub-station in a dilapidated condition. The substation installed capacity at present is only 1 x 2.5 MVA transformers against the load demand which now exceeds 2.7 MVA. Substation arrangements for supply of power are inadequate and unreliable. It has become urgently necessary to augment the installed capacity of the substation and to totally refurbish its equipments. With new loads expected in the near future, the situation is apprehended to deteriorate further.

The constructing altogether of a new 33 / 11 kV sub-station building and other works at the same place where the existing sub-station is located is required.

1.2.1 2. Existing Power Supply Arrangements

The existing 33 / 11 kV sub-station at Bilene is over loaded and in a totally damaged

condition. The 33 kV side of the substation has one incomer and two other outgoing – one for the 2.5 MVA, 33/11 kV transformer and other outgoing for Mahelane. These are running direct as no switchgear exists.

On 11 kV side there is a five panel board installed inside a transit container placed on the ground near the switch house building because the old switchgear got damaged. The panel has one incomer from 2.5 MVA, 33/11 kV Power Transformer and four 11 kV outgoing - one to station auxiliary transformer, and one each to Bilene, Humula, and Mahungo villages. Yet another feeder to Bilene aerodrome is connected to bus bar.

The existing switch house building was closely inspected to assess its suitability for use in the new / refurbished 33 kV sub-station. It was seen that the building is about 6.300 m wide and 11.120 m long with several partitions provided earlier to safely house indoor equipment and switchgear in separate compartments as per practice prevailing in the past.

It has over three / four distinct sections in the switch house indicating that building was unduly extended several times as & when needed. This has resulted into weakness of the resultant structure and roof was laid at four different heights / levels. The main roof slab is cracked at a number of places.

At present nearly all the erstwhile 33 & 11 kV equipments inside the switch house building are damaged, out of use and lying bypassed. With a view to maintain continuity of supply an 11kV panel board has been placed temporarily inside a consignment container just placed nearby on the ground. The existing arrangements are neither reliable nor safe. Layout of existing Building and a single line diagram of 33 & 11 kV circuits that existed and still in use are attached as Annexure.

It has been concluded that the existing building is unsuitable for use for the proposed new S/S refurbishment – of existing one. The existing building is unsuitable for use in refurbishment / new Sub-station. It would not be economical to renovate / refurbish this building for use as a switch house building hence it is recommend that a completely new building has to be constructed for the proposed refurbishment / new sub-station.

1.2.2 Proposed Power Supply Arrangements

Keeping in mind the present requirement as well as expected development of load in near future, a five (5) panel board for 33 kV side – comprising of one incomer from Macia line, one to the proposed 6.3 / 8 MVA Power Transformer, one PT-SA (Potential Transformer & Switch Assembly unit) for a 33 / 0.4 kV S/S Aux.transformer, one outgoing to Mahelane, and one spare for future use, is considered necessary. Similarly, it is proposed to have a six (6) panel board on 11 kV side – comprising of one transformer incomer, and five outgoing - one each to Aerodrome, Humula, Mahungo, Bilene villages and one (1) spare for future. The substation capacity proposed is 8 MVA with a new 6.3 / 8 MVA 33 / 11 kV Power Transformer.

1.2.3 Analysis of Available Alternatives

The existing building has not been found suitable & in good condition for use; constructing a completely new 33 kV substation switch house building has become an requirement. This; though, has an additional advantage that existing supply arrangements can continue without any major disturbance and it would be necessary to have only a minimum number/duration of outages for switch over to the new arrangements. Fortunately; adequate land is available on the same location by the side of existing building for constructing a completely new Switch House Building and it can make use of

any item found usable for this or any other sub-station.

1.2.4 New 33 kV Substation- Advantages

- i) Simple & straightforward clean job for execution, and
- ii) Minimum outage time

1.2.5 New 33 kV Substation -Disadvantages

- i) Fresh selection of a site which must be near from existing substation,
- ii) Re-locating all existing 33 / 11 kV lines to the new location,
- iii) Way-leave requirements may become necessary,
- iv) Additional cost of diversion of lines and setting up of entirely new facilities,
- v) Exclusion of any usable equipment and materials from the existing substation, and
- vi) Existing land, building & other facilities shall be wasted and abandoned.

1.2.6 Contractor Responsibilities

Submit for approval the following Engineering, Design Drawings & Detailed Lists of Equipment & Materials required for the proposed refurbishment. Drawings should be detailed enough to quote "Good for Construction (GFC)" prices:

- a) Substation new Layout Drawing,
- b) Switch House Building layout drawings,
- c) Trenches layout drawings,
- d) Yard layout drawings,
- e) Single Line Diagram of the New Substation,
- f) Detailed BOQ including expanded list of lot items,
- g) Materials required for relocating existing U/G cables & O/H terminal structures,
- h) Technical Specifications of all Equipment & Materials as above,
- i) Manufacturer's drawings of all Major Equipment, Materials, Fittings & Fixtures,
- j) Control and Secondary Wiring Diagram for the New Substation,
- k) Installation and Maintenance Manuals of all Major Equipments,

Supply all Equipment and Materials as a time bound program and handover to EdM / Execution Contractor employed by EdM.

Responsibilities of the Execution Contractor

- 1) Check and accept plan, program and materials for refurbishment,
- 2) Make all arrangements to work safely, Page 5 of 5
- 3) Execute all works as per approved substation layout and drawings in a manner to ensure minimum outages and interruptions of power supply to existing loads,
- 4) Execute following works as per pre-decided work schedule:
 - a) Install & commission new structure as per final plan and layout and to shift all 33 & 11 kV O/H line terminal structures to a safe working distance and pre-determined locations,
 - b) Shift all U/G 33 & 11 kV Cables that may fowl with proposed construction activities to a safe distance and pre-determined routes / locations. This may also involve laying of new and additional cables,
 - c) Restore power supply to new structures / cables together with undressing of old structures / cables in minimum time of outages,