SCOPE OF WORK - SUBSTATION

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4.2 SCOPE OF WORK - SUBSTATIONS

4.2.1 General

The Bidder shall examine the scope of works in this section in close connection with the other documents and particulars forming these Bidding Documents.

Special attention shall be paid to General Specifications and Particular Technical Specifications, in which the general technical requirements are specified. The drawings enclosed in are for bidding purposes only.

If the Specifications and/or Drawings do not contain particulars of materials or goods, which are necessary for the proper and safe completion, operation, and maintenance of the equipment in question, all such materials shall be deemed to be included in the supply.

In the event of any conflict between the Drawings and the Specifications, the latter shall prevail.

In the event of any conflict between scaled dimensions and figures on the Drawings, the figures shall prevail.

Should the Bidder find discrepancies in or omissions from these Specifications or from the other Documents, or should he be in doubt as to their meaning, he should immediately contact the Project Manager for interpretation, clarification or correction thereof before submitting his Bid. Such action shall, however, in no case be considered as a cause for altering the closing date of the Bid.

The scope of work for equipment shall cover engineering design, manufacture, testing before shipment and packing sea worthy or otherwise as required, delivery CIP site, of all equipment as specified in the preceding chapters.

For substations contracted on turnkey basis the substation contractor shall be responsible for design, material supply, transport, erection, and installation and commissioning as well as having the full responsibility for civil works including design and construction of transformer foundations and control building.

The Contractor shall install double bus bar gas insulated with the following bays feeders, incomers and a bus coupler. The contractor shall interface the 33kV switch gear to the existing 132/33 kV transformers and 33/11kv transformers.

The existing 33kV feeders interface connections, support structures shall be designed by the contractor and approved by the project manager. The design shall meet the requirements for highly saline environment and shall minimize outages for interface.

The existing building shall be used for the switch gear and its recommended that the contractor shall familiarize himself with all the building design and status and carry out necessary modifications and reinforcement.

Loose equipment for the Employer's rehabilitation shall be complete with documentation and ancillaries like programs, licences and programming tools.

Equipment that is to be dismantled and removed from existing substations is to be recovered by the Contractor and deposited to sites within or in the immediate vicinity of each substation. Such sites are to be designated by the Employer. The recovered equipment is to be taken over by the Employer at these sites.

KPLC has a SCADA (Supervisory, Control & Data Acquisition) system that is controlled from the Regional Control Centres& the National Control Centre. The National Control Centre (NCC) is at Juja Rd and controls the entire transmission network & substations (ie some 66kV, all 132kV, all 220kV & soon to be introduced 400kV stations.)

There are 4 regional control centres in total. These are located in the following locations; Juja Rd (Nairobi region), Rabai (Coast region), Lessos (West Kenya region) & Kiganjo (Mt Kenya region). These Regional Control Centres monitor & control the 11KV, 33kV & 66kV Distribution networks & substations in their specific regions.

The Control Centres all run ABB's Network Manager WS500 which is the software used for monitoring & Control of all the incorporated substations. The Communication protocol currently supported by KPLCs front end servers is ABBs PCU 400, for data telegram exchange with Remote Terminal Units (RTUs). Whereas, the Station Control Management Systems (SCMS) in the substations in its SCADA system are **IEC 60870-5-101&IEC 60870-5-104**.

The automated 33kV Distribution substation will be required to communicate with the front end server (ABB's PCU400) via communication protocols outlined above. The automated sub-Station must communicate with the Regional Control Centre under which it shall be monitored & controlled.

The interconnected KPLC's telecommunications system is based on a backbone of SDH STM1/4 terminal equipment, FOX 515 from ABB. A network management system (NMS) for the telecommunication system has been installed at NCC.

4.2.2 Standard Substation

This section defines the standard substation components.

4.2.3 33 kV Switchgear GIS Type

4.2.3.1 33kV incomer Bay

1 (one) complete bay shall be equipped with:

- a. 1 (one) set of GIS for 33kV incomer bay with circuit breaker, disconnectors, earthing switch, fast acting earthing switch, current transformers, 3 phase voltage transformers, busbars and busbars connections. Outdoor bushings, transition bus and surge diverters.
- b. 1 (one) set of control/protection panel
- c. 1 (one) bay control unit with proper display, for measurements (V,I,MVAR,MW)
- d. 1 (one) multifunctional protection unit as per 4.1.2.9.2. Section VI Particular Technical specifications substations control, and Protection
- e. overcurrent protection relay.
- f. 1 (one) lock-out trip relay with electrical/hand reset facilities/ scada rest.

- g. 1 (one) lot of necessary interposing relays, MCB's, terminal blocks and wiring to form a complete operative bay control. The control scheme shall be prepared for SCADA operation
- h. 33kV Incomer copper cable 1000mm2

4.2.3.2 33kV Feeder Bay

1(one) complete bay shall be equipped with:

- a. 1 (one) set of GIS for line bay with circuit breaker, disconnectors, earthing switch, fast acting earthing switch, current transformers, 3 phase voltage transformers, busbars and busbar connections. Outdoor bushings, transition bus and surge diverters
- b. 1 (one) set of control/protection panel
- c. 1 (one) bay control unit with display and measuring functions
- d. 1 (one) multifunctional protection unit as per 4.1.2.9.2
- e. 1 (one) lock-out trip relay with electrical/hand reset facilities/scada reset.
- f. 1 (one) lot of necessary interposing relays, MCB's, terminal blocks and wiring to form a complete operative bay control. The control scheme shall be prepared for SCADA operation.
- g. Feeder copper cable 800mm2(GIS to transition structure)

4.2.3.3 33kv Bus Bar Protection

1 (one) bus bar protection unit included in the control panel for 33 kV double busbars.

4.2.4 11 kV Switchgear Outdoor Type

4.2.4.1 11 kV Transformer Bay

1 (one) complete bay shall be equipped with:

- (a) 1 (one) Autorecloser/circuit breaker
- (b) 1 (one) earthing switch
- (c) 1 (one) set of busbars
- (d) 1 (one) set of current transformers
- (e) 1 (one) set of surge diverters
- (f) 3 (three) sets of air break switches
- (g) 1 (one) neutral current transformer
- (h) 1 (one) bay control unit with display and measuring functions
- (i) 1 (one) restricted fault relay function
- (j) 1 (one) neutral point earth fault relay function
- (k) 1 (one) lock-out trip relay with electrical/hand reset facilities/scada reset
- (l) 1 (one) lot of necessary interposing relays, MCB's, terminal blocks and wiring to form a complete operative bay control. The control scheme shall be prepared for SCADA operation.
- (m) 1 (one) set of voltage transformers (with a facility for primary isolation)

4.2.4.2 11 kV Feeder Bay

1 (one) complete bay shall be equipped with:

(a) 1 (one) Autorecloser/circuit breaker

- (b) 1 (one) earthing switch
- (c) 1 (one) set of busbars
- (d) 1 (one) set of current transformers
- (e) 1 (one) set of surge diverters
- (f) 1 (one) bay control unit with display and measuring functions
- (g) 1 (one) 3-phase over current relay function with auto re-close function. The autoreclose function must be selectable with an external switch
- (h) 1 (one) Earth fault relay function
- (i) 1 (one) sensitive Earth fault function
- (j) 1 (one) restricted fault relay function (if not provided on the HV transformer bay panel)
- (k) 1 (one) lot of necessary interposing relays, MCB's, terminal blocks and wiring to form a complete operative bay control. The control scheme shall be prepared for SCADA operation.

Note: 11KV Capacitor bank switchgear shall be equipped with the necessary protection and control relays for Capacitor banks.

4.2.4.3 Auxiliary Transformer bay

1 (one) complete bay equipped with:

- (a) 1 (one) set of expulsion fuses
- (b) 1 (one) set of busbars jumpers

4.2.5 11 kV Switchgear Indoor Type

4.2.5.1 Switch Board Panel for 11 kV Transformer Bay

1 (one) complete bay shall be equipped with:

- a) 1 (one) Withdrawable circuit breaker
- b) 1 (one) earthing switch
- c) 1 (one) set of busbars
- d) 1 (one) set of current transformers
- e) 1 (one) bay control unit with display and measuring functions
- f) 1 (one) restricted fault relay function
- g) 1 (one) neutral point earth fault relay function
- h) 1 (one) lock-out trip relay with electrical/hand reset facilities
- i) 1 (one) lot of necessary interposing relays, MCB's, terminal blocks and wiring to form a complete operative bay control. The control scheme shall be prepared for SCADA operation.
- j) 1 (one) set of voltage transformers (with a facility for primary isolation)

4.2.5.2 Switch Board Panel for 11 kV Feeder Indoor panel

1 (one) complete bay shall be equipped with:

- a) 1 (one) circuit breaker
- b) 1 (one) earthing switch
- c) 1 (one) set of busbars
- d) 1 (one) set of current transformers
- e) 1 (one) bay control unit with display and measuring functions

- f) 1 (one) 3-phase over current relay function with auto re-close function. The auto-reclose function must be selectable with an external switch
- g) 1 (one) Earth fault relay function
- h) 1 (one) sensitive Earth fault function
- i) 1 (one) lot of necessary interposing relays, MCB's, terminal blocks and wiring to form a complete operative bay control. The control scheme shall be prepared for SCADA operation.

4.2.5.3 Switch Board Panel for Indoor Bus- Sectionaliser

1 (one) complete bay shall be equipped with:

- (a) 1 (one) circuit breaker
- (b) 1 (one) set of protection current transformers.
- (c) 2 (two) earthing switches (one on each busbar section if not located elsewhere)
- (d) 1 (one) set of busbars including droppers and risers
- (e) 2 (two) set of voltage transformers (one on each busbar section if not located elsewhere)
- (f) 1 (one) bay control unit with display
- (g) 1 (one) overcurrent function and 1 (one) relay function
- (h) 1 (one) lot of necessary interposing relays, MCB's, terminal blocks and wiring to form a complete operative bay control. The control scheme shall be prepared for remote operation.

4.2.5.4 Switch Board Panel for Auxiliary Transformer

1 (one) complete bay equipped with:

- a) 1 (one) fuse switch disconnector, manual
- b) 1 (one) set of fuses
- c) 1 (one) earthing switch
- d) 1 (one) bay control unit
- e) 1 (one) set of busbars
- f) 1 (one) set of wiring, terminal blocks, etc. to form a complete bay control.

4.2.6 Control, Protection, Metering and Signalling

4.2.6.1 Substation Automation System

General

1 (one) lot complete system (equipment and software) for substation control.

To the extent the internal control and interlocking system for the equipment supplied is not included for that particular equipment, it shall be included herein. All interconnections needed to form a complete installation shall also be included herein.

The control system specified hereunder shall include all necessary equipment for control, protection, metering and signalling. The system shall include all instruments, meters, switches, position indicators, inscriptions and mimic diagrams, protective and auxiliary relays, terminal blocks, internal wiring and any other equipment required to form a complete installation.

Drawings showing the control system, protection units and the boards as they are proposed shall be supplied with the Bid.

The space needed for the boards should not exceed the available space.

Information defining the internal local control communication protocol shall be submitted with the Bid.

Complete sets of schematic diagrams for control, protection, indication, metering, signalling, alarms, etc. shall be supplied as part of the project and shall be subject to the Project Manager's approval.

The requirements as to submission of diagrams, drawings and other documents with the Bid and after award of Contract are stated in the standard form of contract.

4.2.6.1.1 Scope SCADA/SAS.

The scope of work for the SCADA portion shall include but not limited to

- Complete supply, installation and commissioning of SAS as described in specifications including UPS.
- Supply of one time licences for SAS Application, Data Engineering application, system configuration, modification and extensions software.
- Integration of substation to existing SCADA/EMS Central system.
- Complete Control and Protection system as described in specifications
- Spares and Training and other Services as described in this detailed specifications;
- Base Radio as described in the specifications

The supply and services to be performed by the Contractor shall comprise the design, manufacture, factory testing, packing, transport, insurance, unloading, storage on Site, construction works and erection, corrosion protection, site testing, submission of documentation, commissioning, training of KPLC's personnel and warranty of the works.

The proposed SA system for the above work should offer at least the following functionality:

- Full operational control, reporting, alarm and indication facilities for the substation from the RCC's (Supervisory level).
- Full operational control, alarm and indication facilities for the substation from the Human Machine interface (HMI) workstations in the substation control room (Substation Level).
- Operational control of each new circuit/bay from the protection relay panel using the bay control unit LCD display (Bay level).
- Control of each item of plant from the Local Control Cubicle (LCC) (Local Level)
- The control facilities from each control point are to be interlocked (hardwired) to prevent operation of any device simultaneously from more than one control point.
- At least one fully operational control point shall remain available in the event of a single equipment or communications failure.
- Complete facilities must exist for the proper lockout and maintenance tagging of circuits and plant items to ensure the safety of personnel and the security of the system
- The SA system shall use open communication protocols and be readily interfaced with third part devices operating on open protocols. The Tenderer shall describe such interfaces and provide an experience list of devices with which the offered control system has previously been interfaced.

The SCMS shall typically include:

Station Level:

- 2 independent Gateway (Main and Hot-standby) for communications to the SCADA system.
- 1 Operator Workstation/HMI, and the complete workplace (desk, chair).
- Color printer. To print screen shots
- Operator log printer
- Satellite clock, complete with GPS Receiver, Antenna and necessary time synchronization ports.
- Interface for laptop computer for maintenance, information transfer and emergency HMI
- Laptop Computer for maintenance, information transfer and emergency HMI
- UPS system for SCMS.
- Communication network equipment [station (system) LAN, Field Communication Network, Various optical couplers, etc.].
- interface for control and monitoring of the circuit/bay
- Interface for protection devices that cannot directly interface with the substation LAN

4.2.6.2 Control and Measuring Cables

(a) All external cables, conventional or fibre optical, for control, protection, measuring, indication, etc., for the complete plant. Wiring between the switchyard apparatus, transformers, the board(s) and the control system in the control building and the interconnections between the various apparatus in the switchyard shall be included.

4.2.6.3 Telecommunications

a) In order for the SCADA data to be transferred to the Regional control centres, the bidder shall design and commission an appropriate communication system based on Fibre or other approved communication media for data and speech requirement.

Equipment supplied shall be digital and latest technology and shall comply to the latest ITU-T, IEC, ITU-R, IEEE and ETSI standards.

It is required that one remote subscriber be implemented in each substation. Interface for data transmission shall be according to ITU-T recommendation V.24 or V.35

Bit error rates of 1×10^{-6} shall not be exceeded.

- b) It is the responsibility of the contractor to interconnect with existing SCADA and Telecommunications system. However use and extension of existing infrastructure where possible shall be encouraged.
- c) The Tenderer shall acquaint himself with all the sites and determine the requirements for towers or masts to suit his design. When a new tower or mast is necessary, the Tenderer shall supply drawings for the proposed installation. All towers shall be 36 m and self supporting. The tenderer shall provide details of loading and guy stresses for masts or towers to be erected on buildings. All antennae mounting components including waveguides, cables, cable clamps and external cable connectors shall be specified.
- d) Where PLCs are to used or where the T-offs affect existing PLC communication links, blocking line-traps including support strucures shall be in scope of supply.
- e) All communications equipment installed in the country must be type approved by the Communications Commission of Kenya (CCK). The Contractor will obtain the type approval.

The CCK has to be consulted and give approval for each new project and an application has to be submitted stating the location of the sites and request for the frequencies to be used. Unless otherwise stated this application for frequencies is normally done by KPLC.

The radio frequency plan shall be prepared by the Contractor and closely coordinated with KPLC during the project design stage. All path surveys shall be carried out by contractor.

- f) The Contractor shall provide a list of recommended spares, the quantities and prices to last for a period of five (5) years after expiry of guarantee period.
- g) The contractor shall offer training for four (4) technical appointees of the employer for 2 weeks at manufacturer's premises. Terms and conditions similar to 4.2.15
- h) The contractor shall provide necessary configuration software pre-installed on a maintenance laptop with a onetime software license.

4.2.6.3.1 Scope of works - Telecommunication

The scope as described shall include detailed system design, manufacture, and supply, installation, testing, commissioning, remedying of defects, and maintaining the works during the defects liability period and any incidental work necessary for the proper completion of the work in accordance with this contract. Scope shall include integration of STM-4, to the existing KPLC Network Management System. In some cases there shall be need to upgrade existing Telecommunication equipment in order to achieve data and speech routing to Regional and National control centres. Survey and necessary preparation works on existing systems, Equipment and substations to achieve specified functionality shall be in the scope of supply. Contractors shall be required to submit for approval detailed design of system before manufacture.

The STM 4 equipment shall include Tele-protection modules (4 Command), High Speed Ethernet modules and 1+1 protection.

Necessary upgrade of communication and SCADA Front Ends (PCUs) equipment at terminal stations and at Control centres shall achieve complete Data and Speech to RCC/NCC shall be included in scope.

In addition all substations (irrespective of whether SCADA functionality to control centre is established) shall be equipped with a Base Radio capable of communicating with the ASTRO trunking radio system for use during switching operations. Where OLTEs are the terminal equipment, additional Ethernet capability shall be established to cater for other corporate data. All stations shall be equipped with two (2N0.) telephone extensions originating from existing PAXes in Regional control centres.

All communication equipment supplied under this project shall be type approved by the regulator, Communication Commission of Kenya (CCK) and the Kenya Bureau of Standards (KBS) where applicable. It is the responsibility of the contractor to obtain these necessary approvals.

The type of required communication link shall be detailed in scope of supply for individual stations.

The links to be established include the following;

	New Substation	Terminal station	Proposed communication media	Existing Equipment in Terminal station	Control Centre substation reports to
1	kipevu	Rabai	OPGW Existing	FOX 515	RCC

4.2.7 Auxiliary AC Supply Equipment

4.2.7.1 Main AC Distribution Board

1 (one) main distribution board designed for minimum 200 A with the necessary number of panels for:

- (a) 1 (one) circuit breaker, manual operated, minimum 200 A, for the feeder from the station supply transformer.
- (b) 2 (two) current transformers 200/1/1 A with two cores, one core for measuring and one for protection.
- (c) 1 (one) constant time overcurrent relay.
- (d) 1 (one) earth fault relay.
- (e) 1 (one) A-meter function with selector switch.
- (f) 1 (one) V-meter function with selector switch.
- (g) 1 (one) lot of feeder circuit breakers with electro-magnetic and thermal releases. The breaker ratings shall be chosen to suit the different consumers to be connected. 20% of the breakers of each size shall be spare and readily mounted.

4.2.7.2 Sub-distribution Boards and Panels

(a) 1 (one) lot of all necessary sub-distribution boards and panels (including the distribution panel for lighting and small power of the control building).

The boards shall be completely equipped with busbars, circuit breakers, miniature circuit breakers etc. Contactors, motor starters, instruments, operating switches, push buttons, indicating lamps, etc., shall be included whenever required. 20% of the breakers of each size shall be spare and readily mounted.

4.2.7.3 Cables

(a) 1 (one) lot of all necessary armoured power and control cables for supply to the main distribution board and to the sub-distribution boards, panels and equipment except for the cables for lighting and small power which are included in the civil Goods under separate contract.

4.2.8 DC Supply System

4.2.8.1 Battery

- i. 1 (one) 110 V battery. Capacity at least 200 Ah/10h for substations with more than 10 MVA installation of transformer capacity
- ii. The 48V batteries shall be included in the bid for communication equipment and the RTU. The battery shall be at least 100A/10Ah

The capacities to be recommended by the Bidder, based upon the calculated consumption considering a fully developed substation.

Batteries shall be installed in separate room with EX proof ventilation fan (for 110 V batteries only).

4.2.8.2 Charger

(a) 1 (one) DC charger for the 110 V battery.

(b) 1 (one) DC charger for the 48 V Battery.

The chargers shall be complete with instruments, breakers on AC and DC side, and protection.

4.2.8.3 Switchboard

1 (one) switchboard 110 V DC.

The board shall have:

- (a) 1 (one) circuit breaker with magnetic and thermal release for the feeder from earache charger and battery.
- (b) 1 (one) A-meter with shunt for each battery.
- (c) 1 (one) V-meter with selector switch for the voltage between the poles and between poles and earth for each battery.
- (d) 1 (one) set of contacts on the front for banana jacks for the battery voltage and earth.
- (e) 1 (one) battery monitoring devices with alarm contacts.
- (f) 1 (one) lot of all necessary circuit breakers and miniature circuit breakers for the outgoing feeders and circuits.

20% of the breakers of any size shall be spare and readily mounted.

4.2.8.4 Battery Conductors and Fuses

- (a) 1 (one) set of conductors for the battery in the battery room.
- (b) 2 (two) single pole fuse boxes with main fuses for the battery, placed on the wall outside of the battery room, and two fuses for the battery monitoring device.

4.2.8.5 Sub-distribution Boards and Panels

(a) 1 (one) lot of all necessary sub-distribution boards and panels.

The boards shall be completely equipped with busbars, miniature circuit breakers, fuses, etc. Contactors, motor starters, instruments, operating switches, push buttons, indicating lamps, under-voltage relays with alarm contact, etc., shall be included whenever needed.

4.2.8.6 Cables

(a) 1 (one) lot of all necessary DC power supply cables, including wiring to the apparatus in the switchyard.

4.2.9 Earthing System

An earthing network shall be installed comprising the following:

- (a) 1 (one) lot of underground earthing system covering the platform and control building with risers
- (b) 1 (one) complete set of "above-floor" earthing system for the control building, as applicable, with connections to the risers from the under-ground system.

4.2.10 Ancillary Equipment

4.2.10.1 Station Equipment

- (a) 2 (two) self-contained, rechargeable, portable hand-held lights.
- (b) 1 (one) audible alarm system with the necessary wiring.

4.2.10.2 Earthing Devices

- (a) 1 (one) set of three phase portable earthing devices for 33kv with operating rods suitable for earthing of the bay conductors and busbars.
- (b) 1 (one) set of voltage indicator for 33kV with audible and visual indication for voltage

4.2.10.3 Cable Accessories

(a) 1 (one) lot of all connecting material, cable boxes and material for fixing the cables. Terminals and terminal labels to the extent that this is not included in other sections.

4.2.10.4 Racks, Conduits, Ducts, etc

(a) 1 (one) lot of all cables, racks and trays to the extent necessary for the proper distribution of cables.

All the conduits and protection tubes, wherever cables may deteriorate or where cable laying may otherwise present difficulties.

4.2.11 Civil Works

4.2.11.1 Switchgear buildings

Switchgear building has been constructed.

Control Panels and medium voltage indoor switchgears of different Voltage levels shall be installed in separate rooms

4.2.11.2 Cable Trenches

Cable trenches shall be constructed as specified in particular specifications and in scope of work.

4.2.12 Training in control (SAS), Telecommunication and protection system

The training includes travel for the 4 (four) KPLC engineers as well as all course material and other expenses shall be catered by the Contractor. The training shall be held at the manufacturer's place. The training shall cover design, application, testing, commissioning and maintenance of the relevant digital control and protection systems. The training course shall have a minimum of 2 (two) weeks duration for SAS and Protection and one week for communication. The cost of per diem and accommodation shall be met by KPLC.

4.2.13 Factory Acceptance Test

The Contractor shall arrange for 2 participants from KPLC and the Project Manager to witness tests of major equipment listed below in the manufacturer's plant. All routine tests shall be carried out in the presence of the Employer's representatives. The representatives shall approve shipment of the equipment if they are satisfied that the requirements of the specification are fully met

The Contractor shall arrange and meet the full cost of the air tickets and local transportation

- 33kV GIS switch gears disconnectors, earth switch, CTs, VTs and CBs
- Protection and control system
- Power cables
- SAS
- Telecommunications Equipment

FAT shall be carried out as prescribed in the particular technical specifications of the equipment. The cost of per diem and accommodation shall be met by KPLC.

4.2.14 Test Equipment (TS –001)

• Lap top computers: Two units set up with comprehensive software. The pc shall be supplied with all the necessary accessories and ports and loaded with latest operating system. The Lap top must be able to run all the relay and equipment software's supplied under the contract. The lap top specifications shall be approved by the project manager. The Test equipment for Telecommunications shall be as described in 4.1.6

4.2.15 Final documentation

As built drawings:

5 paper copies delivered in binders 3 CD-ROM copy (all drawings in auto cad) 1 set of transparencies

Operation and maintenance manuals: 2 copies per equipment

4.2.16 Site Offices and site facilities(LS-010, -011)

At the location where the Contractor will establish his main site administration:

- At the location where the Contractor will establish his main site administration, an office for site supervisors from the Project Manager with basic office furniture, internet, telephone and access/use of fax and copier shall be provided by the contractor for the implementation period
- The contractor shall provide mobile phone for coordination of activities with project manager and KES 10,000(ten thousand) monthly.

4.2.17 KIPEVU

Kipevu: New substation,

Item no.	Item Description	Unit	Quantity
	KIPEVU, 33KV GIS S/S		
KIPEVU-001	Nineteen(19) bay Gas insulated 33KV switchgear (forteen(14) 33KV outgoing lines and three(3) 33KV transformers incomers and two(2) bus coupler) double busbar configuration. With current transformers	Lot	1

Item no.	Item Description	Unit	Quantity
	voltage transformers, circuit breakers,		
	disconnectors, earth switch, fast acting earth		
	switch, busbar materials and steel structures		
	for support		
KIPEVU-002	33/11kV Transformer control and protection		
	panel	рс	2
KIPEVU-003	33kv line protection and control panel	pc	12
KIPEVU-004	33kv Incomer protection and control panel	рс	3
KIPEVU-005	33kv bus coupler and busbar protection panel	pc	2
KIPEVU-006	Fourteen(14) panel 11 kV switchboard (with 2		
	Incomer panels, 1 bus coupler, 8feeder panels,		
	2 bus PT panels, 2 auxiliary Tx panels)	lot	1
KIPEVU-007	Substation Automation System (SAS)	LOT	1
KIPEVU-008	Control and measuring cables	lot	1
KIPEVU-009	Auxiliary AC supply	lot	1
KIPEVU-010	DC supply System	lot	1
KIPEVU-011	Earthing system	lot	1
KIPEVU-012	11/0.415kV 100KVA station transformers	pc	2
KIPEVU-013	Ancillary Equipment	lot	1
KIPEVU-014	Lightning protection system	lot	1
KIPEVU-015	Optical terminal equipment type SDH STM-4		
	and associated materials for kipevu	lot	1
KIPEVU-016	33KV incomer cables in 1000mmsq s/c Cu		2.5
	including their termination kits	KM	2.3
KIPEVU-017	33KV Feeder cables in 800mmsq s/c Cu		10
	including their termination kits	KM	10
KIPEVU- 018	Telecommunication system and associated		1
	accessories(radio/fiber based communication)	Lot	1
KIPEVU-019	33 kv surge arresters	pc	50
KIPEVU-020	Transition buses with support structures	Lot	1
KIPEVU-021	33KV line cables in 630mmsq s/c Cu including		20
	their termination kits	KM	20
KIPEVU-022	11KV incomer cables in 630mmsq s/c Cu		2
	including their termination kits	KM	5
KIPEVU-023	11KV line cables in 300mmsq 3/c Cu including		4
	their termination kits	KM	4
KIPEVU-019	11 kv surge arresters	pc	40
	Works:		
KIPEVU-201	Civil works (cables) and switchgear building		1
	rehabilitation & reinforcement.	lot	1

4.2.18 Mandatory Spare Parts and Tools

All spares and tools specified below are to be of makes and types that match with the equipment in the scope of works, to the extent possible. Spares and Tools are to be delivered to KPLC's central stores in Nairobi.

4.2.18.1 For 33KV GIS

The following spares and tools are to be provided for the GIS:

Item no.	Item Description	Quantity
	Tools	
TT-001	Gantry crane	1 pc
TT-002	Gas filling equipment	1pc
TT-003	Gas vacuuming equipment	1pc
TT-004	SF6 Gas processing unit	1pc
TT-005	SF6 spare Gas	10 cylinders

4.2.18.2 For Substations

Item no.	Item Description	Quantity
	Spares	
SS-001	33kV GIS Breaker	2
SS-002	33kv main and backup line protection units	2
SS-003	33kV GIS dis-connector	2
SS-004	33kV GIS Current Transformer	2
SS-005	33kV GIS Voltage Transformers	2
SS-006	Transformer Protection unit for 33/11 kV transformer bay	1
SS-007	Bay control unit	2
SS-008	8 SCADA and Telecommunications interface unit of each type	
	as described in 4.1.0	5
55-009	equipment, assorted	5
SS-010	(Control) contactors of matching type to ones used in	5
	offered equipment, assorted	
SS-011	Assorted MCB's for AC and DC distribution boards	10
SS-012	Trip coils for each type of Circuit Breaker	5
SS-013	Close coils for each type of Circuit Breaker	5
SS-014	Indicating lamps	10
SS-015	Interlocking coils for circuit breakers	4
SS-016	Earth switch interlocking coils	4
SS-017	33KV cable termination kit	3
SS-018	SAS and telecommunication tools	1 set
SS-019	Ten(10) 11kV tripping coils	10
SS-020	Ten(10) 11kV closing coils	10
SS-021	Four(4) 11kV earth switch interlocking coils	4
SS-022	Ten(10) 11kV indication lamps of each type	10
	Tools for substations	
TS-001	Lap tops	2

4.2.19 Recommended Spare Parts and Tools

The Bidder shall recommend additional spares and tools suitable for the offered equipment. The prices are to be entered in Price schedule No. 6, which shall not be added to the Grand Summary Prices. The recommended spares and tools are to be specifically discussed and agreed on during contract negotiations