



**KENYA ELECTRICITY GENERATING COMPANY PLC
KGN-HYD (TANA)-01-2018: TENDER FOR VARIOUS CIVIL AND
MECHANICAL WORKS FOR WANJII POWER STATION**

Date: 19th December 2018

ADDENDUM No. 2

In accordance with Tender for Various Civil and Mechanical Works for Wanjii Power Station. **KGN-HYD (Tana)-01-2018**, KenGen wishes to issue ADDENDUM No.2

This addendum addresses the following:

- (a) Revising Section III (Tender Data Sheet) Ref 31 Clause 27-30 item (c).
- (b) Revising of the Specifications and Technical Requirements under Section V clause 3.3 (Supply and install substation earthing mat as specified).
- (c) Revising of the Bill of quantities following site visit on 18th December 2018.
- (d) Tender submission date extension

- (a) **Revising Section III (Tender Data Sheet) Ref 31 Clause 27-30 item (c) to read as follows;**

Copy of registration with National Construction Authority class NCA 2 for Civil Works and NCA 5 for Mechanical works.

- (b) **Revising of the Specifications and Technical Requirements under Section V**

i. Clause 1.8

Additional clause 1.83

Where T8 tubes are used, the specifications will be as under

T8-4foot LED tube light

Color: 6000k – 6500k

Voltage 240Vac

Power 18W

Beam angle 120degrees

Power consumption 6000k -6500k

Cool white

Luminous flux 1800L

ii. **clause 3.3**

- I. The specifications have been revised as follows;
 - The contractor shall install new earthing systems for powerhouse and Substation. The detailed specifications are attached below.

(c) **Revising of the Bill of quantities following site visit on 18th December 2018.**

- I. The following bill of quantities have been revised **2800, 3501,4101,4303,4600,4701,4950,9100** and a copy of the complete revised bill of quantities is attached below

(d) **Tender submission date extension**

The tender closing date has been extended from 17th January 2019 at 2.00pm to **24th January 2019 at 2.00pm.**

(e) **Tender drawings**

The drawings will be available at supply chain office (Tenders Section) on Ground floor stima plaza, ***bidders are advised to carry a flash disk***

ACKNOWLEDGEMENT OF ADDENDUM NO. 2

We, the undersigned hereby certify that the addendum is an integral part of the document and the alterations set out in Addendum has been incorporated in the tender proposal.

Signed

Tenderer:

Date

SECTION VII: REVISED BILL OF QUANTITIES

GRAND SUMMARY OF COST

Item no.	Description	Amount (Ksh)
1	General	
2	Power House	
3	Waterways	
4	Substation	
5	Winch	
6	Draft Tube Gates	
7	Road works	
8	Cofferdam	
9	Perimeter Fence	
10	Day Works	
	GRAND TOTAL	

BILLNo.1 GENERAL

Item No.	Description	Unit	Amount (Ksh)
	BILL No.1- SUMMARY		
1000	Health, Safety, environment and Security	sum	
1100	Insurances	sum	
1200	Mobilization	sum	
1300	Documentation	sum	
	Sub-total Carried forward to Grand Summary		

BILL No. 2: POWERHOUSE

Item No.	Description	Amount (Ksh)
	BILL No. 2 - SUMMARY	
2000	Miscellaneous Requirements	
2100	Power House Roof	
2200	Wall cladding/Window glazing/Ventilation	
2300	Cranes	
2400	Power House Extension (Access Area)	
2500	Power House Partitioning	
2600	Finishes	
2700	Drainage and flood protection	
2800	Power house data and Lighting	
2900	Monorail Systems in the PowerHouse	
	Sub-total Carried forward to Grand Summary	

BILL No. 2: POWERHOUSE

Item No.	Description	Unit	Quantity	Rate (Ksh)	Total (Ksh)
2000	Miscellaneous Requirements				
2001	Temporary works; Access arrangements to the powerhouse, draft tube and winch areas	sum			
2002	Temporary works; Protective screens and barriers.	sum			
2003	Temporary works; Pumping arrangements for de-watering.	sum			
2004	Maintain and operate temporary works provided in items 2001-2004.	sum			
Sub-Total					
2100	Power House Roof				
2101	Stripping off the false roof structure and existing gutters and downpipes and store at a designated area as directed by the engineer	sum			
2102	Remove the bituminous felt/material on roof and Clean the roof	m2	520		
2103	Fabricate welded 12m long truss from 50x50x30mm angle section primed and painted with brackets to receive parlins. Mount the trusses to the roof at 2m interval with rawl bolts. Rawl bolt size a minimum	pcs	20		
2104	Supply and install parlins to detail	m2	520		

2105	Supply and install fascia board to detail	m	120		
2106	Supply and install Type IT4 Gauge 28 Roof sheeting laid at 3° from horizontal with one and a half corrugation side laps and minimum 150 mm end laps and fixed to timber purlins with and including hook bolts, washers, nuts and plastic caps at centers	m2	580		
2107	Supply and install 1.2mm thick, 300mm square aluminum deep box gutters, with solvent welded joints, including steel brackets at 600 mm centers and joint brackets fixing to wall a. Stopped end b. Outlet and jointing to 250 mm square down pipe	m	48		
2108	Supply and install 200mm diameter class C uPVC downpipes complete with bends, anchors to walls, and directed to drain	m	60		
2109	Allow for solid blocks/rumble and cement mortar to cover the eaves of the sloping roof. Apply cement and sand plastering to good finish.	Sum			
Sub-Total					

2200	Wall cladding/Window glazing/Ventilation				
2201a.	Carefully remove asbestos wall cladding to specifications (this job to be executed by a NEMA Licensed Contractor)	m2	650		
2202b.	In the execution of item 2201a, allow for meeting all conditions set out in NEMA approval for handling, transportation and disposal of asbestos roofing sheets to Kamburu disposal site in Eastern Hydros (approximately 110 km)	m2	650		
2203	Supply and install new cladding and flashings on the walls to specifications.	m2	780		
2204	Remove and dispose off broken and aged window glazing	m2	25		
2205	Supply and install toughened 6mm glazing	m2	25		
2206	Supply materials, fabricate and install ventilation louvres similar to existing on walls to suite the new cladding	Nr	13		
Sub-Total					
2300	Cranes				
2301	Remove, straighten, Align and Re- install the existing crane guide rails	Sum			
2302	Supply and install new grooved rollers (for the crane long travel)	Nr	4		
2303	Test and ensure proper crane travel operation	Sum			
Sub-Total					
2400	Power House Extension (Access Area)				
2401	Demolish 600mm thick existing masonry walling and dispose as directed	m2	15		
2402	Cut ,remove and store as directed by the Engineer the existing beams,monorail, columns, angle bracings, glazed window frames, sliding door at the side of entrance to the power house	sum			
2403	Allow for structural design for the powerhouse extension as per general arrangement drawing No.	sum			

2404	Allow for structural design for crane support system as per general arrangement drawing No. KGN-WANJ-C002	sum			
2405	Allow for excavation in rock	m3	7		
2406	Supply and place reinforced concrete class 30/30 for foundation bases as per approved specifications	m3	12		
2407	Supply all necessary materials, fabricate beams , columns and bracings, for the extended crane support system and building structure including connection plates, base plates and anchors.	kg	7000		
2408	Erection of beams, columns and bracings, for the extended crane support system and building structure including supply of bolts.	kg	7000		
2409	Fabrication of steel framed pitched roof to extended powerhouse area including base plates and fin plates.	kg	2000		
2410	Erection of steel framed pitched roof to power house extension including supply of bolts.	kg	2000		
2411	Supply and fix gauge 28 IT4 roof sheeting including flashings	m2	100		
2412	Supply and install wall cladding, flashings and support structures as per approved specifications	m2	182		
2413	Supply high quality material fabricate and install upward rolling door complete with gears and support system and other necessary accessories to the Engineer's approval	Nr	1		
2414	Supply materials fabricate and install pedestrian steel exit door of size 1000x2100mm complete with doorframe, hinges, locks and door closer and other necessary accessories	Nr	1		
2415	Allow for class 20 mass concrete at areas directed by the Engineer	m3	5		
2416	Allow for class 20 reinforced concrete (reinforced with A142 brc)at areas directed by the Engineer	m3	10		

Sub-Total					
2500	Power House Partitioning				
2501	Remove the existing wooden partitions and doors at the control room and offices and dispose.	sum			
2502	Supply materials and construct 200mm thick masonry wall to offices, store and kitchen area to details	m2	49		
2503	Supply and place reinforced concrete class 25/25 for Ring beam as per approved specifications	m3	1		
2504	Supply and install a single aluminium steel sink complete with all necessary plumbing works	Sum			
2505	Supply and install extractor fan at the opening	Nr	1		
2506	supply and install glazed aluminum framed partitions with gypsum boards as per drawings and specifications	m2	190		
2507	Supply and place reinforced concrete class 25/25 for Ring beam as per approved specifications at battery room	m3	1		
2508	Supply and install concrete vent blocks in the battery room	m2	14		
2509	Internal plasterwork in cement sand screed (1:3) 25mm thick	m2	98		
2510	Supply and install necessary electrical and ICT fittings to specifications	Sum			
2511	Supply and install approved brand 24,000BTU split units Air conditioners	Nr	7		
Sub-Total					
2600	Finishes				
2601	Preparation of walls and floor to receive acid resistant tiles to battery room	m2	29.7		
2602	Supply materials and install non slip acid resistant ceramic tiles to battery room	m2	16.2		
2603	Supply materials and install acid resistant wall tiles to battery room	m2	13.5		
2604	Remove the existing PVC floor tiles in offices and control room	m2	222		
2605	Prepare floor surfaces to receive ceramic tiles	m2	222		
2606	Prepare masonry wall surfaces, soffits of offices and control room to receive paint	sum			

2607	Prepare for paintworks all steel structures steel window frames, beams, columns, bracings etc	sum			
2608	Supply non slip floor tiles and install in offices and control building	m2	222		
2609	Supply and install soundproof and fireproof doors complete with frames, door closers, locks and accessories	Nr	18		
2610	Supply and install soundproof and fireproof double doors complete with frames, door closers and remotely controlled electric locks	Nr	2		
2611	Supply paint (undercoat/primer) and paint walls, soffits and metal surfaces to specifications	sum			
2612	Supply and paint final coats to walls and metal surfaces to specifications	sum			
2613	Allow for thorough cleaning of powerhouse floor (machine area)	sum			
2614	provide materials and repair damaged areas of the floor. Rate to include removal and disposal of existing pvc	sum			
2615	Supply material and lay 6mm-9mm thick heavy-duty non –slip epoxy resin screed as specified and to the manufacturer’s specification.(Sikafloor-91DS &Sikafloor -156 ZA primer;Colour :sandstone)	SM	450		
Sub-Total					

2700	Drainage and Flood protection				
2700 (A)	Drainage				
2701	Excavate open drain of size 200x150mm deep and concrete on the floor of the turbine floor. Provide galvanized open grid heavy duty safety covers to fit.	m	20		
2702	For the dewatering pit allow for dewatering, removal of deposits, cleaning and preparation of masonry wall surfaces	sum			
2703	Supply and place 75 mm thick reinforced concrete(class 25) lining to the masonry dewatering pit and allow for inserts	m3	2.5		
2704	Supply and install removable guard rails around the drainage pit. Spacing 1meter of vertical members (size of drainage pit 2600mm x1500mm wide)	sum			
2705	Excavate open drain to falls of size 500x300mm deep, supply materials and stone pitch the drain	m	20		
2706	Replace the existing siphon system with new piping of a similar size. The piping should be properly anchored	Item			
2707	Provide galvanized open grid heavy duty safety covers to specifications for the main drainage pits and drainage channels.	Item			
2708	supply and Install sewage water pumps to specifications	no	2		
Sub-Total					
2700 (B)	Flood Protection				
2709	Allow for survey of the profile of the riverbank and crosssections from the powerhouse to the end of the tailrace	sum			
2710	Allow for excavations at areas directed to receive Reno mattresses	m3	250		
2711	Allow for extra excavation in rock	m3	50		
2712	Supply and install 1x1x1m galvanized gabion boxes	No	900		
2713	Supply and install 2x1x0.2m Reno mattresses	No.	300		
2714	Supply and handpack hardcore to gabions and mattresses	m3	1000		
2715	Allow for mass concrete class 20 at areas directed	m3	5		
Sub-Total					

Total for drainage and flood protection					
2800	Data, Sockets and powerhouse Lighting				
2800 (A)	Powerhouse Data Points				
2801	Remove all the existing data cables. All the recovered items to be handed over to KenGen representative	sum	lot		
2802	The data cables shall be laid in new metallic cable trunks / conduits. The trunks for data cables will be different from that of power cables. All fittings and accessories must be new and of good quality	sum	lot		
2803	Power house store. Install two data outlet points	Nr	2		
2804	Main office. Install three data outlet points	Nr	3		
2805	Ritas office. Install two data outlet points.	Nr	2		
2806	Electrical office. Install three data outlet points.	Nr	3		
2807	Control room. Install three data outlet points.	Nr	3		
2808	Generator area. Install one data outlet at each generator area.	Nr	4		
Sub-Total					
2800 (B)	Power House socket outlet points				
2809	Remove all the existing cables, outlets and trunks. All the recovered items to be handed over to KenGen representative.	sum	lot		
2810	The power cables shall be laid in new metallic cable trunks / conduits. The trunks for power cables will be different from that of data. All fittings and accessories must be new and of good quality	sum	lot		
2811	Power house store. Install two double power socket outlets.	Nr	2		
2812	Main office. Install two double power socket outlets	Nr	2		
2813	Ritas office. Install one double power socket outlet	Nr	1		
2814	Electrical office. Install two double power socket outlets	Nr	2		
2815	Kitchen. Supply and install one 13 amps socket outlet	Nr	1		
2816	Server room. Supply and install one 13 amps socket outlet	Nr	1		

2817	Control room. Supply and install two double power socket outlets.	Nr	2		
2819	Generator area. Supply and install one double power socket outlet at each generator area.	Nr	4		
2820	Generator area. Supply and install a three phase TPN, 32AMPS power outlet complete with plugs and isolation provision.	Nr	4		
Sub-Total					

2800 (C	Power house lighting				
2821	Remove all the existing power cables, electrical fittings, conduits / trunks and hand over to KenGen representative	sum	lot		
2822	The power cables shall be laid in new metallic cable trunks / conduits. The trunks for power cables will be different from that of data. All fittings and accessories must be new and of good quality	sum	lot		
2823	11KV switchgear area. Supply and install SIX (6NO.) T8 LED TUBE(S). The lighting points to be equidistantly located.	Nr	6		
2824	Power house store. Supply and install three (3NO.) T8 LED TUBES. The lighting points to be well spaced.	Nr	3		
2825	Main office. Supply and install two (2NO.) T8 LED TUBES. The lighting points to be well spaced.	Nr	2		
2826	415VAC distribution area. Supply and install two (2NO.)T8 LED TUBES.	Nr	2		
2827	Ritas office. Supply and install one (1NO.)T8 LED TUBE.	Nr	1		
2828	Electrical office. Supply and install two (2NO.) T8 LED TUBES.	Nr	2		
2829	Kitchen. Supply and install one (1NO.)T8 LED TUBE	Nr	1		
2830	Charger area. Supply and install one (1NO.)T8 LED TUBE.	Nr	1		
2831	Battery room. Supply and install two (2NO.) T8 LED TUBES	Nr	2		
2832	Server room. Supply and install one (1NO.)T8 LED TUBE	Nr	1		
2833	Control room. Supply and install two (2NO.) T8 LED TUBES	Nr	2		
2834	Workshop area. Supply and install three (3NO.) T8 LED TUBES. The lighting points to be well spaced	Nr	3		
2835	Extension of the workshop. Supply and install one (1NO.)T8 LED TUBE	Nr	1		
2836	Cable gallery. Supply and install nine (9NO.) T8 LED TUBES. Each row in the gallery to have three (3NO.) lighting points positioned for good light distribution. Provide three circuits (3 switches, one for either circuit)	Nr	9		

2837	Generator area. Supply and install ten (10NO.) LED High Bay 150 watts fittings complete with "bulbs". The lighting points to be in two rows and to have three circuits. The circuits to be well staggered such that an individual circuit gives a good distribution of light.	Nr	10		
2838	Each lighting circuit will have a switching point in addition to where the number of circuits are already defined.	sum	lot		
Sub-Total					
2800 (D)	Power House Security Lighting				
2840	Remove all the existing power cables, electrical fittings, conduits / trunks and hand over to KenGen representative	lot	lot		
2841	The power cables shall be laid in new metallic cable trunks / conduits. . All fittings and accessories must be new and of good quality	lot	lot		
2842	Supply and install Eight metres (8M) galvanized street lighting structures of hexagonal formation complete with 150 watts LED bulbs and fittings. Four structures will be installed along either side of the power house, two structures at the front and one at the rear. The lighting points to be equidistantly located. The ingress protection should be IP 65.	Nr	11		
Sub-Total					
Total for power house data, sockets and lighting					

2900	Monorail Systems in the PowerHouse				
2910	Monorail at workshop				
2911	Allow for structural design of monorail support system	sum			
2912	Fabrication of beams, columns and bracings, to provide structural support to monorail support system including connection plates.	sum			
2913	Erection of beams, columns and bracings, to provide structural support to monorail support system including supply of bolts.	Sum			
2914	Supply and install 3 ton monorail electric crane with extendable control pendant for lifting and lateral movement.	Nr	1		
Sub-Total					
2920	Monorail at 415V board area				
2921	Allow for structural design of monorail support system	sum			
2922	Fabrication of beams, columns and bracings, to provide structural support to a removable monorail support system including connection plates.	sum			
2923	Erection of beams, columns and bracings, to provide structural support to a removable monorail support system including supply of bolts.	Sum			
2924	Supply and install 3 ton monorail electric crane with extendable control pendant for lifting and lateral movement.	Nr	1		
Sub-Total					
2930	Monorail for draft tube gates				
2931	Allow for structural design of monorail support system	sum			
2932	Fabrication of beams, columns and bracings, to provide structural support to a removable monorail support system including connection plates.	sum			
2933	Erection of beams, columns and bracings, to provide structural support to a removable monorail support system including supply of bolts.	Sum			

2934	Supply and install 5 ton monorail electric crane with extendable control	Nr	1		
Sub-Total					
Total for monorail systems					

BILL No. 3: WATERWAYS

Item	Description	Amount (Ksh)
	BILL No. 3 - SUMMARY	
3000	Miscellaneous Requirements	
3100	Mathioya works	
A	Mathioya Tunnel	
B	Mathioya Penstocks	
C	Mathioya Canal Protection	
3200	Maragua Works	
A	Maragua Penstocks	
B	Maragua Headpond	
C	Maragua canal	
D	Maragua Intake and Spillway Gate	
E	Maragua weir	
3300	Peripheral Drains	
3400	Surge Tank	
3500	Staff Gauges	
	Sub-total Carried forward to Grand Summary	

BILL No. 3 : WATERWAYS

Item No.	Description	Unit	Quantity	Rate (Ksh)	Total (Ksh)
3000	Miscellaneous Requirements				
3001	Temporary works; Access arrangements of the penstocks, canals and Mathioya tunnel	sum			
3002	Temporary works; Protective screens and barriers.	sum			
3003	Temporary works; Pumping arrangements for de-watering.	sum			
3004	Maintain and operate temporary works provided in items 3001- 3003.	sum			
Sub Total					
3100	Mathioya Works				
3100 (A)	Mathioya Tunnel				
3101	Provide equipment and labour and remove class 4 rock falls, debris from the tunnel and dispose off at areas directed	m	232		

3102	Provide equipment and labour and remove class 5 rock falls, debris from the tunnel and dispose off at areas directed	m	36		
3103	Provide equipment and labour and break class 2 rockfall types, spread evenly on the invert	m	687		
3104	Provide equipment and labour and break class 3 rockfall types, spread evenly on the invert	m	326		
3105	Allow for removal of the old screen at the grit trap	sum			
3106	Supply materials, fabricate and install new screens at the grit trap	sum			
	Sub-Total				
3100 (B)	Mathioya penstocks				
3107	Allow for inspection of internal and external surfaces and inspection reporting of the penstocks.	sum			
3108	Allow for repairs of corroded internal and external sections	Sum			
3109	Allow for surface preparation of internal and external surfaces to specification to receive paintwork	m2	2240		
3110	Supply paint and paint internal and external surfaces to specifications	m2	2240		
3111	Supply and place reinforced concrete C25/30 for repairs on anchor blocks as directed	m3	10		
Sub Total					
3100 (C)	Mathioya Canal Protection works (Gabions)				
3112	Allow for excavations at areas directed to receive Gabion boxes	m3	40		
3113	Supply and install 1x1x1m galvanised gabion boxes	No.	100		
3114	Supply and handpack hardcore to gabions	m3	120		
Sub Total					

3200	Maragua Works				
3200(A)	Maragua penstocks				
3201	Allow external surface inspection and reporting of the penstocks	sum			
3202	Allow for repairs of corroded external sections	Sum			
3203	Allow for surface preparation of external surface to specification to receive paintwork	m2	650		
3204	Supply paint and paint external surfaces to specifications	m2	650		
3205	Supply and place reinforced concrete C25/30 for repairs on anchor blocks as directed	m3	10		
Sub Total					
3200 (B)	Maragua headpond				
3206	Allow for surface preparation and paintworks to metal surfaces to specification	sum			
3207	Allow for surface preparation, supply paint and apply to screens and gates to	Sum			
3208	supply and place reinforced concrete C25/30 for repairs to the head pond	m3	5		
3209	Supply materials and allow for rendering in cement sand screed (1:3), 50mm thick to masonry surfaces	m2	100		
Sub Total					
3200 (C)	Maragua canal				
3210	Allow for dewatering, cleaning and inspection	sum			
3211	supply and place reinforced concrete C25/30 for repairs to the canal as directed	m3	10		
Sub Total					
3200 (D)	Maragua weir				
3212	Allow for dewatering cleaning and inspection	sum			
3213	supply and place reinforced concrete C25/30 for repairs to the weir as directed	m3	5		
Sub Total					
3200 (E)	Maragua intake and spillway gates				
3214	Rehabilitation of the opening/closing mechanism of spillway gate 2 to	sum			
3215	Rehabilitation of the opening/closing mechanism of intake gate NO.2 to specification and drawings	sum			
3216	Supply and replace seals for two intake and two spillway gates	Sum			
3217	Surface preparation and painting of intake and spillway gates to specification	sum			
Sub Total					

3300	Peripheral drains				
3301	Excavate open drain to falls of size 1000x500mm deep	m	300		
3302	Supply materials and stone pitch the bottom and sides of the excavated drain	m	300		
3303	Supply materials and repair damaged sections of the existing open drains	m2	500		
3304	Allow for cleaning and unclogging of blocked culvert drains	m	30		
Sub Total					
3400	Surge tank (Mathioya)				
3401	Allow for inspection of the surge tank	sum			
3402	Allow for internal surface preparation	sum			
3403	supply and place reinforced concrete C25/30 for repairs to the surge tank as directed	m3	5		
3404	Supply materials and allow for rendering in cement sand screed (1:3), 50mm thick to internal masonry surface with water resistant cement	m2	500		
3405	Supply and Install epoxy based material for concrete repairs at areas as directed by the Engineer	sum	1	500,000	
Sub Total					
3500	Replacement of Staff Gauges				
3501	supply, deliver and Install new staff gauges	nr	3		
Sub Total					

BILL No. 4: SUBSTATION

Item No.	Description	Amount (KSh)
	BILL No. 4- SUMMARY	
4000	Miscellaneous Requirements	
4100	Demolition and Site Clearance	
4200	Earthworks	
4300	In Situ Concrete	
4400	Pre-cast Concrete	
4500	Trenching, Pipework and Ductwork	
4600	Substation earthing	
4700	Security Fence	
4800	construction of new cable trench to the substation	
4900	construction of periphery drain around the substation	
4950	Substation Lighting	
	Sub-total Carried forward to Grand Summary	

BILL No. 4:
SUBSTATION

Item No.	Description	Unit	Quantity	Rate (Ksh)	Amount (Ksh)
4000	Miscellaneous Requirements				
4001	Temporary works; Access arrangements to the Switchyard.	sum	1		
4002	Temporary works; Protective screens and barriers.	sum	1		
4003	Allow for structural design and detailing of transformer foundations and associated structures from the general arrangement drawing provided by the M&E contractor.	sum	1		
4004	Maintain temporary works provided in items 4001-4002.	item			
Sub-total					
4100	Site Clearance				
4101	Allow for site clearance and levelling	sm	400		
Sub-total					
4200	Earthworks				

4201	Excavation, surface preparations of excavated areas and dumping to spoil in any material other than rock for foundations, trenches and oil interceptor.	m ³	50		
4202	ditto in rock	m ³	300		
4203	Backfilling, spreading and compaction to engineer's approval.	m ³	700		
4204	Making good 150mm thick layer of stone chippings to switchyard area.	m ²	800		
4205	Excavate open surface water drain at toe of switchyard embankment, not exceeding 1m in depth and 1m ² in cross sectional area, to join existing.	m	60		
Sub-total					
4300	In Situ Concrete				
4301	Supply and place concrete, design mix Grade C15/20 (mass concrete) for blinding.	m ³	20		
4302	Supply and place reinforced concrete, design mix Grade C30/30 to bases, footings, trenches, transformer bases, oil/water separator and ground slabs and walls as appropriate	m ³	300		
4303	Supply, cut and fix assorted reinforcement rebars	Tons	10		
Sub-total					
4400	Precast Concrete				
4401	Segmental Units; cable trench covers, measuring 750mm x 450mm x 50mm with recessed lifting hooks.	nr	5		
Sub-total					

4500	Trenching, Pipe work and Ductwork				
4501	Trench in rock fill and material other than rock, 1.5m deep; filled with graded material.	m	60		
4502	100mm concrete porous subsoil drain pipes laid in trench with open joints.	m ³	100		
4503	Surface water drainage manholes not exceeding 2m deep including excavation, blinding, 150mm concrete base, rendered solid block work walls, 150mm suspended concrete slab, benching and Broads medium duty type 345C (or similar approved) manhole cover and frame	m	50		
4504	100 mm pitch impregnated fibre duct pipes laid in trench.	nr	3		
4505	100 mm pitch impregnated fibre duct pipe long radius bends set vertically or horizontally.	m	50		
4506	Installation of all associated piping and ducting for new in situ oil interceptor.	nr	10		
Sub-total					
4600	Substation Earthing				
4601	Remove the existing earthing systems at the powerhouse and the substation and dispose as directed by the engineer	Sum	1		
4601	Supply and installation of substation earthing mat as specified	Sum	1		
4603	Supply and installation of powerhouse earthing system as specified	Sum	1		
4604	Suoply materials and install a common earthing point between the substation and powerhouse earthing systems as specified.	Sum	1		
Sub-total					

4700	Security Fence				
4701	Metal post and wire supported galvanized chain link security perimeter fence to BS 1722 Part 1 gauge 8; Height 2.1 m, with three strands barbed wire on cranked arm; posts set in concrete at 3m centers and struts provided at corners and at every fifth post .	m	90		
4702	150mm x 250mm deep marginal concrete kerbing to be laid between new fence posts and including haunching	m	80		
4703	Double leaf steel access gate 4m wide and 3m height to the switch yard	nr	1		
Sub-total					
4800	Construction of new cable trench to the substation				
	Excavation of cable trench trenches including maintaining and supporting sides and keeping bottoms free from water, mud and fallen materials, grading bottoms, and carting away surplus excavated material				
4801	Excavate for open cable trench 400mm wide at the bottom 600 mm deep	m	50		
4802	Form rebates for trench covers 75mm x 60mm x 300mm	m	50		
Sub-total					
4900	Construction of periphery drain around the substation				
	Excavation of drain trenches including maintaining and supporting sides and keeping bottoms free from water, mud and fallen materials,grading bottoms, and carting away surplus excavated material				

4901	Excavate for open drain 400mm wide at the bottom ,with sloping sides at 45 degrees and average 1000 mm deep	lm	60		
4902	ditto 650mm wide at the bottom ,,with sloping sides at 45 degrees and average 1000 mm deep	lm	40		
4903	ditto 850mm wide at the bottom ,,with sloping sides at 45 and average 1000 mm deep	lm	130		
4904	Allow for stone pitching of the drain	sm	300		
Sub-Total					
4950	Substation Lighting				
4951	Supply and install Eight metres (8M) galvanized street lighting structures of hexagonal formation complete with 150 watts LED bulbs and fittings. The structures will be installed around the perimeter of the substation. The lighting points to be Equidistantly located. The ingress protection should be IP 65	nr	8		
Sub-Total					

**BILL No. 5 WINCH
TRACK**

Item No.	Description	Amount (Ksh)
	BILL No. 5 - SUMMARY	
5000	Miscellaneous Requirements	
5100	Winch track works	
	Sub-total Carried forward to Grand Summary	

**BILL No. 5: WINCH
TRACK
REPAIRS**

Item No.	Description	Unit	Quantity	Rate (Ksh)	Total (Ksh)
5000	Miscellaneous Requirements				
5001	Temporary works; Access arrangements at the winch track	Sum			
5002	Temporary works; Protective screens and barriers.	Sum			
5003	Maintain and operate temporary works provided in items 5001-5002.	Sum			
Sub-Total					
5100	Winch track works				
5101	Provide equipment and labour and remove rail and store	Sum			
5102	Provide equipment and labour and remove timber sleepers and dispose to designated area	Sum			
5103	Design of the sleepers and submission of design to engineer for approval	Sum			
5104	Supply materials, labour and equipment to reinstate the rail track bed	Sum			
5105	Supply materials, fabricate and install new concrete sleepers; length 1830mm, width 180mm, height 180mm.	No.	400		

5106	Inspect the rails and submit report to the engineer	Sum			
5107	Allow for remedial measures on the rails as necessary	Sum			
5108	Provide material, labour and equipment and Install and align the rails	Sum			
5109	Supply materials and construct new concrete foundations for the rollers.	Sum			
5110	Supply, install and align a new set of rollers and roller holders for the entire Length.	Sum			
5111	Supply materials and repair the drainage running along the entire length of the winch track	Sum			
5112	Provide materials, labour and equipment to construct a 1.0m diameter culvert below the rails complete with wing walls and 0.6m deep reinforced concrete surround to allow the laying of cables between the powerhouse and substation	M	5		
5113	Test and commission the winch track	Sum			
Sub-Total					

BILL No. 6: DRAFT TUBE GATES

Item No.	Description	Amount (Ksh)
	BILL No. 6 - SUMMARY	
6000	Miscellaneous Requirements	
6100	Draft Tube Gates	
	Sub-Total	

BILL No. 6: DRAFT TUBE GATES

Item No.	Description	Unit	Qty	Rate (Ksh)	Total (Ksh)
6000	Miscellaneous Requirements				
6001	Temporary works; Access arrangements of the draft tube openings	sum			

6002	Temporary works; Protective screens and barriers.	sum			
6003	Temporary works; Pumping arrangements for de-watering.	sum			
6004	Maintain and operate temporary works provided in items 6001-6003.	sum			
Sub Total					
6100	Draft Tube Gates				
6101	Allow for design, production of shop drawings, supply of materials, fabrication, installation and Commissioning of draft tube gates in the existing Draft tube openings at the power house	sum			
6102	Allow for design, production of shop drawings, supply of materials, fabrication, installation and Commissioning of hoisting systems for the gates	sum			
6103	Allow for Design, modification of existing slab, supply of materials, fabrication and commissioning of gates storage sytem (Dogging)	sum			
6104	Carryout design, fabrication and supply of an appropriately sized lifting beam with all accessories	sum			
Sub-Total					

BILL No. 7 : ROAD WORKS

Item	Description	Amount
	BILL No. 7 - SUMMARY	
7000	Miscellaneous Requirements	
7100	Bush Clearing	
7200	Earthworks and Excavations of rock to level	
7300	Grading	
7400	Wearing course	
7500	Side drains	
7600	Stone pitching	
7700	Culverts	

7800	Concrete Haunching	
7900	Rock Boulders	
	Sub-total Carried forward to Grand Summary	-

BILL No. 7 : ROAD WORKS

Item No.	Description	Unit	Quantity	Rate (Ksh)	Total (Ksh)
7000	Miscellaneous Requirements				
7001	Allow for mobilization and demobilization of Machinery and equipment	Sum			
7002	Allow for setting out of the roads	Sum			
7003	Allow for materials testing as directed by the engineer	Sum			
Sub Total					
7100	Bush Clearing				
7101	Allow for bush clearing along the marked access road	M	2000		
Sub Total					
7200	Earthworks and Excavations for the new				
7201	Excavations to level and dumping of spoil	CuM	12000		
7202	ditto on rock	CuM	8000		
7203	Supply of granular material (hardcore), filling, spreading and compaction to level	CuM	20000		
7204	Supply of granular material (Murram), spreading and compaction to achieve thickness of 100mm	SM	12000		
Sub Total					
7300	Grading				
7301	Supply of granular material (Murram) and spreading	SM	12000		
Sub Total					
7400	Wearing Course				

7401	Supply of granular material (Murram), spreading , compaction to 95% MDD to a thickness of 200mm	SM	12000		
Sub Total					
7500	Side Drains				
7501	Cut Side drains on both side of the road; width 2m and average depth of 1.5m along the road as directed by the engineer	CuM	6000		
Sub Total					
7600	Stone pitching				
7601	Allow for stone pitching on the side drains	SM	15000		
Sub Total					
7700	Culverts				
7701	Excavate in any material trench to a depth not exceeding 1.5m. Rate to include shaping and carting away of surplus material to spoil.	CuM	40		
7703	Excavate into any material for headwalls and wingwalls and cart away to tips excess material.	CuM	15		
Sub Total					
7800	Concrete Haunching				
7801	Provide, place and compact 400mm thick class (1:3:6) concrete bed and surround to culverts.	CuM	30		
7802	Provide, place and compact 150mm thick class (1:3:6) concrete to headwalls and wingwalls. Rate to iclude formwork.	CuM	15		
Sub Total					
7900	Rock Boulders				
7901	Supply and place backfill rock boulders as filter drain at wet areas as direcred by the Engineer	CuM	1800		
Sub Total					

BILL No. 8: COFFERDAM

Item No.	Description	Amount (Ksh)
	BILL No. 8 - SUMMARY	
8000	Miscellaneous Requirements	
8100	Cofferdam	
	Sub-Total	

BILL No. 8: COFFERDAM

Item No.	Description	Unit	Quantity	Rate (Ksh)	Total (Ksh)
8000	Miscellaneous Requirements				
8001	Allow for mobilization and demobilization of Machinery and equipment	Sum			
Sub Total					
8100	Cofferdam				
8102	Allow for placement of cofferdam across the river channel	Sum			
8103	Allow for pumping and handling of surface water and/or groundwater from within temporary cofferdam and portions of the river channel that have been temporarily	Sum			
8104	Allow for removal of cofferdam after works	Sum			
Sub-Total					

BILL No. 9: PERIMETER FENCE

Item No.	Description	Amount (Ksh)
	BILL No. 9 - SUMMARY	
9000	Miscellaneous Requirements	
9100	Perimeter fence	
	Sub-Total	

BILL No. 9 : PERIMETER FENCE

Item No.	Description	Unit	Quantity	Rate (Ksh)	Total (Ksh)
9000	Miscellaneous Requirements				
9001	allow for bush clearance along the perimeter fence	Sum			
Sub Total					
9100	Perimeter Fence				
9101	Supply and Install Concrete posts and wire supported galvanized chain link security perimeter fence to BS 1722 Part 1; Height 2.1 m, with three strands barbed wire on cranked arm; posts set in concrete at 3m centers and struts provided at corners and at every tenth post .	m	400		
9102	Backfill Concrete to hold the concrete posts in place and 150mm x 250mm deep marginal concrete kerbing to be laid between new fence posts and including haunching	m3	40		

9103	Excavate 500mm by 500mm by 600mm pits on any material for fencing posts	m3	20		
9104	Double leaf steel access gate 4m wide and 3m height to the Power house access	nr	1		
Sub-Total					

BILL No. 10: DAY WORKS

Tenderers to provide daily rates for all cadre of labour(unskilled, Craftsman, Foreman, Technician and Engineer)
Tenderers to provide daily rates for all kinds of equipment that is relevant to the contract.

REVISED CLAUSE 3.3

.EARTHING SYSTEM

The contractor shall install new earthing system for powerhouse and Substation.

1. POWER HOUSE AND SUBSTATION EARTHING

1.1. GENERAL

The contractor shall be responsible for establishing a new earthing system in the power house and substation for connection of all equipment. The contractor shall carry out the study and surveys necessary for the design of the earthing systems. The power house earthing system shall be connected to the switchyard earthing system.

The calculations and the proposed design of the earthing shall be submitted to the employer for review and approval. The approval process shall be as specified in tender document. **The calculations and sizing of earthing system shall meet requirements of the Electrical & Mechanical works contractor.**

Concrete reinforcement bars shall not be used as part of the earthing grid or as grounding electrode. The contractor shall carry out tests to establish the best points for connecting main earth grounding electrodes.

The earthing installations shall conform to the relevant sections of IEC 60364-5-54, IEEE 80, IEEE 81 and BS 7430.

1.2. SCOPE OF WORK

1.2.1. Power House

The contractor shall design, supply, install, test and commission the earthing grid system for all the equipment supplied in the power house as per specifications and requirements of the Electrical & Mechanical works contractor. The requirements of the earthing systems by the Electrical & Mechanical works contractor shall be provided after contract signature. The existing earthing shall be removed (and handed over to KenGen) and replaced with the new system. Where some equipment is retained in the power house, the contractor shall lay new earthing to this equipment, as part of the scope.

The Contractor shall include for the supply, installation and testing of all secondary earthing systems associated with the supplied or retained equipment.

1.2.2. Switchyard

The contractor shall design, supply, install, test and commission the earthing grid system for all the equipment supplied in the switch yard. The existing earthing shall be removed (and handed over to KenGen) and replaced with the new system. Where some equipment is retained in the switch yard, the contractor shall lay new earthing to this equipment, as part of the scope.

The earthing switches, disconnector switches, circuit breakers and surge diverters shall be directly connected to the electrical conductor earthing terminals and shall not rely on earth paths through the support structure. The support structure shall be separately earthed.

The transformers shall be earthed on two points which are diagonally opposite.

1.2.3. Earthing Conductors

Main earthing bus bars shall be half-hard tinned copper bus bars to BS 1432 with an appropriately sized cross-sectional area and a thickness not less than 3 mm and not more than 7 mm.

Main stranded earthing conductors shall be PVC insulated tinned copper conductors with an appropriately sized cross-sectional area to BS 6004. The PVC insulation shall be green-and-yellow in colour.

All Branch earthing conductors shall be half-hard tinned copper bus bars to BS 1432 or PVC insulated tinned copper conductors of seven or more strands to BS 6004. The minimum cross-sectional area of the PVC insulated branch earthing conductors shall not be less than 2.5 mm².

Branch earthing bars for plant operating at 11KV, including portable earthing terminals shall be of the same size and type as the main earthing bars.

1.2.4. Installation of Earthing Conductors

Earthing Conductors shall be laid straight and level, running vertical and parallel to walls and floors. Earthing bus bars shall be fixed with masonry anchors with a minimum spacing of 5 mm from the surface, using nylon spacers. Fixings shall be spaced not more than 100 times the thickness of the bus bar. The earthing conductors shall be protected against mechanical injury and corrosion.

Closed loops formed by the earthing system and plant adjacent to unshielded high current conductors shall be avoided. Should overheating of a part of the conductors be found, the loop shall be interrupted whilst retaining the earthing function.

Except where unavoidable, earthing conductors shall not be run on floors in areas which may be used as walkways. Where run on floors, conductors shall be suitably protected from mechanical damage.

Busbars installed in locations subject to becoming immersed in water shall be painted in epoxy paint.

The use of PVC insulated stranded branch earthing conductors shall be limited to earthing of separately mounted control devices and similar small items and for other items where the installation of busbars is impractical.

Stranded branch earthing conductors shall be installed on perforated cable trays or enclosed in hot dipped galvanized steel conduit. The conduit serves as mechanical protection and support only. Conduits need only be installed on straight runs and may stop short of joints and terminations. The ends of all conduits shall be bushed.

1.2.5. Earthing Terminations and Joints

Connections to the embedded stub plates in the Powerhouse shall be by a flat steel extension bar brazed to the copper conductor and arc welded to the steel stub plates, or by copper conductor brazed to the copper alloy stub plates. Any variation in height of embedded stub

plates shall be allowed for in the length of the extension bars to ensure the straightness of the copper busbar.

For steel stub plates the galvanized finish on the exposed surface of the stub plates shall be ground back before welding. After welding, the stub plate and extension bar shall be cleaned back to bright steel, degreased and painted with two coats of zinc rich primer.

All joints between earthing busbars shall be brazed. At point of connection to plant and equipment the contact surface shall be cleaned, and the connection made tight with the nuts and washers.

Before brazing the tinned coating, if applicable, of the busbars shall be removed from the joint area. As soon as practicable after joining, the joints shall be painted to avoid corrosion.

Stranded earthing conductors shall be terminated using approved crimped cable lugs. The joint between the main earthing busbars and the cable lugs shall be brazed. The PVC insulation shall be cut back and protected during brazing.

The Contractor shall bond miscellaneous pipes and other metal work as required.

Any underground earth conductor or earth mat joints that may be required shall be made by the thermo weld process.

1.2.6. Earthing Mats

The contractor shall provide steel grate for all the disconnector switches. The steel grate plates shall be placed on the surface and permanently attached to the structure by exothermic welding. .

Every surge arrester shall be connected to the earthing grid via a short direct path to earth and should be free of sharp bends.

1.2.7. Testing of the Earthing System.

After installation, the resistance of the complete earthing system shall be measured by the contractor and measured value submitted to the employer for review and approval. The measured value shall not exceed 1ohm when measured between the earthing grid and the surrounding earth. The step and touch potentials shall be measured as per IEEE & IEC standards. They shall provide a method statement detailing how to carry out the testing of the earthing system.