BILL OF QUANTITIES FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF A 10,000 LITRES/HOUR REVERSE OSMOSIS (RO) DESALINATION PLANT AT KIBUYUNI BOREHOLE, PONGWE-KIKONENI WARD

The rates entered shall include third party fees, levies, input costs, labour and contractor's overheads and profits.

Item	Item Description	Unit	Quantity	As billed Unit Rate (Kshs.)	Amount (Kshs.)
BILL 01	**REVERSE OSMOSIS TREATMENT UNIT (10,000 LITRES/DAY)**				
1.1	Supply, install and test 10,000 Litres/Day Reverse Osmosis (RO) treatment unit complete with industrial-grade Thin Film Composite (TFC) membranes (4 - 6 No. 4040/8040) and stainless steel pressure vessels, sized and configured to suit the borehole water quality (recovery rate 50-75%, salt rejection >=95%). The facility to bw c/w necessary pumps, solar energy requirements, cabling all necessary sensors.	No	1		
Sub-Total for Bill 01 (RO Treatment Unit)					

BILL 03	**PRODUCT WATER STORAGE AND RO PLANT HOUSING**				
3.1	Supply and install 10,000 litre PVC water storage tank for treated (product) water, complete with inlet/outlet plumbing works and fittings on a concrete slab as shall be directed by the Engineer	No	1		
3.2	Supply, deliver, place and install one (1) no. 40-ft steel shipping container, suitably modified and fitted out to provide a secure and weatherproof housing for the RO plant, complete with steel access door, louvered ventilation openings, windows where required, internal electrical installations, lighting, adequate natural/mechanical ventilation, floor protection, corrosion treatment and all necessary fittings, modifications and accessories, including transportation, positioning, anchoring and commissioning, all complete to the satisfaction as directed by the Engineer	Item	1		
Sub-Total for Bill 03 (Storage and Housing)					

MAIN SUMMARY - RO PLANT	
Bill 01: Reverse Osmosis Treatment Unit	
Bill 03: Product Water Storage and RO Plant Housing	
Sub-Total for RO Plant	

Borehole Drilling					
	Item Description	**Unit**	**Quantity**	**Unit Rate (Kshs.**	**Amount (Kshs.)**
BILL 01	**PRELIMINARY AND GENERAL ITEMS**				
	Allow for the necessary mobilization and demobilization of plant and equipment to and from site, camp setting up, water and drilling operations and field camp	Item	1		
	Provide, erect and maintain project signboards in accordance with the specifications	Item	1		
	Conduct hydrogeological investigation for the optimal siting of drinking water borehole at Mwabungo Colorado in Kinondo ward. The exercise should identify the most suitable location for drilling of the new borehole. The identified site must be properly pegged and must offer plausible chances of successful drilling. Also suggest on the possible water quality and expected borehole potential considering that the borehole is intended for portable water supply.	Item			
	The consultant is expected to use both primary and secondary data in the exercise. Secondary data will involve study of available information/data on existing boreholes, drill logs, reports and maps while primary will be obtained by carrying out filed reconnaissance and measurement of existing borehole and geophysical prospecting within the study area using a combination of the most suitable geophysical methods. The outcome of the consultancy will be a detailed hydrogeological survey report giving details of the findings and recommendations.	Item	1		

	Total carried to main summary				
BILL 02	**BOREHOLE DRILLING (120m Air drilling)**				
	Drill a borehole of minimum diameter 205mm (8") through all types of strata including disposal of excavated materials, taking any remedial measures to overcome caving-in, or over drilling to accommodate sloughed material and keeping drilling records as specified between ground level and 120m below ground level.	M	120		
	Supply and install 8" (205mm) internal diameter steel surface casings from ground level to the level of stable formation in the borehole.	No.	1		
	Supply and install PVC 6" (152mm) internal diameter plain casing and slotted screen casing in the borehole (Slots should not exceed 1mm in width and shall have an open area not less than 6%. Slots may be either be vertical or horizontal)	No.	40		
	Allow for taking samples of drill cuttings at two (2) meter intervals, develop a borehole log and submit to client.	No.	60		
	Supply and insert gravel pack (rounded 2-4mm dia) to atleast 3m above top screen	TONS	5		
	Develop the borehole including inserting and removal of development equipment;	HR	6		
	Total carried from Bill 02 to main summary				
BILL 03	**TEST PUMPING AND WATER QUALITY ANALYSIS**				
	Undertake Continuous Discharge Test as specified for 24 hours for actual test pumping to determine maximum discharge, prepare a report and submit to the client.	HR	24		
	Take water samples for laboratory analysis (1 No. sample for Physical, Bacteriological and 1 No. for Chemical each 1.5 liters) and submit the results to the client.	ITEM	2		
	Total carried from Bill 03 to Main summary				

BILL 04	**SOLAR POWER INSTALLATION AND EQUIPPING**				
	Procure the following appliances all as approved by the Project Manager.				
	Supply, Install and test submersible solar pump with a discharge not less than 5m3/hr against 150m head. The pump Impellers should be of Stainless Steel. Must Provide Copies of Pump Characteristic/ Performance Curves to the Supervisor (Brochures). Install as directed by the project manager.	No.	1		
	Supply,install and test 2.2kW Sub motor	No.	1		
	Supply, deliver and test SV 3 3.7kW Sunverter control module as approved by the Engineer.	No.	1		
	Borehole cover 1 ¼ -inch *6WO B/Valve	No.	1		
	DC PV Disconnect switch 1000 VDC/200A	No.	1		
	6mm2x4 PVC Flat submersible drop cable	M	110		
	Float switch	Item	1		
	Braided rope	m	110		
	Supply, deliver, install and test Monocrystaline Crystalline solar module as approved by the supervising engineer	Watt	3600		
	Supply all materials and fabricate 3m high solar support structure (steel and as recommended by the project manager)	Item	1		
	1.5" standard 3m PVC pipe including a cold water meter	No.	35		
	Installation sundries	Item	1		
	DN3 Water meter	No.	1		
	Non return valve 1.5"	No.	1		
	Electrodes sensors for dry run protection	Item	1		
	Borehole chamber				
	Construct 1200x1200x1200mm mansory chamber which should be at least 400mm above the ground with concrete cover	No	1		
	Total from Bill 04 carried to Main summary				
BILL 05	**WATER TOWER AND KIOSK**				

	Site clearance				
	General clearance as directed	SM	100		
	Substructure (all provisional), supply and fix				
	Excavation for foundation	CM	10		
	50mm thick Blinding class in strip footing	CM	0.4		
	Concrete class 25/25 in strip footing and pads	CM	1.4		
	Steel-twisted high tensile bars	kg	130		
	Formwork rough finish	SM	10		
	200mm thick machine cut stone walling	SM	14		
	200mm compacted hardcore fill in structure extended verandeh	CM	2		
	Gauge 1000 sheet Damproof course in structure and extended verandah	SM	12		
	50mm thick murrum blinding in structure and extended verandah	SM	12		
	Chemical anti termite treatment in structure and extended verandah (3 years guarantee)	SM	12		
	Super structure, supply and fix				
	150mm thick concrete class 25/20 in floor slab slab and extended verandah	CM	3.4		
	A142 structured steel mesh slab	SM	24		
	200mm wide 3 ply bituminous damp proof course under walls	LM	19		
	200mm machine cut stone walling, dressed and plumb on all sides.	SM	30		
	Concrete class 25/20 in ring beam, service area, stands and top slab	CM	5		
	High tensile reinforcement steel	kg	300		
	Formwork-fine finish	SM	50		
	12mm plaster to internal walls	SM	40		
	Final screeding to internal floor followed by 8mm thick non-slip ceramic "SAJ" tiles size 300mm x 300mm laid with 2mm spacers using tile adhesive Type 101 as manufactured by Athi River Mining Ltd, includinding pointing in matching anti-fungal coloured cement to fetching bay	SM	5		

	Key and painting in external walls	LM	100		
	Air vents/pv in wall above window and door	No.	4		
	Steel door and lock as per drawings	No.	1		
	Steel window and lock as per drawings	No.	1		
	Painting internal surface 3 coats	SM	25		
	Painting external surfaces as directed including branding as directed, 3 coats	SM	7		
	All internal pipework adn fittings ass shown on drawings, include meter, taps, ball valve e.t.c	ITEM	sum		
	DN 25 G.I pipe class B from tee on mainline to kiosks meter point	LM	20		
	8mm thick non-slip ceramic "SAJ" tiles size 300mm x 300mm laid with 2mm spacers using tile adhesive Type 101 as manufactured by Athi River Mining Ltd, includinding pointing in matching anti-fungal coloured cement to fetching bay.	SM	5		
	Drainage and civil works				
	Drain pipe from roof	LM	3		
	Parapet walling or roof 0.7m high in perforated clay bricks	SM	7.28		
	Drainage grooves in extended verandah at bucket placing frontage	item	sum		
	Complete RC wall for bucket placing as per drawing	item	sum		
	Collection drain around structure, drain pipe and soak pit as per	item	sum		
	50mm thick paving slabs on compacted sand bed around block as per drawings	SM	6		
	Storage Tank				
	Supply and install 10000l PVC tank, inlet and outlet structures to detail as per attached drawings.	No.	1		
	Sub Total for water kiosk				
	Total from Bill 05 carried to Main summary				
BILL 06	**PERIMETER FENCING (ALL PROVISIONAL)**				
	Clearing the site of bushes/trees	SM	100.00		

	Prepare and install reinforced Concrete posts (150mm x150mm and 2400mm height, C15/20) supported with mass concrete at 600 mm , spaced at 3m centre to centre.	No	15		
	Prepare and install Concrete class 1:3:6 for archoring the posts	No	10		
	Supply and install 2.4m high by 14-gauge chain link	LM	40		
	Supply and fix barbed wire Gauge 14 spaced at 450mm (4 Strands) around the pan area as directed by the Engineer	LM	240		
	Provide a provisional sum for construction of a gate to the reservoir compound as directed by the Project Engineer.	No	1		
	Fencing Wire				
	Barbed wire				
	Supply and fix Double strand Barbed wire mtrs, around the perimeter;or equivalent	NO	1.00		
	Chain Link				
	Supply and fix 3.0mm chain link 1.8 m high and twisted 3 times at the ends	item	1.00		
	Bind the chain with a binding wire	KG	10.00		
	Total from Bill 06 carried to Main summary				
BILL 07	**PIPELINE WORKS**				
	Site Clearance				
	Clear pipeline route, grab tree stumps and dispose away all material safely from the site, 1000mm wide.	sm	2,500		
	Excavate 800mm deep and 600mm wide for pipeline trench	cm	1200		
	Backfill the trench after pipe laying	cm	1200		
	Off take				
	Provide all materials for off take connection Supply, fix all necessary fittings for the off take for the pipeline	item	1		
	Pipe laying				
	Supply, lay backfill and test;				

	DN 63mm HDPE PN12.5 pipe. Include cost for handling, joints and various fittings for laying	lm	2,500		
	Valves & Wash outs				
	Supply, fix and test:				
	3"gate valves (include all fittings) as shall be directed by the Engineer	no	4		
	1" single orifice air valves (including fittings)	no	4		
	2" Non-Return valve	No	1		
	2" wash out (including fittings)	No	2		
	Masonry Chamber				
	Construct 1200x1200mm masonry chambers which shall be atleast 450mm off the ground for Air valves, Gate valves and Wash outs	no	10		
	Marker Posts				
	Provide all material, fabricate, cast and install marker posts for A.V, W.O and Water Line	No	30		
	Total Bill 07				
BILL 08	**COMMUNITY WATER POINT**				
	Site Clearance and excavation work				
	Excavate oversite average 150mm deep, wheel and deposit on site as directed.	SM	1.2		
	Excavate for foundation trench not exceeding 1.5m from the ground	CM	6		
	Ditto for rock formation	CM	1		
	Return fill and ram well selected excavated materials	CM	6		
	Load and cart away surplus excavated materials	CM	5		
	300mm thick hardcore layer compacted in 3 layers and blinded with murram	CM	5		

	50mm thick murram blinding	CM	0.3		
	50mm thick weak concrete blinding under strip foundations	CM	0.3		
	Vibrated reinforced concrete (1:2:4) -20mm aggregate				
	200mm thick foundation concrete	CM	1		
	150mm thick floor surface bed	SM	13		
	Sub Total for vibrated reinforced concrete				
	Steel reinforcement				
	Steel bars cut and bent as required including short joining lengths, binding wire and spacer blocks				
	Y8 longitudinal bars in strip footing	kg	21.5		
	Y10 cross(main) bar in strip foundation footing	kg	30.5		
	Sub Total for steel reinforcement				
	Sawn softwood formwork to;-				
	Slides of floor bed 150 to 225mm	LM	18		
	Solid coral block walling in cement sand mortar (1:4) 200mm thick walling	SM	9		
	12mm cement sand (1:4) render trowelled smooth platform finishes	SM	9		
	25mm thick cement sand plaster to sides and top platform	SM	18		
	Sub Total for sawn softwood formwork				
	10,000l PVC Tanks				
	Supply, fix on top of the slab and test 10,000l PVC tank	No	1		
	Total Bill 08				
Bill 09	**COMMUNITY TRAINING**				
	Allow for Kshs. 300,000 for capacity building of Water committee and training of 2No. selected community members later to be absorbed by the Water Committee as scheme operators	No	1		

	Total Bill 09				
Bill 10	TEST RUN				
	Test Run the whole Project by employing the selected and trained local (facilitating them) as well as providing practical technical support of the operations team, necessary supplies and maintanance required	No	1		
	Total Bill 10				
	MAIN SUMMARY				
	BILL 01: PRELIMINARY AND GENERAL ITEMS				
	BILL 02: BOREHOLE DRILLING				
	BILL 03: TEST PUMPING AND WATER QUALITY ANALYSIS				
	BILL 04: SOLAR POWER				
	BILL 05: WATER TOWER & KIOSK				
	BILL 06: PERIMETER FENCING				
	BILL 07: PIPELINE				
	BILL 08: COMMUNITY WATERING POINTS				
	BILL 09: COMMUNITY TRAINING				
	BILL 10: TEST RUN				
	Total Carried to Main Summary				

Summary					
Item	**Description**				Amount
Bill 1	RO Plant				
Bill 2	Borehole Drilling & Associated Works				
	Sub-total 1				

	ADD 2% CONTIGENCIES				
	Add 0.03% PPRA Capacity Building				
	Sub-total 2				
	ADD 16% VAT				
GRAND TOTAL TAKEN TO FORM OF TENDER					