BILL OF QUANTITIES FOR BOREHOLES

Item No.	Description	Units	Quantity	Unit Price (000)	Amount (000)
1	**Activity 1 Insurance of the Works and Site Preparation**				
1.1	Provide insurance cover for the works, in the amount of 20% of the total bid price (GCC: Clause 1.21).The insurance to be obtained from a reputable Insurance Company as approved by the Client.		1		
1.2	**Transport and Set Up** at borehole sites of all equipment and maintain drill rigs for the complete construction of boreholes with all accessories, associated arrangement, auxiliary works, personnel as well as withdrawal after completion and move to next drill site including setting up and moving after unsuccessful drilling	Nos.	1		
1.3	**Site Preparation** of the drill sites and clearing of all drill sites of all trees, brush, undergrowth and any other vegetation obstructing the execution of all contractual works	Nos.	1		
1.4	Erect project name boards for each borehole water supply system, in steel plate **(1.5m x 0.75m)** and solid supporting bars. Overall height: **2m** from ground level. (Wording and letter heights to be specified before commencement of work)	Nos.	1		
2	**Activity 2 Borehole Siting and Drilling Works**				
	Identify drilling point capable of providing the required discharge and drill with a drilling diameter large enough to allow the installation of a temporary casing and a final drilling diameter of at least 152.4 mm. Commissioning of all necessary plant, equipment and accessories for the duration of the works, taking of soil samples, keeping of drilling logs including supply, installation and dismantling of temporary casing as specified. Drilling Method (DTH and/or Mud Rotary Drilling) must be appropriate to the underground conditions and has to be approved by the Engineer.				
2.1	Geophysical surveys/siting of drilling sites to locate boreholes using vertical electrical sounding (VES) method or otherwise. The surveys should provide information to assess amount of water present, soil porosity and degree of saturation of soil/rock	no	1		
2.2	Pipe net work profile survey	LS			

2.3	Drilling through overburden; unconsolidated and consolidated formation, to a minimum depth of 60m, for installation of 150mm diameter casing and screen, taking soil samples and logging the borehole.	M	63		
2.4	Supply, install and withdraw temporary casing 194 mm, (average 5 m)	M	5		
2.5	Supply and install 150 mm threaded joint uPVC slotted/ screen.	M	52.5		
2.6	Supply and install 150 mm threaded joint uPVC Solid/Plain casing.	M	157.5		
2.7	Supply and installation of 150 mm **threaded joint uPVC Sump Pipes in length of 2.0 m** with bottom plug.	Pcs	1		
2.8	Supply and installation of **Filter Gravel** pack, (average depth 12m and standard thickness 50mm). Filter gravel, siliceous, rounded with diameter of 2.0-4.0 mm depending on screen slot size.	M	12		
2.9	Supply and installation of a **Clay Bridge** on top of the filter gravel consisting of 1 m depth of sand (0.2 - 1.0 mm) and 2 m depth of clay (Quellon pellets or similar).	No.	1		
2.10	Supply and insertion of **Back Fill Materials** into the annular space on the top of the clay sealing up to the base of the top cement grout (average 17m).	M	17		
2.11	Supply and insertion of 5m **Cement Grout** on top of the backfill material up to the surface.	M	5		
2.12	**Development** of Drilled Well with Air-Lift Method; including measurements, records, and disposal of water (minimum 3 hours per well)	Hrs.	3		
2.13	Temporary **protection cap** on successful Borehole	Nos	1		
2.14	**Backfill** and seal abortive borehole as specified	Nos	1		
2.15	Construct well-head casing as specified	Nos	1		
	Sub Total Activity 2				

3	**Activity 3 Pumping Tests**				
3.1	Execution of Step Test to determine the hydraulic performance of the well (min. 8 hours) with 4 steps of increasing yields followed by a Constant Test (min. 12 hours) to determine the long term sustainability yield of the borehole including measurement of gw-level and yield, recording of EC, pH, and temperature of the groundwater every hour during pumping. A pump with minimum capacity of 2.5 m3/hr and hydraulic head of 65m must be available with all equipments (generators, cables discharged hose of 100m to ensure safe disposal of water from borehole and other ancilliary materials). Submission of data in digital form (RW Disks) and printouts (data sheet and graphs).	hours	6		
3.2	**Recovery Test** (min. 6 hours); including measurements and records of water level, submission of data in digital form (RW Disks) and printouts (data sheet and graphs).	hours	6		
	Sub Total Activity 3				
4	**Activity 4 Water Quality Analyses**				
	Water quality tests to be done by the water quality monitoring unit of the Water Directorate. Tests will include **Laboratory Analyses of physico-chemical and Bacteriological parameters** (WHO standard).{The Contractor will be invoiced by the service provider}		1		
	Sub Total Activity 4				
5	**Activity 5 Borehole Reports**				
	Borehole, pumping test and water quality reports and well construction files for all well sites, one set of each comprising files in soft copies (RW disk) in bound form.	Nos	1		
	Sub Total Activity 5				
6	**Activity 6 Civil Works (for 1 borehole)**				
	Construction of Tower and Standposts				

	Excavation and Earthworks				
6.1	Excavate topsoil average 150mm deep, to remove any vegetable matter and dispose of excavated materials off site	M^2	8.83		
6.2	Excavating starting at site strip level maximum depth not exceeding 300mm	M^3	1.94		
6.3	Excavate pits for columns commencing from ground level not exceeding 1.0m deep	M^3	2.63		
6.4	**Concrete Works (for 1 borehole)**				
	Reinforced in-situ concrete 1:2:4-12mm aggregate including reinforcement and formwork in				
6.41	Foundation	M^3	3.56		
6.4.2	Column	M^3	5.04		
6.4.3	Suspended floor slab (tower)	M^3	1.76		
6.4.4	Suspended floor slab (solar control room)	M^3	1.73		
6.4.5	Ring beam (solar control room)	M^3	0.28		
6.5	Plain in-situ concrete 1:3:6-12mm aggregate for floor slab concrete in Solar control room	M^3	0.82		
6.6	Reinforced in-situ concrete 1:2:4-6mm aggregate including reinforcement and formwork for concrete standposts. Provide and install 10 complete standposts with galvanized pipe as specified	M^3	0.82		
6.7	Provide roof structure for control, including approved quality roof members and corrugated iron roofing sheet (as shown on dwgs.)	Nos.	1		
6.8	provide and install 10 complete standposts per borehole, with galvanized pipe and vandal-prrof lockable tap of approved robust quality	Nos.	10		
	Scaffold				
6.9	Erecting and dismantling of timber scaffolding for tower construction	LS	1		
	Blockwork				
6.10	Precast sandcrete solid block 150mm thick in cement mortar 1:6 in superstructure.	M^2	17.97		

	Finishing				
8.11	12mm thick cement and sand (1:4) plain face rendered on tower and control room block walls internally and externally	M^2	43.18		
8.12	Provide for tiling of stand post	Lumpsum			
	Painting/Decorating				
6.12	Prepare and apply one coat sealer and two coats of oil paint to rendered surface.	M^2	43.18		
	Doors				
6.13	Provide and fix steel door 600mm x 2150mm high complete with frames, vandal proof locks and ironmongery.	Nos.	1		
	Sub Total Activity 6				
7	**Activity 7 Distribution Network**				
	Supply and install the following pipes and accessories, depth not exceeding 0.6m for transporting the water from borehole to storage tank and distribute to standposts				
7.1	PE Pipe 3"	M	450		
7.2	PE Elbow 3"	Nos.	22		
7.3	PE Tee 3"	Nos.	22		
7.4	PE Socket 3"	Nos.	31.5		
7.5	PE Adaptor 3"	Nos.	21		
7.6	PVC Pipe 2"	Length	3		
9.7	PE Elbow 2"	Nos.	6		
7.8	PE Tee piece 2"	Nos.	4		
7.9	PE Stop cork 2"	Nos.	2		
7.10	pe adaptor 2"	Nos.	6		
7.11	PE tank connector 2"	Nos.	4		
7.12	PE Reducer 2" * 1"	Nos.	2		
7.13	Supply, transport & lift to tower slab 5000 litres water tank (vertical), four on each tower at levels shown in drawing	Nos.	2		
7.14	provide precast concrete peg positioned at 10 m interval to show pipe route	Nos.	1		
7.15	PE pipe 1"	M	249.79		
7.16	PE Elbow 1"	Nos.	20		
7.17	PE Tee piece 1"	Nos.	20		
7.18	PE Adaptor 1"	Nos.	15		
7.19	PE Gate Valve 1"	Nos.	10		
7.20	PE Tank connector 1"	Nos.	6		
7.21	PE Reducer 1" * 3/4"	Nos.	20		

7.22	PE Pipe 3/4"	Nos.	15		
7.23	PE Elbow 3/4"	Nos.	20		
7.24	PE Tee Piece 3/4"	Nos.	25		
7.25	PE Adaptor 3/4"	Nos.	30		
7.26	PE Gate Valve 3/4"	Nos.	10		
7.27	Pe Nipple 3/4"	Nos.	20		
7.28	PE Socket 3/4"	Nos.	20		
7.29	Tap Head 3/4"	Nos.	10		
7.30	Solvent Cement	Nos.	6		
7.31	Thread Tape	LS	10		
7.32	Supply And Fix 4" Di Gully Trap	Nos.	10		
7.33	Construct 3' * 3' stand pipe splash apron in stone masonry with a 200-300mm boulders such as granite	Nos.	10		
7.34	construct stone masonry line drainage channel 2.0m long and 0.15m wide, depth 0.1m from splash apron to soakaway pit	Nos.	10		
7.35	construct soakaway pit, depth 1.5m, diameter 0.7m, filled with medium hard rock (sandstone)	Nos.	10		
	Sub Total Activity7				
8	**Activity8: Training of Borehole Operators; Plumbers (12) and solar pump Technicians (24)**				
8.1	Training of borehole attendants in basic plumbing works and maintenance of solar system	Nos.	3		
8.2	Provide training manuals and maintenance tools	Set	1		
	Sub Total Activity 8				

UMMARY	
Activity 1 Insurance of the Works and Site Preparation	
Activity Borehole siting and drilling Works	
Activity 3 Pumping Tests	
Activity 4 Water Quality Analyses	
Activity 5 Borehole Reports	
Activity 6 Civil Works	
Activity 7Distribution Network	
Activity 8 Training of Plumbers and Borehole Operators	
Total Activity Cost	
Add 10% of total activity Cost for Contingencies	
GRAND TOTAL for LOT	