**BILL OF QUANTITIES FOR THE DRILLING OF A BOREHOLE,** **INSTALLATION OF SUBMERSIBLE PUMP, AND SOLAR SYSTEM IN BIYEMTI COMMUNITY, KODOMTI WARD, NUMAN LGA, ADAMAWA STATE**



**2022**

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| **BILL OF QUANTITY FOR DRILLING OF BOREHOLE AND INSTALLATION OF SOLAR SCHEME IN BIYEMTI COMMUNITY, KODOMTI WARD, NUMAN LGA, ADAMAWA STATE** | | |
| **COST SUMMARY** | | |
| **Preamble**  This bill of quantities is for the construction of 1 No. borehole complete with submersible pump, solar system and fencing point in Biyemti community, Kodomti Ward, Numan LGA, Adamawa State. The coordinate point of the geophysical investigation is: **09028’023.61”N, 11050’19.80”E** | | |
| **DESCRIPTION** | **Comment** | **AMOUNT (~~N~~)** |
| Borehole Drilling |  | **3,754,000** |
| Supply and installation of solar pump |  | **1,500,000** |
| Supply and installation of solar powered system |  | **1,478,500** |
| Supply and installation of 20,000 litres PVC (4N0s of 5000L capacity) tanks on 9m high steel stanchion |  | **2,150,000** |
| Construction of 2 tap stands, 2 soak pits, and 1 animal trough |  | **1,800,000** |
| Security fencing and landscaping |  | **1,910,000** |
| **Total** |  | **12,855,000** |
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| **BOREHOLE DRILLING** |  |  |  |  | |
| **DESCRIPTION** | **Unit** | **Qty** | **Rate** | **Amount** | |
| ***SITE CLEARING AND MOBILIZATION*** |  | | | | |
| Mobilization of drilling rigs and necessary tools, equipment, and machines to site | Item | 1 | 500,000 | 500,000 | |
| ***DRILLING*** |  | | | | |
| Using 8-inch diameter bit with Percussion or rotary drill method by using appropriate rigs, cutter, pipes, machine, and other equipment capable of drilling up to a depth up to 80 meters (depending on the availability of appropriate soil layer) through all sorts of strata.  Protection of caving by supplying necessary casing pipe, collection of soil samples at every change of strata and preserve them for analysis, withdrawal of boring & casing pipes etc. | M | 100 | 10,000 | 1,000,000 | |
| ***CASING*** |  | | | | |
| Provide and install 150mm diameter internal casing uPVC not less than 15bars (Panar or equivalent) type as per specification | N0 | 35 | 10,500 | 367,500 | |
| Provide and install 150mm diameter Screen uPVC not less than 15 bars (Panar or equivalent) slot size 0.5-1.0mm (factory slotted) | M | 33 | 10,500 | 346,500 | |
| ***GRAVEL PACKING*** |  | | | | |
| Provision of suitable gravel pack to fill the annular space between the sides of the borehole and the screen. The gravel pack grain sizes are to be defined by the grain size of the aquifer and can ranged from 2-4mm in diameter.  Reasonably homogenous, calibrated, clean from debris, round and preferably siliceous available from riverbed, free from soil and other materials, including supply, delivery, casting and cleaning. Enough gravel pack shall be installed to completely cover the uppermost screen and yonder by an additional 2-metres to allow for settling. A good supply of water should be introduced with the gravel to prevent bridging. The gravel pack shall be capped with a 2-metre vertical column of clay seal to prevent any seepage that may contaminate aquifers with subsequent pollution of ground water | LS | 1 | 200,000 | 200,000 | |
| ***GROUTING*** |  | | | | |
| Grouting with clay or with a mixture of bentonite and cement.  The first clay grout of 2 meters length must be placed on top of the gravel pack to stop the grout from plugging the gravel pack. Including supply, delivery, fitting and fixing.  Clay back filling for the intermediate space between the clay plug and the concrete plug, fill up with sand and clay.  The last 2 meters should be filled up with a mixture of water and cement grout up to the ground level.  The procedure involves filling the annular space up to the ground level and then leaving to set for a minimum of 12 hours before starting further development; all costs including supply, delivery, casting and cleaning. | M | 10 | 10,500 | 105,000 | |
| ***BOREHOLE DEVELOPMENT*** |  | | | | |
| The service provider shall carry out development and cleaning of borehole by airlifting and air jetting methods upon completion of installation of casing and gravel pack. This shall be done to remove silts, clays and fluid residues deposited on the borehole wall and adjacent portions of the aquifer during the rehabilitation process. The service provider should make arrangement of water level measuring kits including transportation of air compressor unit to site (For the purpose of air compressor of evaluation 24 hrs is considered) | Item | 1 | 500,000 | 500,000 | |
| ***TEST PUMPING*** |  | | | | |
| Establish borehole parameters by test pumping the borehole for 12 hours and provide borehole data such as yield, draw-down. The following elements will be contained in the test pumping.  a) A period of recovery after production pumping/development.  b) A pre-test (calibration, typically 2 to 3 hours);  c) A period of recovery after pre-test  d) A step draw-down test (typically five steps, each of 2 hours duration; total 10 hours);  e) A period of recovery after step draw-down test | Item | 1 | 250,000 | 250,000 | |
| ***WATER QUALITY TEST*** |  | | | | |
| A minimum of 2 litres each for chemical and bacteriological analysis shall be collected by the contractor in the presence of the Engineer or his representative. (3) Water samples should be collected in clean, sterilized properly sealed and protected plastic containers from the borehole for reference to a Water Testing Authority recognized and authorized by Mercy Corps for laboratory analysis, after completion of test pumping. One sample will be used for each of these tests: physical, chemical and bacteriological analyses. The samples so collected should reach the authorized Water Testing Laboratories (Ministry of Water Resources and National Agency for Food and Drug Law and Control (NAFDAC)), within 6 hours from the time of collection from the borehole unless otherwise. Specific parameters to be measured shall include.   * **Physical Parameters** – Colour, Odour, Taste, Turbidity, pH Value, Electrical Conductivity, Temperature * **Chemical Parameters** – Nitrate, Nitrite, Total Hardness, Fluoride, Chloride, Sulphate, Copper, Manganese, TDS, Total Iron, Arsenic * **Biological Parameters** – Faecal Coli form Counts | No | 1 | 35,000 | 35,000 | |
| ***BOREHOLE COMPLETION REPORT*** |  | | | | |
| A full borehole completion report shall be prepared by the service provided and submitted to the Mercy Corps within ten days of the completion of the pumping tests. The borehole completion report shall include the following:  a. A borehole log, showing borehole location, ground surface elevation, measuring point elevation, soil strata, static water level and dimensions of casing, screen, grounding and cap.  b. Pumping tests reports  c. Result of analysis of water  d. All other records as specified | Report | 1 | 50,000 | 50,000 | |
| ***BOREHOLE CLEANING AND DISINFECTION*** |  | | | | |
| Provide for the disinfection of well by introducing granular Calcium Hypochlorite or Sodium Hypochlorite into the annular space along with the gravel pack material at a concentration of 500grammes per cubic meter of pack. | LS | 1 | 100,000 | 100,000 | |
| ***SANITARY SEAL AND CAPPING*** |  | | | | |
| To provide an effective seal to the entry of contaminants, up to 3.0-metres depth of the borehole from the surface shall be grouted using cement slurry 1.85-2.15 kg / liter  For Sanitary seal and well head construction, the top of the casing shall be a minimum of 0.5m above the original ground level and there shall be a flange for connection of the wellhead assembly. The conductor pipe (surface casing) around the inner casing shall be raised at least 30 cm above the inner casing and then capped properly by welding 6mm Ø thick 8-inch steel plate to secure the well. Around the casing, there shall be a 1.5m x 1.5m x 1m concrete slab. | No | 1 | 300,000 | 300,000 | |
| **Sub Total** |  |  |  | **3,754,500** | |
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| **SUPPLY AND INSTALLATION OF SOLAR PUMP** |  |  |  | | |
| **DESCRIPTION** | **Unit** | **Qty** |  | | |
| Supply and install 2.2 Kw, (70-100m head depending on yield of borehole), hybrid inverter type or approved equivalent | No | 1 | 1,350,000 | | 1,350,000 |
| Provision for the well head including air valve, sluice valve, non-return valve, meter and support anchor as directed by the Engineer | Item | 1 | 150,000 | | 150,000 |
| **Sub Total** |  |  |  | | **1,500,000** |
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| **SUPPLY AND INSTALLATION OF SOLAR POWERED SYSTEM** |  |  |  | |  |
| **DESCRIPTION** | **Unit** | **Qty** |  | |  |
| Solar photovoltaic panels (10), 240-300 watts “Siemens” or approved equivalent, complete with accessories, to be executed in whole or part all installed steel frames above ground | Item | 1 | 1,050,000 | | 1,050,000 |
| Drop cable HT-TKN-F | m | 60 | 1,500 | | 90,000 |
| Supply and install 32mm diameter rising main GMS water pipe, Class C. | m | 60 | 5,500 | | 330,000 |
| 50mm diameter gate valve as ‘pegler’ or approved equivalent | No | 1 | 8,000 | | 8000 |
| **Sub Total** |  |  |  | | **1,478,500** |
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| **SUPPLY AND INSTALLATION OF 20M3 OVERHEAD TANK** |  |  |  | |  |
| **DESCRIPTION** | **Unit** | **Qty** |  | |  |
| Supply and Installation of 4 No. 5 cubic meters black PVC tank installed on 6 meters above the ground steel stanchion with 50mm outlet pipe, gate valves, water gauge and float valves. Provide for disinfection of the tanks after installation. Provide steel name plate branded with Mercy Corps logo. | No | 1 | 2,150,000 | | **2,150,000** |
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| **CONSTRUCTION OF TAP STAND, SOAK PIT, AND ANIMAL TORUGH** | **Unit** | **Qty** |  | |  |
| Provide for water distribution network 2 tapstands with 6 taps each complete with concrete slab and 2 soak pits according to specification and design as attached.  Construct using 9’’ sandcrete blocks animal water trough (2.5m x 4m x 0.9m deep) linked to the fetching point 50m apart to collect wastewater during and after fetching as per attached design. | No | **1**1 | 1,800,000 | | **1,800,000** |
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| **SECURITY FENCING AND LANDSCAPING** |  |  |  | |  |
| **DESCRIPTION** | **Unit** | **Qty** |  | |  |
| Provide and fix perimeter fence, complete with gate and lock according to specification as provided in drawings. | LS | 1 | 1,800,000 | | 1,800,000 |
| Landscape fenced area and finish with 12/15mm granite chippings | LS | 1 | 110,000 | | 110,000 |
| **Sub Total** |  |  |  | | **1,910,000** |
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| **NOTE** | | | | | |
| * *It is necessary for the Contractor to make an on-site verification of the actual requirements of the construction works before its implementation. Bill of quantities, work items, measurements and other related works are subject to change, all discrepancies must be reported immediately to Mercy Corps representative and shall be concurred before proceeding with the works.* * *The quantity and total amount of works in serial number 3 to 8 is non-exhaustive and just for an indication of the highest possible amount to be paid based on these quantities. The actual amount will be based on the quantity of work achieved in the field, as approved by Mercy Corps field representative.* | | | | | |