

## **SCOPE OF WORK AND TECHNICAL SPECIFICATIONS**

This document shall be read and understood in conjunction with the BOQ and design drawings provided for clarification.

### **1 SCOPE OF WORK**

The project is located at Ngarannam, Mafa LGA, Borno State (Lat: 11.916924°; Long: 13.573721°). The scope of works which is generally the drilling, installation and reticulation of solar-driven borehole is detailed below:

**1.1 Drilling Locations:** Drilling of two (2) deep aquifer boreholes (underground water wells) within Ngarannam as would be directed by the supervising Engineer as informed from the Geophysical survey report for productive borehole.

1.1.1 Drilling of deep Aquifer Borehole

1.1.1 Carrying of in-depth geophysical survey with minimum of five (5) VES points in each proposed borehole locations and produce the geophysical survey report,

1.1.2 Drilling a 6" stainless steel API casing borehole to a productive depth in accordance with the Geophysical Survey report,

1.1.3 Development of borehole, disinfection, sampling for water quality testing, pump testing, installation of solar pump and solar systems etc.

1.1.4 Reticulation of water and construction of 3 standard water fetching points per borehole at locations directed by the supervising Engineer.

**1.2 Construction of Tank Stand/Tower, well casement head, Storage & Perimeter Fence with steel Gate and 32 No water Stand posts**

Construction of 6 Unit of 152 x 89mm x 16kg/m steel I section Universal Beam as primary stand column, 9.0m high with 16sqm area base plate to receive 4Nos of 5000Litres capacity Gee-pee tanks per boreholes.

Construction of 5.4sqm concrete well encasement head with deep fabricated locking device encased metal box size 450 x 450 x 1000mm (see attached design)

Construction of WIRE MESH fence 40m long x 2.4m high complete with metal post at 2 meters intervals and access gate for each borehole to enclose the borehole and tank stand

Construction of 32 No fetching Stand posts overall size 3300mm x 3300mm wide x 1000mm high (with 4 taps heads per point) at the designated areas within the housing units, schools, . All taps shall be 'Even products' push taps or similar approved quality. The works include all

CONSTRUCTION OF TWO (2) SOLAR DRIVEN DEEP AQUIFER BOREHOLES IN DIFFERENT LOCATIONS WITHIN  
NGARANNAM, MAFA L.G.A BORNO STATE

necessary excavation; backfilling; earthworks, concrete base with BRC wire mesh works, 230mm sandcrete blocks ceramic with floor and wall tiles; pipework connections from main boreholes to all 32 fetching points, 20 Units of teachers' apartments and 20 units of security personnel houses.

## 2 DELIVERY PERIOD

The delivery period for all the items mentioned in the scope of works, BoQs and drawings is  
**Twelve (12) Weeks as per the below**

Table 1: Contract Duration

Activity	Duration /Time	Responsible Unit/Reporting
Signing the contract	Within 1-week of awarding the contract	Procurement/Vendor
Site Handover	Within 1-week after signed contract	Engineering Team/Govt. Partner
Mobilization	Within 2-weeks of site handover	Contactor and engineering team
Contract commencement date	End of Handing Over of site	Engineering Team/Procurement
Contact Duration	Ten (10) weeks from site handover date	Contractor/Supervising Engineers
Substantial Completion of the project	Nine (9) weeks from site handover	Contractor and the supervising engineer
Project Handover and closing	Within 1 week after the substantial completion.	Contactor and UNDP engineering team and Government partners.

## 3 GENERAL SPECIFICATIONS

### TECHNICAL SPECIFICATIONS

1. All works and processes shall be carried out using equipment, tools and methods that comply with applicable construction Health, Safety and Environmental regulations, standards and policies. The use of PPE, safety caution tapes and symbols are mandatory. Safety first!
2. The works shall follow a sequence and employ methods that will have the least negative impact on the natural environment, public and private property, pedestrian and vehicular traffic
3. All excavations work for overhead tank stanchion foundations must be clearly encircled with safety caution tapes during works
4. Excavation for reticulation works shall be a minimum of 500mm depth.
5. Filling around foundations etc. is to be of selected earth obtained from the excavation and is to be filled in 150mm layers, each layer well rammed and consolidated
6. All formation level must be compacted before concrete blinding
7. Ordinary Portland cement shall be used for all masonry and concrete works and must be lump free
8. Fine aggregates shall be sieved and free of organic matter and other impurities. Well-graded crushed granite shall be used as coarse aggregate (20-25mm for reinforced concrete; 35-40mm for mass concrete)

CONSTRUCTION OF TWO (2) SOLAR DRIVEN DEEP AQUIFER BOREHOLES IN DIFFERENT LOCATIONS WITHIN  
NGARANNAM, MAFA L.G.A BORNO STATE

9. Water-Cement ratio by weight shall not exceed 0.55. The quantity of water used in the mixing of the concrete must be adequate to ensure proper hydration of the cement and to bring the mass to a proper consistency and to a workable mix.
10. Batching of concrete shall be by volume and Concrete shall be placed gently and not tipped or dropped from a height, it shall then be thoroughly rammed into positions to fill the forms and surround the reinforcement without displacing it and without the formation of voids or cavities.
11. Compaction of fresh concrete shall be done with a poker vibrator for adequate compaction.
12. Curing of concrete shall be in accordance with the recommendation set out in the B.S. Code of Practice and all surfaces shall be kept continually wet after concreting and protected from the sun and drying winds by covering with wet sacking, etc. for not less than one week.
13. 28-day compressive strength shall be 15N/mm<sup>2</sup> (1:3:6 mix ratio) for mass concrete and 21N/mm<sup>2</sup> (1:2:4 mix ratio) for reinforced concrete
14. Hollow sandcrete blocks (225mm X 225mm X 450mm) shall be machine-molded and not hand molded
15. Minimum crushing strength of sandcrete blockwork shall not be less than 2.5N/mm<sup>2</sup> (cement-sand ratio of 1:6 by volume; no of blocks must not exceed 25 per 50kg bag of cement during fabrication).
16. Formwork shall be removed without damage to the concrete.
17. A schedule of suggested minimum striking times is given below:  
Walls, sides of R.C beams sides of columns- 2 days after concreting  
Soffits of slabs and soffits of casting to steel beams- 7 days after concreting  
Soffits to R.C beam- 14 days after concreting
18. All reinforcement shall comply with BS 4449 and associated codes with regards to bending, lapping, binding and cranking
19. Reinforcement shall be kept free of oil, mud, rust prior to use
20. Concrete cover of 25mm shall be provided to reinforcement in beams and columns; and 50mm cover for foundation
21. High yield steel (tensile strength of 410N/mm<sup>2</sup>) of specified size shall be used for both main reinforcements and links/stirrups.
22. Electrical wiring shall be full conduit and insulated
23. All electrical installations must be earthed, and fittings must be tested and commissioned prior to handover of project.
24. All paint materials (silver coating) shall be the best quality of their respective kinds and in accordance with their latest British Standards and obtained from an approved manufacturer. No dilution of painting materials will be allowed, except strictly in accordance with the manufacturer's directions, or as described in their literature.
25. Water Supply pipes and fittings shall be uPVC Class C-E of minimum 9Bar in accordance with BS 3505/3506.
26. Development of drilled borehole shall include airlifting or flushing/pumping-to-waste until the borehole is clear. Pump testing shall be carried out for a minimum of 8hrs after development with at least 1.5hp pump for minimum of 6hours.
27. Disinfection of borehole with prescribed dosage of chlorine shall be carried out before pump installation.
28. Construction of the water tank stand shall be minimum of 6m high of specified stanchions and silver coated.
29. Foundation works shall be under strict supervision of the Engineer with full compliance to reinforcements requirements

CONSTRUCTION OF TWO (2) SOLAR DRIVEN DEEP AQUIFER BOREHOLES IN DIFFERENT LOCATIONS WITHIN  
NGARANNAM, MAFA L.G.A BORNO STATE

30. All solarization materials including pump, inverter, CU200 control unit, DC-AC converter and fittings/accessories shall be original **Grundfos** of specified rating or **Lorentz pump** equivalent with all accessories.
31. Solar panels shall be 240w Polycrystalline made by **Yinglin/Exide** or equivalent quality brand approved by Supervising Engineer
32. The floors of all water fetching points shall be **concrete** and finished with white or blue color vitrified tiles and located at area designated by Supervising Engineer
33. Only "Push-taps" shall be installed and all tap heads that fail within the retention period shall be replaced

## 4 CONDITIONS AND SCHEDULE OF PAYMENTS

The payment is separated into three (3) milestones which is applicable to each borehole locations as shown in Table 2.

Table 2: Milestone payments for the construction of Boreholes in Banki

Milestone No.	Milestone's Description and Required Activities & Documentations	Payment Amount (NGN)	Completion Date
Milestone No. 1	<p>40% payment upon submission of signed contract, Performance Bond from the Bank, <i>plus</i>:</p> <ul style="list-style-type: none"> <li>Attend project entry meeting in UNDP Sub-Office, Maiduguri or via Zoom and presenting signed contract, proposed workplan and list of staffs submitted.</li> <li>Handing over of site/Taking over of site</li> <li>Install ongoing project signage with site HSE measures on site as approved by Supervising Engineer</li> <li>Completion of Drilling, Casing, gravel-packing, flushing, airlifting and pump-testing of boreholes</li> <li>Submit list of workers (not less than 10 with at least 1 woman) who MUST have worked minimum of 5 days on the project)</li> </ul>	40%	(1-6 weeks from the commencement of contract)
Milestone No. 2	<ul style="list-style-type: none"> <li>Complete all steel tank stand works from foundation, erecting of stanchions, paintings, installation of visibilities, overhead tanks, installation of solar systems etc.</li> <li>Achieve up to 100% substantial completion of the borehole in terms of water qualify test, disinfection, installation of solar pump with</li> </ul>	55%	(7-11 weeks from the commencement of contract)

CONSTRUCTION OF TWO (2) SOLAR DRIVEN DEEP AQUIFER BOREHOLES IN DIFFERENT LOCATIONS WITHIN  
NGARANNAM, MAFA L.G.A BORNO STATE

<b>Milestone No.</b>	<b>Milestone's Description and Required Activities &amp; Documentations</b>	<b>Payment Amount (NGN)</b>	<b>Completion Date</b>
	<p>accessories, reticulation works, testing of water networks, construction of fencing</p> <ul style="list-style-type: none"> <li>• Installation of permanent visibilities/signages as approved by the supervising Engineer</li> <li>• General testing of borehole, water fetching points, plumbing fittings, and associated works</li> <li>• Inspection of completed project certify project completion Submit invoice for 55% contract sum to Supervising Engineer alongside project completion report</li> </ul>		
Milestone No. 3	<ul style="list-style-type: none"> <li>• Post-completion inspection and certification report by UNDP Engineer that defects which occurred within 6months of practical completion have been satisfactorily repaired and submission of As-Built drawing (AutoCAD/pdf) and records of all components of the project</li> </ul>	5%	24 weeks after the substantial completion date.

## 5 General Requirements

### 5.1 Reports, Meetings and Work-Plan (Time-schedule)

The contractor is expected to submit weekly progress report, mentioning in his report the following:

- The activities which have been done in that week,
- The material provided to the site
- The weather conditions,
- The challenges and delay in the project.
- The number of labors for each day of the week.
- Progress of work related to the quantities.
- Photographs showing progress of works.

There will weekly meeting between UNDP engineer and the contractor.

The contractor is expected to follow submitted and approved work schedule (work-plan) and changes should be communicated and approved by Supervising Engineer before proceeding.

### 5.2 Health and Safety

The contractor is fully responsible for the safety of operations in the site.

## CONSTRUCTION OF TWO (2) SOLAR DRIVEN DEEP AQUIFER BOREHOLES IN DIFFERENT LOCATIONS WITHIN NGARANNAM, MAFA L.G.A BORNO STATE

He has to follow the below:

1. Provide his staff with PPE , helmet ,vest and safety shoes.
2. Provide the project site and the holes with safety tape.
3. Provide first Aid kit to the site.

### COVID 19

The contractor must provide his staff with face masks and keep the social distance at work.

## 6 Site Location Map

The location of the site is as shown as the below google image.

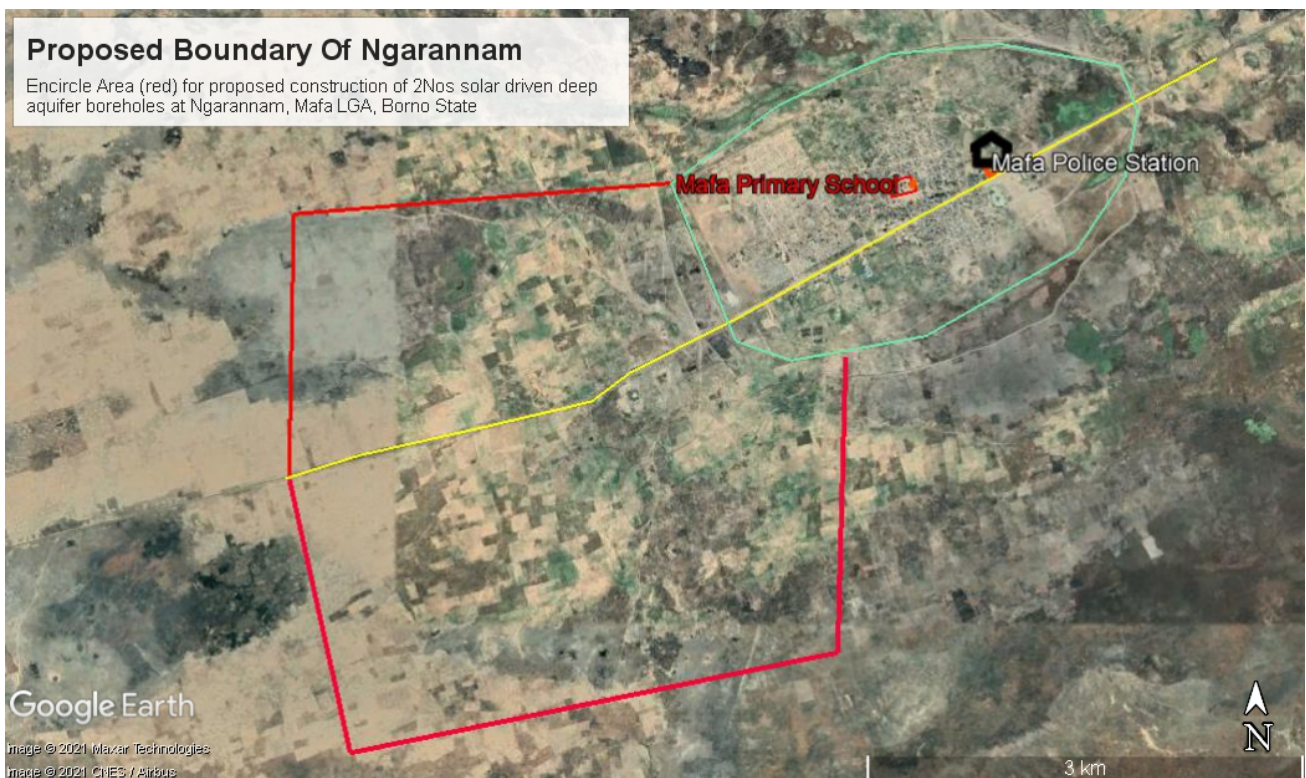


Photo 1: Google Image showing location for proposed 2Nos Boreholes at Ngarannam, Mafa LGA, Borno State