TERMS OF REFERENCE FOR THE CONSTRUCTION OF SOLAR POWERED BOREHOLE DRILLING & EQUIPPING REF: DS4Y/srd/241106 - ToR

- Impact Hub Harare

- Expires 29 Nov 2024

1.0 Introduction

As part of the Digital Skills 4 Youth project, Impact Hub Harare intends to drill a borehole
and equip it with solar powered pumping system in Tsholotsho Matabeleland North Province.

The overall goal of the project is to improve access to safe water for the DS4Y Makerspace.

Impact Hub Harare therefore invites bids from reputable suppliers for the solar powered borehole drilling and equipping services.

2.0 Scope of works

The work comprises inter alia siting/hydro-geophysical surveys and drilling of boreholes at the above locations, inclusive of sustainable yield testing, water quality test, borehole equipping with solar powered pumps and water reticulation systems and security fencing as specified herein.

Duties and Responsibilities

3.0 Workmanship

a. The Contractor is expected to implement the project in accordance with acceptable
engineering practices, standards and codes.

b. All works shall be carried out by suitably qualified and experienced person(s) and must
comply with acceptable and good workmanship standards, paying particular attention
to structural integrity, alignment, squaring, plumbing and levelling of structures.
c. The Contractor shall provide and maintain, as far as is reasonably practicable, a working
environment that is safe, without risk to the health and safety of the community and environment. The activities on site thereof shall be undertaken in such a manner as to
ensure, as far as practicable that persons who may be directly affected by the activities are not thereby exposed to hazards to their health and safety.
d. The Contractor shall observe all construction procedures and liaise with the Client's
representative and Rural Infrastructure Development Agency (RIDA) for relevant stage
approvals. Where work is to be covered or concealed, the Contractor shall not proceed
past that point until approval has been received.
e. The Contractor shall, upon receiving a contract instruction, cause the same to be made
good in a perfect and workmanlike manner at their own cost and in default thereof the
Client shall be entitled to cause it to be made good and to recover the cost thereof from the Contractor or to deduct the same from amounts due to the Contractor.
DS4Y/srd/241106-ToR
4.0 General requirements
4.1 The Contractor shall deliver boreholes conforming to all the requirements for siting,
drilling, testing (to determine sustainable yields and water quality) and equipping of the boreholes. Borehole water shall pass the minimum acceptable standard water quality specifications (Portable Water ZWS 560:1997) for domestic use.
4.2 Dry holes and/or poor water quality yielding boreholes shall be replaced and tested by

the Contractor at no further cost to the Client. Therefore, bidders must include costs of
replacing unsuccessful boreholes emanating from poor water quality and/or dry holes
in their pricing.

4.3 The Contractor shall share the geo-physical survey results with the Client before drilling
operations. The Contractor shall also share the yield test results before equipping the
boreholes with pumps.

4.4 All materials shall be procured and supplied new by the Contractor unless otherwise
noted and all materials shall be approved by the Client or Client's representative prior
to commencement of works.

4.5 Borehole location shall be identified in agreement with RIDA and in consultation with
the Client.

4.6 The Contractor shall inform the Client and RIDA or its representatives and make them
aware of every activity during the siting, drilling, testing and equipping process who
shall also be sensitized on basic upkeep, maintenance and repair of all the installed
infrastructure.

4.7 The borehole drilling Contractor, also responsible for the geo-physical surveys shall
generate a technical report stating all findings and justifications including those for
unsuccessful boreholes within a week after completion of each successful borehole. All
installations made shall be listed and shared with the Client.

5.0 Technical specifications

5.1 Borehole drilling

The Contractor shall on behalf of the client obtain the authority to drill from the

Zimbabwe
National Water Authority (ZINWA) and quotations for drilling a wet hole and equipping
should include but not limited to the following specifications:
a. Suitable drilling methods shall be applied with no additional charges applicable should the Contractor encounter loose, soft or hard formations.
b. Boreholes shall be drilled vertical and the casing shall be plumb. The Contractor can be requested to perform a verticality test using approved methods and at their own expense, if so required by the Client. Deviation from verticality shall not
DS4Y/srd/241106-ToR
c. d. exceed 20mm. All necessary corrections shall be subject to the Client's approval. If
the error cannot be corrected, then drilling shall cease, and a new borehole shall be drilled. The cost for making corrections or re-drilling shall be met by the Contractor. During drilling, representative samples of soil shall be collected at every five meters penetrated and when a change in the soil profile is encountered as well as at every water strike.
The Contractor shall use temporary steel casing or class 16 UPVC casing in unstable
formations to stop collapses during drilling until a self-supporting geology is reached. e. The Contractor shall drill boreholes to a minimum depth of 80 meters with a minimum bit diameter of 165mm and cased to the bottom with 140mm class 10 UPVC casing and screen. Where drilling is envisaged to go beyond 80 meters approval shall be sought from the Client or its representative in which case drilling may be continued up to a maximum depth of 120m.
e. Full depth casing will then follow when final depth and promising blow yields have been attained with slotted casing in the lower parts of the borehole and at water strikes. This will then be followed by gravel packing and well development.
f. The screen shall be of the same class and standard as the plain casing. h. The lower end of the casing shall be plugged by a Class 10 UPVC cap glued to the end.
g. The angular space between the casing/screen and the drilled borehole wall shall be gravel packed using 6mm washed quarry. The top 6 meters shall be installed with a grout sanitary seal to minimize direct seepage of surface water into the borehole.

5.2 Borehole yield test

a. To establish the borehole potential and estimate the sustainable yield, a yield test shall be performed. The test shall include:

i. Step-drawdown test (SDT): 4 x 1-hour steps at constant discharge rates of one half, three quarters, equal to, and one and half times the expected yield respectively. ii. A Constant Discharge Test (CDT) shall be carried out for 2 hours at a discharge rate advised by the SDT above and approved by the Client.

iii. Recovery test (RT): Allow water levels to recover until the water level returns to at least 90% of the static water level or until at least 3 readings taken in succession are identical as approved by the Client.

b. Water levels shall be measured every 30 seconds for the first 5 minutes, then every

minute until 15 minutes have elapsed, then every 5 minutes until the end of the drawdown test. Pumping rates shall be measured at the beginning of pumping and after every 20 minutes. Discharge rate shall be maintained within 10% of the required rate for the duration of the test.

c. Successful boreholes (wet hole) shall be capable of delivering sustainable yields of

more than 0.75 litre per second or as shall be approved by the Client.

DS4Y/srd/241106-ToR

5.3 Water quality tests

The Contractor shall be responsible for testing the quality of the borehole water at an approved water testing laboratory. The Contractor shall collect water samples in approved

containers and take them to the laboratory at the end of the pumping test. Water quality

tests shall be performed to determine the biological, physical and chemical properties of

the water. The Contractor shall furnish the Client with the test results

5.4 Water pump installations and solar power connection

The Contractor shall supply and fit pumps and electrical system to the following guiding

specifications:

a. b. c. d. e. Installation of the solar powered systems shall be directed by the actual

field data
obtained. The system shall run on Grundfos solar powered submersible pumps with dry run sensor, motor, and controller (or of a similar approved brand) capable of delivering a flow of 0.7 l/s at the ultimate water tank inlet level. Head losses shall be considered for the whole system and at the maximum borehole depth.
The Contractor shall allow for power supply connections from an existing solar system setup at the DS4Y hub.
A power distribution board equipped with a circuit breaker and pump drive shall be secured as shall be directed by the Client. The Contractor shall provide a 1.2m x 16mm earth rod hammered into the ground as earthing to the system.
Armored cables and/or trunking shall be used on exposed surfaces.
All designs and installations shall be to the approval of the Client prior to fitting.
5.5 Water reticulation
a. b. c. d. e. f. The system shall be installed with a 50-gallon pressure tank, pressure switch, and
50mm ‘Elster Kent Helix’ water meter.
Supply and fix 2No. x 5000 Litre (Jojo or similar approved) plastic storage tanks with float valves on 4m high steel galvanized and painted tank stand.
Tank stands shall be secured (bolted/encased) in minimum 800mm deep concrete footings. The top platform members shall not cut through or cause deformation to the water tanks. Guard rails shall be provided on the top platform.
A 75mm thick concrete apron shall be constructed under the tank stand with edges extending 500mm from the tank stand legs and tucked 150mm into the ground. e. All above ground water pipes shall be in galvanised iron.
Minimum cover (backfill) over underground pipes shall be 450mm. Pipes shall be encased in galvanized pipes on river, trench or gully crossings. The galvanised pipes shall be embedded in concrete on either side of such crossings.
2 x 20mm bib taps shall be connected to the water line from the tanks which shall be in excess of 100m from the water storage tanks, end capped to allow future connections. h. A 700mm wide apron and bund wall shall be constructed at each

5.6 Concrete works
faucet point (see drawing). i. Rate for excavation for pipe works, pipe laying and backfilling from pump to water storage tanks and from storage tanks to faucet

points shall be priced per meter. Allow 100m from pump to water storage tanks.
a. b. The ratio of cement: sand: stone for all concrete mixes shall be 2 bags of cement to
2 wheelbarrows of sand to 3 wheelbarrows of stone. All aggregates shall be free from organic matter, clay and other impurities. The aggregates shall be from an approved source. Stone aggregates shall have a nominal size of 19mm.
All concrete structures shall be cured for 7 days, starting 24 hours after pour

How to Apply

6.0 Suppliers' Information Required
6.1 The suppliers should provide the following information and documents together with their bids:
a. Current Tax Clearance Certificate
b. VAT Certificate
c. Certificate of Incorporation
d. List of the Company's Directors
e. Lead time
f. Company Profile
g. Current/previous similar works - tenderers must list or attach records of ongoing projects or those successfully undertaken in the past including 3 referral letters.
7.0 Tender/Bids Submission
7.1 Tender documents should be in sealed/closed envelope and addressed to
The Purchasing Committee
Impact Hub Harare
194 Baines Avenue
HARARE
OR send to the following e-mail address: procurement.harare@impacthub.net
7.2 Tender documents must be submitted before 13:00 hours on 29 November 2024.
7.3 Impact Hub Harare reserves the right to reject any or all submitted bids