Tender document for
Drilling of Deep Well at Oromia Regional State
East Shoa zone, Gimbichu Wereda, Finchawa
Egeziarab Kebele

Ref. WAE/BD/Fenchawa/OB/22/0002
INVITATION TO BID

Borehole Drilling Work

Ref: WAE/BD/Fenchawa/OB/22/0002

WaterAid is an international Non-Governmental Organization established in 1981. Its vision is a world where everyone, everywhere has access to safe water, sanitation and hygiene and its mission is to transform lives by providing safe water, sanitation and hygiene (WaSH). WaterAid works in partnership with government at all level to effectively contribute towards the achievement of its vision and mission. WaterAid started its mission in Ethiopia in 1983 by financing small projects through established organizations such as Ethiopian Red Cross Society but opened its country office in 1991. So far, it served more than 3 million people with safe water, sanitation and hygiene.

WaterAid Ethiopia hereby invites eligible bidders to submit their bids for:

Drilling of Deep Well at Oromia Regional State, East Shoa zone, Gimbichu Woreda, FINCHAWA EGEZIARAB kebele, 100 km from Addis Ababa and 30km from woreda town.

1. A complete set of bid document can be obtained from WAE’s office from May 16, to May 27, 2022 during working hours, 08:30AM – 12:30PM and 01:30PM – 05:00PM.

2. Bids must be accompanied with renewed business licence and registration, VAT, TIN Registration Certificate and have to submit these requirements/s.

3. Tender shall be valid for a period of ninety (90) days after Tender opening and must be accompanied by Tender Security of 2% of Contract price in the form of Bank Guarantee or CPO cheque. Bidders should submit their offers in sealed envelopes to WAE’s office on or before May 30,2022 until 02:30 PM

Note: CPO must be attached in the original financial document.

4. Bid must be clearly marked by “bidders name, address, legal stamp and Reference Number of the bid WAE/BD/Fenchawa/OB/22/0002 “.

5. Bidders must submit the technical and financial document separately. The technical and financial documents should have one original and one copy for each, clearly marked "ORIGINAL" and "COPY". Each envelope shall be stamped and sealed. In the event of any discrepancy between them the original will prevail.

6. Partial bidding is not allowed.

7. Bids will be opened in the presence of bidders or representatives who prefer to attend at our office on May 30, 2022 at 03:00 PM.

8. WaterAid Ethiopia reserves the right to accept or reject any or all bids. Late bids shall also be rejected.

WaterAid Ethiopia

Tel: +251 11 669 5965, E-mail: waethiopia@wateraid.org

In front of Bole Medehanialem Church, next to Edna Mall, United Insurance Building 3rd floor

Addis Ababa, Ethiopia
II - INSTRUCTION TO TENDER

1. The Employer, WaterAid Ethiopia, wishes to receive tender for the water well drilling and well completion work as specified in the Technical specifications, here in after referred to as "the Works".

2. The Employer, WaterAid Ethiopia has received a Grant Aid from Boeing company for water well drilling and well completion works of FINCHAWA EGEZIARAB Kebele. WAE is intending to apply part of the budget to eligible tenders' payments under the contract for which this tendering document is issued.

   Payments will be made in accordance with the terms and conditions of the agreement.

3. The contractor is required to show his methodology, equipment, and schedule, which will enable him to complete the works with efficiency. A contractor who does not provide satisfactory methodology, equipment, material and personnel with clear schedule will be considered as "non-responsive".

4. The tender document has the following content:
   - Invitation to Tender
   - Instructions to Tenderers
   - Conditions of contract; it will be provided up on signing of an agreement
   - GGC&SCC are as per SBD of Ethiopia
   - Form of Bid
   - Technical specifications; it will be provided up on signing of an agreement
   - Safeguarding policy; it will be provided up on signing of an agreement
   - Code of conduct; it will be provided up on signing of an agreement
   - Bill of quantity

5. Tenderers must satisfy themselves that the documents are complete and conform to the above-mentioned content. If any pages are missing or anything concerning the documents is not clear, the Tenderer must immediately notify the Employer, in order that any discrepancy can be rectified during the Tender period.

   The employer will not be responsible for any such discrepancies that are not brought to his notice during the Tender period.

6. At any time prior to the deadline for submission of tenders, the Employer may amend the tendering documents by issuing Addenda. Any Addendum thus issued shall be part of the tendering documents and shall be communicated in writing or by cable to all invited Tenderers. Tenderers shall promptly acknowledge receipt of each Addendum by cable to the employer. To give the Tenderers reasonable time in which to take an Addendum into account in preparing their Tenders, the Employer may extend as necessary the deadline for the submission of Tenders.

7. The Tenderer shall be domiciled and licensed to do such business in Ethiopia as specified in the tender and shall furnish copy of its renewed trade license for the current fiscal year 2014 E.C and competency registration certificate from the Ministry of Water Resources, VAT registration certificate and Tax Identification Number (TIN). Tenderer shall not be under a declaration of ineligibility for corrupt or fraudulent practices.

8. The tenderer shall submit complete sealed separate envelopes for financial and technical proposals. For each proposal the tenderer shall prepare one original clearly marked "original" and one copy clearly marked "copy". The tenderer shall seal the original and copy of the tender in separate envelopes, dually marking the envelopes as "original" and
"copy". The two envelopes shall then be sealed in an outer bigger envelope. The inner and outer envelopes shall:

A. Be addressed to the employer at the address provided in the "Invitation to tender"
B. Bear the name and identification number of the contract;
C. Provide warning not to open before the time and date for opening.

The tender shall contain no alterations, omissions, or additions unless the person or persons signing the bid initial such corrections.

9. The tenderer shall furnish, as part of its tender, a bid security amounting to 2% of the bid price.
   ➢ Be in the form of bank guarantee or CPO from banking institution domiciled and licensed to do business in Ethiopia;
   ➢ Be payable promptly upon written demand by the employer in case of the conditions stated in clause 14 below are revoked;
   ➢ Be submitted in its original form; copies will not be accepted;
   ➢ Be kept in the financial proposal envelope;
   ➢ Remain valid for a period of 120 days.

10. Joint venture is not allowed

11. The Employer as "non-responsive" shall reject any bid not accompanied by an acceptable bid security.

12. The bid securities of the unsuccessful bidders will be returned as promptly as possible, but not later than 28 days after the expiration of the original period, or any subsequently extended period of tender validity.

13. The bid security of the successful bidder will be returned when the bidder has signed the agreement and furnished the required performance security.

14. The bid security may be forfeited:
   I. If the tenderer with draws its tender after bid opening;
   II. In case of a successful bidder, if he fails to sign the agreement, or furnish the required performance security.

15. All correspondence and submissions with respect to the Tender shall be in the English Language. Supporting documents and printed literature furnished by the bidder may be in another language provided they are accompanied by an accurate translation of the relevant passage in the above stated language, in which case, for purpose of interpretation of the tender, the translation shall prevail.

16. All duties, taxes and other levies payable by the contractor under the contract, or for any other cause, as of the date 28 days prior to the dead line for submission of bids, shall be excluded from the unit rates and prices, and the total Tender price submitted by the bidder shall include the duties, taxes and other levies as shown in the Bill of Quantities.

17. Tenders shall remain valid for the period as stipulated in the form of agreement.

18. If the Tender is submitted by a firm or company it must be signed by a person or persons duly authorized thereto, of the company, a copy of which resolution is to be submitted with the Tender.

19. All prices quoted and payments made are to be in the currency of the Federal Democratic Republic of Ethiopia (Birr).
20. For comparison of Tenders, Tenderers must submit the Tender price based on the Tender documents without modification or qualification. Failure to comply with this requirement may invalidate or prejudice the Tender. Tenderers, however, may in addition make an alternative offer based on alteration to the Tender and shall clearly indicate all deviations from the General conditions of contract, conditions of particular Application, and the specification for drilling, Bill of quantities and other schedules and forms which allow for alterations by the Tenderer, provided only that such offer shows an overall saving on the cost of the works as a whole. Alternative proposals shall where necessary be covered by schedules complete in themselves, prepared by the Tenderer, to replace corresponding schedules in the basic document. Every alternative shall be separately priced.

21. Unskilled labour shall be drawn from labour available in Ethiopia as far as possible and conditions of employment shall strictly comply with the policy of the government of the Federal Democratic Republic of Ethiopia.

22. The employer reserves the right to adjust arithmetical or other errors in the Tender during evaluation if there is disagreement between unit rate and total offered price for an item in the bill of quantity. The correction shall be based on the offered unit rate. If unit rate is not given on the BOQ total price and volume shall be used to recalculate the unit rate. Any adjustments made to the Tender will be stated to the Tenderer prior to the award of the contract.

23. All recipients of the Tender Documents (whether they submit a Tender or not) must treat the details of the document as private and confidential.

24. The Tenderer shall carry the cost of all expenses incurred by him when visiting the work area and in preparing his Tender. The Employer or the Engineer will not be responsible for or pay for expenses or losses which may be incurred by any Tenderer in the preparation of his Tender or on any site visit required in connection therewith.

25. In the adjudication of Tenders, due account will be taken of the Tenderer's past experience and performance in the execution of similar drilling works of comparable magnitude, and the degree to which he possesses the necessary technical and financial background to enable him to complete the work successfully within the contract period.

   Tenderers are therefore required to satisfy the Employer of their ability to perform the works satisfactorily and to this end shall furnish details in the "Schedule of work satisfactorily carried out by the Tenderer" (Schedule SF 5), of contracts of a similar nature and magnitude, which they have successfully executed in the past.

26. Tenderers must provide a Schedule of personnel and Employees in full and should supplement the information with attached curricula vitae of the key personnel to be used on the contract. It is a requirement that all personnel to be employed on the contract must be Ethiopian citizens or in possession of valid permits to work in Ethiopia.

27. Tenderers must complete the "Schedule SF 3" in full giving all relevant engine, chassis, and serial numbers of the machinery they intend to use on the contract. Any plant or equipment required completing the work, and not in the possession of the Tenderer, shall be detailed on a supplementary list to schedule SF 3.

28. The Tenderers must provide the work program. The successful Tenderer will be asked to furnish to the Employer within 7 days from the date of the letter of Award a more detailed work program, before he commences the contract. In addition, the Tenderers shall present full details of the work at hand in separate sheet.

29. The Tender submitted by the Tenderer shall comprises the following documents
A. The bid (Form of Tender)
B. Bid security
C. Priced Bill of Quantity
D. Qualification form and document

30. The tenderer must initial each page of the tender documents and sign and seal wherever it is requested. The Tenderer must also sign any Appendices to the Tender. Failure to complete and sign any of these forms may invalidate the Tender.

31. Any inquiries regarding the Tender Documents or any related matter, prior to submission of Tenders, should be directed to the Employer. Verbal replies given to questions at any site visit or elsewhere shall not be regarded as binding unless confirmed in writing upon request by means of a Notice, which shall be sent to all Tenderers.

32. After submission and before decision no interviews dealing with the subject can be granted to anybody, and no calls or letters bearing on this Tender will be answered by the Employer. Tenderers, however, may be called upon to clarify any aspect of their Tender at the discretion of the Employer, and shall supply any further information requested and necessary to the assessment of the Tenders.

33. The successful Tenderer will be advised by the Employer to this effect by letter through the mail, fax or by telegram. In such case the post office shall be regarded, as the agent of the Tenderer and delivery of such acceptance to the post office shall be treated as delivery to the Tenderer.

34. Copies of all insurance required under the contract must be finalized before commencement of the works and submitted to the Employer within fourteen days of receipt of the letter of Award. Prior to the policies becoming available, proof that the necessary proposals for insurance have been lodged with, and accepted by a competent insurance company, will be acceptable instead of the policies.

35. The formal conclusion of the contract is conditional on the presentation and acceptance of a satisfactory performance Bond prior to the signing of the contract.

36. The Employer or his duly appointed representative reserves the right to inspect the Tenderer's plant and equipment during the Tender period and prior to the award of the contract. It is a condition of tender that the Tenderer's plant and equipment as described in schedule SF 3, is available for inspection in Ethiopia during the Tender period. If the Employer discovers that the plant and equipment described in the Schedule is falsely stated or finds inconsistently stated in the tender, this will lead to rejection of the tenderer.

37. The Tender or any person of the tenderer who canvasses or causes to be canvassed, any person employed by or in the service of the Employer or the engineer, in favours of his Tender shall be rejected.

38. The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of contract, without thereby incurring any liability to the affected tenderer or Tenderers or any obligation to inform the affected tenderer or Tenderers of the grounds of the Employer's action.

39. The employer is not bound to award full work specified in the tender to a single tenderer and it reserves the right to partially cancel or give the work to more than one Tender. The Tenderer must be aware and ready to accept if it is awarded part of the work.

40. The employer shall open the financial bids, in the presence of Tenderers designated representatives who chose to attend. The representatives who are present shall sign a
register evidencing their attendance. The employer shall prepare minutes of the bid opening, including the information disclosed to those present.

The financial offer will be opened at the time, date and location indicated in the invitation letter. The bidders name, the presence (or absence) and amount of bid security, and any such other details the employer may consider appropriate, will be announced by the employer at the opening.

The technical evaluation committee formed by the Employer will open and evaluate the technical part.

41. Evaluation and Comparison of Tenders

The Tender shall be evaluated according to the criteria and percentages attached to each criterion.

The Technical part will have the following points and evaluation will be out of 100 points.

1. Drill rig type, maximum depth of drilling, compressor type 20 points
2. Availability of pumping test machine, 10 points
3. Company Experience 30 points
4. Personnel 30 points
5. Work plan 10 points

The Financial part shall evaluate by giving 100 points for the lowest offer. The other Tenderers shall get points proportionally according to the following formula:

Financial points = 100 x Least price offer/ offered price

The final evaluation of the global offer will be made according to the following formula:

Final point = Technical point * 70% + Financial point * 30%

The contract will be awarded to the tenderer having the highest final point.

42. The Employer will award the contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and scoring the highest final point in accordance to clause 41. If two or more bidders score equal points the employer will award the contract to the least bidder.

43. The Employer notifies the successful tenderer that its bid has been accepted, and send the bidder the agreement in the form provided in the bidding documents, incorporating all agreements between parties.

44. Within 7 days of receipt of the Agreement, the successful tenderer shall sign the agreement and return it to the employer, together with the required performance security in the form of bank guarantee in the form stipulated in the Tender Document. The performance security shall not be released without the prior consent of the employer even if the validity period has expired.

45. Up on fulfilment of clause 44 the Employer will promptly notify the other Tenderers that their bids have been unsuccessful, and their bid security will be returned as promptly as possible.

46. Upon the successful tenderer furnishing of the performance security the employer will promptly notify the name of the winning bidder to each unsuccessful bidder and will discharge the bid security of the unsuccessful Tenderers.
47. Within 7 days of receipt of letter of acceptance from the employer, the successful Tenderer shall furnish to the employer a performance security in the form stipulated in the Tender Document.

48. The contractor shall commence his work within 15 days after signing the agreement. The advance payment shall not be, and in no way will be related to commencement date. Advance payment shall be effected to the contractor by the Employer up on receipt of advance payment guarantee according to the relevant conditions of contract.

49. Guarantees for –
   ➢ **Bid bond & Performance bond can be C.P.O**, “Bank Guarantee” or “Insurance bond or guarantee
   ➢ Advance payment guarantee shall be “C.P.O”, or “Bank Guarantee”

50. Tenderer is allowed to apply for the bid, which shall not be beyond their capacity. WaterAid-Ethiopia has the right to decide the number of wells to be awarded for the tenderer upon evaluating the Tenderers capacity to complete the work within the allotted time frame or schedule.

### Abbreviations used in the tender document

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Unit</th>
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<tbody>
<tr>
<td>mm</td>
<td>for millimetre</td>
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<tr>
<td>m</td>
<td>for meter</td>
</tr>
<tr>
<td>m²</td>
<td>for square meter</td>
</tr>
<tr>
<td>m³</td>
<td>for cubic meter</td>
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<tr>
<td>km</td>
<td>for kilometre</td>
</tr>
<tr>
<td>hr</td>
<td>for hour</td>
</tr>
<tr>
<td>L.S.</td>
<td>for lump sum</td>
</tr>
<tr>
<td>No.</td>
<td>for number</td>
</tr>
<tr>
<td>E.C</td>
<td>for Ethiopian Calendar</td>
</tr>
<tr>
<td>PVC</td>
<td>for plasticized polyvinyl chloride</td>
</tr>
<tr>
<td>B/H</td>
<td>for Borehole</td>
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<tr>
<td>DTH</td>
<td>Down The hole Hammer</td>
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</table>
CONTRACT DATA

The following documents are also part of the contract

1. The Employer is WaterAid Ethiopia
2. The project manager is Zewdu Kelbessa (Project Manager).
3. The name of the contract is FINCHAWA EGEZIARAB kebele Deep Well Drilling Project (WWD & WWC grade 5 & above)
4. The works consist of Deep well drilling, casing installation, gravel packing, well development, pumping test, water quality test, well head construction and completion of the well including the supply & hand pump installation in accordance to the B.O.Q. and Specification.
5. The start date shall be up to 15 days after contract signing. The intended completion date for completing drilling of all wells shall be 30 days after the date of commencement or agreement signing.
6. The contractor shall submit a revised program for the works within 7 days of receipt of the letter of award, which shall be considered as base for intended completion period.
7. The sites are located in FINCHAWA EGEZIARAB Kebele, Gimbichu Woreda of East Shoa Zone.
8. The defects liability period is 365 days.
9. The governing language of the contract is English.
10. The law that applies to the contract is the law of the federal democratic republic of Ethiopia.
11. The advance payment will be 30% and will be paid to the contractor no later than 15 days after advance payment request.
12. Payment shall be affected only upon completion of the whole works for each well drilling and testing as indicated in number 4 above.
13. Amount of liquidation damage is 0.2% of the contract price per day. Limit of Liquidation damage is 10% of the contract price.
14. Amount of performance Bond is 10% of Tender price
15. Time within which performance bond is to be produced after the date of the written Letter of Award is 7 days
16. Duration of performance Bond is until issue of certificate of Completion
17. Special non-working day New Year’s Day, Good Friday, Christmas Day, or as published in the Government Gazette
WELL DRILLING AND TESTING SPECIFICATION

1. GENERAL

1.1. SCOPE OF WORK

The requirements of the work are as follows:

1. Drilling of production wells with the diameter specified in the BOQ,
2. Supply and installation of surface and well casings, screens, observation pipe, filter pack, development, test pumping and well head construction as necessary,
3. Water and aquifer sampling for each well drilled,
4. Disinfections and securing of all wells using an appropriate method on completion of construction,
5. Preparation of factual reports for each borehole detailing the work carried out and the results obtained,
6. All other associated and ancillary works

1.3 GEOLOGY

Please refer to the regional geological data

1.4 HYDROGEOLOGY

Please refer to the regional hydro-geological information

1.5. SITTING OF WATER WELLS

The contractor shall drill the well at the exact location designated by the engineer. The engineer shall establish the exact location of boreholes in the field.

1.6 SITE CLEARING & ACCESS TO ALL SITES

The employer or the Engineer will obtain the necessary permission for access to the drilling sites, but any access road or bush clearing to provide access to the drilling site and undisturbed construction work will be the responsibility of the employer. The contractor at his own cost will repair any damage to the surface of any private roads, fences or gates by the contractor's plant and equipment.

Drilling mud pits, abandoned dry wells & others must be properly back filled and levelled after completion of drilling work. After completion of drilling and construction work, the environment shall be thoroughly cleaned from foreign substances brought to the site during the construction activity. Any other damage to private property will be handled strictly according to the general condition of contract.

The contractor shall dispose of drilling fluid, cuttings, and discharged water in a manner prescribed by the engineer so as not to create damage to public or private property.

1.7 Outline Well Design

1. The water wells will be drilled with nominal diameter specified in the BOQ in the overburden upper section and installed with temporary or permanent, as the case may be, surface casing to protect caving during drilling and for hanging pump in case of borehole completed with PVC well casing.
2. The drilling diameter below surface casing installation depth shall be 10" or as specified in the BOQ. If the borehole is to be housed with casing and screens their positioning shall be instructed in written by the Engineer based on the result of lithologic and electrical log (if conducted).
3. A 19mm nominal internal diameter observation pipe will be installed in the annulus with slotted sections opposite screen sections as specified in BOQ.
4. If written instruction is given by the engineer gravel pack will be installed in the annular space of the shallow wells wall and the outer portion of the casings to a minimum of 5m above the static water level.

5. Cement grout shall be applied above the gravel pack in unconsolidated section. Before applying cement grout a minimum of 50cm thick sand bridge shall be placed above the gravel to protect cement infiltration.

6. On completion of testing each borehole shall be secured with 6mm thick steel plate welded to the top of well or surface casing, as the case may be, and well head shall be constructed as per the specification.

2. Contractors Personnel and Materials

The contractor shall supply capable and appropriate drilling machine and experienced personnel and suitable drilling equipment to perform the drilling and well completion works. Each bidder shall furnish with the bid information, which shows:

a. Experience record of the contractor on works of the same nature.
b. Name and experience record of the personnel of the contractor to be assigned for the work
c. Manufacturer's name and model number of drilling machine or machineries to be used. This includes rig, compressor, mud pump, power unit and other pertinent equipment

The drilling unit shall consist but not limited to the following items:

1. The drilling rig must be equipped with hoist block for pulling down casings and recovering casings from unsuccessful wells.
2. A services truck to transport well casing, fuel, water and other supplies and equipment
3. A vehicle to transport the crew from site to site and from drill site to living quarters.
4. A welding plants.
5. A water tank suitable for hauling water to the site for use in drilling.
6. A list of all equipment, vehicles, drilling tools, hand tools, welding equipment, pumping sets, deep meter etc to be assigned for the project shall be included in the contractor-bidding document.

3. Inventory

Prior to the commencement of work the engineer shall have the right to inspect the drilling and pump testing units of the contractor to be assigned for the project.

Any items of the inventory rejected by the engineer as being unsatisfactory by reasons of wear, the Contractor will replace inadequacy, unsuitability etc. as soon as possible.

4. Materials

The materials to be used for the construction of this well shall meet the following requirements:

4.1 Well Casings

If the engineer orders installation of casings and screens, all casings to be supplied for the construction of the well shall be manufactured of PVC or steel or other ferrous materials (as described in the BOQ), new, seamless, threaded ends and couplings and comply with the standard such as DIN 4920, API and ASTM. Casings can be joined to each other with threaded and coupled joints or by welding. If reinforcing is required for threaded casings after the casings are joined, the joint may be reinforced with welding if the Engineer finds it necessary and gives approval to the contractor.

The welding to be used for joining casings is DC arc welder with a rating of at least 250 amperes. The welded parts shall be clean and free of slag.
For boreholes with depth up to 150m the well casing and screen to be installed shall be made of PVC and for boreholes above 150m depth the well casing and screen shall be made of steel. But in case the formation penetrated is dominated by caving unconsolidated formation where it is difficult to install PVC casing and screen change might be ordered with written instruction.

If the well is completed in fractured and stable aquifer the Engineer may instruct the contractor to install the whole string of casing and screen assembly to be suspended or hanged on the surface casing at the well head with appropriate flange. In that case, the bottom of the casing should be at least 5m above the bottom of the hole leaving an open space for accumulation of aquifer materials falling from the wall of the well. For such type of installation, the bottom of the casing should be sealed or plugged and filter packing is not required.

Minimum wall thickness for all casing shall be as follows;

<table>
<thead>
<tr>
<th>Nominal inside diameter</th>
<th>Minimum wall thickness</th>
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<tr>
<td>150mm</td>
<td>5.4mm</td>
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<tr>
<td>200mm</td>
<td>6.4mm</td>
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<tr>
<td>250mm</td>
<td>7.8mm</td>
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<tr>
<td>300mm</td>
<td>8.4mm</td>
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<tr>
<td>350mm</td>
<td>9.5mm</td>
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</tbody>
</table>

A. SURFACE CASING
The contractor shall drill a well of diameter specified in the BOQ in the upper unconsolidated formation to accommodate the outer temporary (protective) casing of the specified diameter for each well. Temporary surface casings are used to protect caving overburden during drilling and for hanging pumping set and well casing when installed permanently in boreholes completed with PVC well casing or in boreholes not packed with gravel. The diameter of this casing must be wider than the presumed drilling diameter to allow the drilling bit to pass through to continue further drilling. The top of the outer casing when permanently installed shall be above a known flood levels in the area.

B. INNER CASING
The working (production) casing to be installed shall be manufactured of PVC if the borehole depth is 150m and less or steel if the depth is more than 150m. This casing shall have a diameter specified in the BOQ. The casing can be threaded or blank of the standards.

C. WELL SCREEN
The Well screen shall be manufactured of PVC or steel based on depth of the well and shall have a minimum of 10% open area. The slots shall be widening inward to minimize clogging. Johnson Division or an equal if approved by the engineer shall manufacture the well screen.

If the contractor supplies slotted screens the slots must be factory slotted or made using standard slotting machines, vertical, 100mm in length and the slots around the perimeter of the casing must be equally spaced. The slots should be clean and without cutting residues. Drilled holes or torch cut slots are not permitted.

The screen slot size shall be selected based on a mechanical size analysis of either the natural water-bearing sediments or the filter pack material. The maximum slot opening must be 2.5mm. Of the total water bearing section 70% should be screened. The screen should extend 1m from top and bottom of the aquifer. The screen should not extend above the draw down level while the well is in production.
Screens of diameter specified in the BOQ shall be installed in the location of aquifer layer based on the findings of well loggings (lithological and electrical). The Engineer shall give written instruction for the location of well screens. They shall be incorporated into the well casing by threaded ends. Short lengths of well screen can be incorporated at intervals in the casings adjacent to the aquifer to permit the entrance of water into the casing from the rock.

4.2 Observation Pipe

Water level observation G.S. pipe should be installed in the annulus of each well to be drilled. The observation pipes shall be 3⁄4" internal diameter. The pipe should be closed at the bottom by a plug. The observation line should reach approximately as deep as the screens of the well. The uppermost slotted section should be about 10 meter below the topmost screens. Slots must start at about 2m above the lower end of the pipe.

If observation pipe screens are made by hand, slots may be cut with a hack saw. Slots may be arranged on two sides, in an alternating manner, the slot spacing on each side being about 2-3cm apart. Care should be taken that the slots are clean and without cutting residues. Drilled holes or torch-cut slots are not permitted.

The observation pipe shall be installed on the outside of the casing and screen column before applying the gravel pack.

It must under all circumstances be installed in a rectilinear way to allow the free passing of probes. Non-compliance with this requirement entitles the Engineer to accept the well.

4.3 Gravel Pack

If the Engineer instructs gravel packing, the gravel to be supplied shall be natural well-rounded, smooth and uniform, sieved and washed river gravel, preferably quartz grains. If pure quartz gravel can’t be obtained the engineer may consent to install similar materials. The engineer based on the size of the aquifer materials shall order and approve the gravel size. The maximum allowable non-round particles are 10%. The gravel pack must be placed in the annular space between the casing holes starting from the bottom up wards, up to the level instructed by the engineer depending on the static water level.

To avoid bridging of the gravel, which may lead to severe damages to the casing, screens and to the borehole wall, it is forbidden to fill-in the gravel by mechanized equipment. The gravel must be filled- in by hand, using shovels during well development.

Filling will proceed slowly and carefully during well development. The correct placing of gravel will have to be controlled by continuous recording of the volume of gravel consumed and by repeated measurement of the achieved level of packing.

If the aquifer is unconsolidated and poorly sorted the engineer might order development of the aquifer formation to attain natural gravel pack.

5. SUPPLY OF DRILLING WATER

The provision of all water for drilling operation is the responsibility of the contractor. The water to be used for drilling should have the quality of drinking water. Therefore, the contractor will be required to make his own arrangements for drilling water of such quality.

6. DRILLING METHODS

The boreholes to be drilled are situated in different geologic environments, which include unconsolidated sediments, slightly to well consolidated rocks, and medium to hard formations. Hence, the drilling equipment and methods to be used shall be capable of drilling through all the formations to be encountered.
The aquifer will be drilled with a minimum damage from clogging of inter-granular pores of fractures or any other openings, which make up the permeability of the aquifer.

7. WELL DEPTHS
Well depths are variable as indicated on the list of sites. Drilling might be ordered to be stopped at shallower depths, or to be continued based on the actual field hydro geological and geological findings. The drilling Contractor is therefore required to be equipped, accordingly.

8. DRILLING DIAMETERS
Drilling shall be started with diameter specified in the BOQ for each well in the unconsolidated upper section for the installation of surface casings and continued to the final depth with the diameter specified in the BOQ. The drilling diameter however may change according to the geological situation during actual drilling. Changes shall not be made unless otherwise the engineer feels changes are necessary and gives written approval.

9. GEOLOGICAL LOGGING
Lithologic log of formation penetrated should be done at 1m intervals. Drilling cuttings shall be collected during the drilling operation and handled in a manner that they can easily be identified. Samples shall be taken at predetermined intervals of 1m and whenever there is a change in formation type.

10. ELECTRICAL LOGGING
Electrical (resistivity) logging of drilled wells shall be carried out to determine the aquifer position in the well as deemed necessary by the engineer. Casing arrangement shall be based on the lithologic and electrical log result.

11. PLUMPNESS AND ALIGNMENT
Upon completion of lowering of casings or at any other time requested by the engineer the borehole shall be checked for verticality and straightness using deviation measuring instruments like Inclinometer, Draft indicator, etc.

Running a dummy down the casing may also check the alignment. The dummy shall consist of a cylinder 10m in length with a diameter 20mm less than the well casing. The dummy must pass freely through the entire length of the cased borehole.

The contactor may also conduct these and any other tests when he may deem necessary to satisfy himself that the borehole is being drilled plumb and straight. These tests shall be made entirely at the contractor’s expense.

If the hole is out of alignment as determined by the dummy or more than 1% out of vertical, then the hole shall be abandoned and re-drilled.

12. WELL DEVELOPMENT
The term well development means the work carried out after completion of the construction of a well and prior to test pumping. The objective of development is to improve well performance, to increase well capacity and to reduce an unacceptable level of the amount of sediment contained in the water yielded by the well. In a few cases further development may be required after testing.

The development of the well shall remove the native silts and clays and drilling fluid residues deposited on the borehole face and in adjacent portions of aquifer during drilling process. Development shall also remove a predetermined finer fraction of filter pack. If organic drilling fluids are used, it must be broken down chemically according to manufacturer’s recommendations before or during development.
Borehole development must be using an air lifting technique. The work must continue until the engineer is satisfied that the borehole, gravel pack and adjacent aquifer have all been adequately cleared of drilling fluid, aquifer fines and drill cuttings and a satisfactory yield has been attained. In case of caving formation where the borehole is drilled with mud rotary or percussion rigs, other techniques of development as bailing, back washing, surging, etc might be used.

13. WELL DISINFECTIONS
After drilling, wells should be disinfected to make sure that no bacterial, viruses and other pollutants are remaining in the well, which may have entered the well during drilling and construction works. The well shall be disinfected after installing the testing pump set into the well and before collecting any samples for determining microbiological quality. This shall be done by placing a chlorine solution into the well so that concentration of at least 50mg/l of available chlorine exists in all parts of the well at static conditions. All the well surfaces above the static level shall be completely flushed with solution. The solution shall remain in a well a minimum of 2 hours before pumping the well to waste.

14. TEST PUMP AND ACCESSORY EQUIPMENT FOR AQUIFER TEST
A. PUMPS AND OTHER EQUIPMENT
Electricaly powered submersible pumps, fitting in to a casing of diameter specified in the BOQ and with capacity to be specified at the end of drilling should be available on site, to carry out pumping test. All equipment shall be reliable for periods of 36 hours of continuous operation at the designed rate.

b. Generators
The contractor must be equipped with generator sets with a capacity to drive the submersible pumps, welding machines and all power requirements. The generator set should be capable to operate for a minimum of 36 continuous hours.

C. WATER LEVEL GAUGES
The contractor should have on site electric sounding device suitable for a maximum depth of 400m. The devices should fit into the ¾” observation pipes and should permit direct, convenient and accurate reading of depth of static and dynamic water levels.

D. DISCHARGE METERS
A 90° rectangular V-notch weir shall be installed on the end of the pump discharge line to determine the discharge rate. A control valve shall be installed so that the discharge rate will not vary more than 5% from the average rate. The engineer shall approve the equipment and installation. Possibility of checking and calibrating the equipment must be provided.

14.1. TEST PUMP UNIT
If, bailing or preliminary pumping test shows that the well has sufficient capacity to be of interest, pumping test shall be carried out.

The test pump unit shall consist of well experienced crew, a submersible pump, a diesel powered generator to run the pump, pipe on which to set the pump and all necessary tools and equipment to carry out pumping tests with an accurate measurement of water discharge and water level in the well. The equipment and crew shall be capable of performing a step draw down test for up to 8 hours and a constant discharge test for up to 36 hours. The capacity of the submersible pump to carry out test pumping shall be ordered by the engineer based on the borehole yield estimate at the end of drilling.
14.2. WELL TESTING

Special importance is attributed to this phase of the work. The contractor will proceed with utmost care, by assigning qualified and experienced personnel and shall use reliable and accurate equipment.

The tests will presumably be performed according to non-equilibrium methods in several stages, each with a specified constant and sustained discharge. No interruption of the test will be tolerated. After having measured the static water levels, a step drawdown tests should commence with the lowest discharge step. After a steady state flow is reached, the discharge will be increased and the second step will be run until similar condition of flow is obtained, followed by the 3rd and 4th steps. During or after the test the Engineer will decide upon, following the results, whether the test is satisfactory or a further development is required, to be followed by a new test.

After the well is fully recovered and allowed to rest for a short period of time, a constant discharge tests will subsequently be run, followed by the respective recovery tests. In the case where stabilization of water level cannot be obtained, the engineer may have to decide to extend the duration of the test period. Test can't be terminated without written instruction of the engineer.

In case the engineer demands provisional pump testing to be carried out in open well or after installation of casings and before gravel packing, the contractor will perform the test accordingly. Payment shall be made only for installation and removal of casings if the well yield is found unsatisfactory. A failure to remove the casings is to the expense of the contractor.

If pumping test is conducted in a well field, during pumping in the tested well, the water level in the remaining wells will be observed. In case there is interference, an interference test is to be performed simultaneously with the constant discharge test, with draw down and recovery measurements taken in all wells. The Engineer shall decide whether a satisfactory stabilization has been obtained in all wells and whether an additional test is to be performed, this time with the observed well pumping and the pumping well as an observation one.

Discharge must be accurately adjustable by means of an easily handled valve. Discharge will be measured by an orifice installation on the discharge pipe, by a water meter or by a V notch with and accuracy of at least 1% possibility for the check up and calibration by means of a tank must be provided. In case the orifice installation will be used a continuous discharge, adjustment will be taken care of by means of the valve.

During testing the temperature of the pumped water will be measured at regular intervals.

Also, during testing, water samples should be taken from the pumped water.

14.3. PUMPING TEST DURATION AND MEASURING FREQUENCY

Three kinds of tests might be carried out:

1. 4-step draw down discharge tests
2. Constant discharge tests until stabilization of water level is achieved.
3. Simultaneous/group tests
4. Recovery test

During each test the pumps should operate without interruption. In case of interruptions, caused by negligence or technical defects, a repetition of the respective test may be ordered at the contractor's expense.

Draw down measurements can be but not necessarily, made in the following time intervals:
<table>
<thead>
<tr>
<th>Time from Pumping start</th>
<th>Time intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5 minutes</td>
<td>0.5 minutes</td>
</tr>
<tr>
<td>5 to 60 minutes</td>
<td>5 minutes</td>
</tr>
<tr>
<td>60 to 120 minutes</td>
<td>20 minutes</td>
</tr>
<tr>
<td>120 to shut down of pump</td>
<td>60 minutes</td>
</tr>
</tbody>
</table>

This schedule holds good for each discharge step of the 4-step-draw down discharge tests as well as for the constant discharge tests.

The discharge rates should be controlled and adjusted carefully, and readings should be made together with the draw down measurements.

Water level recovery measurements following the final shutdown of the pump, after the completion of each discharge step and after the continuous discharge tests, should be made in the same time intervals as cited in the table above.

14.4. DISPOSAL OF PUMPED WATER
The pumped water must not be allowed to re-infiltrate in the vicinity of the wells. The water should be disposed of by means of discharge pipes towards a nearby natural overland drainage (stream, river). Pools should not be allowed to form. Improper discharge water disposal may result in a non-acceptance of the pumping test.

15. DEFECTIVE WORKS
In conformance with pertinent clauses of the contract conditions acceptance of a test may be refused in case of:
  > Interruption of test
  > Unacceptable variations of discharge
  > Incomplete or inaccurate measurements and observations
  > Missing samples
  > Improper development of the well

16. WATER SAMPLING
Water samples must be taken from the pump discharge for laboratory analysis. The sample should be taken in containers, which have been washed twice with the water to be sampled. The bottles should be clearly marked, showing name and number of well, date of sampling, hour of sampling and signature of person taking the sample.

Samples will be stored in cool place and delivered to the laboratory in the shortest time possible for chemical, bacteriological, and physical analysis of water.

If water samples show that the water is not of suitable quality for domestic use, the exploratory hole may be abandoned, and the contractor shall be ordered to recover the casings.

17. CAPPING THE WELL
After completion of the pumping test and removal of the test pump unit, and after the last water level recovery observation have been made, wells shall be securely welded to the top of the surface or production casing as the case may be with steel plate of 6mm thickness to prevent illegal access to the well. An appropriate socket and plug for the observation pipe must also be installed.

18. Grout Seal
The annular space between the preventive and production casing shall be sealed with mixture of Portland cement and water slurry by a pour in method from the top for sanitary protection in case the surface casing is permanently installed. In case the temporary casing is to be removed the annular space between the borehole wall and the well casing has to be sealed with mixture of Portland cement and water as described above. Before grouting a minimum of 50cm bridging sand followed by clay plug of 6m or more shall be placed over the gravel pack in order to avoid cement infiltration into the gravel. Cement grout should not be placed before the end of the pumping test to allow the gravel to settle and be filled up as necessary.

19 Well Head

Constructing wellheads around the casing must complete the successful wells. The surrounding of the well casing must be excavated until reasonable firm foundation is obtained for wellhead construction. In case firm foundation is not available close to the surface the space around the casing shall be excavated to a depth of 1.50m and filled with concrete. The concrete wellhead in C.25 will have a dimension of 1X1X1.5 meter and must be bedded 0.5m above the ground surface.

The casing shall protrude a minimum of 0.2mt above the concrete block unless and otherwise specified by the engineer.

20 Miscellaneous Equipment

Miscellaneous Equipment for pertinent measurements and observations, e.g. welding and cutting equipment with an electric welding plant with a minimum welding current of 180a in good working order, cutting equipment, stop watch, thermometer, pressure gauge (in case artesian conditions are encountered) sediment cones, PH- paper, containers for water samples must be provided and be on site.

21. SPECIAL REQUIREMENTS

21.1. Recover of Screens and Casings

Casing and screens from unsuccessful wells will be recovered by pulling using the hoist line on the drilling rig or an appropriate hydraulic jack. It is to the contractor expense, if unable to recover casings from unsuccessful wells. Payment shall be made only for the installation and removal of casings for the unsuccessful wells.

21.2. Fishing for Lost or Stuck Tools and Equipment

Fishing will be done using the most appropriate techniques and fishing tools, in order to minimize the time required for fishing and with minimum damage to the hole and to the items being fished, standard fishing tools as well as special tools fabricated on site or in a shop may be used.

In a situation where drilling tools and equipment are lost or stuck in a hole, the Engineer's Representative shall decide whether it is in the interest of the Employer to carry out fishing operations in order to salvage a hole or for any other reason. If, in the opinion of the Engineer, it is not in the interest of the Employer to carry out fishing operations, the contractor may fish to recover tools and other equipment at his own, without creating any delays to the Employer's time schedule.

22. Work Sheet and Records

During drilling and testing the contractor will keep records on printed forms, penetration rates, lithology, drilling problems encountered, draw down, discharges, temperature, etc
The drilling and pumping test and recovery sheets should be filled in accurately and should contain remarks on all irregularities observed and other information which may be of interest for future drilling in the area and the assessment of the tests (e.g. remarks on water odour, taste, colour, suspended matter, etc.) Technical failures and irregularities should likewise be mentioned.

Work sheets for each drilling unit will be prepared in English by the contractor hydro geologist for each shift. The work sheets will be prepared in duplicate and signed by the contractor representative and the Engineer. The Engineer will retain the original. The work sheets will include the following information.

a) Drilling

1. The location of the drilling site, name of well,
2. Make, model, type and size of drilling rig,
3. Date of commencement and completion of drilling,
4. Type of work performed including mobilization, demobilization and on-site relocation and number of hours on each type of work,
5. Name of all crew members,
6. Size of hole and depth penetrated,
7. Log of formation penetrated,
8. Length and size of casing installed,
9. Length and size of screen installed,
10. Length and size of observation pipe installed,
11. Any problems encountered,
12. The result of bailer tests or other tests carried out,
13. Total drilling time in hours. Drilling, as here in defined, includes drilling, installation and removal of casings, bailing, screen installation, water sampling, well development and fishing for lost or stuck tools and equipment when ordered by the Engineer's Representative,
14. Total stand by time in hours. Stand by is here by defined as time when no drilling is in progress due to delay ordered by the Employer, the Engineer or the Engineer's Representative,
15. Total time in hours lost due to break down, shortage of labour or materials or for any other reason that is the responsibility of the contractor,
16. Length in meters of casing recovered
17. Time spent fishing on the contractor’s time
18. Materials stockpiled on site including those supplied by the contractor and those supplied by the Employer, if any.

b) Test pumping

1. The location and name of the well being tested. Physical characteristic of the well including depth, diameter, size of casing screen setting and length of screen,
2. Date of commencement and completion of pumping test,
3. Type and capacity of pumps used,
4. Type of work performed and number of hours on each type of work including mobilization, demobilization or on-site relocation
5. Position of pumps,
6. Total test pumping in hours. Total time charged must agree with pumping test data sheets. Chargeable time for test pumping is from the start of a pump test to the time pumping stops. No payment will be made for tests rendered unsatisfactorily by reason of break down or lack of fuel or for any other reason.
7. Interpretation result of the test which include values of Transmissivity, storativity, hydraulic conductivity, safe yield and recommended pump position, and amount of water to be pumped per day.
8. Total stand by time in hours, stand by is here in defined as time where no test pumping is in progress due to delay ordered or caused by the Employer or the Engineer or the Engineer's Representative. Stand by also includes time when recovery observations are being made prior to the commencement of the removal of the pump at the commencement of demobilization or on-site relocation.
9. Total time in hours lost due to break down, shortage of labour or materials or for any other reason that is the responsibility of the contractor.
10. Names of all crewmembers actively engaged in the work.

23. Protocols and Records
The contractor must keep exact records on all activities. The following records must be presented to the Engineer for checking and signing, not later than 24 hrs after the completion of the relevant activities:
- Daily working sheets on drilling
- Well equipment used
- Development
- Test pumping, lithological borehole logs
- Verticality tests

Field copies of borehole logs and or pumping test data sheets and graphs must absolutely be kept up to date. Upon request of the Engineer the respective graphs and sheets must be updated without delay whenever he visits the site, to give full information on the present situation. Representative samples of the penetrated section must also be taken, kept and shown on request to the Engineer.

Clean copies of all information as requested by the contractor conditions and other tender documents must be submitted within one month after the completion of the respective well operation.

24. Final Reports
After completion of each well (drilling, development, re-development, and pumping tests) the contractor must submit a final report incorporating all-important result of specific activities. The well report must contain remarks on all special observations, difficulties, etc. The complete well report must be such that the activities and findings can be reproduced step by step. For every well, the final report must consider the specific well reports and must be submitted within one month after completion of all activities in the relevant well.

25. MEASUREMENT AND BASIS OF PAYMENT
25.1 MOBILIZATION AND DEMOBILIZATION
This item in the bill of quantity includes moving all materials, equipment and personnel of the contractor for constructing and developing the well to and from the site. It also includes cleaning up the site before commencing the work and upon completion of the contract. Mobilization and demobilization must be quoted as lump sum at the item provided in the Bill of quantity of this contract document.
25.2 INTER SITE MOBILIZATION
Inter site mobilization shall mean transporting of all contactors’ manpower, equipment and plant between two drilling sites in the same woreda. The Price shall include the complete removal of the necessary drilling equipment, materials and crew from the previous drilling site.

25.3 DRILLING
Payment for drilling will be made at the unit price per meter shown in the bill of quantity for the various diameters of the borehole.

Measurement will be made vertically to the nearest 0.1m from the original ground level to the bottom of the completed hole. This price will include all materials, equipment, labour and all work incidentals thereto except for those items for which payment is specified additionally to that of drilling. No payment will be made for boreholes abandoned or incomplete as a result of lost or stuck tools, stuck casing, failure to meet plumb ness or alignment tests, or any other reason that is the fault of the contractor.

25.4 SURFACE CASING
Payment for surface casing will be made at the unit price per meter shown in the bill of quantity for the various sizes of pipe. Measurement will be made to the nearest 0.1m vertically from the top of the casing to the bottom of the casing installed in the completed borehole. This price shall include supply of surface casings, pipes cutting, pipe welding, installation, testing and all work.

No payment will be made for temporary casing, which is installed to facilitate drilling operations and is subsequently to be removed. No payment will be made for surface casing installed in an abandoned borehole as defined in the item above.

25.5 WELL CASING
Payment for well casing will be made at the unit price per meter shown in the bill of quantity for the various sizes and types of pipe. Measurement will be made to the nearest 0.1m vertically from the top flange of the wellhead to the bottom of the casing in the borehole less any section of screen, which is paid for separately. This price shall include supply of casing, couplings, welding, and installation, testing and all work incidentals thereto. No payment will be made for temporary casing, which is installed to facilitate drilling and is subsequently to be removed. No payment will be made for well casing installed in abandoned borehole as defined in the item above.

25.9 WELL SCREEN
Payment for well screen will be made at the unit price per meter shown in the bill of quantity for the various sizes and types. Measurement will be made to the nearest 0.1m from the top of the screen to the bottom of the screen for each section of screen installed in the casing. This price shall include supply of well screens, couplings, welding and installing, testing, and all work incidentals thereto. No payment will be made for well screens installed in abandoned boreholes resulting from the contractor’s fault as defined above.

25.10 OBSERVATION PIPE
Payment for observation pipes, blank and slotted, will be made at the unit price per meter shown in the bill of quantity. Measurement will be made to the nearest 0.1m vertically. This shall include supply, installation, testing and all work incidentals thereto.

25.11 GRAVEL PACK
Payment for gravel pack is made at the unit price per cubic meter shown in the bill of quantity. This price shall include supply, installation, testing, and all work incidentals thereto.
25.12 WELL HEAD
Payment for wellheads will be made at the unit price per wellhead shown in the bill of quantity. This price shall include materials, excavation, prefabrication, installation, reinforced concrete, back filling, and drainage, site grading and all work incidentals thereto. It also includes supply and placement of sand and paddle clay seal.

25.13 GROUT SEAL
Payment for grouting will be made at the unit price per meter shown in the bill of quantity. Measurement will be made vertically to the nearest 0.1m from the top to the bottom of the completed grouting. This price shall include materials, installations and all work incidentals.

25.14 WELL DEVELOPMENT
Payment for development will be based on the unit price per hour shown in the bill of quantity. It shall cover only those hours the development tools and equipment are actually being operated.

25.15 PLUMB AND ALIGNMENT TEST
Payment for plumpness and Alignment tests required in writing by the engineer will be made at the price per site in the bill of quantity. The price will include materials, equipment and all work incidentals thereto. No payment will be made for tests carried out by the contractor for his own information.

25.16 TEST PUMPING
Payment for test pumping will be made at the unit price per hour in the bill of quantity. Measurement to the nearest minute will be as shown on the test pump data sheets from the time the pump test starts until it is completed. No payment will be made for tests terminated without written instruction of the engineer. The price shall include materials, equipment and work incidentals thereto.

25.17 MONITORING RECOVERY
Payment for monitoring recovery will be made at the unit price per hour shown in the bill of quantity. Measurement to the nearest minute will be shown on the recovery monitoring data sheets from the time the monitoring starts until it is completed. No payment will be made for monitoring terminated prior to the time specified by the engineer or rendered unsatisfactory.

25.18 TEST PUMPING STANDBY
Payment for test pumping standby will be made at the unit price per hour shown in the bill of quantity. Measurement shall be made to the nearest minute when test pumping is stopped on orders from the engineer. Payment will only be made when the test pump is set up in a hole and is fully operational.

25.19 CAPPING THE WELL
Payment for furnishing and installing the well cap will be based on the lump-sum price shown in the Bill of Quantity.

25.20 ELECTRICAL AND LITHOLOGIC LOGGING
Extra payment shall not be considered for lithologic logging but shall be included in the unit prices and lump sums in the bill of quantities.

Payment for electrical logging will be made at the unit price per well being logged.

26. FINAL REPORT
Payment for the well report shall be made as lump sum price as indicated in the BOQ. No payment shall be made for reports found unsatisfactory due to lack of consistency and specific details of works performed.
25.26 Abandoning a well
a) No payment shall be effected for boreholes abandoned without written instruction of the Engineer whether it is dry or of low discharge rate.

b) No payment shall be effected for boreholes abandoned due to collapsing, caving, improper Casing installation, and any other technical failure that the contractor could not manage to rectify as requested by the engineer.

PRICING PREAMBLE
The Bill of Quantities forms parts of the contract document and shall be read in conjunction with all other documents comprising the contract documents.

1. The quantities set out in the Bill of quantities are approximate only and do not necessarily represent the actual amount of work to be done. These may be than the amounts listed in the following Bills. Payment shall be made only for work performed or materials furnished in accordance with the contract and the price listed in the bill of quantities.

2. The description of the items in the Bill of Quantities are for identification purposes only, the work covered by the items being fully specified in the relevant clauses in the specifications and/or shown on the drawings.

3. The prices and rates to be inserted in the Bill of Quantities shall be fully inclusive values of the work described under the several items, including all costs and expenses which may be required and for the construction of the work described, together with all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based.

4. Except where lump sum (L.S.) amounts are required, the contractor shall enter an applicable rate in the "Unit price" column of the Bill of Quantities for each item where a quantity has been specified. Where the quantity is specified in the "Quantity" Column, the appropriate amount (Quantity * unit price) should be entered. In the "Total" column, where the quantity is not specified, and unit rates only are required the contractor shall enter an applicable rate in the "Unit price" column and shall leave blank the "Total" Column.

5. Items against which no rate or Lump sum is entered in the Tender will not be paid for when executed, because payment for such work will be regarded as covered by other rates in the Bill of Quantities.

6. No payment shall be made for any item not listed as a pay item or not shown in the Bill of Quantities (other than authorized extra work). The contractor shall allow in the tender prices for such items of work, which in his opinion have been omitted.

7. Payment based upon the rates tendered in the Bill of Quantities shall cover all the services and incidentals included in the work covered by the contract and shall be made in accordance with the Tender Conditions, the General Conditions of contract, the specifications for Drilling and Drawing (if any) and the Agreement pertaining to the contract and must make due allowance for all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based.

8. The Tender sum filed in by the Contractor shall be final and binding for the purposes of tendering and the Tender sum may not be adjusted should there be any mistakes in the rates, amounts and totals in the Tender. Should there be any discrepancies between the Tender sum and the correctly extended and total Bill of Quantities the employer shall have the right to make such adjustments to individual rates and amounts as deemed necessary in order to reconcile the grand total of the Bill of Quantities with the Tender sum in the Form of Tender. In such an event the contractor will be consulted but failing agreement
between the parties, the decision of the Employer will be final and binding. In their own interest contractors should make sure of the correctness of their scheduled rates (and extensions) and the Tender sum on the form of Tender.

9. All unit prices and lump sum prices tendered shall be fully exclusive of General Sales Tax (GST), Duties and other levies. All General Sales Tax (GST), Duties and other levies will be fully added to the total prices as indicted in the summary page of the Bill of Quantities. No additional payments shall be made in this respect. All Sales Taxes must be paid to the Ethiopia Receiver of Revenue.

Where materials are purchased outside of the Republic of Ethiopia, appropriate arrangements must be made by the contractor for the import of these materials to Ethiopia, where up on GST will be payable to the Ethiopia Revenue Office. Contractors will, on request, have to provide proof that the appropriate Sales Tax has been paid to the Ethiopia Revenue Office.

10. All rates and sums of money quoted in the Bill of Quantities shall be in the currency of Ethiopia.

11. The units of measurement described in the Bill of Quantities are metric units.
### SUMMARY TABLE

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
<th>Unit Price</th>
<th>Total Price</th>
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<td>Deep Well-1 (80 meters) The total depth of the well depend on the yield and site engineer recommendation.</td>
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<td>Grand Total</td>
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</tr>
</tbody>
</table>
**BILL OF QUANTITY-01**

Project site: East Shoa Zone  
Woreda: Gimbichu  
Kebele: - Finchawa Egeziarab  
No. of Wells: - 1 shallow well (Finchawa Egeziarab)  
Estimated depth: - 80 m (The total depth of the well depend on the yield and site engineer recommendation). GPS location----------------------------------------

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Unit</th>
<th>Qty</th>
<th>Rate</th>
<th>Amount</th>
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<td>1.1</td>
<td>Mobilization and demobilization of manpower, equipment &amp; construction materials and site preparation before and after the drilling work</td>
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<td>Demobilization</td>
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<td>Bore Hole Drilling</td>
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<td>Site clearing before and after construction</td>
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<td>2.3</td>
<td>Drilling in all formations</td>
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<tr>
<td>2.3.1</td>
<td>DTH and/or mud/air rotary drilling with 14 1/2' for surface casing</td>
<td>m</td>
<td>20</td>
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<td>2.3.3</td>
<td>DTH and/or mud/air rotary drilling with 12'-bit diameter</td>
<td>m</td>
<td>60</td>
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<td>2.6</td>
<td>Borehole logging</td>
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<tr>
<td>2.6.1</td>
<td>Drilling rate &amp; Lithological logging</td>
<td>L.S</td>
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<td>2.6.2</td>
<td>Geo-Physical well logging</td>
<td>L.S</td>
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<td>2.7</td>
<td>Supply and installation of PVC and steel casings</td>
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<tr>
<td>2.7.5</td>
<td>Steel Blind casing 8&quot;</td>
<td>m</td>
<td>Rate only</td>
<td></td>
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<td>2.7.6</td>
<td>Steel Screen Casing 8&quot;</td>
<td>m</td>
<td>Rate only</td>
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<td>2.7.7</td>
<td>PVC Blind Casing 8&quot;</td>
<td>m</td>
<td>40</td>
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<td>2.7.8</td>
<td>PVC Screen Casing 8&quot;</td>
<td>m</td>
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<td>2.7.9</td>
<td>Steel Surface Casing 14&quot;</td>
<td>m</td>
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<tr>
<td>2.8</td>
<td>Installation of 3&quot;/4 GIS observation pipe</td>
<td>m</td>
<td>70</td>
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<tr>
<td>2.9</td>
<td>Supply and Pack Selected and well-rounded river gravel</td>
<td>m³</td>
<td>10</td>
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<tr>
<td>2.11</td>
<td>Grout with mass concrete to a depth not less than 5m (1:3:6mix) and construct well head</td>
<td>L.S</td>
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<tr>
<td>Item No.</td>
<td>Description</td>
<td>Unit</td>
<td>Qty</td>
<td>Rate</td>
<td>Amount</td>
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<tr>
<td>2.12</td>
<td>Construction of well head with mass concrete (0.70mx0.70mx0.70m)</td>
<td>L.S</td>
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<tr>
<td>2.13</td>
<td>Supply and weld iron cover on the top of the borehole</td>
<td>L.S</td>
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<td>2.14</td>
<td>Prepare end report of abandoned wells that is well drilling which includes geological column, well profile, drilling diameter, etc including reason for the abandonment of each well with 4 copies including soft copy</td>
<td>L.S</td>
<td>Rate only</td>
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<td>3</td>
<td><strong>Conduct well Yield Pumping Test</strong></td>
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<tr>
<td>3.1</td>
<td>Mobilization of Crew, materials and pump testing equipment</td>
<td>L.S</td>
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<td>3.2</td>
<td>Inter site mobilization</td>
<td>L.S</td>
<td>Rate only</td>
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<td>3.3</td>
<td>Site clearing and rigging up</td>
<td>L.S</td>
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<td>3.4</td>
<td>Provisional or preliminary test</td>
<td>Hr</td>
<td>3</td>
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<td>3.5</td>
<td>Step draw down test (Four step, 1:30 hour for each test)</td>
<td>Hr.</td>
<td>6</td>
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<tr>
<td>3.6</td>
<td>Constant yield pumping</td>
<td>Hr.</td>
<td>24</td>
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<td>3.7</td>
<td>Recovery test</td>
<td>Hr</td>
<td>12</td>
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<td>3.8</td>
<td>Demobilization</td>
<td>L.S</td>
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<tr>
<td>4</td>
<td>Collection of water samples during test pumping in sealable plastic bottles and conduct water quality analysis (complete physio-chemical &amp; bacteriological)</td>
<td>L.S</td>
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<td>5</td>
<td>Prepare end report of the wells that is well drilling and pumping test which includes geological column, well profile, drilling diameter, casing installation, well yield, pumping test data, curve analysis etc with 4 copies including soft copy</td>
<td>L.S</td>
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<td>Total for Finchawa Egeziarab Borehole</td>
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<td></td>
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<td>VAT (15%)</td>
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<td>Grand Total</td>
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