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METHOD STATEMENT
FOR
TUBEWELL INSTALLATION

1.0 Purpose

The purpose of this method statement is to have an appropriate methodology to carry out the Drilling of Bore Well at proposes site.

2.0 Scope

This method statement illustrates comprehensives activities and guidelines for mobilization of materials & machineries, drilling activity, testing and commissioning of bore well.

3.0 Tools and Equipment

- Truck Mounted Vertical Drilling Machine
- Lorry Crane
- Hand Tools

4.0 Methodology

4.1 Mobilization

Mobilization of drilling machine and associated tools shall be mobilized to meet the requirements of the drilling system proposed. It should have the capacity to drill, construct and develop permanent casing and screen.

4.2 Dimension of Bore Well

The bore hole shall be drilled in **279.4 mm (11 inches)** diameter in the upper soil and weathered rock material until reaching the hard formation. On reaching the hard formation each borehole is to be cased and its diameter reduced to **200 mm (8 inches)**. The 200 mm borehole shall be drilled by down-the-hole (DTH) hammer drilling to certain depth.

4.3 Design of Well

The tube well is to be constructed and designed as a screened well. However, in section where the formation is unstable, casing of **152 mm (6 inches)** diameter (uPVC pipe and screen) shall be installed inside the 8 inches diameter borehole. The length of the casing and screen shall be placed at the horizon where aquifers are located.

4.4 Screen and Rubber Packing / Gravel Pack

The slot size of the uPVC screen will be 2 mm. The rubber packing / gravel pack shall be placed in the annular space between the borehole and the well casing or screen and from the bottom of the lowest screen section to the level being 5 m to 10 m above the top screen. Depends on formation. Then, above the rubber packing / gravel pack shall be backfill will impervious clay and cement grouted with concrete to keep from surface contamination.

4.5 Water Samples

Water samples will be taken at the end of the test to the laboratory analysis with 25 parameters water quality analysis test report.

4.6 Drilling of Bore Well

- Mobilization of truck mounted drilling machine and drilling equipment at site.
- Power engine and compressor check list shall be prepared prior to commence the activity.
- Lorry crane shall be used for offloading of drilling pipes, casing pipe, uPVC casing pipes and tool box.
- Make sure no leakages found prior to start any kind of drilling activities.
- Setting of drilling machine at drilling point by using of hydraulic jack fitted with drilling machine truck.
- Drilling mast shall be done vertical position by using of hydraulic system.
- Alignment and verticality of drilling mast shall be done by using of level which fitted in the mast.
- Lift the 3 inch dia x 5.5 meters long drilling rod by using of wire rope hook is fitted winch.
- Tag line shall be used while lifting the drilling rod and controlled by drilling crew.
- Drilling rod shall be fitted in the rotary head which mounted in the Mast.
- 12 inch dia x 1 feet drill bit shall be lifted the same way mentioned above by using of winch and screwed with drill bit.
- Temporary water tank capacity 5000 liters shall be installed at site near the drilling point for drilling purpose.
- Flexible water hose connection with pump from water tank to rotary head shall be made and to be secured properly by using of appropriate clamps to avoid incident due to pressure.
- Then drilling activity shall be carried out and simultaneously water to be pumped through drilling bit to cut soil easily and also to control the dust in the pollution.
- Drilling shall be done in the soil formation until reached hard layer or hard rock formation.
- After pull out of the drill bit, continue with installation of temporary casing (9 inch diameter x 3 meters long) to avoid the alluvium formation from collapse. This temporary casing put it until hard layer or rock formation.

- The temporary casing shall be lifted by winch and to be installed in the drill hole with one meter projection on the ground to use the casing clamp to hold the casing pipe for further installation.
- Then lift the second casing pipe by winch fitted in the truck mounted drilling machine and place on the top of the first casing pipe which already placed in the drilled hole.
- Then rotary head shall be used for tightening of the casing pipe.
- Tag line shall be used for lifting of the casing pipe to avoid any damage of property and any injury.
- Then lift the two casing pipe joined together by casing head and remove the casing clamp.
- After removal of casing clamp, lower down the casing pipe with maintaining of 1 meter projection above ground to continue the next casing pipe installation.
- The same sequence shall be followed for the installation of all casing pipes.
- In hard formation, the hammer bit shall be used (8 inch diameter x 1 meter long hammer bit) with high air compressor for further drilling. The rock cutting samples will come out during the cutting of hammer activity.
- The canvas shall be put on the drilling machine (around drilling bit) where drilling bit passing through the casing pipe to avoid cutting particles flying.
- During in this method that use of air compressor, the water bearing zone will be detected during the hammer of hard rock layer formation.
- The water bearing zone or fractured zone that detected during drilling will be recorded to use in well design or well development.
- Pull out all the rods and hammer bit to install permanent uPVC Casing and Screen (6 inch dia x 5.5 meter long pieces).
- The temporary casing pipe shall be removed by using of winch and rotary head by the same procedure followed for installation.
- After install the uPVC casing, continue with flushing activity to clean and take out all the cutting debris inside the tube well. During this flushing the discharge of water that produced from the tube well will be recorded to determine the volume of water.

- After complete the flushing activity, the plinth concrete shall be done as a foundation around the uPVC casing pipe to avoid any damage of the casing.
- Then 4 inch stainless steel submersible pump shall be joined with 50 mm dia, specification PN 12.5 poly pipe and to be installed together in the bore hole till suitable water level.
- Nylon rope shall be installed together with pump to avoid loss of pump in the bore hole during installation activity.
- The tube well cover plate shall be installed on well head.
- Then control box with ELCB of submersible pump shall be installed 2 meter distance from the well head or suitable location.
- Then efficiency test shall be carried out after completion of control box installation

5.0 Conduct Well Efficiency Test

Pumping tests have to be conducted to determine the efficiency of the well. **This is very important to avoid over pumping that can affect surrounding areas like settlement of land.** The efficiency of a well must be over 70% *(Department of Minerals and Geosciences requirement).* On termination of the development process, before starting the test, allow the water level to recover to its original position (static water level). For the test, two methods shall be undertaken. The first shall be a four (4) steps drawdown test within a duration of 60 minutes for each step. The pumping rates of the four steps shall progressively increase with approximate equal increments. The second test shall be a 24 hours constant discharge test whereby the drawdown in water level and recovery reading will be recorded. The maximum volume that can be abstracted from the tube well will be decided from this test. This rate (volume) can be used for a long-time abstraction without drying. The long-time dry condition just give the slightly affect to groundwater abstraction.

6.0 Pump Installation

All electrical works comprising wiring and connection to the nearest electrical supply, installation of pedestal mounted and weathered proof control panel; cabling for pump set, signal cable including all necessary as water level monitoring and start or stop.

7.0 Production Well Schematic