GROUNDWATER SURVEY REPORT

SEPTEMBER 2024

FEASIBILITY STUDY FOR GROUNDWATER EXECUTED AT JAMIA MASJID FAROOQ AZAM, DHOK MAIL, TEHSIL LAWA, DISTRICT TALAGANG

CLIENT

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Prepared by

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1.0 INTRODUCTION

This report presents the findings of the Groundwater Survey (GWS) executed on 21th of September, 2024 on the request of "Mr. Kayyum Niazi" at Jamia Masjid Farooq Azam, Dhok Mail, Tehsil Lawa, District Talagang.

The main objectives of the survey were to determine the sub surface lithological parameters and characteristics in term of groundwater potential and to select suitable site for the exploration of groundwater through installation of a Borehole. The maximum depth at different sites has been scanned 300 m (about 984 ft) by latest ground water survey technology. The Survey Team, in consultation with the Client selected the appropriate locations to be surveyed for groundwater exploration with the help of "PQWT S-500" & American NAVVY latest ground water survey instruments.

The summary of field operation and field data processing / handling has also been given to provide the principal of the sounding techniques. It includes the interpretation of PQWT data presented in the form of vertical columnar sections indicating interpreted / estimated underground hydrological conditions. The details of field survey conducted, methodology, analysis of the data collected, results and recommendations are presented in this report.

2.0 SCOPE OF WORK

The Client aims to develop groundwater resource by installing "Tube well / Borehole" to meet the drinking / irrigation water supply requirement. Prior to plan the exploration of groundwater from the area it is very important to have latest diagnostic scientific information regarding sub surface hydro-geological conditions of the study area.

- Site reconnaissance to assess field conditions and plan the groundwater studies.
- Geological appreciation of the study area based on the available literature & field work.
- PQWT survey to ascertain the subsurface lithology, thickness and lateral distribution of the subsurface deposits and groundwater.
- Analysis of data obtained through above studies to establish potentials of groundwater in the study area.
- To make recommendations of the sites favorable for groundwater exploitation.

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3.0 FIELD INVESTIGATIONS

Two different types of instruments were used to determine the sub surface lithological parameters and characteristics in term of groundwater potential.

I) - NAVVY Ground Water Detector (American)

II) – PQWT S-500

3.1 Working Principle of NAVVY Ground Water Detector

It is an advanced Long Range Water Locator System (LRWLS) works on the Digital Frequency Signal Processing (DFSP) methodology & it receives the electrostatic fields of the water (figure-1).

This system works on the technology of transmission and reception, it sends and receives waves at the same time, and it searches for the target according to its types by sending a signal with a frequency corresponding to the self-absorption frequency, which differs according to the type of water. As the water molecules, according to its type, absorb (dampen) the electric signal, thus the difference in the received signal strength reveals the presence of water.

This device relies on the detection of underground water through the impact of waves out of the device static electricity fields formed around the water as a result of its presence under the ground, waves of the device to amplify the size of these fields and escalate to the surface of the soil, which helps the device in locating water from long distances. The device amplifies this signal and directs the target location directly and accurately to the destination through the automatic pointers on the screen. It can also detect the quality of water i.e. natural water - mineral water - salt water etc.

Figure 1: Showing the latest "NAVVY" Ground Water Survey Instrument

3.2 Working Principle of PQWT S-500

PQWT (S-500) uses the natural electric field source as a working farm, with resistivity contrasts underground rocks and minerals or groundwater, based on measuring the natural electric field on the surface of the N different frequency electric field component, according to their different variation to study. This method measures the electrical component of the electromagnetic field of the earth, so called natural electric field method. It is controlled source electromagnetic (CSEM) geophysical survey technique which is usually used for groundwater exploration.

This geophysical method involves transmitting a controlled electric signal from Electrode-A (transmitter site) at a suite of frequencies into the ground from one location and measuring the received electric and magnetic fields in the area of interest from Electrode-B (receiver site) as shown in figure-2.

3.3 Instrumentation and Field Procedure

In PQWT groundwater survey, two Electrodes A & B were placed at maximum length of 10 m (shown in figure-2) with dot spacing of about 0.5 - 2 m that records the natural electric field of the earth and then software generates the subsurface curve graph & profile map.

Figure-2: Showing the field procedure of PQWT Groundwater Survey (GWS)

3.4 Methodology of the Interpretation and Evaluation of Data

The methodology of the interpretation of PQWT data (figure-5) made through subsurface profile map, defined as the vertical section of the measuring points that is exposed by a measuring of Natural electrical fields variations, examples are shown in the following figure-3 & figure-4.

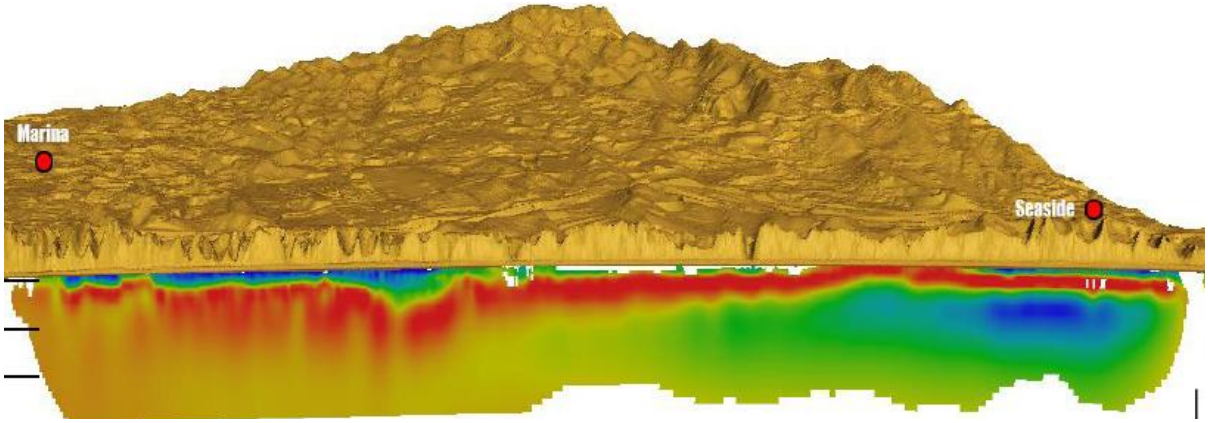


Figure 3: Showing the example "Cross-Section obtained by PQWT instrument"

The data obtained from site / field is processed through software which generate the subsurface profile map, representing contours of the elevation of a particular rock / mineral or ore formation, reservoir or geologic forms in beneath the surface, such that folds, faults, fractures and other geologic structures.

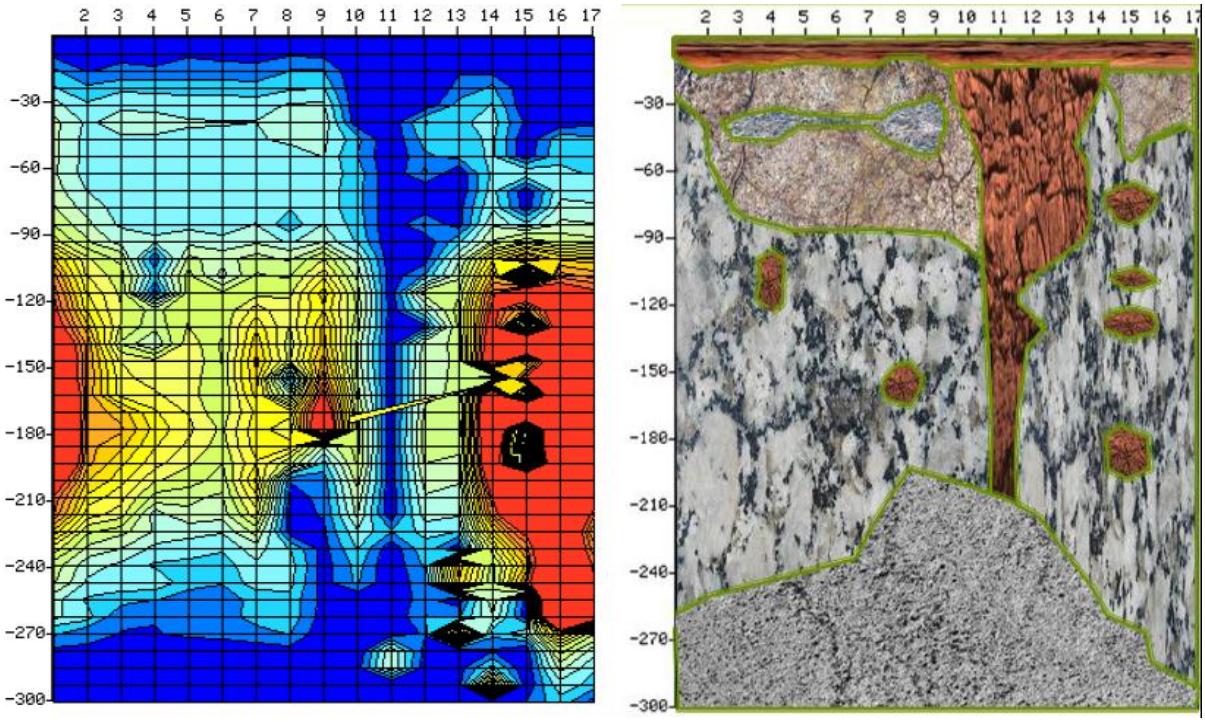


Figure 4: Showing the example of subsurface fractures in a Rock

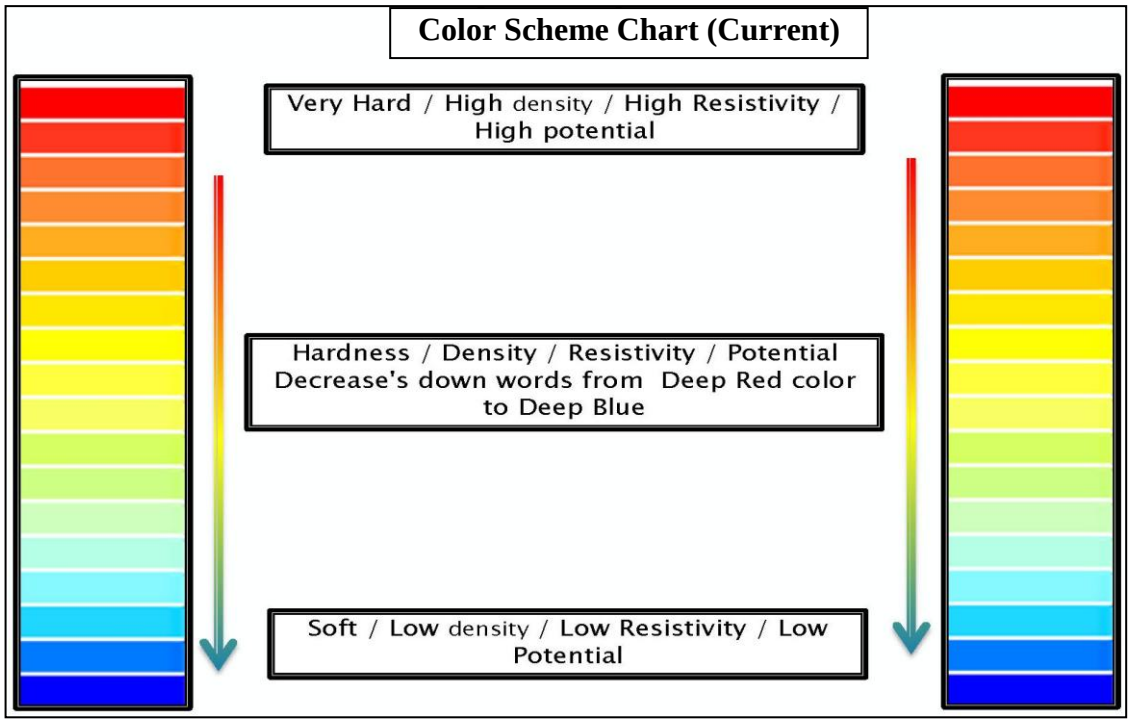
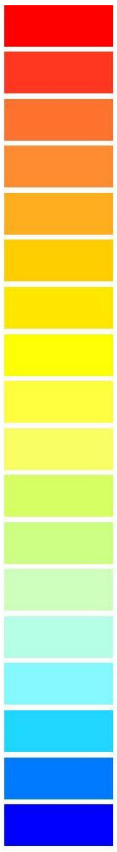


Figure 5: Showing the color scheme chart determination of PQWT survey profiles



Red Color represents **highly** strengthen/ high resistivity of rock formation, and the color indicate danger symbol, we don't get water in this zones/ getting in limited areas

Orange Color represents **less than the highly** strengthen rock formation, this color also indicates some of danger zone, here we don't get water in this zones / getting in the limited areas

Yellow Color represents **medium** strengthen rock formation, this color also indicates warning to getting water in this zones

Green Color represents the **less-than medium** strengthen rock formation, this color also indicates starting of water zones

Light Blue Color represents the **soft rock formation** / water bearing rock formation, this color indicates wealthy chances of getting water in the zone

Blue Color represents the **soft rock** formation / water bearing rock formation, this color indicates wealthy chances of getting water in the zone

3.5 Study area Results

The groundwater survey (GWS) was conducted at four (4) different places of the study area and coordinates were taken by handheld GPS (table-1).

The results of PQWT groundwater survey (GWS) profiles are represented as curve graph and colorful profile map. The color chart represents the identification, description, variation, and analysis of subsurface rock formation and its distribution. The contours in the profile map represents the elevation of a particular rock / mineral / ore formation, reservoir or geologic forms in beneath the surface, such that folds, faults, fractures and other geologic structures.

Table-1: Showing the location & Proposed drilling depth of Surveyed Profile

Sr.	Ground Water Survey (GWS) Profile	Area / Location	Coordinates in UTM (taken by handheld GPS)	Proposed Drilling Depth & Water Probability
1	**GWS-1, 2, & 3**	Periphery of Jamia Masjid Farooq Azam	771045.44 m E 3646252.18 m N	No Adequate Presence of Ground Water
2	**GWS-4**	Al-Habib Market	771054.00 m E 3646277.00 m N	+/- 150 m (~about 492 ft) 80 – 85 %

The results of the executed subsurface Ground Water Survey (GWS) profiles & the site working photographs are shown in the following attached figures 6 & 07.

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TALHA KHAN
(M.Sc Geologist)

Figure 6: Showing the Ground Water Survey is in progress at the site (GWS-4)

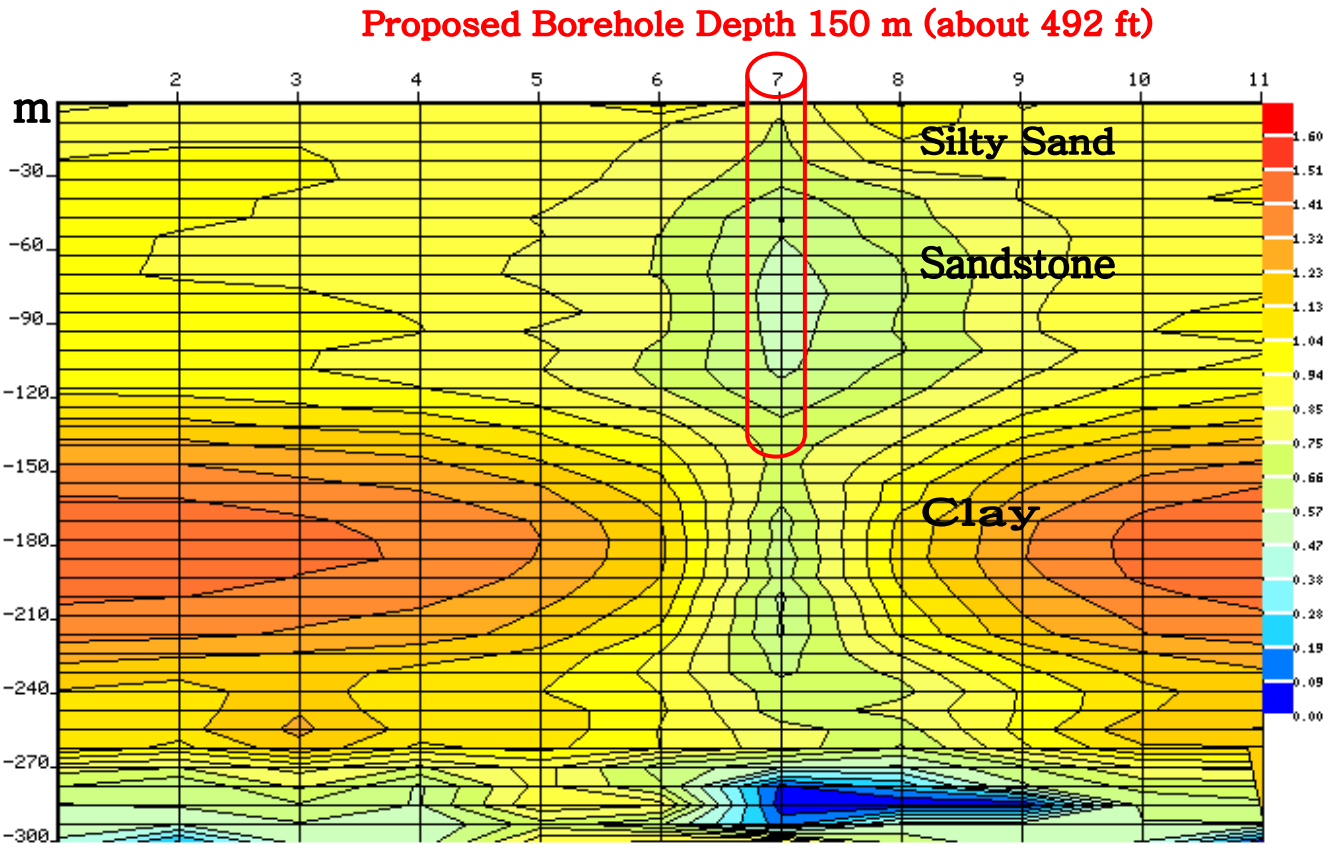

Figure 7: Showing the subsurface cross sectional map of the profile GWS-4 (Line L-824)

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

- Topographical, hydrological & hydro-geological situation of the investigated area reveals that there are moderate chances of the presence of groundwater potential at the proposed locations only.
- The project area is consists of clay, gravel / boulder, Sandstone & Shale.
- Four (4) groundwater surveys were conducted at the proposed site and coordinates are taken by handy GPS.
- Due to the presence of Clay / Shale the potential for required quantities of groundwater may be expected to exist in the subsurface of the study area, if proper recharge system is available**.**

4.2 Recommendations

- Based on experience and interpretation of groundwater survey conducted at the project area both the profile GWS-4 (at Al-Habib Market) has moderate ground water potential at the marked location only as given in the table-1 (figure-6).
- According to the site results there are 80 – 85 % chances of the presence of ground water at the proposed locations only. The location of the proposed drilling point was marked at project site location.
- The proposed drilling depth of the trial borehole for GWS-4 location is about 492 ft (table-1, page-6).
- In the presence of Geologist the groundwater potential must be confirmed through test drilling in Diameter of 12 - 18 inches (trial borehole) with heavy percussion drilling method up to the explored depth as given in the table-1, depending upon the geological & hydro-geological conditions**.**
- Proper Geological Logging is recommended in the presence of Geologist, to make the proper design of the borehole.
- The cutting samples must be preserved to analyze the subsurface geological conditions and hydrological characteristics.
- The proposed ground water depth depends upon the acquired machine data. In case of failure of the borehole the Company (GTE) will not be responsible for any loss in the bore-hole drilling.

Note: This report is not valid for any court of law against the Company