



# SACHIDARAJ ENGINEERING PVT. LTD.

NABL ACCREDITED LABORATORY, ISO-9001-2015, ISO-14001-2015, CERTIFIED CO.

PROJECT MANAGEMENT, STRUCTURAL DESIGNER, SURVEYER & GOVT. VALUER

SACHIDARAJ

SOIL TEST, PILE LOAD TEST, INTEGRITY TEST & NDT TEST DONE HERE, GSTIN : 20AAYCS6831J1ZW

## Hydrology Report

Date:- 21/07/2023

This is to certify that applicant Mr. Shankar Kumar, S/o- Mr. Phool Chand, intends to build Residential Commercial apartment having 8 Nos. of Flats, on old plot no- 420, new Plot No.- 8/1618, old khat no - 99, new Khata No.- 392, P.S- Adityapur, Ward No-4, Mauza- Gamharia, Thana No.- 66, District- Saraikela-Kharsawan, Jharkhand, which shall have a population of about 40 persons in the said Residential commercial apartment. There are Single Block up to (B+G+4) Storied Building with Plot area 550.28 sqm, proposed BUA 359.27 sqm and falls under the jurisdiction of Adityapur Municipal Corporation.

Applicant has estimated an overall requirement of 5400 liters (Assuming 135 ltrs. per day per head for 40 persons) of water per day for human consumption use and the other purposes of residents of the said Residential unit, which is not currently available from Urban water supply system or Drinking water and sanitation Department.

As such applicant plans to extract ground water in the said plot for the said requirement and store the same in the overhead tank or surge tank of 1 nos. of 10,000 liter storage capacity.

We hereby certify that the said extraction / development in such amount and use of ground water is possible, therefore it is permitted. In lieu of said permission for use of ground water the applicant shall comply with the following instructions:-

5940 ltr/per hr - bore No.1 (regarding extraction rate)

1. Physically odorless and colorless, Chemical Analysis Report attached herewithas Annexure (regarding quality of water testing)
2. Through Roof top rain water harvesting and waste water harvesting (regarding recharging of aquifer)
3. NOC from Central Ground Water Authority if required by the local authority.

In case it is learnt / observed by any authority of Urban Administration that the applicant is not complying with the said instructions or is abusing the said source, necessary action shall be taken against him/them.

I do hereby declare that the information given herein above are true to the best of my knowledge and belief and based on the basis of engineering / field test.

For, Sachidaraj Engineering Pvt. Ltd.

**Er. S. N. SINGH**  
Chartered Engineer  
Regd. No:- M-394575-3

(Structural & Geotech Consultant)



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● JAMSHEDPUR ● RANCHI ● PATNA ● RAIPUR

## Geophysical Investigation Report

1. *Description of Site*
  - (i) *Name of Client* : *MR. Shankar Kumar*
  - (ii) *Name of the Area* : *Gamharia, Adityapur*
  - (iii) *Location* : *Within the premises of proposed site*
  
2. *Date of Investigation* : *21/07/2023*
  
3. *Investigations Conducted* :
  - (i) *Hydrogeological Studies*
  - (ii) *Geo - Botanical Studies*
  - (iii) *Electrical Resistivity Surveys*
  
4. *Resistivity Method used* : *Vertical Electrical Sounding (VES)*
  
5. *VES Configuration* : *Pole - Dipole*
  
6. *Geology of the area* : *The study area forms undulating land within Saraiekela - Kharsawan District. Natural vegetation is low to medium. The area is underlain by Granite, Gneisses of Achaean age. These rocks exhibit weathering maximum thickness up to 45 meters. The rocks traversed by numerous joints, cracks and fissures, which form the Water bearing zones within this hard rock.*
  
7. *Depth of Static Water Table* : *30 m - 150 m*



8. Results of VES : 1 site was probed by Pole-dipole configuration.  
The layer parameters of VES1 is enclosed.

- (i) Thickness of Weathered zone : 6-9 m  
(ii) Thickness of Semi-weathered zone : 15 m  
(iii) Depth of hard & compact rock : 20 m onwards  
(iv) Fracture (if any) : Given in Annex. - 1

9. Recommendation for Drilling : Given in Annex. - 1  
(i) Casing : As per condition seen in drilling  
(ii) Water bearing zone expected : Given in Annex. - 1  
(iii) Layer's parameter's : Given in Annex- 2

*Annex. - 1*

No.	Fractures (m)	Maximum depth to be drilled (m)	Expected Yield
VES-1.	25-45, 100-125, 150-170,	170	2.5" - 3.5"

*Pl. Note.* Medium to High discharge is expected in course of drilling.



## Geological Report of the area/district

### **General information of Saraikela-Kharsawan**

1. Geographical area – 2996 sq km
2. Number of Block – 8
3. Number of Panchayat – 172
4. Number of Village – 1187
5. Population – 1065056
6. Average Rain Fall- 1351.6 mm

### **Geology of the Area:-**

The geology of the district follows the Regional stratigraphy of Singhbhum District of Jharkhand; the litho-structural environment is distinctly separated by the 160 Km long thrust zone — known as the Singhbhum Shear zone. North of it, occur a group of metamorphosed rocks while the southern part is conspicuous by the presence of un- metamorphosed rocks which are underlain by the older metamorphic. The Whole sequence of rocks in south Singhbhum and also in the eastern part is traversed by younger igneous bodies of ultrabasic, basic and acidic compositions. The stratigraphic sequence of South Singhbhum is as follows,-

- Newer dolerite
- Quartz veins, veins of pegmatite,
- Granophyre, Soda Granite
- Singhbhum granite
- Singhbhum Orogeny
- Dhanjori Lava
- Quartzite, conglomerate
- Unconformity Kolhan Series
- Unconformity Iron Ore Series
- Unconformity Older Metamorphic

### **Geomorphology of the Area:-**

1. Major physiographic unit - Undulating topography marked by isolated hills and valleys
2. Major Drainages :- Subarnrekha and Kharkhai Rivers

### **Major Soil Type of the Area :-**

Alfisols / Ultisols



### **Irrigation by Different Sources:-**

1. Dugwell :- 17015
2. Borewell:- 184
3. Tank / Pond :- 100
4. Canals :- 2

### **Hydrogeology of the Area:-**

The southern part of the district is underlain by Granite-gneiss of Achaean age forming the basement. These occur as large batholiths and are intruded by basic rocks. In the central and northern part of the district the rocks of Barakar formation consisting of feldspathic sandstones, shales and coal seams overlying the metamorphics are exposed. In the western and northern part of the district alluvial cover of moderate thickness, caps the Archaean crystallines and the Gondwana sedimentaries.

The district is underlain by diverse geological formations with complex tectonic framework. The geological formations have been grouped under three main categories

- a) The gneissic complex in the southern and the central part
- b) The Rajmahal traps in the eastern and southeastern part
- c) Gondwanas overlain by thin mantle of alluvial cover in the northern and central part.

Ground water occurs mostly under phreatic condition in all the lithological units within the shallow aquifers and locally under semi confined and confined condition in deeper aquifers.

1. Major Water bearing formation :- Chotanagpur Granite Gneiss, Gondwanas, Alluvium.
2. Pre-monsoon Depth to water level during 2012) m bgl. :- 5.23-12.20
3. Post-monsoon Depth to water level during 2012) m bgl. :- 1.6-7.10

### **Ground Water Quality of the Area:-**

Ground water in the phreatic aquifers in Saraikela district slightly alkaline in nature, which is also colourless, odourless. The specific electrical conductance of ground water in phreatic zone during May 2011 was in the range of 655 -2408  $\mu\text{S}/\text{cm}$  at 25°C. The suitability of ground water for drinking purpose has been evaluated on the basis of pH, Total hardness (T.H), Ca, Cl, F and NO<sub>3</sub>. Presence of Chemical constituents more than permissible limit F and NO<sub>3</sub>, Fluoride and Nitrate above permissible limit in patches

### **Dynamic Ground water Resources**

1. Total Ground water availability = 188.59 mcm
2. Net Annual Ground Water Draft = 22.10 mcm
3. Projected Demand for Domestic and industrial Uses up to 2025 = 17.30 mcm



## Report of Hydrogeological Survey

A detailed hydro geological investigation has been carried out to get the discharge of existing bore well on the land represent by Mr. Shankar Kumar, s/o-Mr. Phool Chand, New Plot No.- 8/1618, New Khata No.- 392, Thana No-66, PS- Adityapur, Mauza-Gamharia, District- Saraikela-Kharsawan, Jharkhand, which shall have a population of 240 persons in the proposed one nos. Residential Commercial Tower of (B+G+4) Storied Building, having proposed BUA = 359.27 Sqm.

The details of the discharge test carried out at bore well no 1. is as under

1. Total Depth of Bore Well No 1	:	600'
2. Diameter of the bore well	:	6"
3. Diameter of outlet pipe	:	2"
4. Detail of pump	:	5 HP Submersible
5. Static Water Level	:	150'
6. Pump Started at	:	10.15 AM
7. Discharge measured upto	:	10.17 AM
8. Maximum draw down as noticed	:	10.17 AM
9. Water level after draw down	:	99'

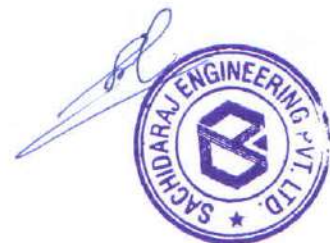
Calculation of discharge of bore well : The rate of discharge is measured by the taking volume Vs time method in account a container of 200 liters is taken and its found that the container was filled in 100 seconds

Hence the rate of discharge can be calculated as follows:  $Q =$

$$\frac{165 \times 60}{100} = 99$$
$$= 99 \times 60 = 5940 \text{ ltr/hr}$$

### Remarks

1. Since the bore well is yielding (5.940 ltr/hr) water at 5,940 ltr/hr which is providing sufficient water for the above mentioned consumption if borehole is pumped for 2 hours on alternate pattern. In addition to this the proposed site is under the command area of Jindal Water Supply Project which is likely to start very shortly which in due course would reduce the extraction of Ground Water.
2. Regarding the recharging the proposed apartment has got 690 sq.mt open roof area which can retain annual rain water of given magnitude 650 cubic meter. Average rain fall of Adityapur is 1351.6 cm (1.35 mtrs) as per our calculation annual volume of water recharge 17,06,400 ltrs. 1 (One) Recharge pit of 32 cubicmeter is recommended near the fracture zone of the existing bore.
3. As laid down for recharging ground water in the plot by means of roof topharvesting of rain water it will improve the quality of ground water in the area.
4. Roof top harvesting of rain water to recharge the ground water aquifer must be as per design of and plan as attached herewith this report.



5. The construction of recharge pit including 4.5" dia drilling in the recharge pit in the building premises to facilitate complete roof top harvesting of rain water to recharge ground water should be technically supervised by hydrologist.
6. About waste water recharging as per standard calculation for Commercial Building of 100 people will dispose waste water of 50,000 liters and the same can be used for surface recharge by construction of ordinary soak pits within or outside the premises.

**Observation and Recommendations:-**

1. The above upcoming project of Residential units is viable as per the current under ground water availability. Further one more bore hole is recommended for reducing load over the existing water aquifer or arrangement of water supply from other local authority in due course.
2. Roof Top Rain water harvesting should be strictly implemented for sustainable water supply for the project.

- Annexure:
1. Water Quality Test Report
  2. Plan and Section drawing for Recharge Pit.
  3. Bore hole location map and roof top area map.

