Chirayu Charitable Foundation

CHIRAYU CHARITABLE FOUNDATION

Reg. No BPL/H. Bad Division/9410/2001

Arvind Goenka
PRESIDENT

Dr. Ajay Goenka
SECRETARY

To,

The Regional Director,
Central Ground Water Board,
North Central Region,
1st Block, 4th Floor, Paryawas Bhawan,
Jail Road, Bhopal (M.P) 462011.

Sub: Submission of compliance report.

Ref: Letter 1.No.21-4(67)/NCR/CGWA/2010-853 dated 16 Mar 2010.
2.No.4-6/NCR/TS-637 dated 15-02-2011.

Sir,

With reference to the above mentioned letters please find enclosed the Compliance Report regarding the NOC conditions for withdrawal of ground water in the hospital and medical college premises. It is also informed that the monitoring of ground water levels and quality of ground water is being done periodically. The data of water levels and ground water quality will be submitted from time to time to your office.

Yours faithfully

Secretary
For Chirayu Charitable Foundation

Received
20/6

11, Professor Colony, Goenka House, Bhopal, Tel. : 2661222
Chirayu Hospital, 6, Malipura, Bhopal, Tel. : 0755-2737402, 2737403, 2530090

REPORT ON COMPLIANCE OF NOC CONDITIONS FOR GROUND WATER WITHDRAWAL

Background

M/s Chirayu hospital had applied to Central Ground Water Authority for withdrawal of ground water in the premises of Hospital and medical college at village Bhaisakhedi, Block Phanda, Tehsil Huzur, District Bhopal vide application dated 22-12-2009. The NOC was given on 16 March 2010 vide letter No. 21-4(67)/NCR/CGWA/2010-1853. The NOC was accorded by CGWA subjected to fulfillment of conditions. The present report pertains to the fulfillment of those conditions.

Introduction

The Chirayu Hospital and Medical College is located in the Bhaisakhedi village, Block Phanda, Tehsil Huzur, District Bhopal, on Bhopal-Indore State Highway 18. The village Bhaisakhedi is located about 4 kms from Bairagah on the Indore Road. The project area lies in Survey of India toposheet No.55 E/7 is located at North latitude 23 16' 05 and East longitude 77 18' 28". The total land area of the Hospital and Medical college premises is 1, 29,100 sq meters. The roof top area of the buildings and sheds covers an area of 21,957 sq.m, Road/Paved area 23,611 sq.m, Green belt area 12, 702.13 sq.m and open land 30,300 sq.m.

The project area lies in the micro watershed basin of Kolan Nadi. The Kolan Nadi is not perennial but flows only during rainy season. A small ephemeral tributary of the kolan Nadi flows near the project area and ultimately joins the upper lake near Bhaisakhedi. The project area is covered with black cotton soil. The thickness of the soil ranges from 2.0 to 2.5 m.

Hydrogeology

The entire area is underlained by Deccan Trap basalts which overlie the Bhander Group (Vindhyan Super Group) of rocks comprising of sandstone and shale. The primary porosity and permeability is absent in basalts. However the secondary porosity and permeability is developed due to weathering, fracturing, jointing and formation of vesicles. The aquifers in basalts are due to the presence of this secondary porosity and permeability. The occurrence and movement of ground water in basalts occurring in the area is controlled by the degree of weathering. The thickness of individual lava flows range from 10 to 30 m and varies from place to place. Each individual lava flow generally consists of three units namely the weathered and clayey upper portion, vesicular middle portion and the massive bottom portion.

Six bore wells and one piezometer has been drilled in the premises. On the basis the data of the bore wells and piezometer drilled in the area it is inferred that Deccan trap basalts are encountered up to the maximum drilled depth of 432 ft. The aquifers encountered are weathered basalt, vesicular basalt and fractured basalt. The discharge of the bore wells range from 0.22 lps to 3.5 lps. The depth to water level in the bore wells ranges between 10.00 to 29.50 mbgl. In the area the ground water occurs in the weathered formation giving rise to unconfined aquifer. This aquifer is more or less encountered in all the bore wells drilled in the area. The aquifers occurring at deeper levels are encountered in the vesicular basalts, jointed and fractured basalts giving rise to semi confined to confined aquifers. Red Bole encountered in the bore wells act as semi-confining or confining layer. The location of the bore wells is shown in Fig.1. The details of the bore wells are given below in Table 1.

Hydrochemistry

The water sample from bore well in the premises was collected on 03-03-2011 for determining the concentration of chemical constituents in the ground water. The results of the chemical analysis are tabulated below in Table 2.

Table 2: Chemical quality of bore well no.3

Constituent	Concentration
pH	8.02
Ec µmhos	710
CO_3 (mg/l)	Nil
HCO_3 (mg/l)	122
Cl (mg/l)	128
SO_4 (mg/l)	60
NO_3 (mg/l)	17
F (mg/l)	0.24
Ca (mg/l)	38
Mg (mg/l)	32
Na (mg/l)	62
K (mg/l)	1.2

Artificial Recharge

Artificial recharge is also defined as the process by which ground water is augmented at a rate exceeding that under natural condition of replenishment. Artificial recharge efforts are basically aimed at augmentation of the natural movement of surface water into ground water reservoir through suitable civil construction techniques. The artificial recharge is implemented in the project area to replenish ground water resources in aquifers and to conserve water for future use. The following benefits are expected due to implementation of rain harvesting in the area to recharge the ground water.

- The groundwater levels in the area would not decline and would on the contrary rise at the present rate of withdrawal of ground water.
- The yield of the bore wells would increase.
- The sustainability of the bore wells would increase.
- The quality of ground water would be improved as rain water is devoid of any impurities. The soil mantle through which rainwater is recharged would act as membrane to the travel of pathogen contained in the water.
- The ground water resources in the area would be augmented.
- The surface runoff would be stored on the surface and in sub surface during the rainy season and would be used during the remaining part of the year.
- Soil erosion would be retarded.

In the premises the water levels in the bore wells are below 10 mbgl therefore recharging of shallow aquifers is feasible. Also the deeper aquifers have been encountered indicating that the formations occurring at depths would accept the rain water injected thereby recharging the deeper aquifers.

Compliance of the NOC conditions

The following conditions are complied with as detailed below

1. The withdrawal of ground water does not exceed 256 m^3/day. The abstraction of ground water in the campus is through 6 bore wells only. The number of bore wells drilled does not exceed the number of bore wells mentioned in NOC i.e. Eight (8) (Total 8, 4 existing, 4 proposed).

2. The bore wells have been fitted with water meters and is shown in Fig1A.

3. The analysis of water sample of piezometer constructed is given below:

4. The following ground water recharge measures have been implemented in the area in consultation with Regional Director, Central Ground Water Board, North Central Region, Bhopal.

- Two tanks each of dimension 20 m X 6 m and depth of 2 m have been constructed in the noth west part and southern part of the premises. The capacity of each tank is 2400 Cubic meters. Thus the volume of rain water that will be harvested in the two tanks is 4800 cu.m. The water harvested in the tank would recharge the ground water and would also be used for gardening. A photograph of the tank is shown in Fig-2 The overflow from the tank is being recharged in the bore well located at distance of 46 meters. Before injection of overflowing rain water, the rain water is allowed to pass through filter pit constructed near the bore well shown in Fig 3.
- The total roof top catchment area in the premises is 21957 sq.m. The normal annual rainfall of the area is 1154 mm i.e. 1.15 m. The rain water collected on roof tops of the buildings and sheds is 25250 cubic meters per annum. The first shower of rain is not being harvested and allowed to flow as runoff. Some rain water would be subjected to evaporation. Considering that these losses are about 15 percent the remaining 85 percent of rain fall i.e.21463 cu.m is harvested in the seven bore wells in the area. The rain water is passed through the online filters before injection in the bore wells as shown in Fig.4
- The total area of roads and paved area in the premises is 23611 sq.m. The normal annual rainfall of the area is 1154 mm. Thus a total volume of 27153 cu.m/annum is generated. Considering that 75 percent (as per norms) rain water can be harvested, the quantum of rain water being harvested and recharged is 20634. The rain fall run off over the open land is diverted through drains. Along the drains pits are constructed. The dimension of the pits is 4 m in length 0.5 m wide and 1 m depth. A bore of 5m depth having a diameter of 4 inches is drilled in the pit. A 3 inches PVC casing pipe with slots below 3 to 4.5 m depth is lowered in

the bore. The pit and the annular space between the bore and casing pipe are filled with filter material pebble and gravel. These recharge structures are constructed intermittently in the entire area. The total area of the drains is 1,10,000 sq.m. The total numbers of drain pits constructed are 27. The sectional view is shown in Fig 5. The photograph is shown in Fig 6.

4. The photographs of the recharge structures are enclosed.

5. A piezometer has been constructed in the premises for monitoring the water levels. The location of the piezometer is shown in the Fig.1. The details of the piezometer is shown in Fig.7 and Fig.8.

   Total Depth drilled: 67 mbgl.

   PVC Casing pipe lowered: 12 mbgl. Below 12 m uncased.

   Diameter of PVC casing pipe: 4"

   Depth to Water: 15.75 mbgl

The subsurface geological rock formations encountered during drilling of piezometer is given below in Table.3

Table:3 Lithological log of Piezometer

Drilling Depth (mbgl) From	To	Thickness	Rock formations	Remarks
0.00	2.00	2.00	Soil & Clay	
2.00	12.00	10.00	Highly weathered Basalt	
12.00	25.00	13.00	Vesicular Basalt	Aquifer encountered
25.00	55.00	30.00	Massive Basalt. Red bole encountered between 33 to 35 m depth.	
55.00	60.00	5.00	Vesicular Basalt, slightly fractured	Aquifer encountered.
60.00	67.00		Massive Basalt.	

6. Chemical quality of ground water

The ground water sample of the piezometer was collected on 06 March 2011 and analyzed to determine the quality of water for domestic use. The results of the chemical analysis are detailed below in Table 4.

Table:4 Chemical quality of Piezometer

Constituent	
pH	8.02
Ec µmhos	710
CO_3 (mg/l)	Nil
HCO_3 (mg/l)	122
Cl (mg/l)	128
SO_4 (mg/l)	60
NO_3 (mg/l)	17
F (mg/l)	0.24
Ca (mg/l)	38
Mg (mg/l)	32
Na	62
K	1.2

7. Two Sewage Treatment Plants (STP) are established in the premises as shown in Fig.9. The sewage generated is treated up to a secondary level with chlorination. The quantum of sewage water treated is 300 m^3/day in each STP, thus total quantum of treated water is 600 m^3/day. The treated water is used for toilet flushing and horticulture.

Conclusions

All the conditions mentioned in the NOC for withdrawal of ground water are complied with as mentioned above. The monitoring of water levels and chemical quality is being done and the water level data and quality data collected will be submitted to Regional Director, CGWB, NCR, Bhopal periodically.

Table: 1 Details of Bore wells drilled in the Chirayu Hospital and Medical College premises

S.No	Coordinates	R.L. magl	Total Depth (In feet)	Diameter In inch	Lowered Depth of Casing pipe(feet)	Pump Lowered Depth (In feet)	HP of Pump	Static Water Level (meter)	Duration Of pump Running (hour)	Discharge (LPS)
1	23^0 16' 28" 77^0 18' 32"	506	180	7	50	160	5	12	6-8	-
2	23^0 16' 04" 77^0 18' 28"	505	350	7	50	-	5	11.78	20	1.25
3	23^0 16' 07" 77^0 18' 24"	512	220	7	50	180	5	10	20	2.50
4	23^0 16' 11" 77^0 18' 28"	514	250	7	50	180	7.5	29.5	10-15	0.22
5	23^0 16' 10" 77^0 18' 31"	511	200	7	50	180	7.5	28.60	1-2	0.2
6	23^0 16' 09" 77^0 18' 35"	508	240	7	50	180	5	13.50	20	1.65
7	23^0 16' 02" 77^0 18' 31"	511	432	7	50	-	-	14.50	Not pumped	-
8	23^0 16' 04" 77^0 18' 31"	510	430	7	50	-	-	12.50	Not pumped	-
PZ#	23^0 16' 05" 77^0 18' 28"	505	225	-	50	-	-	15.75	-	-

PZ = Piezometer

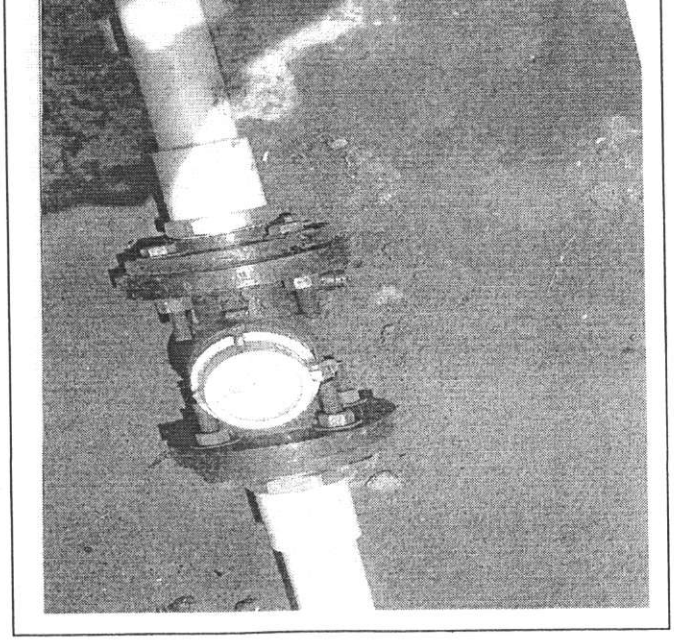

Fig. 1A: Water Meter Fitted in Bore Wells

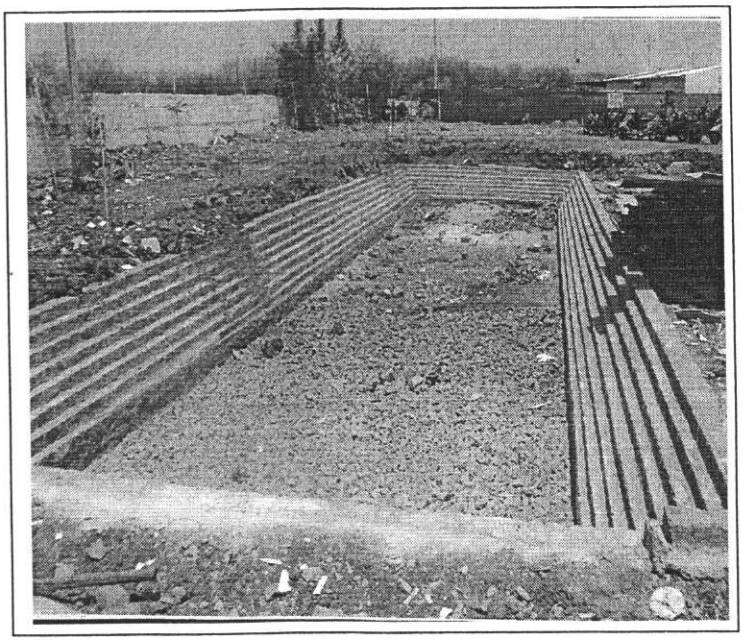

Fig. 2: Recharge Tank

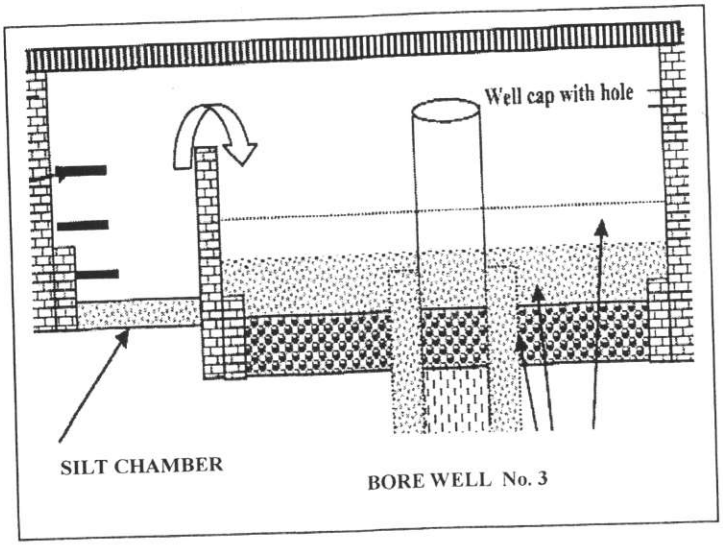

Fig. 3: Filtration Pit

Fig. 4: On Line Filter

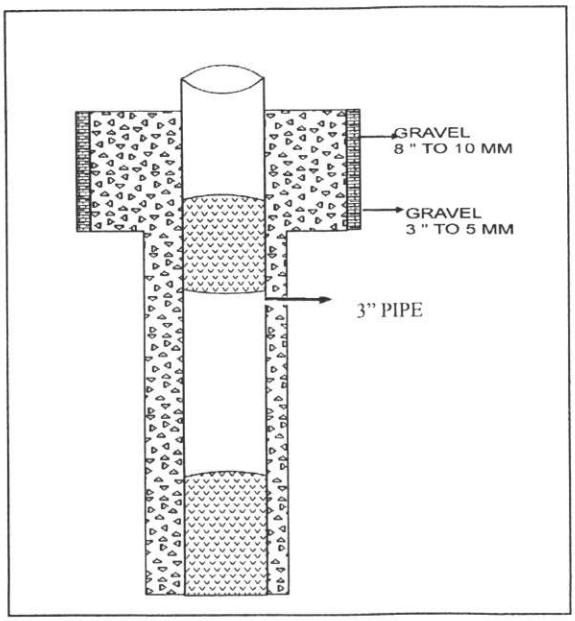

Fig. 5 A: Sectional View of Recharge Pit in Drainage

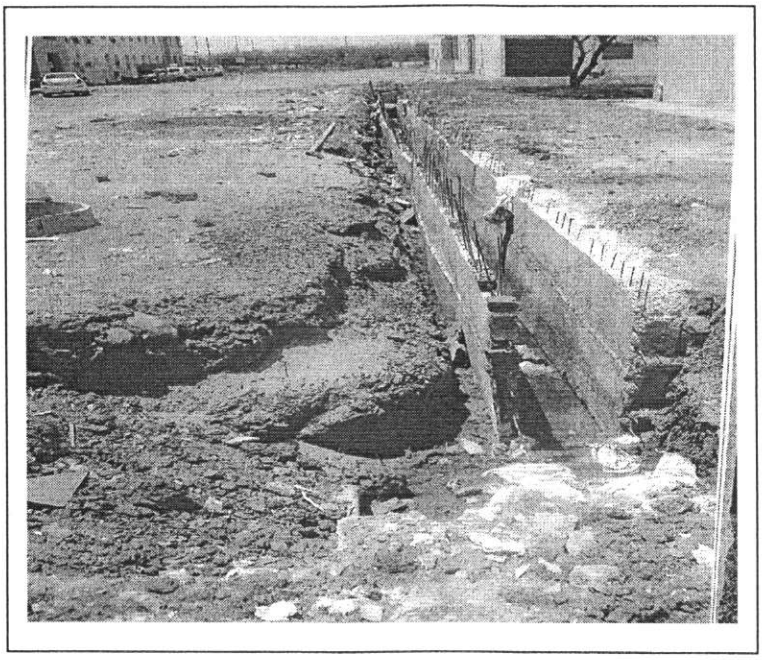

Fig. 5 B: Strom Water Drainage under Construction

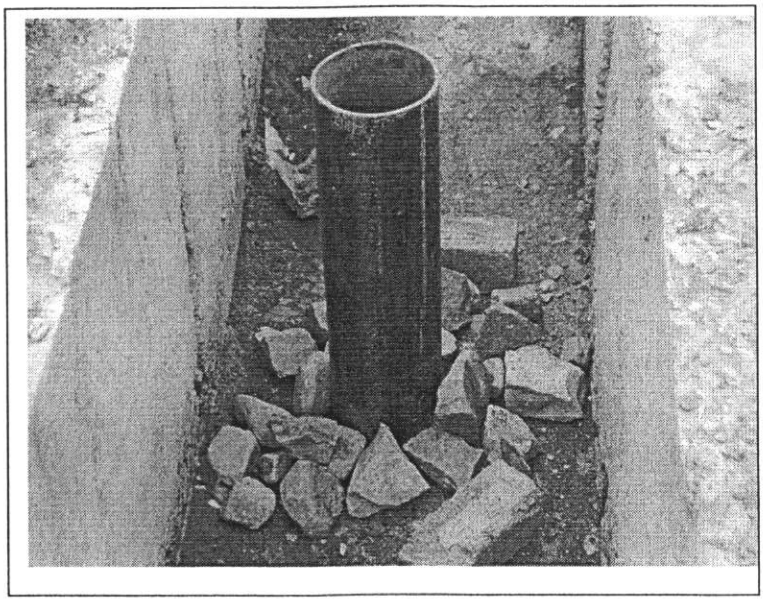

Fig. 6: Recharge Pit in Drainage

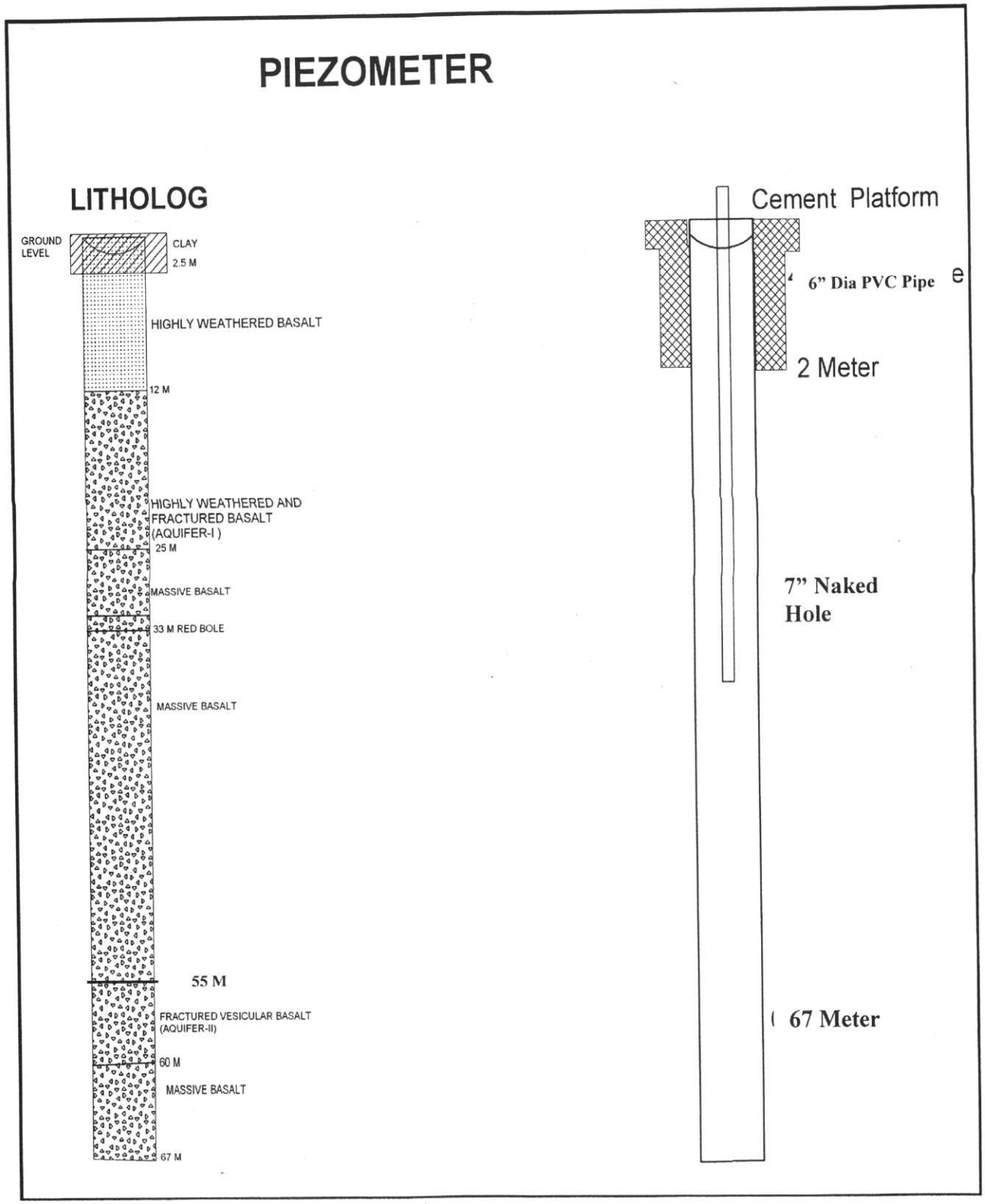

Fig. 7: Piezometer with Litholog

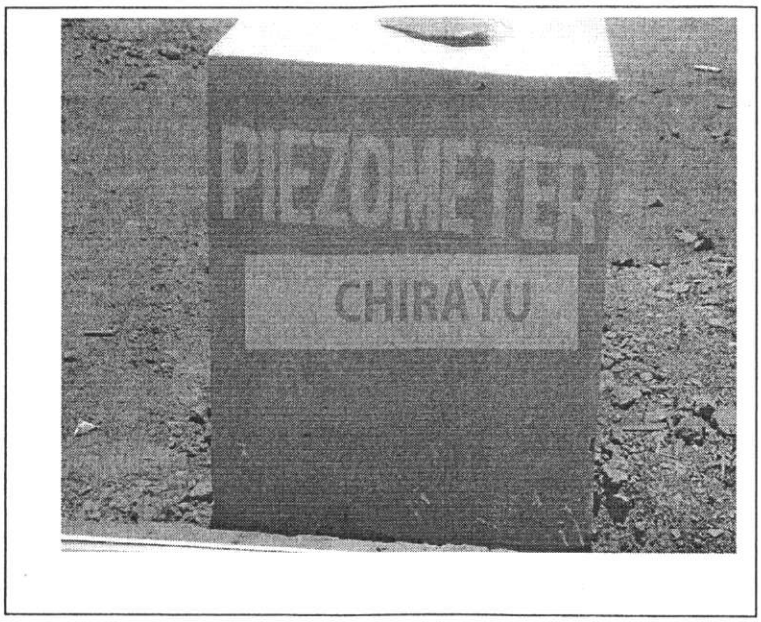

Fig. 8: Piezometer

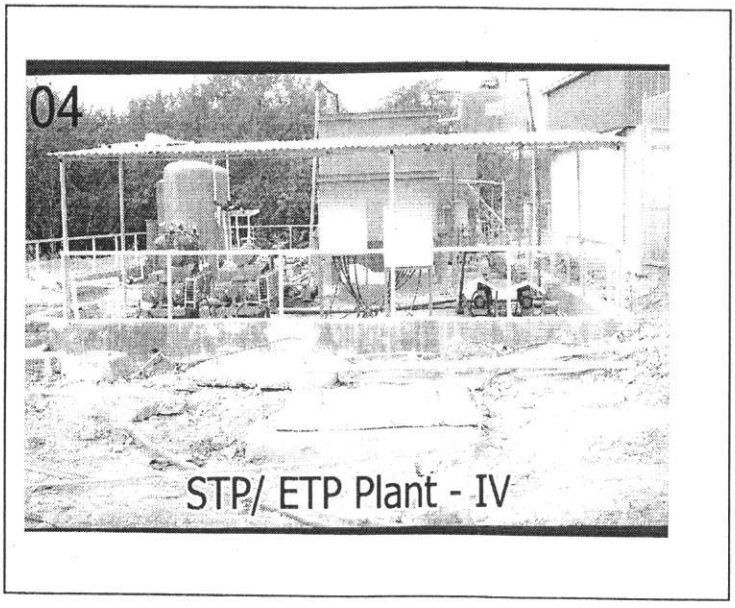

Fig. 9: Sewage Treatment Plan