Any other relevant information

1. Rain Water Harvesting

KRISHNA INSTITUTE OF MEDICAL SCIENCES
"DEEMED TO BE UNIVERSITY",
MALKAPUR, TAL – KARAD, DIST – SATARA.

PROJECT NAME – RAIN WATER HARVESTING

DEPARTMENT NAME – CIVIL-MAINTENANCE DEPT.

RAIN WATER HARVESTING

(YEAR - 2019)

REGISTRAR
Krishna Institute of Medical Sciences
"Deemed To Be University", Karad

RAIN WATER HARVESTING

The RWH System

The harvesting of rain water simply involves the collection of water from surfaces on which rain falls and subsequently storing this water for use. The rain water collected can be stored for direct use or can be recharged into the underground aquifers. In scientific terms water harvesting (broadly) refers to collection and storage of rain water from the roof tops. This also restricts evaporation and seepage into building foundations.

A rain water harvesting system consists of:

i. Roof catchment
ii. Rain / Storm water drains
iii. Down pipes
iv. Filter chamber
v. Storage tanks / Pits / Sumps
vi. Ground water recharge structures like pit, trench, borewell, or combination of these structure.

RWH is a way to capture the rain runoff, store that water above ground or charge the underground aquifers and use it later. This happens naturally in open rural areas. But in congested, over-paved metropolitan cities, there is a need to devise methods to capture the rain water. The rain water that is incident on the surface / roof top is guided to bore wells or pits or new/old/abandoned wells through small diameter pipes to recharge the underground water which can be used later whenever required.

Rain water can be harvested to the extent of 65,000 liters per 100 sq. m. area per year from roof tops.

Rainwater Harvesting Techniques

There are two main techniques of rain water harvesting:

a. Storage of rain water on surface for future use
b. Recharge to ground water

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INTRODUCTION

The storage of rain water on surface is a traditional technique and the structures used were underground tanks, ponds, check dams, weirs, etc. Recharge to ground water is a new concept of rain water harvesting and the structures generally used are:

a. **Pits:** Recharge pits are constructed for recharging the shallow aquifer. These are constructed 1 to 2 m wide and 3 m deep which are back filled with boulders, gravels, coarse sand.

b. **Trenches:** These are constructed when the permeable stream is available at shallow depth. Trench may be 0.5 to 1 m wide, 1 to 1.5 m deep and 10 to 20 m long, depending up availability of water. These are back filled with filter materials.

c. **Dug wells:** Existing dug wells may be utilized as recharge structure and water should pass through filter media before putting into dug well.

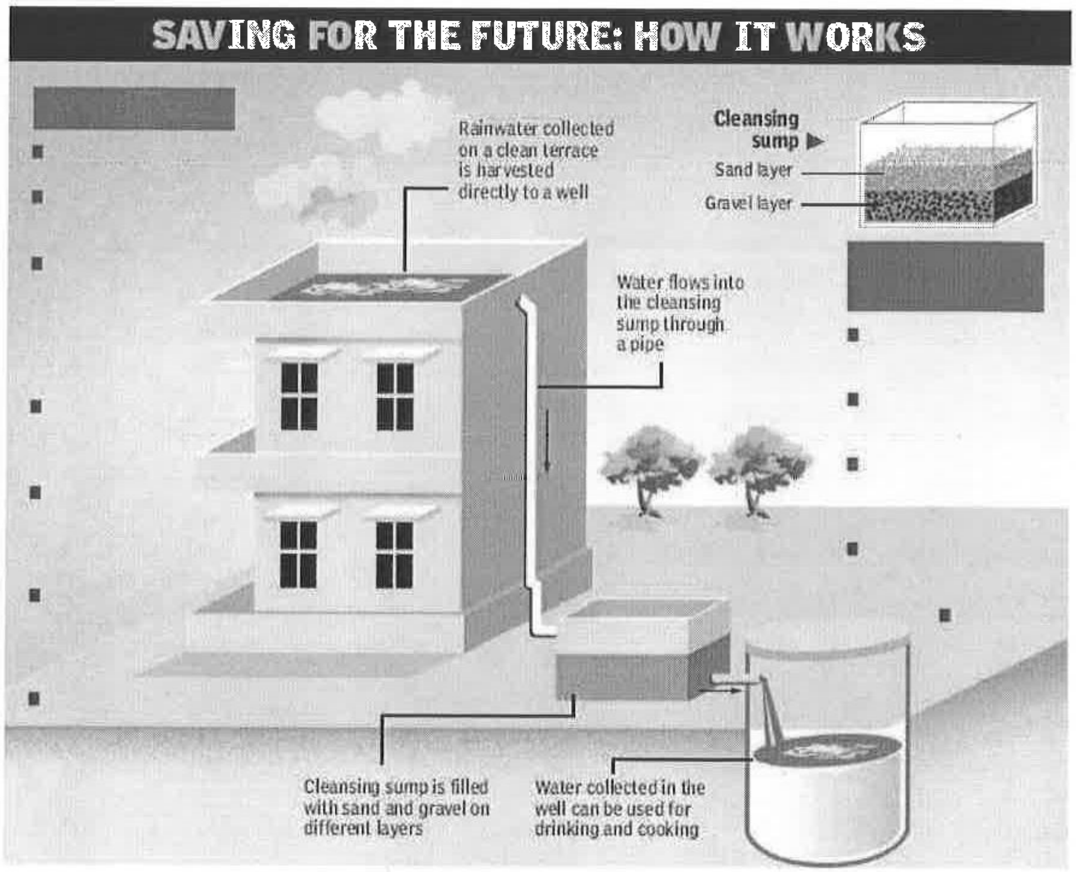
d. **Hand pumps:** The existing hand pumps may be used for recharging the shallow / deep aquifers, if the availability of water is limited. Water should pass through filter media before diverting it into hand pumps.

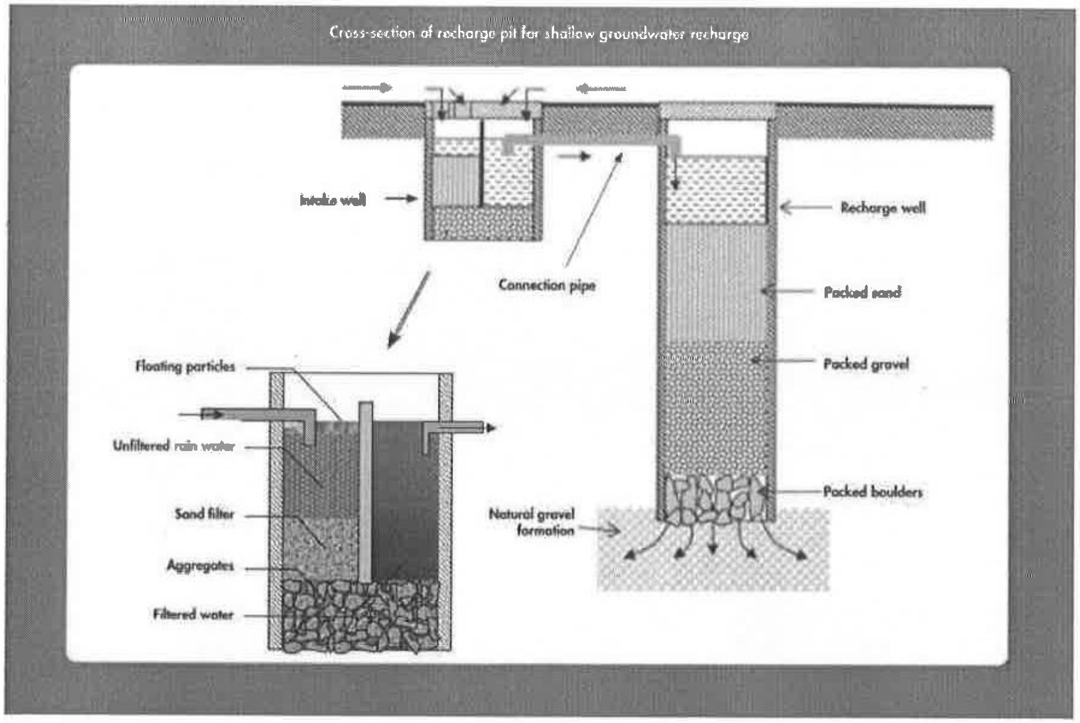
e. **Recharge wells:** Recharge wells of 1 to 3 m diameter are generally constructed for recharging the deeper aquifers and water is passed through filter media to avoid chocking of recharge wells.

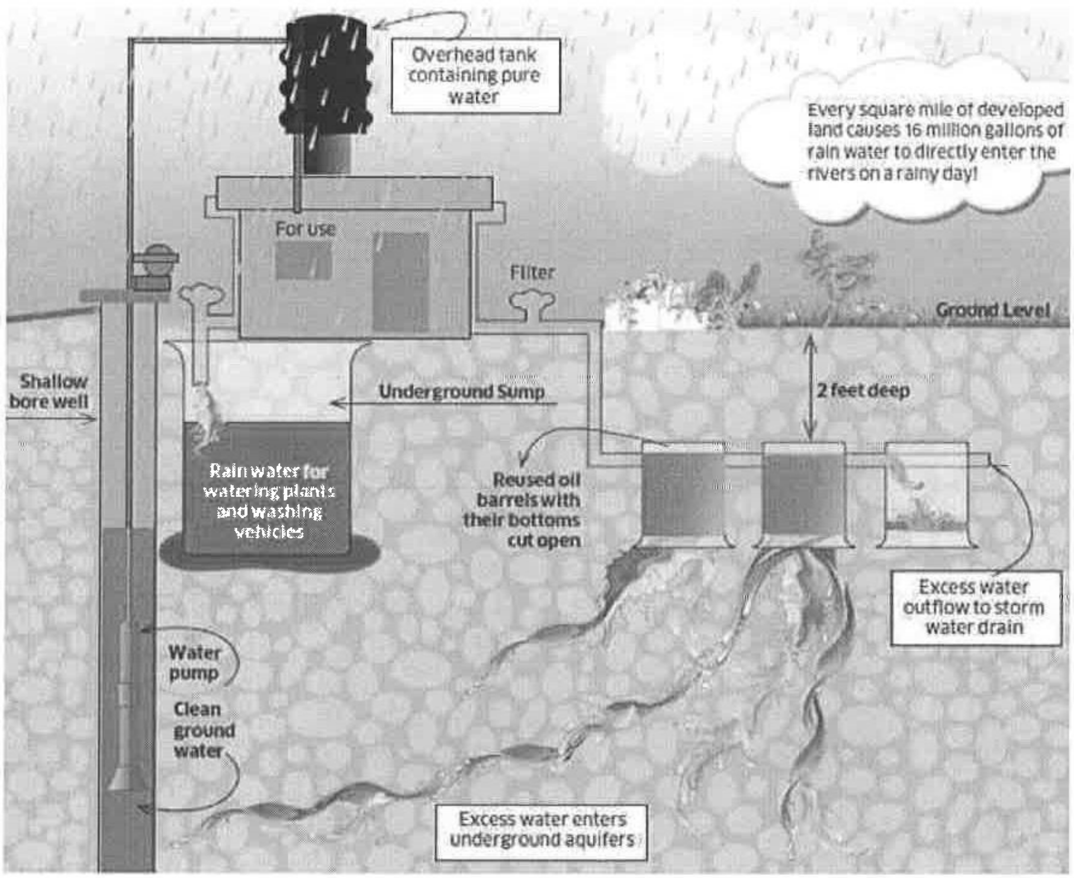
f. **Recharge shafts:** For recharging the shallow aquifer which are located below clayey surface, recharge shafts of 0.5 to 3 m diameter and 10 to 15 m deep are constructed and back filled with boulders, gravels and coarse sand.

g. **Lateral shafts with bore wells:** For recharging the upper as well as deeper aquifers lateral shafts of 1.5 to 2 m wide and 10 to 30 m long depending upon availability of water with one or two bore wells are constructed. The lateral shafts are back filled with boulders, gravels and coarse sand.

h. **Spreading techniques:** When permeable strata start from top then this technique is used. Spread the water in streams / nalas by making check dams, nala bunds, cement plugs, gabion structures or a percolation pond may be constructed.


SAVING FOR THE FUTURE: HOW IT WORKS
Rainwater collected on a clean terrace is harvested directly to a well
Cleansing sump
Sand layer
Gravel layer
Water flows into the cleansing sump through a pipe
Cleansing sump is filled with sand and gravel on different layers
Water collected in the well can be used for drinking and cooking


Cross-section of recharge pit for shallow groundwater recharge
Intake well
Connection pipe
Recharge well
Packed sand
Packed gravel
Packed boulders
Natural gravel formation
Floating particles
Unfiltered rain water
Sand filter
Aggregates
Filtered water


Overhead tank containing pure water
Every square mile of developed land causes 16 million gallons of rain water to directly enter the rivers on a rainy day!
For use
Filter
Ground Level
Shallow bore well
Underground Sump
2 feet deep
Rain water for watering plants and washing vehicles
Reused oil barrels with their bottoms cut open
Excess water outflow to storm water drain
Water pump
Clean ground water
Excess water enters underground aquifers

RAIN WATER HARVESTING

Project By: - Civil - Maintenance Department

Aim: - To increase ground water level for bore well.

Current Performance: - Bore well water used for Medical College Building.

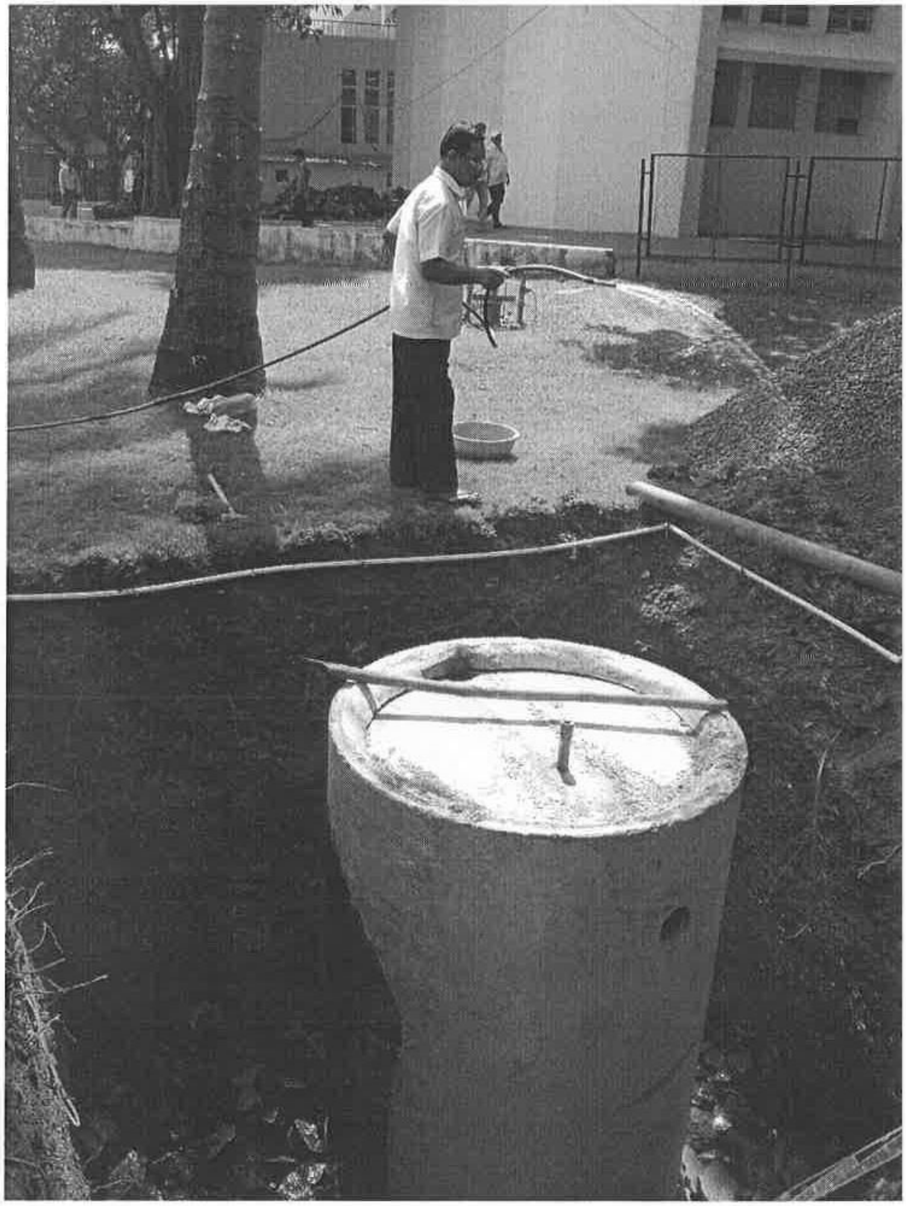
Methodology: -

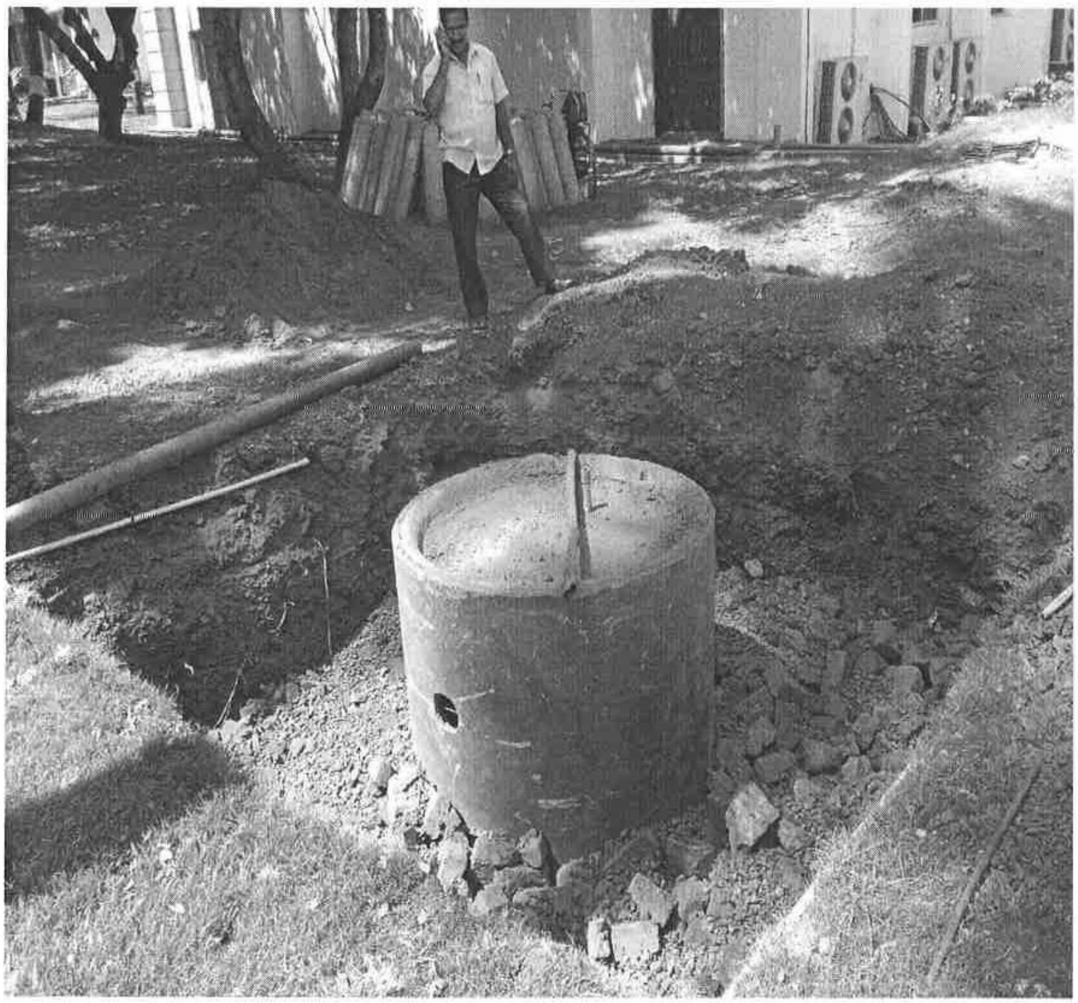
1) Construction of Storage Tank
   Details:
   Excavation in ground for dimensions of 3m × 3m × 3m.
   Filling the trench, providing the RCC pipe of 4 ft. Diameter, 8 ft. Height.
   Filling filter media by using rubble stone, brick bat, aggregate and sand layer by layer for filter.

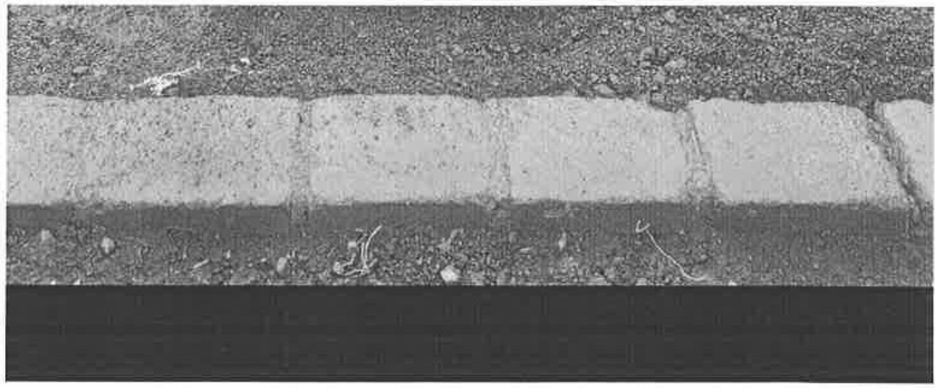
2) Collecting rain water from the Terrace of the Medical College Annexure Building by using 4' PVC pipe up to storage tank.

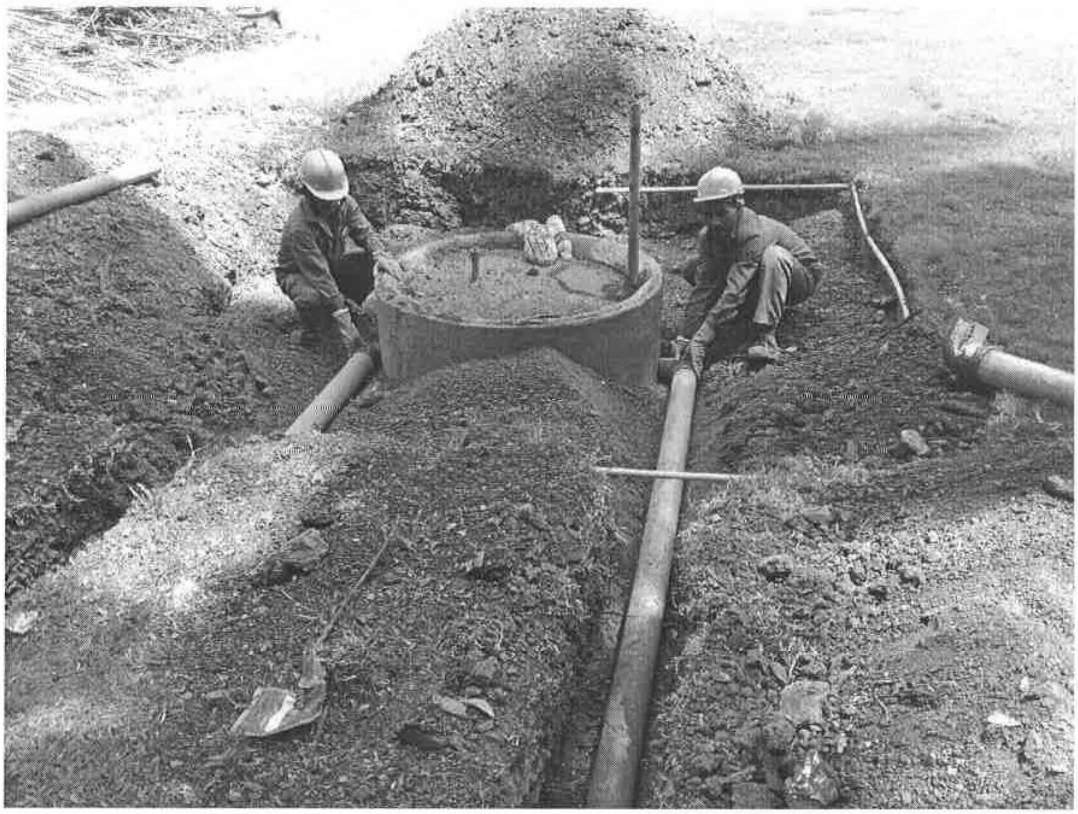
3) Percolating the stored rain water from storage tank into the ground.

4) Monitoring of bore well pumping hours.









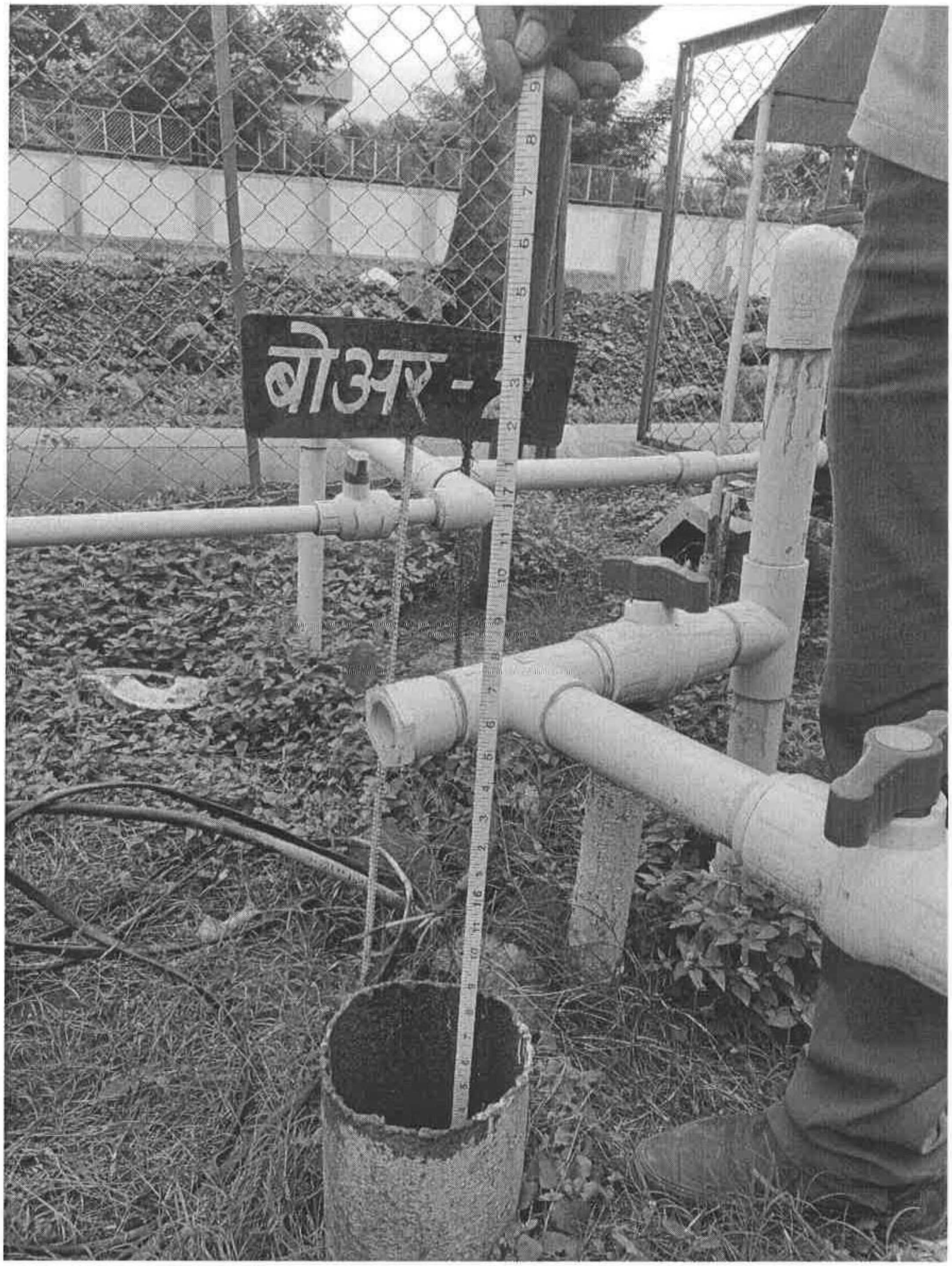

बोअर -

Table 1: Monitoring of ground water level

Month (2019)	Water Level Depth
March	28 ft.
April	30 ft.
May	32 ft.
June	30 ft.
July	29 ft.
August	25 ft.
September	16 ft.

Table 2: Monitoring of bore well pumping hours

5 hp pump discharge 200 liter per minute (12000 lit/hr)

Month (2019)	Hours	Discharge per Day
March	8	96000 lpm
April	6	72000 lpm
May	4	48000 lpm
June	5	60000 lpm
July	7	84000 lpm
August	10	120000 lpm
September	12	144000 lpm

CONCLUSION

We have successfully completed the project of "Rain Water Harvesting near Bore Well no. 2." This project collects the rain water from terrace area of 16000.00 sq. ft. from Medical College Annexure Building. This water was earlier flown into the drainage and was wasted. But now all this water is collected into the Rain Water Harvesting Plant with the help of 4'' PVC pipe line, it is then percolated into the ground which helps to increase the ground water level. The capacity of this project to collect and percolate the rain water from the terrace into the ground is 10 lakh lit/year. This collected extra water from bore well no. 2 can be supplied for main water storage tank, laundry and gardening purpose. It has been observed that by practicing the rain water harvesting practice we have achieved to increase the ground water level.

RAIN WATER
HARVESTING

(YEAR OF COMPLETION, 2019)

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PROJECT NAME – RAIN WATER HARVESTING (2019)

DEPARTMENT NAME – CIVIL-MAINTENANCE DEPT.

Sr. No.	Building Name	Terrace area sq.m.	Water collection lac lit/year	Near Bore
1	New medical college	1600	10.00	Bore no. 2
2	Hostel no. 4 & 7	1740	11.00	Bore no. 5
3	Hostel no. 5 & 6	1700	11.00	Bore no. 6
4	Administrative office, OPD building & cobalt unit	1300	8.50	Bore no. 3
5	Ladies hostel no. 1	1300	8.50	Bore no. 4
6	Ward no. 3 & 18	1000	6.50	

RAIN WATER HARVESTING

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PROJECT NAME – RAIN WATER HARVESTING (2020)

DEPARTMENT NAME – CIVIL-MAINTENANCE DEPT.

Sr. No.	Building Name	Terrace area sq.m.	Water collection lac lit/year	Near Bore
1	D type Staff quarter	640	4.00	Bore no. 3, 4
2	IHR Hostel new	450	2.80	Bore no. 3, 4
3	IHR Hostel old	440	2.75	Bore no. 3, 4
4	NRI Hostel	500	3.10	Bore no. 3, 4

RAIN WATER HARVESTING

(YEAR OF COMPLETION, 2019)

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PROJECT NAME – PROPOSED RAIN WATER HARVESTING (2021)

DEPARTMENT NAME – CIVIL-MAINTENANCE DEPT.

Sr. No.	**Building Name**	**Terrace area sq.m.**	**Water collection lac lit/year**	**Near Bore**
1	Medical College	2000	12.00	Bore no. 1
2	Dental College	2250	14.00	Bore no. 7
3	Pharmacy College	950	6.00	Bore no. 7
4	Physiotherapy College	1050	6.50	Bore no. 7
5	Parking	3000	18.00	Bore no. 1

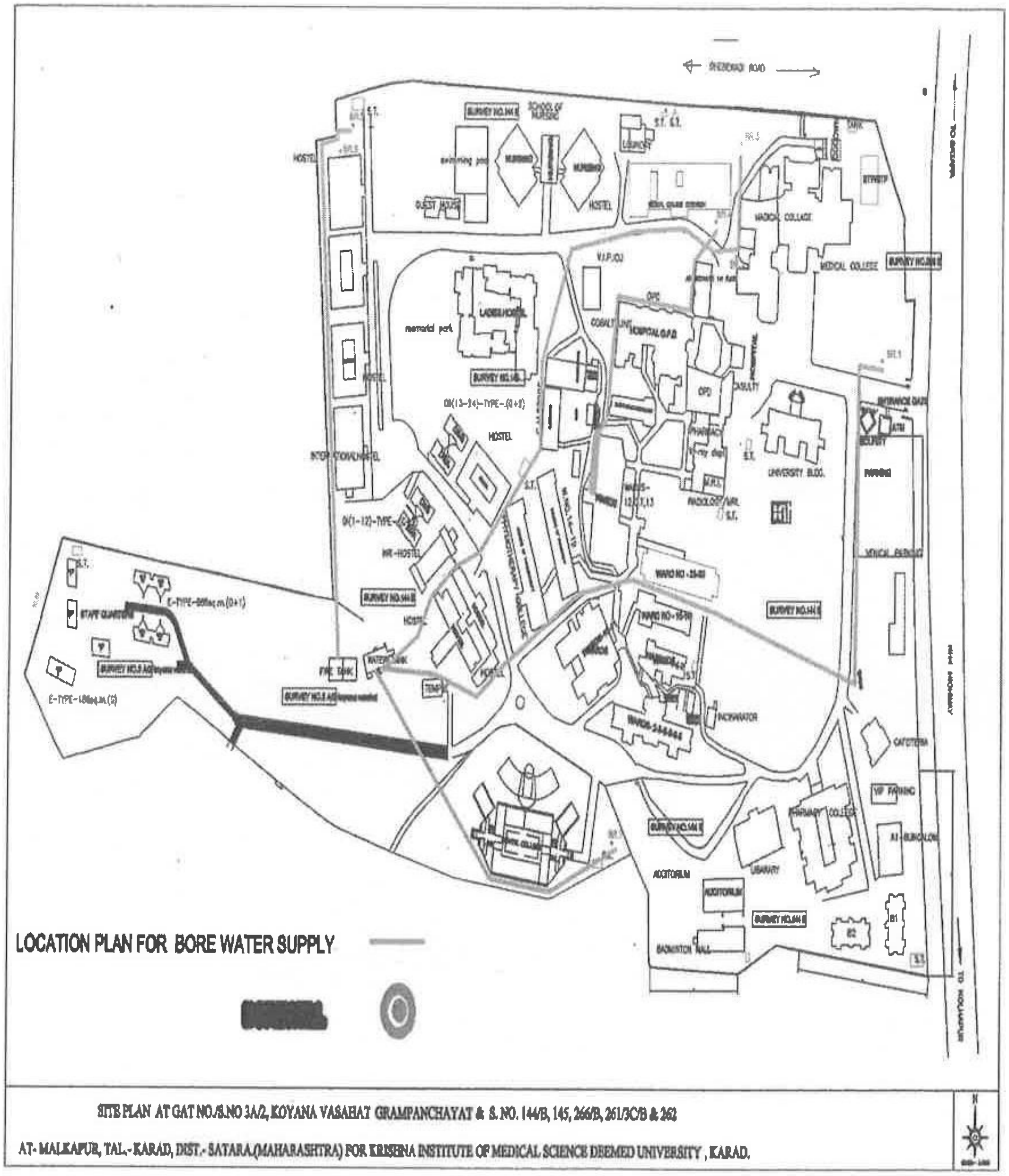
Note: Rainfall 625mm/year at Satara Dist.

Water Collection = Terrace area * Rainfall

RAIN WATER HARVESTING

(PROPOSED PROJECTS, 2020)

2. Borewell / Open Well Recharge



ETP, STP, KIMSDU, Karad

1) Effluent Treatment Plant (ETP): -

ETP is attached with the all labs of Medical College & Laundry. ETP has the capacity of 100 KLD. This consists of bar screen chamber, equalization tank, flocculater tank & tube settler.

Effluent coming from labs & laundry firstly enters into bar screen chamber. In bar screen chamber the floating materials present in effluent gets arrested & blockage or choking of the downstream equipments avoided. This arrested material removed manually & then disposed of suitably.

From bar screen chamber the effluent enters into equalization tank. In this tank, the aeration is provided for proper mixing of effluent. Aeration is given with the help of air blowers.

Then with the help of transfer pumps, the effluent is lifted to the flocculater tank. In flocculater tank lime is added with the help of dosing pumps to maintain the p^H & to remove the solids (TDS & SS) present in the effluent. In this tank aeration is provided with the help of air blowers for proper mixing of lime in effluent.

After flocculater tank, the effluent enters into the tube settler tank. In this tank the tube settler media is provided. With the help of tube settler media, sludge present in the effluent is settled & the clean effluent is transfer to the Sewage Treatment Plant (STP). The sludge settled at the bottom of the tank is transfer into the sludge holding tank or sludge drying bed with the help of sludge transfer pumps.

ETP Flow Diagram

Bar Screen Chamber

↓

Equalization Tank

↓←**Alum Dosing**

Flocculator Tank

↓

Tube Settling Tank

↓

To STP

2) Sewage Transfer Pump (STP): -

STP is based on MBBR technology. STP is attached with the all drainage water system & also ETP present in the institute premises. The capacity of STP is 500 KLD. It consists of bar screen chamber equalization tank, aeration tank, tube settler, chlorine contact tank, sludge holding tank, PSF & ACF.

Sewage coming from all drainage water system & ETP is firstly enters into bar screen chamber. In bar screen chamber the floating materials present in effluent gets arrested & blockage or choking of the downstream equipments avoided. This arrested material removed manually & then disposed of suitably.

From bar screen chamber the sewage enters into equalization tank. In this tank, the aeration is provided for proper mixing of sewage. Aeration is given with the help of air blowers.

With the help of sewage transfer pumps, the sewage transfer into aeration tank. Aeration tank consist of diffuser & MBBR media. This diffuser is attached to the air blowers. This diffuser provide the fine air bubbles in sewage which helps bacteria to decompose the organic material present in the sewage which reduces Biochemical Oxygen Demand(BOD) & Chemical Oxygen Demand(COD) of the sewage.

Then this sewage enters into the tube settler tank. Tube settler tank consist of tube settler media. With the help of tube settler media the sludge settled at the bottom of the tank & clean sewage enters into Chlorine contact tank. The sludge at the bottom of tank is transfer to sludge holding tank or sludge drying bed with the help of sludge transfer pump.

Sewage present in chlorine contact tank is transfer to the PSF with the help of filter feed pumps. Between chlorine contact tank & PSF pipeline, online dosing of Sodium Hypochlorite is done with the help of dosing pumps to kill the pathogenic bacteria present in the sewage.

In Pressure Sand Filter (PSF), the suspended particles & other remaining particles present in the sewage are remove. In Activated Carbon Filter (ACF), color & smell present in the sewage is remove. The filtered sewage enters into Treated Water Tank. From Treated water tank, the treated sewage is lifted & used for gardening.

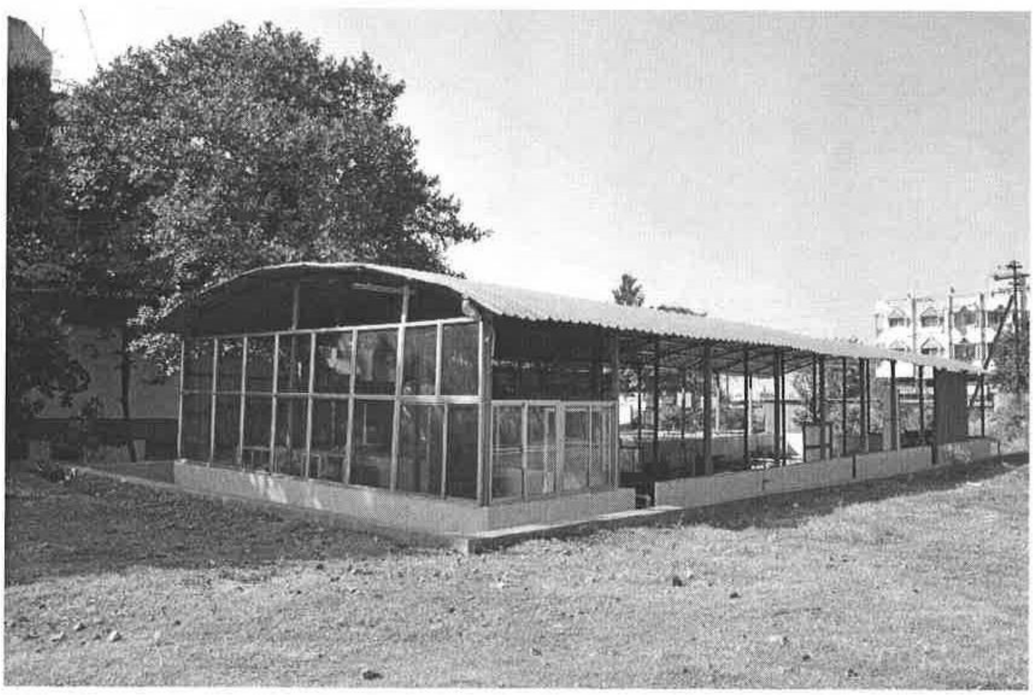


Image No.1: **ETP+STP Site View**

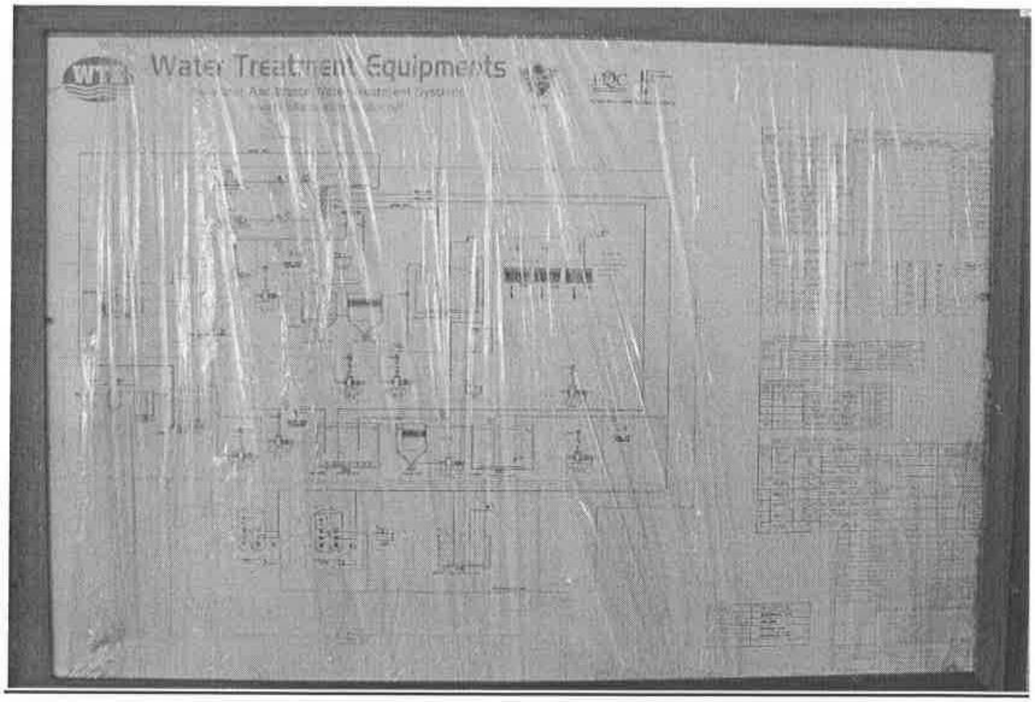


Image No.2: **Block Diagram of ETP & STP**

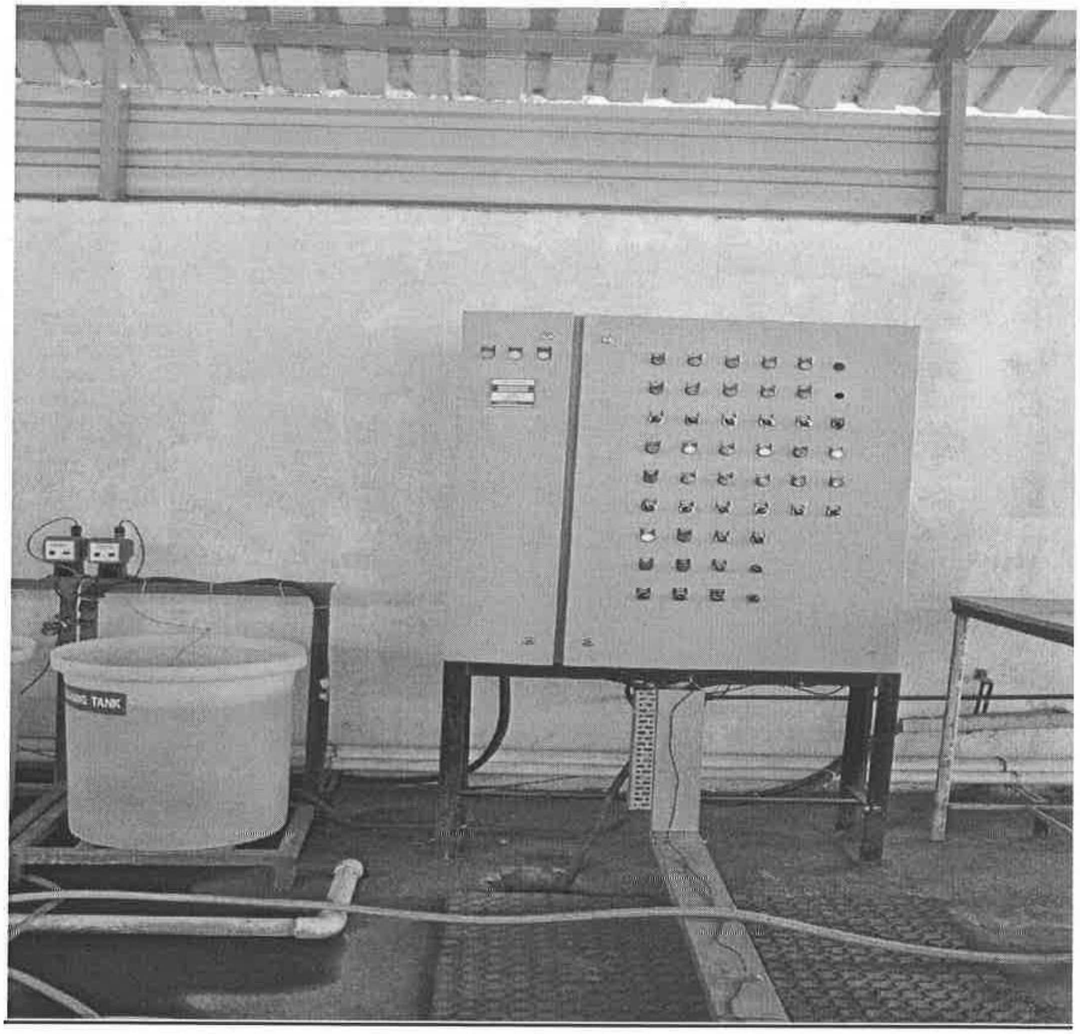


Image No.3: **<u>Control Panel of plant</u>**

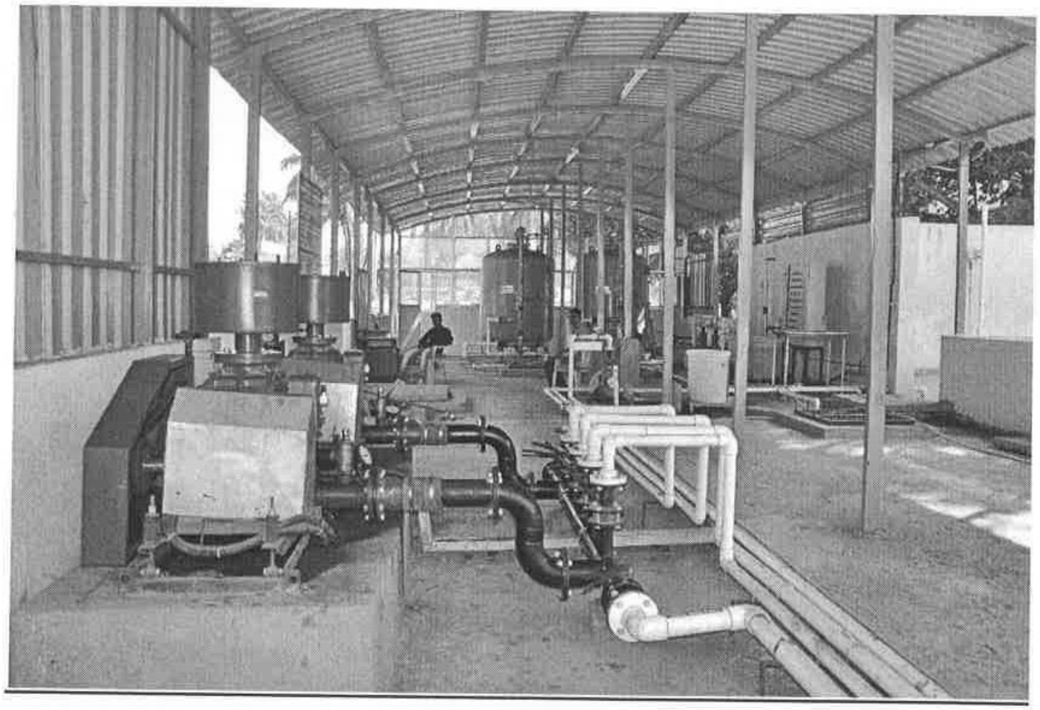


Image No.4: **<u>Internal Machineries (Air compressor, ACF, PSF, Chemical dosing system)</u>**

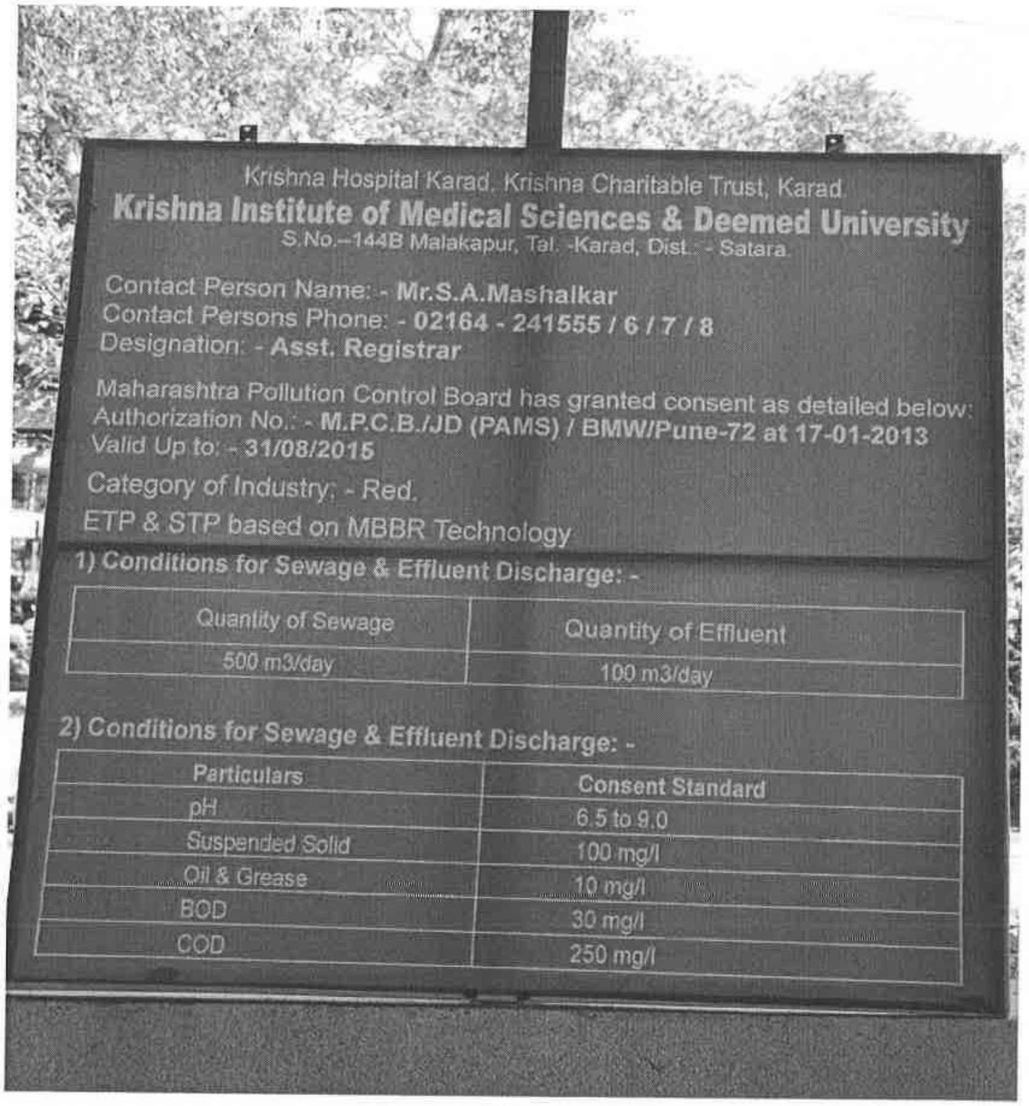


Image No. 5: **Brief Information of plant (capacity, parameter limits)**

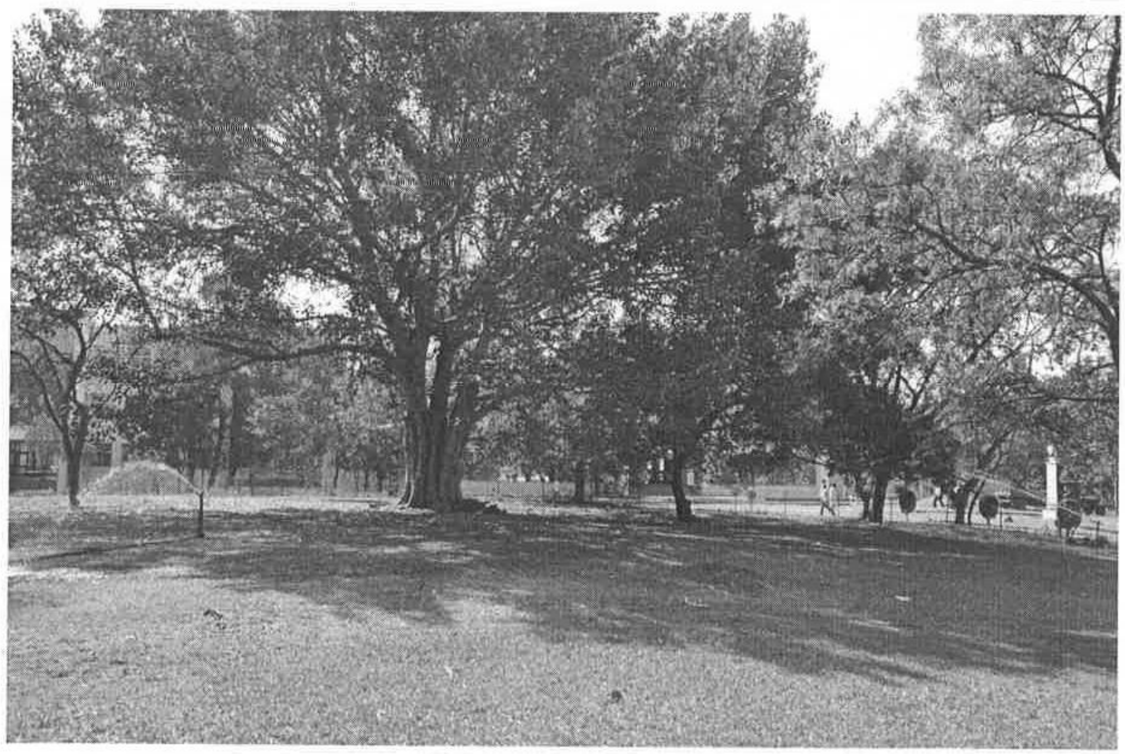


Image No.5: **Treated water used for gardening**

STP Flow Diagram

Bar Screen Chamber

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Equalization Tank

↓

Aeration Tank ← Urea & DAP Dosing

↓← **Alum Dosing**

Tube Settling Tank

↓

Chlorine Contact Tank

↓← **Sodium Hypochlorite Dosing**

PSF

↓

ACF

↓

Treated Water Tank

↓

To Garden

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