Dhirajlal Gandhi College of Technology

Accredited by NAAC | Approved by AICTE & Affiliated to Anna University | Opposite Salem Airport, Salem - 636 309. www.dgct.ac.in.

INDEX
CRITERION: 7.1.4

RAIN WATER HARVESTING

Objectives:

- To meet the increasing demand of water.
- To reduce the run-off which chokes the drains?
- To avoid the flooding of roads.
- To raise the underground water table.
- To reduce groundwater pollution.
- To reduce soils erosion.
- Supplement domestic water needs

Rainwater can be mainly harvested by anyone of the following methods:

- By storing in tanks or reservoirs above or below ground
- By constructing pits, dug wells, lagoons, trench or check dams on small rivulets.
- By recharging the ground water.

Before adopting a rainwater harvesting system, the soil characteristics, topography, rainfall pattern and climatic conditions should be understood.

Rainwater harvesting can be harvested from the following surfaces:

1. Rooftops:

If buildings with impervious roofs are already in place, the catchment area is effectively available free of charge and they provide a supply at the point of consumption.

A Rooftop rainwater harvesting system consists the following elements:

- Collection area,
- Conveyance system,
- Filtration/treatment
- Storage
- Usage/Recharge

The collection area in most cases is the roof of a house or a building. The effective roof area and the material used in constructing the roof influence the efficiency of collection and the water quality. A conveyance system usually consists of gutters or pipes that deliver rainwater falling on the rooftop to cisterns or other storage vessels.

Both drainpipes and roof surfaces should be constructed of chemically inert materials such as wood, plastic, aluminum, or fiberglass, in order to avoid adverse effects on water quality. The water ultimately is stored in a storage tank or cistern, which should also be constructed of an inert material.

Reinforced concrete, fiberglass, or stainless steel is suitable materials. Storage tanks may be constructed as part of the building, or may be built as a separate unit located some distance away from the building.

2. Paved and unpaved areas:

i.e., landscapes, open fields, parks, storm water drains, roads and pavements and other open areas can be effectively used to harvest the runoff. The main advantage in using ground as collecting surface is that water can be collected from a larger area. This is particularly advantageous in areas of low rainfall.

3. Water bodies:

The potential of lakes, tanks and ponds to store rainwater is immense. The harvested rainwater can not only be used to meet water requirements of the city, it also recharges groundwater aquifers.

4. Storm water drains:

Most of the residential colonies have proper network of storm water drains. If maintained neatly, these offer a simple and cost effective means for harvesting rainwater.

The Advantages of Rainwater Harvesting:

1. One of the beauties of rainwater harvesting systems is their flexibility. A system can be as simple as a barrel placed under a rain gutter downspout for watering a garden or as complex as an engineered, multi-tank, pumped and pressurized construction to supply residential and irrigation needs.
2. Rainwater harvesting systems are integrated with the house, which makes the water easily accessible.
3. Rainwater harvesting systems are personal, which prevents arguments about who should take care of maintenance.
4. One time Installation cost, roughly some rupees 2500 to 5000 per system including slow sand filter while sustainability of the construction is larger than that of a pump or well.
5. The used materials can be kept simple, are obtainable nearly everywhere at local (low) cost price.
6. The construction is easy and cheap in maintenance.

ESTIMATION OF STORM WATER RUN-OFF

Total area of the college	=	41,197 m^2
Total Roof area of the building	=	3,948 m^2
Total Paved area of the college	=	5,400 m^2
Total Hostel area	=	4,500 m^2
Total Lawn area	=	5,000 m^2
First year block area	=	1,673 m^2
Average rainfall intensity in Salem	=	2.43 cm/hr
Surface area other than plinth area	=	41,197- (3,948+1,673+ 4,500)
	=	31,076 m^2
	=	3.10 hectares
Soil area	=	31,576-(5,400+5,000)
	=	20,676 m^2

SURFACE AREA: (Lawn + Soil surface + Paved area)

Q_p = (1/36) x K x P_c x A

K = (∑ KA) / A

= ` $\frac{[(5,000x0.2) + (20,676x0.5) + (5,400x0.9)]}{[5,000+20,676+5,400]}$

K = 0.5545

Q_p = (1/36) x 0.5545 x 2.43 x 3.107

= 0.1162 m^3/sec

Q_p = 10 MLD

ROOF SURFACE:

K = 0.9 Coefficient of run-off for roof area.

Q_p = (1/36) x K x P_c x A

= (1/36) x 0.9 x 2.43 x 1.01

Q_p = 0.0613 m^3/sec

Q_p = 5.29 MLD

CONCLUSION:

As per government norms we have implemented rain water harvesting in our esteemed institution. From this harvest we get 5.29 MLD from roof and this rain water which is collected is diverted to two areas, in which 2.5 MLD is connected to bore well which will be helpful in the ground water recharging and 2.5 MLD is let into the sump directly with screening for the daily usage purpose. Also by the surface rain water harvesting we are getting 10 MLD which is collected in the collection pond and it is used for the gardening purpose and other various purpose as well as for the groundwater recharging. To conclude from this method we are pleased to say that there is no water scarcity in our Institution. Moreover we are proud to say that we act as a role model for other neighboring Institutions.

RAIN WATER HARVESTING STRUCTURE

1) Roof Top Collection

Open Terrace Finishing to Flow Rain Water to Down Take Pipe

Open Terrace Finishing to Flow Rain Water to Down Take Pipe

2) Paves Ways Rainwater Harvesting

Road Having Gradient to Collect Surface Water

Rain Water Harvesting Pit

Rain Water Harvesting Pit

BORE WELL / OPEN WELL RECHARGE

Open Ground Rainwater Collection

Rain water collection Pond of capacity 16 LAKH Liters

BOREWELLS CONSUMPTION & CONSTRUCTION OF TANK and BUNDS

Bore well is cased in the region of loose subsoil strata open in hard rock or in crystalline rock. High grade PVC pipes are used for casing in bore wells .As we know our water resources is reducing day by day we have to preserve it from all means of contamination and over use. It is used to create a well underground to draw water and to avoid the reduction of water supply. We are using this reuse water for non- drinkable uses like watering the garden and flushing the toilet including in hostels The underground sump capacity is 40,000 liters approximately.

Bore well

Bore well water storage tank

S.No.	Bore well Points	Location	Bore depth	Remarks
1.	Point 1	Near new STP-Pump installed (7.5 HP)	600-950 ft	Pump is running for 25 minutes.
2.	Point 2	Hand ball ground	1500 ft	Water is at the level of 82ft
3.	Point 3	Near compound wall (Harvesting pond)	1300ft	Water is at level of 66ft
4.	Point 4	Near old STP (manufacturing lab backside)-Pump installed (5HP)	700-800ft	Pump is running for 25 minutes.
5.	Point 5	Near recycled water storage tank (new point has been identified)	900-1150 ft	Water is at level of 33ft 6 in
6.	Point 6	Near sump	1200ft	Water is at level of 295ft 6in
7.	Point 7	Near Canteen generator-Pump installed(5HP)	1300ft	Pump is running for 25 minutes
8.	Point 8	ground corner (near Kho-Kho court)	1100 ft	Water is at level of 302ft
9.	Point 9	Near cricket net practice pitch	600ft	Closed
10.	Point 10	Near ladies hostel at entrance	1030ft	Water is at level of 472ft
11.	Point 11	Near ladies hostel mess	750ft	Water is at level of 407ft
12.	Point 12	Entrance of library	980ft	Closed
13.	Point 13	Backside of boys hostel at corner	400ft	Closed
14.	Point 14	Near cricket net practice pitch	800ft	Closed
15.	Point 15	New bore well near canteen entrance	1500ft	Water is at level of 500ft

WASTE WATER RECYCLING

TREATMENT PROCESS CARRIED OUT IN THE DGCT COLLEGE

The activated sludge process provides an excellent method of treating either raw sewage or more generally the settled sewage. The sewage effluent from primary sedimentation tank, which is thus normally utilized in this process, is mixed with 20 to 30 percent of own volume of activated sludge which contains a large concentration of highly active aerobic micro organisms. The mixture enters an aeration tank, where the micro organisms are mixed together with large quantity of air for about 4 to 8 hours. Under this condition, the micro organisms will oxidize the organic matter, and colloidal matter tends to coagulate and form a precipitate, which settles down readily in the secondary settling tank.

The settled sludge is recycled to the head of aeration tank, and be mixed with sewage being treated. New activated sludge is continuously being produced by this process and a portion of it being utilized and sent back to the aeration tank, whereas the excess portion is disposed of properly along with the sludge collected during primary treatment after digestion.

The effluent obtained from a properly operated activated sludge plant , usually having a lower BOD than that of a trickling filter plant.BOD is removal up to 80-95% , and bacteria removal up to 90-95% .Moreover, land area required is less. However , in this process it is necessary to ensure that the supply of oxygen is present, continuous mixing of sewage and the activated sludge and that the ratio of volume of activated sludge added to the volume of sewage is being constant.

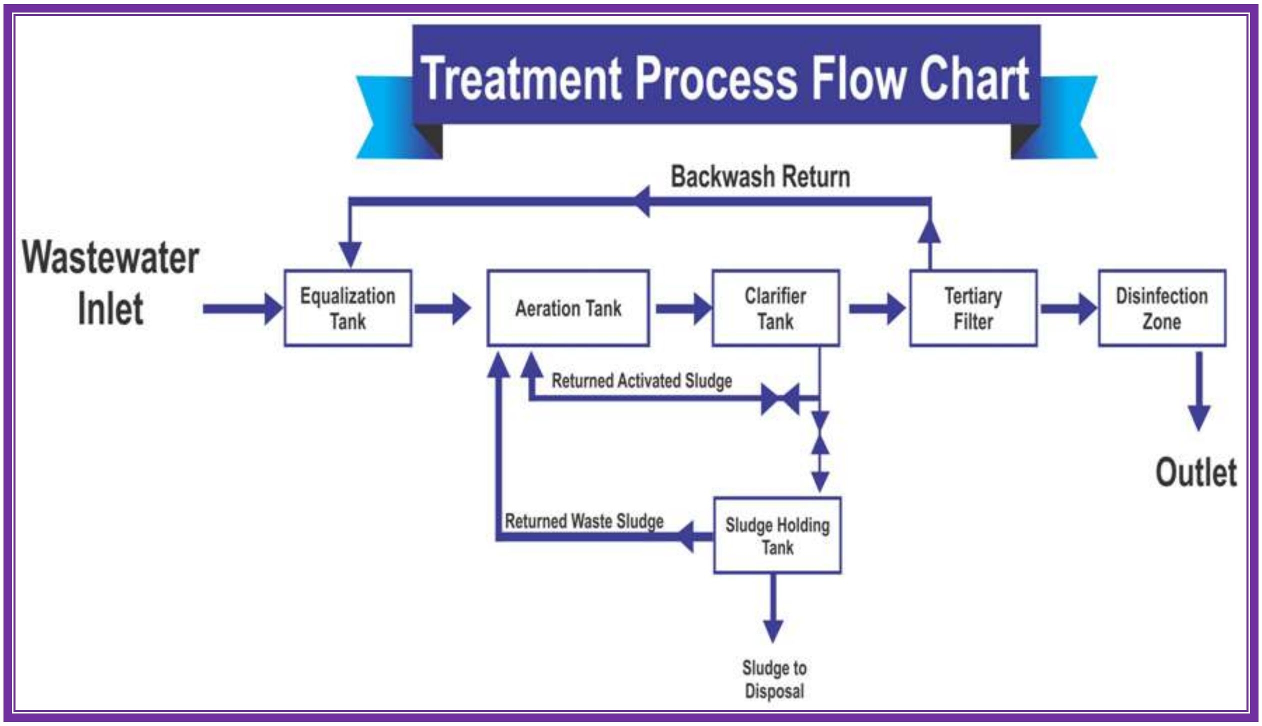
Moreover, there is a problem of obtaining activated sludge at the start of new plant. Hence, when a new plant is put in to operation a period of about 4 weeks must required to form sludge during this period all the sludge from the sedimentation tank will be returned through the aeration tank.

VARIOUS OPERATIONS AND UNITS OF TREATMENT

The Following flow diagram show that the removal of girt and solids by screening in grit chamber and primary sedimentation tanks is generally considered after aeration. The pre- removal of these settle able solids is helpful in preventing deposits on aeration devices, and thereby not reducing their efficiencies.

Moreover, if not pre-removal may settle down in the aeration tank, and by decomposition interface with the treatment process. Accordingly, girt removal, and primary sedimentation are considered necessary for a activated sludge process.

Sine in this process, it is necessary to keep the sewage as fresh as possible and the sedimentation tank is must required for treatment process. During this period, of primary detention may vary with the size of plant and the characteristics of sewage, but tank size will provide an overflow rate of about 40,000 liters per sq-m of plan area per day. For a depth of about 2.4m the detention time will be about 1.4 hours.



STP PLANT

STP PLANT

By this STP method, harmful contaminant in water is removed and this water can be used for toilet flushing and gardening purpose. This STP method can be adopted in area where there is water scarcity in places and where the groundwater level is low.

Dhirajlal Gandhi College of Technology - 2016-17

STP Works

Ledger Account

1-Apr-2016 to 31-Mar-2017

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Date		Particulars	Vch Type	Vch No.	Debit	Credit
4-8-2016	To	**Britt Enviro Tech** *Being STP maint. work / Bio micros, Pressure stand, carbon fillter, plumbing Accessories & reconditioning charges B.No: 23 / 04.08.16.*	Journal	758	1,79,818.00	
16-10-2016	To	**Water Purification Systems** *Being STP work charges B.No: 1463 / 16.10.16*	Journal	1257	17,500.00	
6-1-2017	To	**Water Purification Systems** *Being STP work B.No: 1486 / 06.01.16*	Journal	1708	4,150.00	
17-1-2017	To	**Britt Enviro Tech** *Being STP maint. work / Bio micros, Pressure stand, carbon fillter, plumbing Accessories & reconditioning charges B.No: 43 / 17.01.17*	Journal	1757	3,52,393.00	
7-3-2017	By	**Britt Enviro Tech** *Ch.No: 807520 issued towards final payment for the B.No: 43 / 17.01.17*	Payment	3256		7,393.00
					5,53,861.00	7,393.00
	By	**Closing Balance**				5,46,468.00
					5,53,861.00	**5,53,861.00**

MAINTENANCE OF WATER BODIES AND DISTRIBUTION SYSTEM IN CAMPUS

The water supply system includes facilities for pumping, storage, treatment and distribution of water in our campus. Underground is a main resource for water supply. There are 13 boreholes points are provided in various places such as nearby Ladies hostel, canteen generator, bus ground etc for adequate water supply. The water is pumping out by using submersible pump and stored in underground tank capacity of 40,000 liters.

In our DGCT campus, 5 numbers of overhead tanks are provided for drinking water supply for students, staffs and workers in our college campus and hostel. The water is supplied for drinking purposes after reverse osmosis treatment with proper distribution network.

The waste water from college are collected through pipelines for treatment. The primary treatment is carried out continuously and passed with filter bed. After the recycled water is used for gardening purpose to avoid water scarcity.

R.O PLANT

RO drinking water distribution taps