SREE NARAYANA INSTITUTE OF TECHNOLOGY®
Approved to AICTE, New Delhi & Affiliated to APJ Abdul Kalam Technological University
Theppupara .P.O, Adoor, Pathanamthitta (Dist.), Kerala - 691554
Ph: 04734-244600,244700 Fax: 04734-243400
www.snit.edu.in, Email: info@snit.edu.in
Managed by: Pattayil Kunjukunju Memorial Charitable Trust, Adoor

RAINWATER HARVESTING SYSTEM

The Civil Engineering Department of the college has been entrusted to prepare a master plan for the distinctive project and implements the same. The department computed total annual water demand in the campus. It has been estimated that the demand is **1512cumec/day**. They have set a target to make the campus water sustainable.

The institution has a sprawling campus of more than 10 acres. The institution has a built-up roof area of **203.92sq. m**. The annual rainfall in the premises has been estimated as **2666mm**. The rainwater that falls on the roof of the building has been estimated as **542,427 liters per year**. Roof Rainwater harvesting project has envisaged and implemented with a capacity 10lakh liters of roof water harvesting tank. The annual surface run off water in the campus has been estimated as **14,064,910 liters per year**. The surface runoff water is driven in a topologically structured plan to different underground wells so that the ground water level is recharged and maintained. Runoff water is also channelized to pond and pool in the campus so the water is not lost in any manner. As a result, a total of **14,607,337 liters** of water is being saved annually in the campus through this distinctive project.

Sree Narayana Institute of Technology * Adoor * PRINCIPAL

Dr. Shaji Mohan.B
Principal
Sree Narayana Institute of Technology
Theppupara, Ezhamkulam, Adoor
Pathanamthitta- 691554

RAINWATER HARVESTING IN SNIT CAMPUS

Sree Narayana Institute of Technology, Adoor has taken steps to conserve water in its campus by adopting some water conservation methods like Rainwater Harvesting. Today 40% of the water demand in the campus is met from this arrangement during water scares seasons.

RAINWATER AVAILABLE FOR HARVESTING

Total rooftop and surface area: 203.92sq. m

Average annual rainfall in Adoor: 2666 mm or 105.0 inch.

Total volume of rainwater harvested: 2666 mm x 203.92 m^2 = 543,650.72L per year

WATER SUPPLY SOURCE

There are 8 wells,2 tube well and a 20ft deep pond which have water whole year are located inside the campus which cater to the total water requirements of the college.

ROOFTOP WATER HARVESTING

The runoff from the terrace of the college main building is channelized into the rainwater harvesting tank located inside the campus with 15m diameter. The water from the top of roofs of main building is collected through the proper network pf pipes. There is a well- connected pipe network collect the roof top water by guttering method and this water carried out through down take pipe or drain to harvesting system. The coarse mesh provides passage for debris at roof. The first flush device is providing to flush of the water received in first shower. The first shower rain tube flush of to avoid contaminating rechargeable water by probable contaminant of atmosphere and catchment roof. They provide filter media before the water carried out the storage tank. The Reinforced Cement Concrete storage tank is constructed above ground level.

OBJECTIVES OF RAINWATER HARVESTING IN SNIT CAMPUS

- To meet the increasing demand of water during draught season
- 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.

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REPORT ON SURFACE RUN OFF

The institution has a sprawling campus of more than 10 acres. The total annual water demand in the campus has been estimated as **1512cumec/day**. Surface runoff water harvesting is the collection, accumulation, treatment or purification, and storing of storm water for its eventual reuse. Surface runoff water is an excellent alternative to using mains drinking water for many purposes. The College Management has set a target to make the campus water sustainable by means of Surface runoff Harvesting and Rain water Harvesting.

The annual rainfall in the premises has been estimated as **2666mm**. The annual surface run off water in the campus has been estimated as **14,064,910 liters per year**. The surface runoff water is driven in a topologically structured plan to different underground wells so that the ground water level is recharged and maintained. The land area producing runoff that drains to a common point is called a drainage basin. Runoff water is also channelized to pond and pool in the campus so the water is not lost in any manner. Surface runoff often occurs because impervious areas (such as roofs and pavement) do not allow water to soak into the ground. The rainwater that falls on the roof of the building has been estimated as 542,427 liters per year. Roof Rainwater harvesting project has envisaged and implemented with a capacity 10lakh liters of roof water harvesting tank. As a result, a total of **14,607,337 liters** of water is being saved annually in the campus.

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SURFACE RUNOFF HARVESTING IN SNIT CAMPUS

Sree Narayana Institute of Technology, Adoor has taken steps to conserve water in its campus by adopting some water conservation methods like Surface runoff Harvesting. Today 50% of the water demand in the campus is met from this arrangement during water scares seasons.

WATER SUPPLY SOURCE

There are 8 wells ,2 tube well and a 20ft deep pond which have water whole year are located inside the campus which cater to the total water requirements of the college.

OBJECTIVES OF SURFACE RUNOFF HARVESTING IN SNIT CAMPUS

- To meet the increasing demand of water during draught season.
- To reduce loss of water by its running –off.
- To avoid flooding of roads and grounds in Campus.
- To reduce groundwater contamination.
- To reduce the run-off which chokes the drains.
- To raise the underground water table.
- To reduce soils erosion.
- Supplement domestic water needs.

SURFACE RUNOFF WATER HARVESTING

The runoff from the unpaved area is intercepted using underground pipes and are collected in an Earthen Ditch located in the lowermost point of the campus which facilitates groundwater recharge.

CALCULATIONS

Catchment: College campus

(Calculation are for 1 storm)

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1. Catchment area

Roof top area = 203.92 sq.m

Open area = 34000 sq.m

2. Average rainfall intensity

Rainfall intensity, i = $\frac{3430}{t+18}$ assuming t= storm duration as 120mins

=2.5cm/hr

3. Runoff Coefficient

Impermeability factor of Roof top area, p1= 0.95

Impermeability factor of Open spaces, p2 = 0.3

Run-off Coefficient K = $\frac{a1p1+a2p2}{A} = \frac{203.92x0.95+34,000x0.3}{203.92+34000}$ = **0.3**

4. Storm Duration = 1hr

Now by using rational area

From roof top area

Quantity of storm water ,Q = $\frac{KiA}{360} = \frac{0.3x25x0.0204}{360}$ = **0.000425cumecs = 0.425L/s** ()

Now assuming 5% losses accounting for evaporation

Therefore,

Loss = $\frac{5}{100}$x0.425 = 0.021 L/s

Total runoff = 0.425-0.021 = 0.446L/s **= 38.534 m^3/day**

5. **Water Demand**

Working hours, Q = 1500 persons x 8 hours x 45Lpcd = 540,000L/d

Whole day (Inmates), Q = 300 persons x 24 hours x 135Lpcd = 972,000L/d

Total demand = 1,512,000 L/d = **1512m^3/d**

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Domestic Water Demand:

Minimum domestic water consumption (Annual average) for weaker sections and LIG colonies in small Indian towns and cities.

Use	Consumption in l/h/d
Drinking	5
Cooking	5
Bathing	55
Washing of clothes	20
Washing of utensils	10
Washing and cleaning of houses and residences	10
Fiushing of water closets,etc	30
Total	135 L

Water requirements of individual institutions and commercial Establishments

Use of water = 135 L per day(residential)

Total person = 300 (hostel)

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Q = 300 * 135 L

= 40,500 L /day

Total person = 1500 (full strength)

Use of water = 45L (day scholar)

Q = 1500 * 45 L = 67 500 L

Total demand =108 000 L/d

A tap drips one drop of water every second. It takes 3000 such drops to fill a 200 ml glass.3000 drops will drop in 3000 seconds. One day of 24 Hrs. has 24*60*60 = 86400 seconds. In 3000 seconds, water drips 200 ml.

Volume of water wasted in 3000seconds = 200 ml

So volume of water wasted in 86,400 seconds = 5.76 litre

5.76 litres water was wasted in one day by this dripping tap

Annually, 365 * 5.76 litres = 2102.4 L

Total no of taps = 150

Total = 150 taps * 2102.4 L =315,360 L (wasted water)

Save every drop of water is the catching slogan of the project. Staff and students were given awareness on the theme. It was estimated that a drop of water leaked from a tapcan add up to 2100 liters of water annually. There are 150 water taps in the campus. If all of its leak dip-dip that would amount to 315000 litres annually. Therefore, actions to repair and main the taps leak proof was initiated as a campaign with the help of staff and students. Stickers were displayed on vital locations, wash rooms etc. with the above slogan. **It is estimated that 300000 litres of water is saved through the above actions.**

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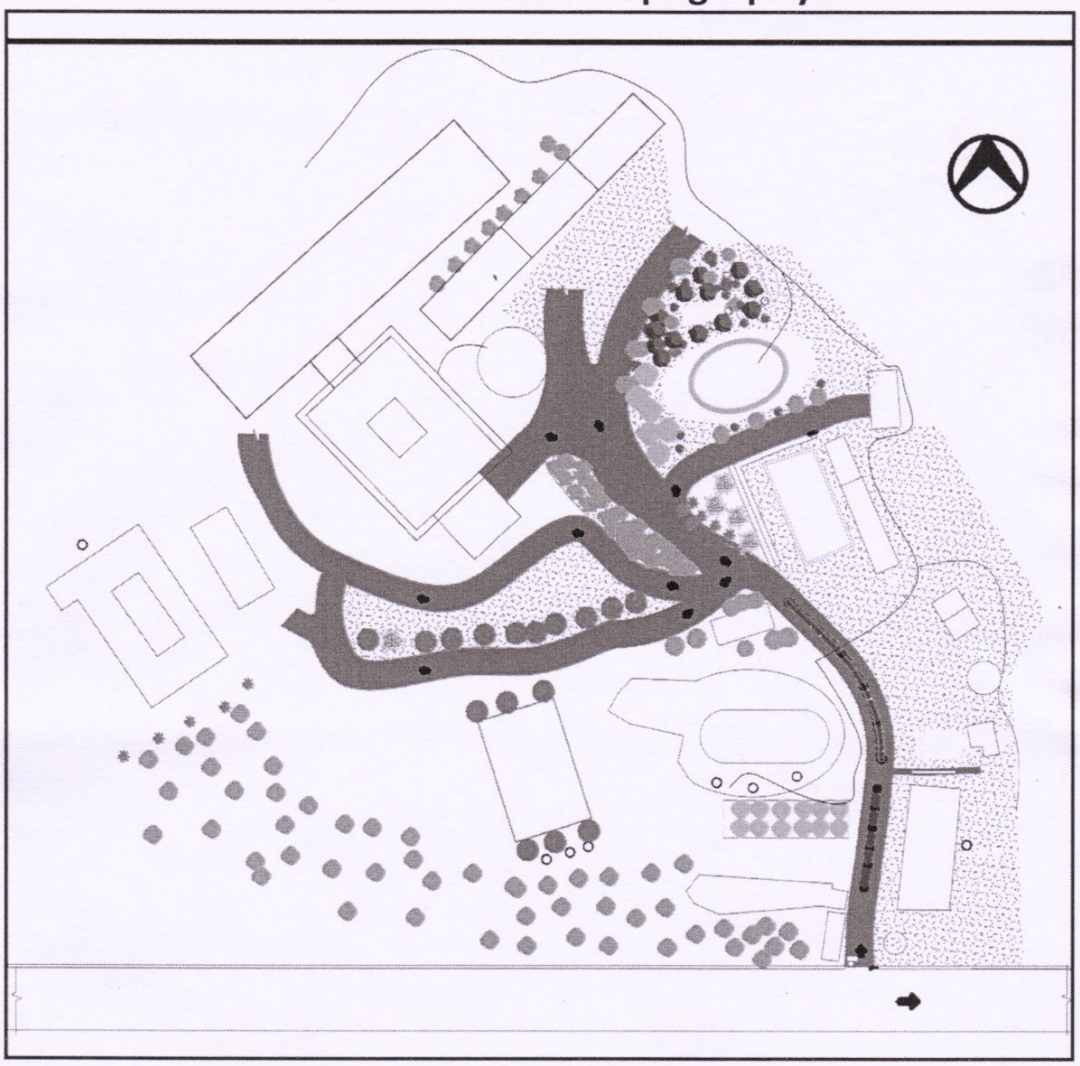
Water Stream Topography



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