CAUVERY COLLEGE FOR WOMEN
(Autonomous)
TIRUCHIRAPPALLI

WATER CONSERVATION
AND
RAINWATER HARVESTING REPORT

2023 – 2024

CENTRE FOR ENVIRONMENTAL SUSTAINABILITY
DEPARTMENT OF ENVIRONMENTAL SCIENCES
Bishop Heber College (Autonomous)
Tiruchirappalli, Tamilnadu – 620 017

WATER CONSERVATION

CAMPUS ENVIRONMENT AUDIT CERTIFICATE

Issued under the Green Campus Certification Process

CENTRE FOR ENVIRONMENTAL SUSTAINABILITY

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Annamalai Nagar, Woraiyur,
Tiruchirappalli District Tamilnadu – 620018

Has successfully conducted the **Water Conservation and Rain Water Conservation** in accordance with the Sustainable Development Goals (SDGs) and standards of regulatory agencies in India.

Based on the Scope of Environment audit we hereby acknowledge and certify that:

The Management, Teaching fraternity, students, and support staff of the **Cauvery College for Women (Autonomous)** have taken efforts to create a strategic change in attaining holistic Environmental Sustainability.

Period of Audit : 2023 – 2024

Date of Certification : 22 March 2024

Prof. A. Alagappa Moses
Ecology and Biodiversity Consultant
Functional Area Expert - NABET

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Empanelled Expert, FAE
Eco Services India Private Limited
Approved Function Area/s : EB (A)

CAMPUS GREEN AUDIT CGA CERTIFIED Bishop Heber College DEPARTMENT OF ENVIRONMENTAL SCIENCES

CAMPUSENVIRONMENT AUDIT
CentreforEnvironmentalSustainabilityDepartmentofEnvironmentalSciencesBishopHeberCollege(Autonomous)Tiruchirappalli,Tamilnadu

TowardsCleanandGreenCampus

WATER CONSERVATION AND RAIN WATER HARVESTING

Rainwater harvesting is a technology used to collect, convey and store rain water for later use from relatively clean surfaces such as a roof, land surface or rock catchment. RWH is the technique of collecting water from roof, Filtering and storing for further uses. Rainwater Harvesting is a simple technique of catching and holding rainwater where its falls. Either, we can store it in tanks for further use or we can use it to recharge groundwater depending upon the situation. RWH system provides sources of soft, high quality water reduces dependence on well and other sources and in many contexts are cost effective. RWH system is economically cheaper in construction compared to other sources, i.e. well, canal, dam, diversion, etc.

Rainwater harvesting is an important environment friendly approach. It is a Green Practice having double benefit of keeping the groundwater level undisturbed and charging the aquifer. Rainwater and run-off water, stored in a planned way, can save the earth from soil erosion and flood and recharge the aquifers to increase the groundwater level.

Objectives of Rain Water Harvesting

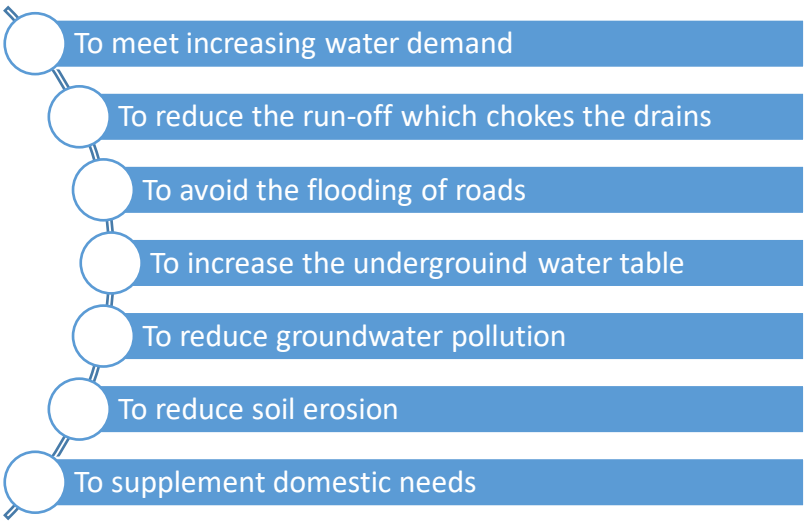

Fig. 1: Objectives of Rain Water Harvesting

Climate in Tiruchirappalli:

The climate of Tiruchirappalli (or Trichinopoly, Tiruchi or Trichy) is tropical, with a dry season from January to March and a rainy season from September to November. In the other months, the rains are quite irregular, and are generally not abundant. Temperatures are high all year round, and are higher than on the coast, although they drop a bit from November to January. The city is located in south-eastern India, in the state of Tamil Nadu, at 10 degrees north latitude, on the south bank of the Kaveri River. The summer monsoon does not arrive because it is hindered by the Western Ghats, especially in the first period, in June and July, when the currents blow more directly from the west. Instead, the rains increase from August or September, when the currents from the east or north-east blow more and more often.

Tiruchirappalli is in the path of tropical cyclones. Typically, cyclones occur from April to December, although the extreme south of India is normally affected only in November and December. In any case, since the sea is warm all year round, in theory they can also form from January to March, perhaps in light form (as tropical storms).

Tiruchirappalli – climate Data

In Tiruchirappalli, precipitation amounts to 820 mm (31.9 inches) per year: so, it is at an intermediate level. It ranges from 4 mm (0.2 in) in the driest month (February) to 170 mm (6.7 in) in the wettest one (November). Here is the average precipitation.

Temperature

In Tiruchirappalli, the average temperature of the coldest month (December) is of 25.7 °C (78.2 °F), that of the warmest month (May) is of 32.4 °C (90.4 °F). Here are the average temperatures.

Rainfall

The average annual rainfall is 820 mm (31.9 in), slightly lower than the state's average of 945 mm (37.2 in). Fog and dew are rare and occur only during the winter season.

Rainfall variability is also a challenge to the functionality of rainwater harvesting systems. The characteristics of horizontal variability of rain can be presented as a fraction rain cover or probability distribution. Rainfall variability has a significant contribution to the amount of water that can be saved by rooftop rainwater harvesting systems.

About 60% to 90% of total annual rainfall occur during the monsoon season (June to September) over different states, except Tamil Nadu, which contributes only about 35% to the annual rainfall during monsoon season.

Table 1: Average Precipitation in Tiruchirappalli

Tiruchirappalli - Average precipitation			
Month	**Millimeters**	**Inches**	**Days**
January	13	0.5	2
February	4	0.1	1
March	5	0.2	2
April	30	1.2	4
May	65	2.6	6
June	40	1.6	7
July	60	2.4	6
August	70	2.8	10
September	140	5.1	10
October	143	5.6	14
November	170	6.7	13
December	80	3.1	8
Year	820	31.9	8

https://www.climatestotravel.com/climate/india/tiruchirappalli

Components of Rainwater Harvesting system in the Campus

Rainwater harvesting system comprises of components for transporting rainwater through pipes or drains, filtration, and tank/well for storage of harvested water. The common components of rainwater harvesting system in the campus are:-

1. **Catchments**: The surface which directly receives the rainfall and provides water to the system is called catchment area. It can be a paved area like a terrace or courtyard of a building, or an unpaved area like a lawn or open ground. A roof made of reinforced cement concrete (RCC), galvanized iron

or corrugated sheets can also be used for water harvesting. The College has a ground catchment area of 6313.09 sq.m.

2. **Coarse Mesh**: It prevents the passage of debris, provided in the roof. Coarse mesh are placed in all roof-top area in all the drains. Various types of drain mesh fixtures are shown below:

Fig. 2: Drain Mesh Fixtures

3. **Gutters**: Channels which surrounds edge of a sloping roof to collect and transport rainwater to the storage tank. Gutters can be semi-circular or rectangular and mostly made locally from plain galvanized iron sheet. Gutters need to be supported so they do not sag or fall off when loaded with water. The way in which gutters are fixed mainly depends on the construction of the building, mostly iron or PVC brackets are fixed into the walls.
4. **Conduits and Pipe Joints:** Conduits are pipelines or drains that carry rainwater from the catchment or rooftop area to the harvesting system. Commonly available conduits are made up of material like polyvinyl chloride (PVC) or galvanized iron (GI).

Recharge structures:

Rainwater Harvested can also be used for charging the groundwater aquifers through suitable structures like dug wells, bore wells, recharge trenches and recharge pits. Various recharge structures are possible - some which promote the percolation of water through soil strata at shallower depth (e.g., recharge trenches, permeable pavements) whereas others conduct water to greater depths from where it joins the

groundwater (e.g. recharge wells). Recharging methods adopted in the campus are abandoned tube wells, Settlement tank, Recharging of service tube wells, Recharge pits, Soak ways /Percolation pit, Recharge troughs, Recharge trenches.

5. **Percolation Pits**

   The Campus has 6 percolation pits distributed in the campus; the designed capacity of each pit is 1.27m^3 with a net volume of 7.62 m^3. The design features of the percolation pits are given below:

Methods of Rain Water Harvesting

There are mainly two methods of rainwater harvesting,

Surface runoff harvesting
Rooftop rainwater harvesting

1. Surface Runoff Harvesting

The rainwater flowing along the ground during the rains will be collected in low lying area.

2. Roof top Rainwater Harvesting

Roof Top Rainwater Harvesting Method is adopted in all the buildings where the rainwater is captured from the roof catchments of various buildings and drains into sand gravel filter pits of 1.27 m^3 volume capacity. Totally 6 pits are available in the campus.

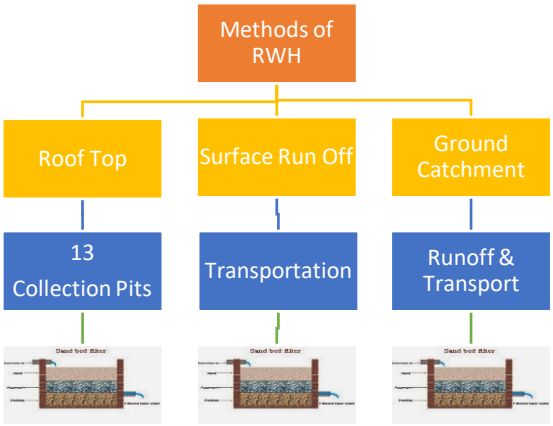

Fig.3: Methods of Rain Water Harvesting

Sand Gravel Filter

In the solid granular media category, three materials have been used – sand, gravel, and pebbles. Media less than 2mm in diameter is sand and anything larger is referred to as gravel**.**

The rainwater flows relatively slowly through sand and is used for single-pass filters. However, gravel is used for recirculation filters which can accept larger amounts of runoff than single-pass sand filters. Each layer is separated by wire mesh.

Rain Water Harvesting Potential

Table 2: Rain Water Harvesting Potential Calculation

Rain Water Harvesting Potential	:	Mean annual rainfall in mm x area in m^2 x runoff factor
Roof top area	:	8802.00 m^2
Rain Water Collection Pit	:	06 Pits
Volume of each collection Pit	:	1.27 m^3
Type of Filter in collection Pit	:	Sand Gravel Filter
Ground catchment area	:	3840.00 m^2
Mean Annual rainfall	:	95.00 mm (3.74 inch)

Runoff Coefficient	:	0.8

Co-efficient Chart		
1.	Roof catchment • Tiles • Corrugated metal sheets	 0.8 – 0.9 0.7 – 0.9
2.	Ground surface covering • Concrete • Brick pavement	 0.6 – 0.8 0.5 – 0.6
3.	Untreated Ground catchment • Soil on slopes less than 10% • Rocky natural catchment	 0.0 – 0.3 0.2 – 0.5
Harvesting Potential = Rainfall (mm) x Area of Catchment x Runoff coefficient		
A Guide to Techniques of Water conservation and Management, UNDPIndia2008		

Table 3 Status of Rainwater harvesting by Roof top and Catchment Method

1	2	3	4	5	6	7
S. No.	**Area**	**Mean Annual Rainfall (mm)**	**Roof Top Area (Sq.M)**	**Runofff actor**	**Rain water in Litres (3x4x5)**	**Rainwater In m³**
1	Roof Top	95.11	8802.00	0.8	669726.58	669.73
2.	Ground Catchment	95.11	3840.00	0.8	292177.92	292.17
	Quantity of Rain water harvested					961.9

Table 4: Status of Rainwater harvesting by Pit Method

Type of Collection Pit	No. of Pits	Volume of each pit in m^3	Total Volume of Rain water Harvested in Pit method	
			m^3	Litres
Sand Gravel Pits	06	1.27	7.62	7620.00

Table 5: Summary of Rain Water Harvested in the Campus

S. No.	Area	In litres	m^3
1.	Roof Top	669726.58	669.73
2.	Catchment	292177.92	292.17
3.	Pits	7620.00	7.62
		969524.5	969.52

Rain water collected from the roof top and ground catchment is 969524.50litres.