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Groundwater Recharge using Rainwater Harvestment Methods at Viva Institute of Technology, Virar (E)

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Abstract**—***The various techniques used for artificial recharge of ground water aquifers prove to be effective in storing water for human use in all over states of India, with the possible exception of coastal zone where the extreme porosity of aquifer and its connection to the sea resulted in less water being available for harvest then was injected. In general, recharge was effective in minimizing water loss due to evaporation compared with similar surface storage system, so we have designed effective rain water harvesting system by adopting ground water recharge technique & proposed to our esteemed Institute "Viva Institute of Technology Virar (E)" to help and meet with the demand using rain water harvesting techniques. Our design incorporates in a circuit which will collect water into storage tank and the overflow of water will further help to replenish the ground water level once the tank is filled.*

Keywords—Aquifer, Evaporation, Ground Water Recharge, Porosity, Replenish

I. INTRODUCTION

Water is one of the most widely used substances on our earth. We need water for all our activities in day- to-day basis. Water supply in urban area is continuously short against the total demand. Surface water is inadequate to meet our demand and we must depend on ground water. Due to rapid urbanization, infiltration rate of rainwater into the subsoil has decreased drastically and recharging of ground water has diminished. This scenario requires an effective alternative source to bridge the gap between demand and supply. Rainwater which is primary source of water is easily available and is the purest form of water, would be an immediate source to augment the existing water supply by catching water wherever it falls.

VIVA Institute of Technology Virar, East is suffering through the scarcity of water. So it is mandatory to list out necessity of master plan towards bright vision and towards conservation of water by any means with addition to that descriptive objective of planning & methodologies that we should adopt for sustainable development.

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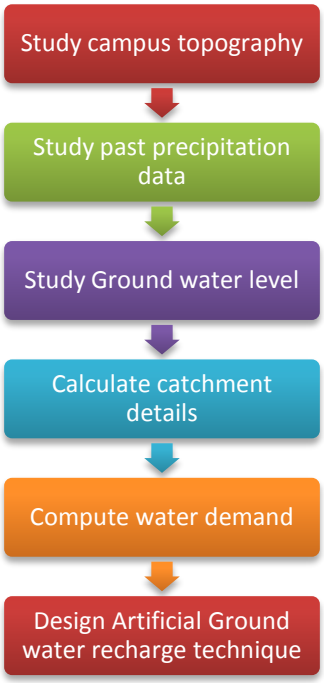
II. OBJECTIVE

To design efficient rain water harvesting system for college, So that we can conserve primary source of water for future use.

III. METHODOLOGY



IV. DATA COMPUTATION

- **L shape building**

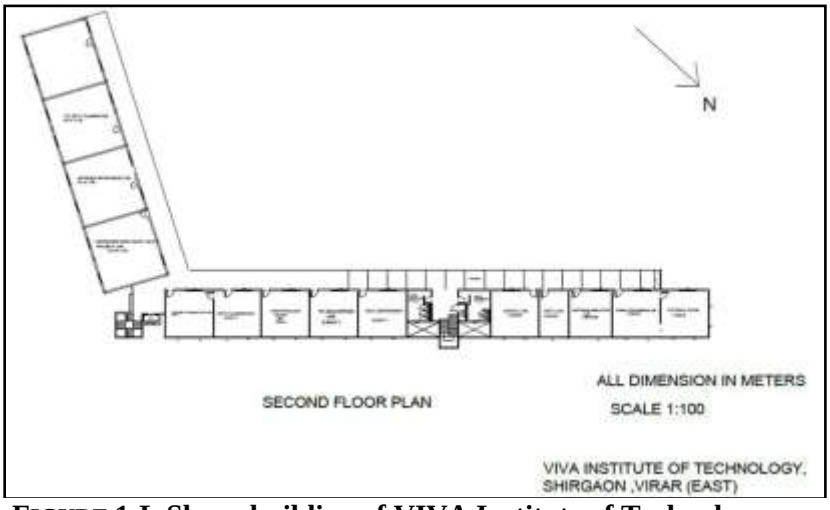


FIGURE 1:L Shape building of VIVA Institute of Technology

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Calculation of precipitation at L shape building

Terrace area of L shape building (A) = 1711.13m^2
Average annual rainfall (R) =0.706
Runoff coefficient (C) =0.8

Rainwater harvesting by terrace area = A×R×C
= 1711.13×2.787×0.8
= 3812.13m^3
=38,15,130L

- **Civil building**

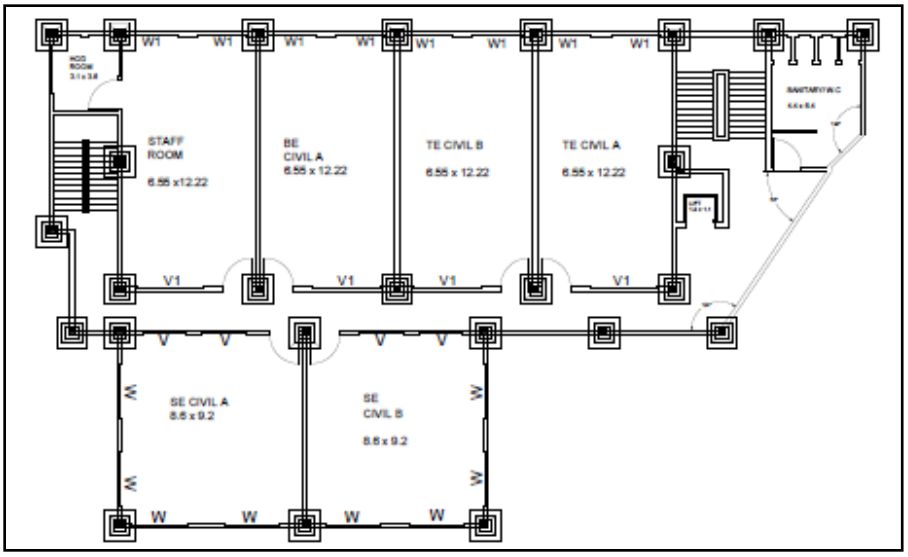

FIGURE 2:Civil building of VIVA Institute of Technology

Calculation of precipitation at Civil building

Terrace area of civil building (A) = 603m^2
Average annual rainfall (R) =0.706
Runoff coefficient (C) =0.8

Rainwater harvesting by terrace area = A×R×C
=603×2.787×0.8
= 1344.48m^3=13,44,480L

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TABLE 1
COMPARISON BETWEEN MAIN METHOD

Sr. No.	Paper Name	Advantages	Disadvantages
01.	Ground water response to artificialrecharge of rainwater in chennai,India	Construction of percolation pond which, - control rate of evaporation - Facilitate recharge into surrounding ground which in turn improves soil moisture, improves agricultural productivity and mitigates against drought - Can assist recharge of shallow wells, boreholes and springs - Can reduce salinity in groundwater	Construction of percolation pond which, - Low efficiency due to imperfect control over water flow - Great loss of water by Surface Runoff, Infiltration, Deep Percolation
02.	Roof top rain water harvesting	- Simple Construction - Easy of Maintenance - System are flexible & Adaptable	- Vulnerable water quality - Water supply is climate Dependant - Storage capacity is limited
03.	Alternative Technologies for FreshwaterAugmentation	- surface water runoff is controlled due to aquifer recharge, resulting in less sedimentation problems - Groundwater recharge collects water during wet season for use in dry season, when demand is highest - Technology is easy to understand and operate	- Recharge can degrade the aquifer unless quality control of the injected water is adequate - Discharge of nutrients and micro-pollutants may negatively affect the receiving soil and the aquifer - Unless significant volumes can be injected into an aquifer, groundwater recharge may not be economically feasible

V. CONCLUSION

The recharge structures established in the Viva Institute of Technology, Virar (E)has been effective in recharging the roof top water harvested and stored in the underground storage tank in the study area as well as the existing recharge wells established in the campus. The recharge is very effective in increasing the level of the water table in the study area and also some ground water flow appears to take place to further downstream. This case study brings to the light the importance of microlevel management of water sources that may influence the sustainable management of water as common property resource.

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