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Approved By AICTE, DTE & Affiliated to DBATU, Lonere

7.1.2: The institution has facilities and initiatives for

Index

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Principal
SVKM's Institute of Technology,Dhule

3. Water conservation

1. Rainwater Harvesting

I) Detail Report Rainwater Harvesting

To gather the rainfall, the institute has a rainwater collecting system in place. Water is becoming an increasingly limited natural resource in cities like Dhule as a result of significant urbanization. The institute building's roof serves as the catchment area, which is 4139 M^2. Rainwater from the institute building's terrace is collected through a proper piping system from various locations on the terrace. All of the rainwater that has been gathered in this way is directed into a single channel and transported there to be stored in an underground tank. During monsoon season, the subsurface tank has the potential to hold 10,000 liters of rainwater. This aids in recharging the ground water as well as the tube well that was drilled on the campus. It will raise the ground water table in the nearby properties. For gardening, lawn maintenance, and other uses, a pump is used to pull water from an underground sump.

II) Components of Rainwater Harvesting System:

A Rainwater harvesting system comprises of components for transporting rainwater through pipes or drains, filtration, and tanks for storage of harvested water. The details of the components of rainwater harvesting system have shown in photo.

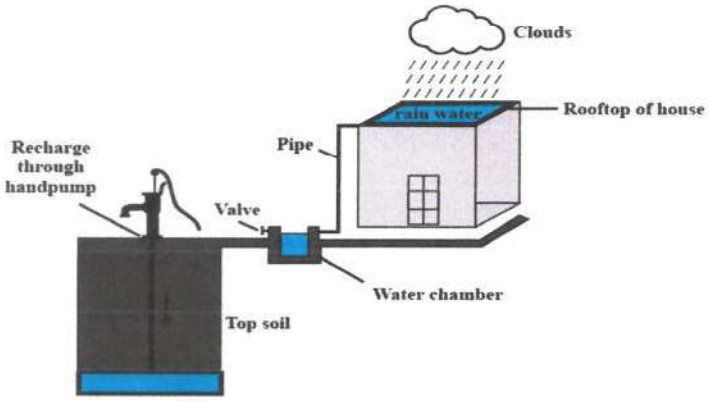

Photo of Rainwater Harvesting

Photo of At the college top, water collection

With above literature it is observed that the water gathering framework can be created with subjective and quantitative methodology for the contextual analysis viable.

III. Study area:

This campus of SVKM's IOT, Dhule is situated at $20^0$52'06" N latitude and $74^0$46'05" E Longitude and is located at Dhule region, Maharashtra. We have captured the satellite view of SVKM's campus using Google Earth.

Photo of Satellite View of SVKM's Campus

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The campus of this institute is situated at the Dhule city. The residential accommodation is provided to eligible faculty staff and students. The total strength of campus including students and staff peoples is approximately 3500. Thus, water is most natural resource being always in high demands by human beings and is indispensable part of the life. Hence, to face water scarcity in the future we should contribute in conservation of natural resources by initiating small steps at campus level. Therefore, in this situation, rain water harvesting system can be considered as a futuristic solution.

Rainwater harvesting system of SVKM's IOT campus using Geographic Information System (GIS). Demarcate and calculate area. The slope of the locations has checked by GPS essentials. Analyse the potential of runoff from the rainfall from the catchment and suggest suitable recharge pit locations and also, volume of rainwater to be recharge in the ground. The institute construct a underground storage tank.

IV. Calculation of RWH system for location 1:

For the proposed location in SVKM's campus, visual inspection, survey by GPS essentials and Geographic Information System (GIS) has been carried out and required analysis is done.

For location 1: *(Calculations are for 1 storm, considering intensity of storm as 2 cm/hr)*

Collected data –

1. Catchment area

    1. Rooftop area = 4139 m2
    2. Open area (Conc.) = 1151 m2
    3. Open area (Soil) = 1819 m2

Assume,

2. Average rainfall intensity =4 cm per 2 hr.

3. Runoff coefficient,

For roof top area = 0.95

For open area = 0.8

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4. Storm duration = 2 hr.

5. Now, by using rational formula,

For roof top area,

$Q = C.I.A / 3.6$

$= 0.95 \times 20 \times 4139 \times 10^6 / 3.6$

$= 0.02184$ m3/sec

For open area (Conc.),

$Q = C\ I\ A / 3.6$

$= 0.8 \times 20 \times 1151 \times 10^6 / 3.6$

$= 0.0061$ m3 /sec

For open area (Soil),

$Q = C\ I\ A / 3.6$

$= 0.8 \times 20 \times 1819 \times 10^6 / 3.6$

$= 0.00808$ m3 /sec

Thus, Total runoff = 0.02184 + 0.0061 + 0.00808

= **0.036028 m3/sec**

Now,

Total runoff volume = peak runoff rate × storm duration

=0.036028 × 2 ×3600

= **259.4016 m3**

= **259401.6lit.**

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Photo of Satellite View of SVKM's Campus

For this volume of water, recharge pit of dimensions 8 m × 8m × 4 m can be constructed, at the open place available beside SVKM's IOT building is shown as location 1 in photo 4.

%Water obstructed in a pit:

$$\%\text{water obstructed} = \frac{volume\ of\ recharge\ pic}{Total\ run\ off} X\ 100$$

$$\%\text{water obstructed} = \frac{256}{259.40} X\ 100$$

$$\%\text{water obstructed} = 98.01\%$$

For Location 1:

If we consider a single storm of 2hrs of intensity 2cm/hr then **98.01 %** of rainfall can be obstructed.

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Estimate of Open well recharge:

Sr.no.	Items	Quantity (m3)
1	Excavation	256 m3

Table: Estimate of Open well recharge

RWH drainage Pipes

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Photo of Open well recharge

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Photo of Open well net fencing for safety of students

Rainwater harvesting recharge pit

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