



7.1.4.1 Rainwater Harvesting

Rainwater Harvesting

With the increase in population the demand for fresh water is also increasing. Extraction of water from the ground to meet the needs of people has led to the lowering of ground water table. To deal with this problem Invertis University, Bareilly installed rainwater harvesting (RWH) system to reduce the dependency on ground water and use the captured rainwater for daily needs. RWH is the collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer or a reservoir with percolation.



Fig.1 Rainwater Harvesting System

Type: Roof top harvesting

Location: Invertis University, Bareilly

Calculation of catchment area:

Roof top area of respective blocks:

Building Name	Roof top area (m ²)
M-BLOCK	565
T-BLOCK	350
SEMINAR HALL	510
NILGIRI HOSTEL	720
LIBRARY	320
TOTAL	2465



Fig.2. Aerial view of Invertis University

Selection of runoff coefficient:

For concrete roof taking runoff coefficient as 0.80.

Determination of rainfall in Bareilly region:

Monthly rainfall data of Bareilly.

Month	Rainfall (mm)
January	22.9
February	25.3
March	14.5
April	8.9
May	19.3
June	106.4
July	307
August	290.9
September	186.1
October	44.9
November	3.9
December	9.7

Total	1039.6
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Computation of rainfall water harvested:

Volume of water harvested = Total catchment area (m²) x Total annual rainfall (m) x Runoff Coefficient

$$\begin{aligned} \text{Volume of water harvested} &= 2465 \times 1.0396 \times 0.8 \\ &= 2050.0912 \text{ m}^3 \end{aligned}$$



Fig.3. Conduit to carry rainwater from roof to tank.

Calculation of optimum dimension of tank:

- Considering that the collected water is to be used in Nilgiri hostel.
- Total number of students residing in hostel is 150.
- Assuming consumption = 150 Lpcd
- Total water demand per day = $150 \times 0.1 = 15 \text{ m}^3$.

As water is stored on monthly basis, Size of the tank will be equal to the excess amount of water left over after consumption. Hence, mostly excess amount of water assumed to be collected during the period of maximum rainfall – July and August.

- Assuming amount of water consumed per month = $150 \times 0.1 \times 30 = 450 \text{ m}^3$
- Amount of water collected during July and August = 1179.06 m^3

- And, amount of water consumed during this two month = $2 \times 450 = 900 \text{ m}^3$.
- Hence, total amount of water to be stored = Size of tank = $(1179.06 - 900) \text{ m}^3 = 279.06 \text{ m}^3$
- Assuming Height of tank to be = 4m
- Surface area of tank = 69.765 m^2
- Assuming L/B ratio = 2
- Width of tank (B) = $5.90 = 6 \text{ m}$
- Length of tank (L) = $11.81 = 12 \text{ m}$

Therefore dimension of tank are = 12m x 6m x 4m.



Fig.4. Underground rainwater tank.

Water Conservation

The world is focusing on sustainable development so that the over exploitation of natural resources can be prevented. One such natural resource is fresh water, which is depleting at a faster rate and is a matter of grave concern.

Invertis University took a step ahead to preserve this natural resource. Here at Invertis University we have rain water harvesting system for harvesting the rooftop rain water and the surface runoff is harvested to recharge the ground water. For this borewell and bunds are constructed to retain the surface runoff. The retained water is infiltrated to the ground and the ground water gets recharged.



Fig.1. Borewell for ground water recharge

INVERTIS UNIVERSITY, BAREILLY

The University have internal member team for maintenance of water bodies and distribution system committee. List of committee members are below.

Maintenance of Water bodies and Distribution system Committee			
S. No.	Constitution		Designation
1	Sh. L. P. Mishra	Director Administration, IU	Chairman
2	Mr. Atul Johri	Staff	Co coordinator
3	Ms. Shally Sharma	Staff	Member
4	Ms. Arti jaswal	Staff	Member

Invertis University Water Distribution Systems

Today, a water supply system consists of infrastructure that collects, treats, stores, and distributes water between water sources and consumers.,

Many efforts on the development of a water supply system have been made through for sustainable water supply. However, the complexity of system limited the site specific application at the first era. As water demands pressures raise increasingly on the existing water supply system, many studies attempted to develop a general water supply system to assist decision makers to design more reliable systems for a long range operation period. The purpose of distribution system is to deliver water to consumer with appropriate quality, quantity and pressure. Distribution system is used to describe collectively the facilities used to supply water from its source to the point of usage.

Water quality should not get deteriorated in the distribution pipes

- It should be capable of supplying water at all the intended places with sufficient pressure head.
- The layout should be such that no consumer would be without water supply, during the repair of any section of the system.
- It should be fairly water-tight as to keep losses due to leakage to the minimum.
- It should be capable of supplying the requisite amount of water during firefighting

Inspection prior to reassembly

- Check the water tank for leakage/damage.
- Wash and clean all the parts with mixture of kerosene oil and water.
- Check the stand assembly level with spirit level.
- Check the coupler for broken threads.
- Clean the flanges and spout pipe for crack and leakage.

Invertis University Bareilly

Maintenance Cell Report 2020

Common Trouble shooting for centrifugal pumps

S.no.	Problems	Probable cause	Remedy
1	Pumps motor fails to start	Blown fuse of open circuit breaker motor of starting	Replace fuse or reset circuit breaker ,replace and consult supplier/electrician check packing and loosen open pump and remove dirt
2	water not delivered	Pump has lost its priming leaks in pipe or suction pipe no water in the source due to over plumbing collapse of well casing or screens clogging of well screens	Repeat priming seal the leaks deepening of source consult well driller and get it cleaned
3	Pump is not running properly	Low yeild in well air leaks in suction pipe partial clogging of well screens impeller is worn out obstruction of foot valve	Well deepening pull drop pipe from well and seal the leaks consult well driller and get it cleaned clean/replace impeller clean foot valve
4	Noice in pump	Bearing or other part are loose pump motor is loosely mounted low level of water in well air in suction pipe	Tighten or replace parts tighten the mounting reduce pumping rate repair air leaks
5	Damage base coupling	coupling got broken	Base coupling to be changed
6	Urinal blockage	Some garbage was collected in the tank	Pressure machine to be used
7	water is not coming properly	Internal pipe got damaged	Pipe to be fixed

8	Water is not coming in wash basin	Wash basin tap got damaged	Wash basin tap to be repaired
9	Three phase motor is not working	Banding motor got fused	Banding of motor to be prepared
10	Cleaning tanks	Taps got slipped	New taps to be fixed
11	Cleaning tanks	Dirt /fungus adhere to tanks wall	Call the tank cleaners and clean the tanks
12	Installation of pipes /taps	Need for new installation as per requirment	Call the plumber and install the devices
13	Water is over flowing	Over flow pipe got damaged	New over flow pipe to be arranged
14	water tank leakage	Tank pipe got damaged	New pipe to be arranged
15	water is flowing in wash basin	Tap got loosen	New tap to be arranged
16	water is not coming in the washroom	pipe line got choaked	use to be presure machine
17	Damge cystem	cystem pipe got broken	New cystem pipe to be fixed
18	Blockage urinal	Some garbage was collected in the wall of tank	Tank to be cleaned
19	Seepage issue in chembers	Tank got damaged	New tank to be arranged
20	Installation of taps	Need for new installation	Call the plumber and install the taps
21	Pumps motor fails to start	Blown fuse of open circuit breaker motor of starting	Replace fuse or reset circuit breaker ,replace and consult supplier/electrician check packing and loosen open pump and remove dirt

22	Noise in pump	Bearing or other part are loose pump motor is loosely mounted low level of water in well air in suction pipe	Tighten or replace parts tighten the mounting reduce pumping rate repair air leaks
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