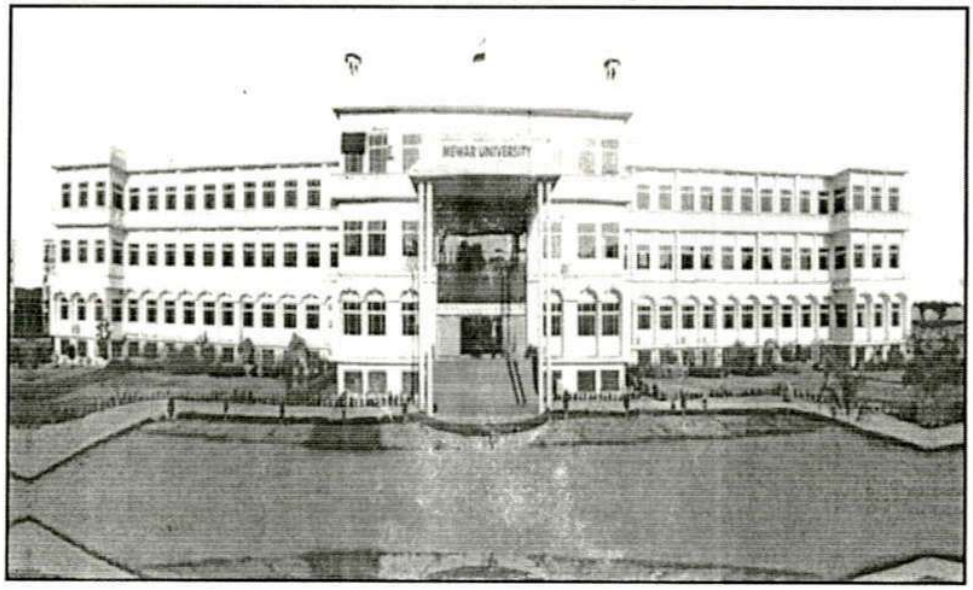
WATER CONSERVATION AUDIT REPORT

CONSULTATION REPORT



MEWAR UNIVERSITY

Gangrar Chittorgarh (Rajasthan)

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Gangrar, (Chittorgarh)

MEWAR UNIVERSITY Chittorgarh-312901 (Raj.)

PREPARED BY

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(2021-22)

CONTENT

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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Mewar University Gangrar Chittorgarh for** allowing us to conduct an water audit for the university.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation during the study.

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Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
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Lead Auditor ISO50001:2011 [EnMS] from FICCI, Delhi
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Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

Green Monitoring Committee.

OFFICE OF THE REGISTRAR
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No. MU/RO/Admin/2022/1450 Dated : 4/5/2022

OFFICE ORDER

Reconstitution of Green, Environment & Energy Auditing Committee

Green Audit, Environment Audit & Energy Audit Committee is reconstituted to conduct the necessary audit in due course. Members of the Audit Committee are mentioned below:

S. No.	Name	Designation	Committee Role
1	Dr. Y. Sudershan	Professor & Dean, Department of Agriculture	Co-Ordinator
2	Mr. Rakesh Kumar Singadiya	Director, Empirical Exergy Pvt. Ltd.	External Auditor
3	Dr. Neelu Jain	Associate Professor, Department of Agriculture	Internal Auditor
4	Dr. Satish Kumar Ameta	Asst. Professor, Department of Life Science	Internal Auditor
5	Mr. Deepak Kumar Joshi	Asst. Professor, Department of Electrical Engg.	Internal Auditor
6	Dr. Mohd. Ashid	Asst. Professor, Department of Chemistry	Member
7	Ms. Nirma Kumari Sharma	Asst. Professor, Department of Electrical Engg.	Member
8	Mr. Suraj Kumhar	Asst. Professor, Department of Electrical Engg	Member
9	Mr. H. Widhani	OSD	Member
10	Mr. Narendra Kumar Ved	Non-Teaching Staff	Member
11	Ms. Sanchita Karnik	Non-Teaching Staff	Member

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Copy to:
1. PS to Hon'ble Chairperson for Kind information.
2. PS to President/Pro President for kind information.
3. Deans/Directors/CoE for Information.
4. All HoDs for information.
5. Concerned Committee Members
6. Coordinator, IQAC Cell.
7. Admission/Accounts/Examination/Stores/IT Support/Library/
8. Wardens/Maint.I-C/Receptionist

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MEWAR UNIVERSITY

The Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- **Mr. Rakesh Pathak**, [Director & Electrical Expert]
- **Dr. Suresh Kumar Soni** [Certified Energy Auditor & Energy Expert]
- **Mr. Sachin Kumawat** [Sr. Project Engineer]
- **Mr. Lokesh Kumar Varma** [Project Engineer]
- **Mr. Mohit Malviya** [Fire saftey Engineer]
- **Mr. Aakash Kumawat** [Site Engineer]
- **Mr. Ajay Nahra,** [Sr. Accountant & admin]

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EXECUTIVE SUMMARY

The executive summary of the water conservation audit report furnished in this section briefly gives the identified water conservation measures, that can be implemented in a phased manner to conserve water and increase the productivity of the university.

WATER CONSEVATION INITIATIVE TAKEN BY UNIVERSITY: -

- **WASTEWATER TREATMENT PLANT: -**

  University has installed a sewage treatment plant (STP) for wastewater generated in various activities on the university campus. The output of the plant is 14.5 m^3/hr University has utilized treated water for gardening purposes. **It's appreciable.**

- **RAIN WATER HARVESTING SYSTEM: -**

  The university has a "Rainwater Harvesting System" on the institute campus for maintaining the groundwater level. This system saves about 70 to 80 % of the rooftop rainwater of the building. It is appreciable.

- **Sprinkler system:-**

  University has installed a water sprinkler system for garden, lawn area. **Its appreciable.**

RECOMMENDATION

WATER MONITORING SYSTEM

- University has required to installation of water flow meters to quantify the real-time water consumption of the university.
- Installation of a **"Cloud-based (IoT based) groundwater extraction monitoring system"** for the bore well to quantify freshwater consumption per day in the university.

DRIP WATER IRRIGATION

- Use a drip water irrigation system for plants and trees.

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USE EFFICIENT WATER TAPS .

- Water saving taps either reduce water flow or automatically switch off to help save water. So, it is highly recommended to install efficient water taps in university to reduce water consumption.

USE EFFICIENT URINAL TAPS.

- Replacing these inefficient fixtures with water sense labelled flushing urinal can save between 0.5 to 04 liter per flush without sacrificing performance. Installing water saving flushing urinal will not only reduce water use in facilities but also save pumping energy on water bills.

INSTALLATION OF WATER OVERFLOW SENSOR IN TANKS: -

- It was observed that water overflow in overhead tanks after tank filling. So, it is recommended installation of water overflow sensor to avoid water overflow.

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CHAPTER- 1
WATER CONSUMPTION AND WASTEWATER SOURCES

1.1 Details of source of fresh water and use areas:

The main source of freshwater is Borewell for the university. The freshwater is mainly used for drinking, housekeeping, gardening, domestic activity, and new construction project. Details of the pumps are given in the table.

Table:1.1 Details of Freshwater sources.

Sr. No.	Fresh Water Sources	Location	Motor Power (HP)	Remark
1	Open Well	The back side of the Sanga hostel	10	For Freshwater Supply
2	Borewell-01	Near Open Well	5	For Freshwater Supply
3	Borewell-02	The back side of the Mess	3	For Freshwater Supply
4	Borewell-03	Near Temple	7.5	For Freshwater Supply
5	Borewell-04	Near STP Plant	5	For Freshwater Supply
6	Borewell-05	Near MBA building	3	For Freshwater Supply
7	Transfer Pump-01	UG Tank Near Mess	5	Transfer Pump
8	Transfer Pump-02	UG Tank Near Khajuri	5	Transfer Pump
9	Transfer Pump-03	UG Tank Near Khajuri	5	Transfer Pump
10	Transfer Pump-04	UG Tank near MBA Tank	7.5	Transfer Pump
11	Transfer Pump-05	STP outlet	5	Transfer Pump

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1.2 Water Flow Measurement and Power measurement: -

Table 1.2: - Flow and power measurement of borewells.

Sr. No.	Fresh Water Sources	Location	Motor Power (HP)	Voltage	Current	Power Factor	Power Consumption (kW)	Measured Water Flow (m3/hr)	Working (Hr./day)	Water Extraction (m^3/ day)
1	Open Well	Back side of Sanga hostel	10	407	14.3	0.78	7.9	9.6	16	153.6
2	Borewell-01	Near Open Well	5	405	11.3	0.82	6.5	5.7	16	91.2
3	Borewell-02	Back side of Mess	3	402	5.3	0.84	3.1	2.5	14	35
4	Borewell-03	Near Temple	7.5	Under Maintenance						0
5	Borewell-04	Near STP Plant	5	399	4.5	0.79	2.5	2.1	16	33.6
6	Borewell-05	Near MBA building	3	397	5.1	0.86	3	1.5	16	24
7	Transfer Pump	UG Tank Near Mess	5	402	10.1	0.86	6	5.6	14	78.4
8	Transfer Pump -01	UG Tank Near Khajuri	5	403	11.1	0.83	6.4	10	16	160
9	Transfer Pump -02	UG Tank Near Khajuri	5	401	9.4	0.78	5.1	4.4	16	70.4
10	Transfer Pump	UG Tank near MBA Tank	7.5	398	9.6	0.85	5.6	8.5	14	119
11	Transfer Pump	STP outlet	5	398	7.6	0.86	4.5	14.5	10	145
	Average total water exraction m^3/ day									910.2

Observation: - It was measured that the average freshwater consumption of the university from open well and borewell is 910.2 m^3/ day.

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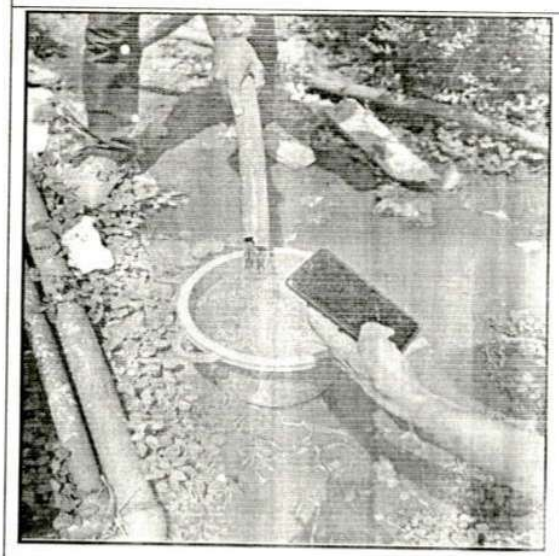
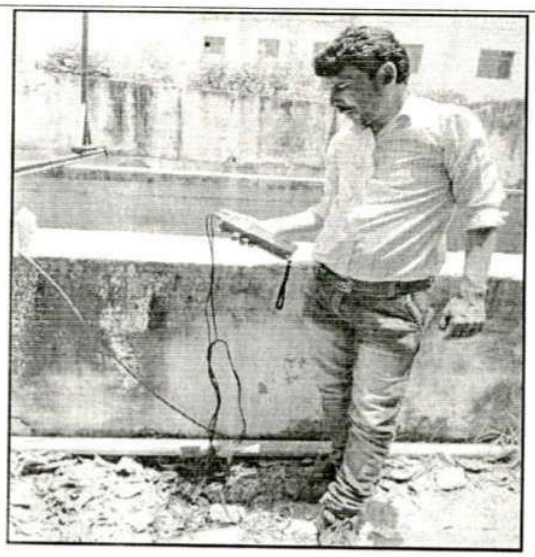
1.3 Water accounting & metering system:

It was observed that there is a requirement for water flow meters on borewells to quantify per day groundwater extraction from different sources.

ultrasonic flow Meter installation at university tank



Water measurement by bucket method.



Measurement at STP outlet

Figure: - 1.1 Water flow measurement on the university campus.

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1.4 Water storage capacity in University campus: -

There are different types of tanks available in the university for water storage like Underground RCC tanks, Overhead RCC tanks, PVC tanks, etc.

Table 1.3: - Water Storage tank in university campus

Sr. No	Location	Type of Tank	Unit Capacity (Liter)	Quantity	Total Capacity (Liter)	Total Capacity (Kilo Liter)
1	Administrative and Academic Block, Annapurna Mess and Education Block	Underground (RCC tank)	1,00,000	4	4,00,000	400
2	Administrative and Academic Block	Overhead tank (RCC)	40,000	2	80,000	80
3	Guest House	Overhead tank (RCC)	30,000	1	30,000	30
4	Workshop	Overhead tank (RCC)	50,000	1	50,000	50
5	MBA Building	Overhead tank (RCC)	30,000	1	30,000	30
6	Panna Girls hostel	Overhead tank (RCC)	15,000	1	15,000	15
7	Annapurna Mess	Overhead tank (RCC)	30, 000	1	30,000	30
8	2 BHK residency	Overhead tank (RCC)	15,000	1	15,000	15
9	1 BHK Residency	Overhead tank (RCC)	30,000	2	60,000	60
10	1 BHK Residency (B- Block)	Overhead tank (RCC)	30,000	4	1.20.000	120
11	Kumba Hostel	Overhead tank (RCC)	20,000	2	40,000	40
12	Pratap Hostel	Overhead tank (RCC)	20,000	2	40,000	40
13	Sanga Hostel	Overhead tank (RCC)	30,000	2	60,000	60
14	Bhoj ha Sah (International Hostel)	Overhead tank (RCC)	40,000	2	80,000	80
15	Meera Girls Hostel	Overhead tank (RCC)	20,000	1	20,000	20
	Total Water Storage Capacity of Mewar university: -				9,50,000	1070

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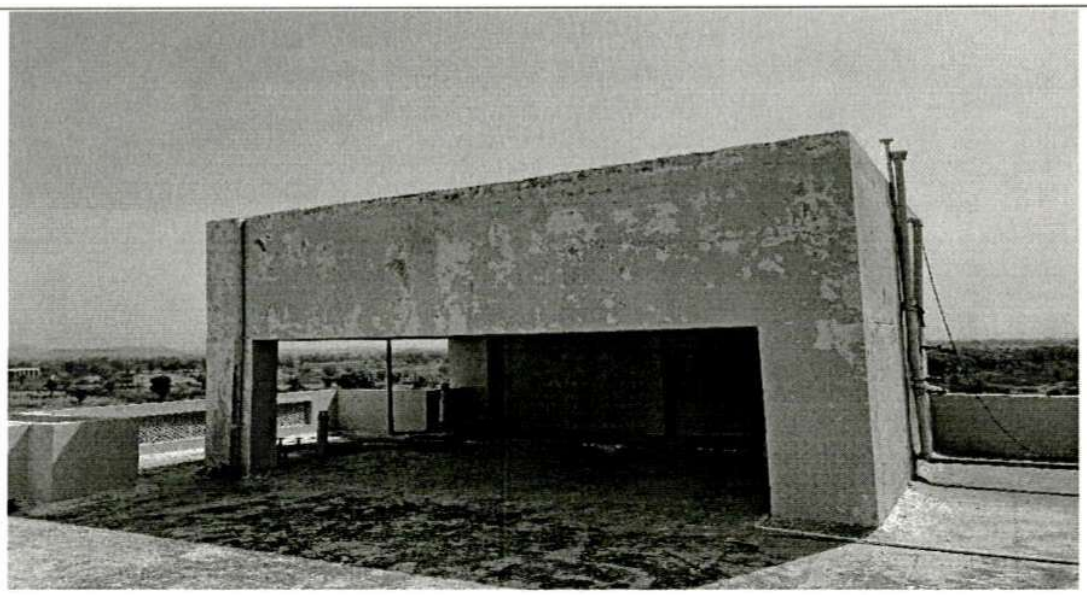
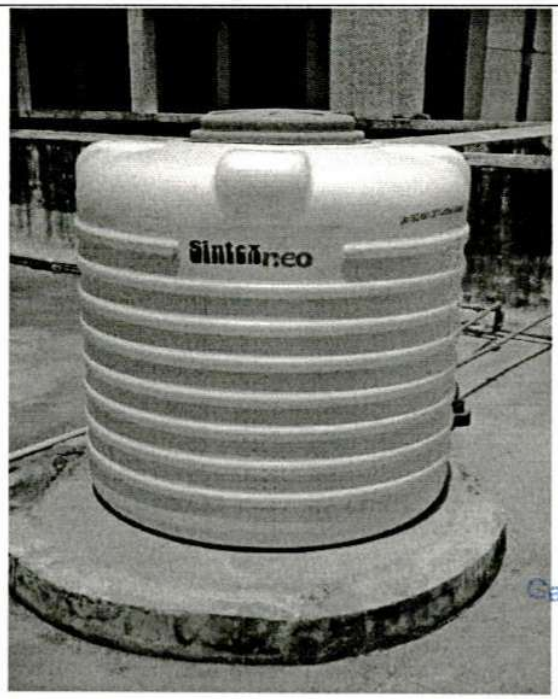
1.5 Photographs of water storage tanks.



Fresh Water Storage tank



RO Treated water storage tanks

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Fig:- 1.2 Water Storage Tank and capacity of University Campus

1.6 Water use areas on University Campus: -

Water is preliminary used for drinking, domestic, gardening, and clinical activity. The audit team visited various departments and buildings to determine appliances. The details of the washroom, toilet, and taps are given on the table

Table: 1.4 Details of washroom and Uses Taps in various areas

Admin block						
Sr.No.	**Location**	**Urinals**	**Hand wash**	**Toilets**	**Taps**	**Drinking Taps**
1	Basement	14	23	23	46	22
2	First floor	13	26	28	56	
3	Second floor	18	25	33	66	
4	Third floor	22	27	37	74	
M.B.A. Block						
Sr.No.	**Location**	**Urinals**	**Hand wash**	**Toilets**	**Taps**	**Drinking Taps**
1	Ground floor	5	8	6	12	4
2	First floor	5	8	6	12	4
3	Second floor	5	8	6	12	4
4	Third floor	5	8	6	12	4
Engineering Block						
Sr.No.	**Location**	**Urinals**	**Hand wash**	**Toilets**	**Taps**	**Drinking Taps**
1	Ground floor	4	4	6	12	4
2	First floor	5	4	5	10	4
3	Second floor	3	4	6	12	4

Sr. No.	Location	Urinals	Hand wash	Toilet	Bathroom	Taps	Drinking Taps
1	Bhamashah International Hostel	0	114	114	0	228	4
2	Sanga Boys Hostel	16	28	32	32	64	16
3	Kumbha Boys Hostel	16	24	32	32	64	16
4	Pratap Boys Hostel	24	48	48	48	96	8
5	Panna Dhai Girls Hostel	0	12	32	32	64	16
6	SC Meera Girls Hostel	0	12	24	24	48	8

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1.7 Details of RO in University Campus.

Table 1.5: - Details of RO on the campus.

Sr. no	Location	Capacity (Litre)	Quantity
1	Main Building	500	1
2	Veg Mess	500	1
3	Kumbha Hostel	100	1
4	Pratap Hostel	100	1
5	Sanga Hostel	100	1
6	Panna Hostel	100	1
7	Guest house	50	1
8	Meera Hostel	100	1
9	1 BHK (B- Block)	50	1
10	MBA Building	100	1
11	BhamaShah International Hostel	50	1

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1.8 Waste Water Generation sources: -

At present wastewater is generated from various departments, canteen, mess, hostels like washrooms, handwash, and washing of medical equipment in Pharmacy department and RO rejected water treated in STP plants. After that treated water university to be reused in gardening.

Table: - 1.6 Wastewater generation area on the university campus

Sr. No	Key Water Usage Section	Type of water used (raw, treated, etc.)	Water Consuming activities
1	Admin Block	Fresh Water	Drinking and other uses
2	Hostels	Fresh Water	Drinking, Food cooking, other Uses
3	Institution Buildings	Fresh Water	Drinking and other uses
4	Canteens /Mess	Fresh Water	Food cooking, drinking
5	Residential	Fresh Water	Drinking, domestic and other activities
6	Guest House	Fresh Water	Drinking and other uses

- Some photographs of wastewater generation sources are given

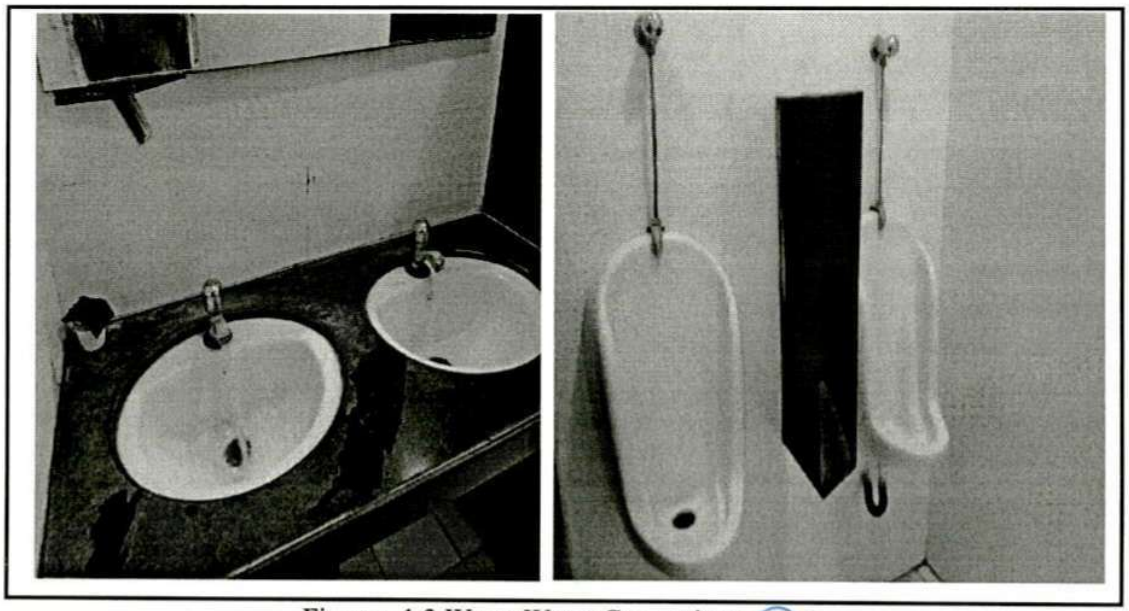

Figure:- 1.3 Waste Water Generation sources

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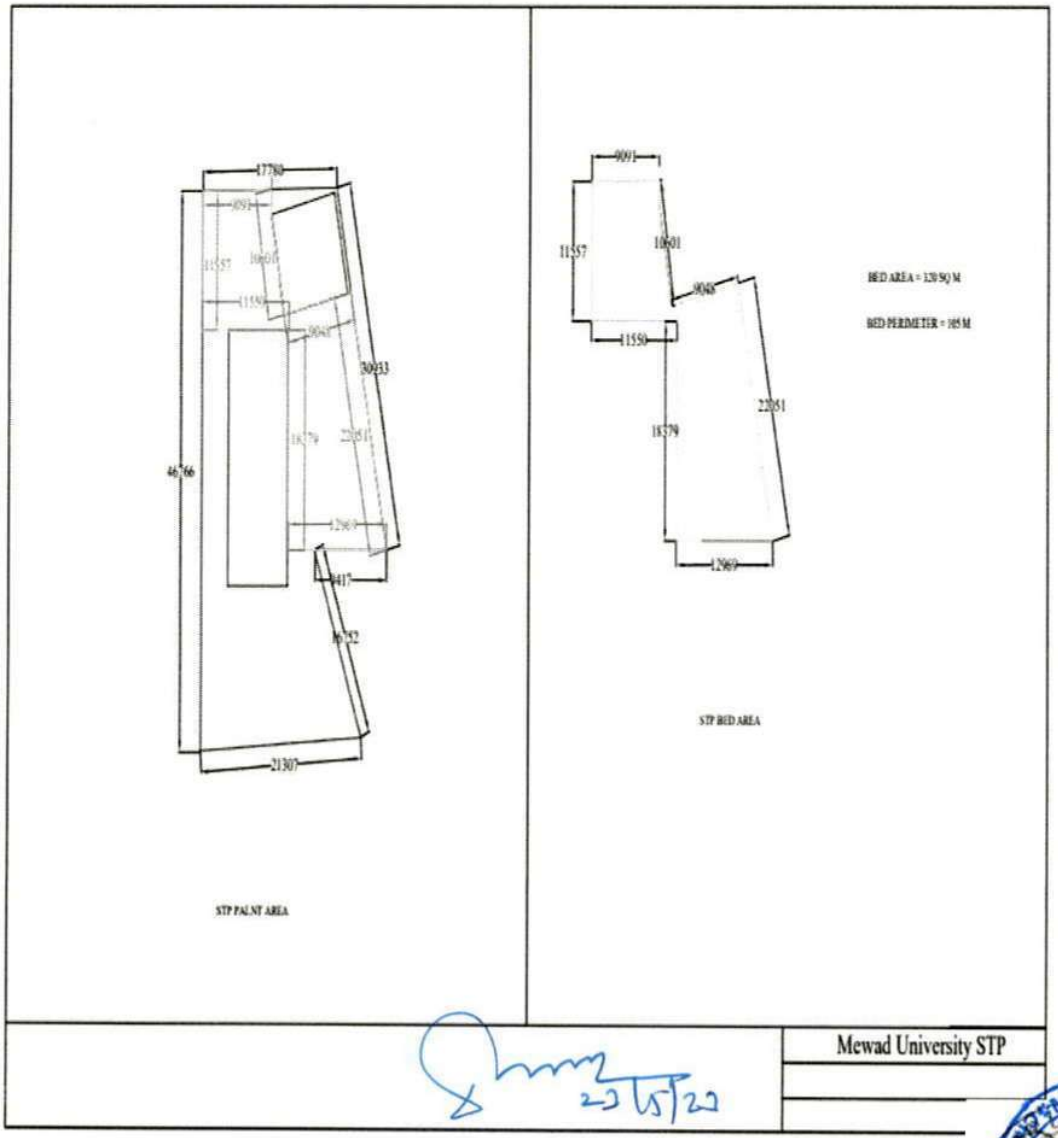
CHAPTER- 2
WATER CONSERVATION MEASURES

Water conservation Measures

2.1 Waste Water Treatment Plant: -

University has installed an STP plant for wastewater treatment. After the water treatment is utilized for the gardening purpose.

The layout of the STP plant: -



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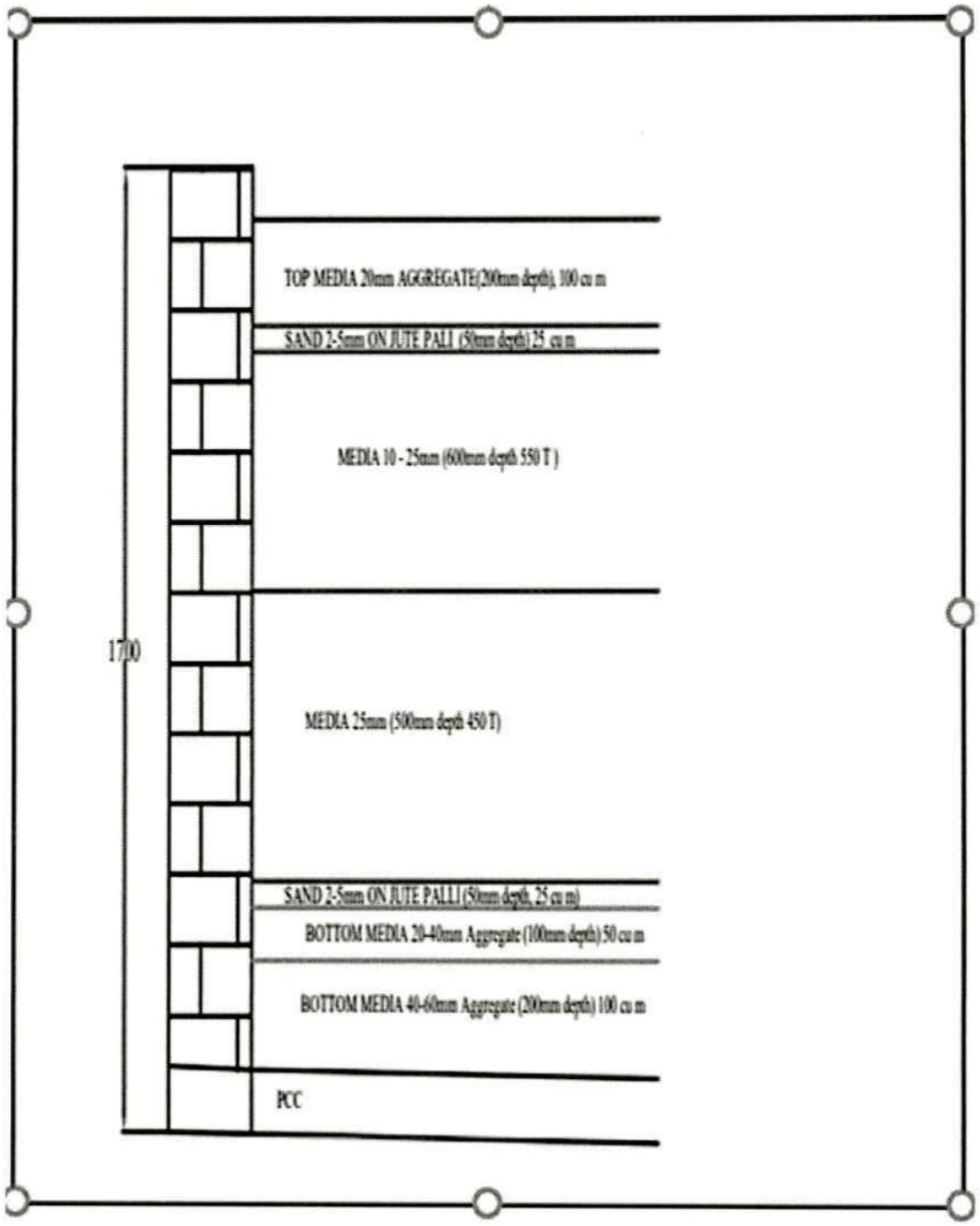
Design of Biological treatment system for STP



Observation: - All wastewater treated in the STP plant and treated water are used for gardening purposes. **It's Appreciable.**

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2.2. Rainwater Harvesting systems

Rainwater harvesting is a technique to capture the rainwater when it precipitates, store that water for direct use or charge the groundwater and use it later.

There are typically four components in a rainwater harvesting system:

- Roof Catchment.
- Collection.
- Transport.
- Infiltration or storage tank and use.

If rainwater is not harvested and channelized it runoffs quickly and flows out through storm-water drains. For storm-water management, the recharge pits, percolation pits, and porous trenches are constructed to allow stormwater to infiltrate inside the soil.

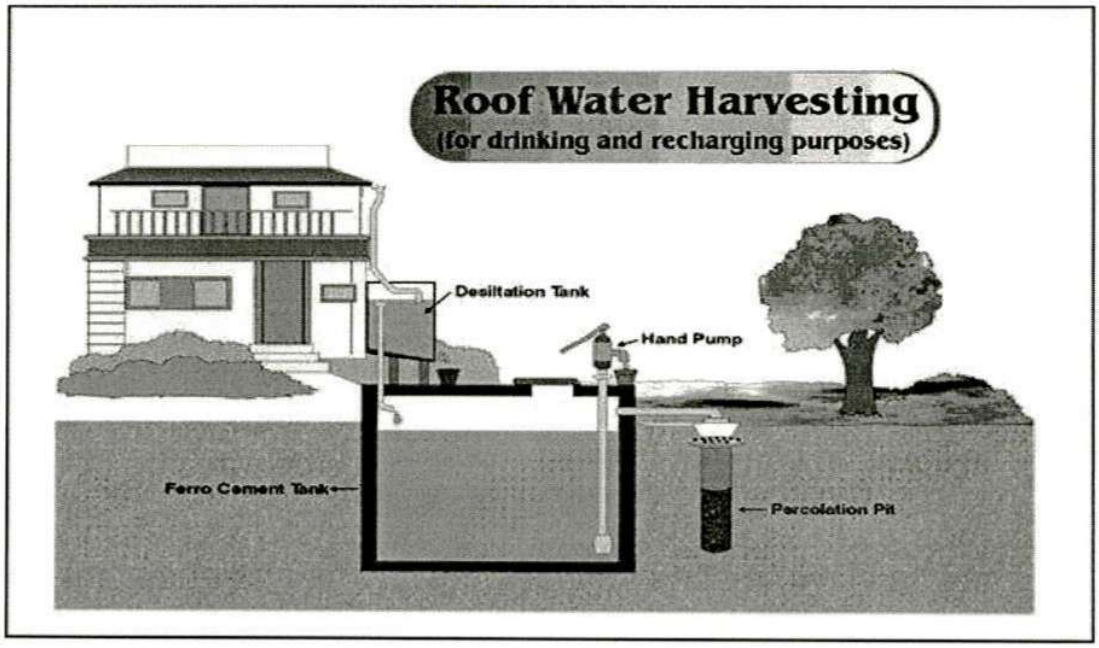

Figure: - 2.1 Components of a rooftop rainwater harvesting system

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Rainwater harvesting system in Mewar University:

University has rainwater harvesting systems on campus.

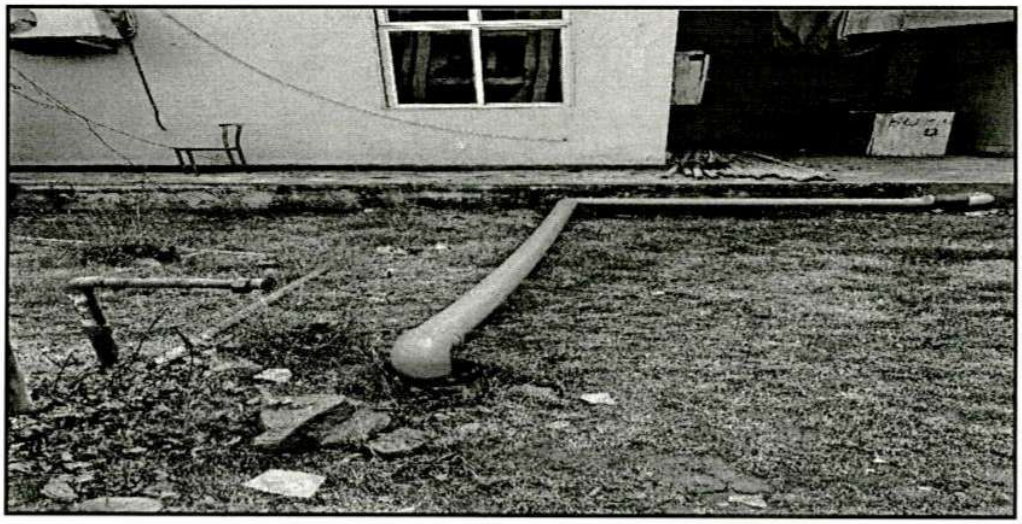

Figure 2.2:- Rain Water Harvesting System on the university campus

Observation:-

University has installed rainwater harvesting system in the campus for capture the rain water in university. Its appreciable.

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2.3 Fresh Water uses for Gardening:

University has installed a water sprinkler system for the lawn area in front of the main university admin block. **Its appreciable.**

Figure 2.3:-Water Sprinkler system in university lawn

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