Empirical Exergy Private Limited (EEPL)

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CIN No: U74999MP2018PTC045751

Ref No: EEPL/2019-20/JUNE/C-14 **Date: 25/06/2019**

ENVIRONMENTAL AUDIT CERTIFICATE

This is certified that the Environmental audit was conducted at **Mewar University, Chittorgarh (Rajasthan)** dated 11/06/2019 to 14/06/2019 (Four Days) and the audit report has been submitted by **Empirical Exergy Private Limited (EEPL), Indore**

We avail this opportunity to express our deep and sincere gratitude to the management for their wholehearted support and co-operations during the environmental audit.

This certificate is being issued based on the Environmental Audit conducted by EEPL.

For- **Empirical Exergy Private Limited**

EMPIRICAL EXERGY PRIVATE LIMITED INDORE (M.P.)

Rajesh Kumar Singadiya (Director)
M.Tech (Energy Management),
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Lead Auditor ISO50001:2011 [EnMS) from FICCI,
DelhiCertified Water Auditor (NPC, Govt of India)

ENVIRONMENT AUDIT REPORT

CONSULTATION REPORT

MEWAR UNIVERSITY

Gangrar Chittorgarh (Rajasthan)

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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(2018-19)

CONTENT

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 environmental 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.

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
Certified Water Auditor (NPC, Govt of India)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

Green Monitoring Committee.

OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)

Ref. No.MU/RO/2019/2177 25/02/2019

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:

Sr. No.	Name	Designation	Committee
1	Dr. Satish Kumar Sharma	Professor, Department of Agriculture	Co-Ordinator
2	Mr. Rakesh Kumar Singadiya	Director, Empirical Exergy Pvt.Ltd.	External Auditor
3	Mr. K.K. Bhati	Asst. 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 Engineering	Internal Auditor
6	Dr. Mohammad Ashid	Asst. Professor, Department of Chemistry	Member
7	Mr. Suraj Kumhar	Asst. Professor, Department of Electrical Engineering	Member
8	Mr. Brijesh Kumar Meena	Asst. Professor, Department of Agriculture	Member
9	Mr. H. Widhani	OSD	Member
10	Mr. Narendra Kumar Ved	Non-Teaching Staff	Member
11	Mr. Rajesh Sharma	Non-Teaching Staff	Member

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:
1. PS to Hon'ble Chancellor (for kind information)
2. PS to Hon'ble President/Vice Chancellor(for kind information)
3. All Officers/Deans/Directors/Hod's
4. IT Section/Accounts Dept./All Staff
5. Coordinator – IQAC Cell
6. Record File

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 safety Engineer]
- **Mr. Aakash Kumawat** [Site Engineer]
- **Mr. Ajay Nahra,** [Sr. Accountant & admin]

EXECUTIVE SUMMARY

The executive summary of the environmentalaudit 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.

ENVIRONMENT AUDIT RECOMMENDATION

WATER MONITORING SYSTEM

- University hasplannedthe installation of water flow meters to quantify the real-time water consumption of the university**.**

DRIP WATER IRRIGATION SYSTEM FOR GARDENING.

- Usedripwaterirrigation systemforgardening.

WATER SPRINKLER SYSTEM

- There are good potential to install water sprinkler system for Lawn area in institute. Itwillbereducedwater consumptionofuniversity campus

INSTALLATION OF WATER OVERFLOW SENSOR IN TANKS.

- Itwasobservedthatwateroverflowinoverheadtanksaftertankfilling.So,itisrecommend edinstallation of wateroverflowsensorto avoid wateroverflow.

CHAPTER-1
INTRODUCTION

1.1 About University

Mewar University is an autonomous body set up by the Government of Rajasthan through Act. No. 4 of 2009 passed by the Rajasthan Legislative Assembly (Government of Rajasthan). The University is recognized by the UGC u/s 2(f) of UGC Act with powers to confer degrees u/s 22(1) of the UGC Act, 1956 vide their letter no. F.9-15/2009(CPP-I) dated 30th March 2009. This is the only private and self-financed University in Rajasthan which is also approved by the UGC u/s 12B of the UGC Act vide their letter No. F.9-15/2009 (CPP-I/PU) dated15th October 2018. The University is also NAAC accredited.

Mewar University has never affiliated with any institution, nor has the University ever set up any study centre in any part of the country other than its main campus at Gangrar in Chittorgarh (Rajasthan).

Mewar University is promoted by the Mewar Education Society (MES). It is controlled by a Board of Management, constituted by the MES, which is headed by Chairperson Shri Ashok Kumar Gadiya, a great visionary, educationist, and nationalist, who translated his ideas and dreams of promoting higher education into reality by setting up institutes of learning in various subjects. In no time, he has carved out a niche for himself as an educationist, who believes in the inculcation of values through education in the young generation.

The group, under the able leadership of Dr.Ashok Kumar Gadiya and the active support and association of renowned academicians, experienced professionals, and technocrats, has established a chain of Institutes of higher education and learning

VISION:-

To develop a centre of excellence for technical, professional and vocational education and research at par with national and international standards.

MISSION:-

To develop the framework for effectively conducting various educational and research programmes of the highest standards to produce confident, self-reliant, and responsible youth for society and outstanding professionals for government, industry, and business. The mission is to "**Reach the Unreached**"

Objective:-

- Provide easy access to high-quality education in Management, Engineering, as well as other academic & professional fields to its students, irrespective of their caste, creed, age, gender, region, or country, at an affordable cost.
- To offer a conducive environment for pursuing research and vocational studies with a market-driven orientation.
- To expose students to new ideas, fresh vision, and pragmatic ambition and enhance their competency in the ever-changing business environment.
- To provide a flexible choice-based credit system of education and dual-degree programmes while flexible adopting modes of delivery to suit students' requirements of learning.
- To prepare and assist students in improving their future prospects through career counselling and placement support, on-the-job training, industrial visits, presentations, and group discussions.
- To Promote and practice a convenient distance education concept in India and abroad.
- To spread job-oriented Skill Development education in rural and tribal areas

1.2 About Campus: -

Table 1.1 Details are the total build-up area given in the table:-

TOTAL GROUND COVERED. =20856.78 SQ.MT									
TOTAL OVERALL BUILT-UP ALL FLOORS AREA:- 76024.72 SQ.MT									
S.NO	BLOCK	FAR AREA				BUILT AREA			
		GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR AREA IN SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT	GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT
1	ADMINISTRATIVE AND ACADEMIC BLOCK.	8890.84	8519.33	8675.24	8675.24	8966.05	9050.97	9206.74	9206.74
2	EDUCATION BLOCK	1062.08	1170.08	1062.08	1062.1	1193.08	1253.27	1126.29	1126.29
3	ENGINEERINGBLOCK	1979.9	11979.9	1979.9	0	2126.84	2093.74	2093.74	0
4	MEWAR HOSPITAL	1337.03	1337.03	0	0	1590.91	1590.91	0	0
5	BHAMASHAH HOSTEL	1382.11	1382.11	1382.11	1382.1	1601.64	1572.82	1572.82	1572.82
6	SANGA HOSTEL	1189.78	1189.78	1189.78	1189.8	1359.6	1341.62	1341.62	1341.62
7	KUMBHA HOSTEL	602.71	602.71	620.65	620.65	709.19	697.35	697.35	697.35
8	PRATAP HOSTEL	640.52	640.52	665.78	665.78	749.38	739.64	739.64	739.64

S.NO	BLOCK	FAR AREA					BUILT AREA			
		GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR AREA IN SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT		GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT
9	PANNA DHAI HOSTEL	376.53	376.53	382.3	382.3		447.6	435.97	435.97	435.97
10	MEERA HOSTEL	323.13	323.13	323.13	323.13		386.87	381.68	381.68	381.68
11	GUEST HOUSE	229.94	223.58	223.58	223.58		295.78	258.82	258.82	258.82
12	STAFF QUARTERS(1 BHK)	285.11	285.11	285.11	285.11		367.6	362.67	362.67	362.67
13	STAFF QUARTER	276.99	276.99	276.99	276.99		353.84	349.18	349.18	349.18
14	ANNAPURNA MESS	613.7	0	0	0		708.4	0	0	0
	TOTAL	19190.37	28306.8	17066.65	15086.78		20856.78	20128.64	18566.52	16472.78

Mewar university from Google map

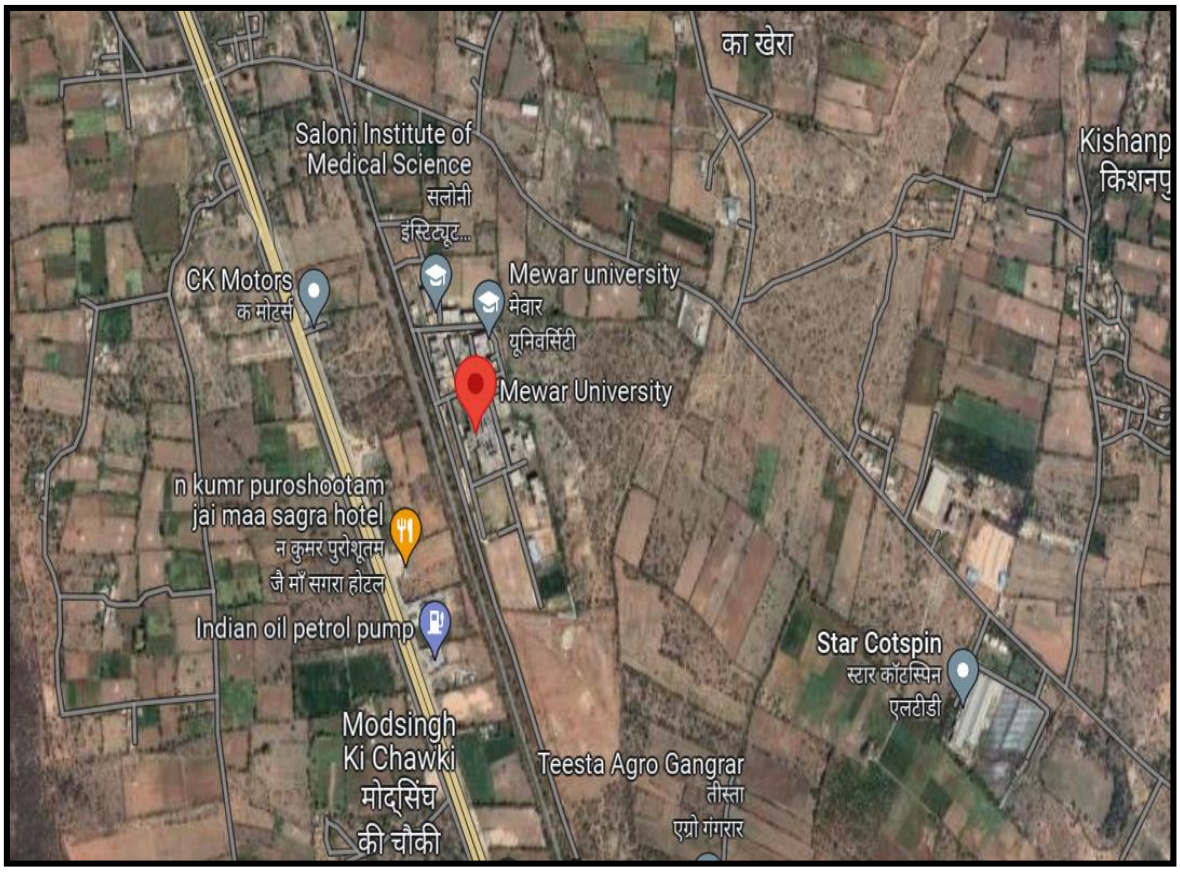
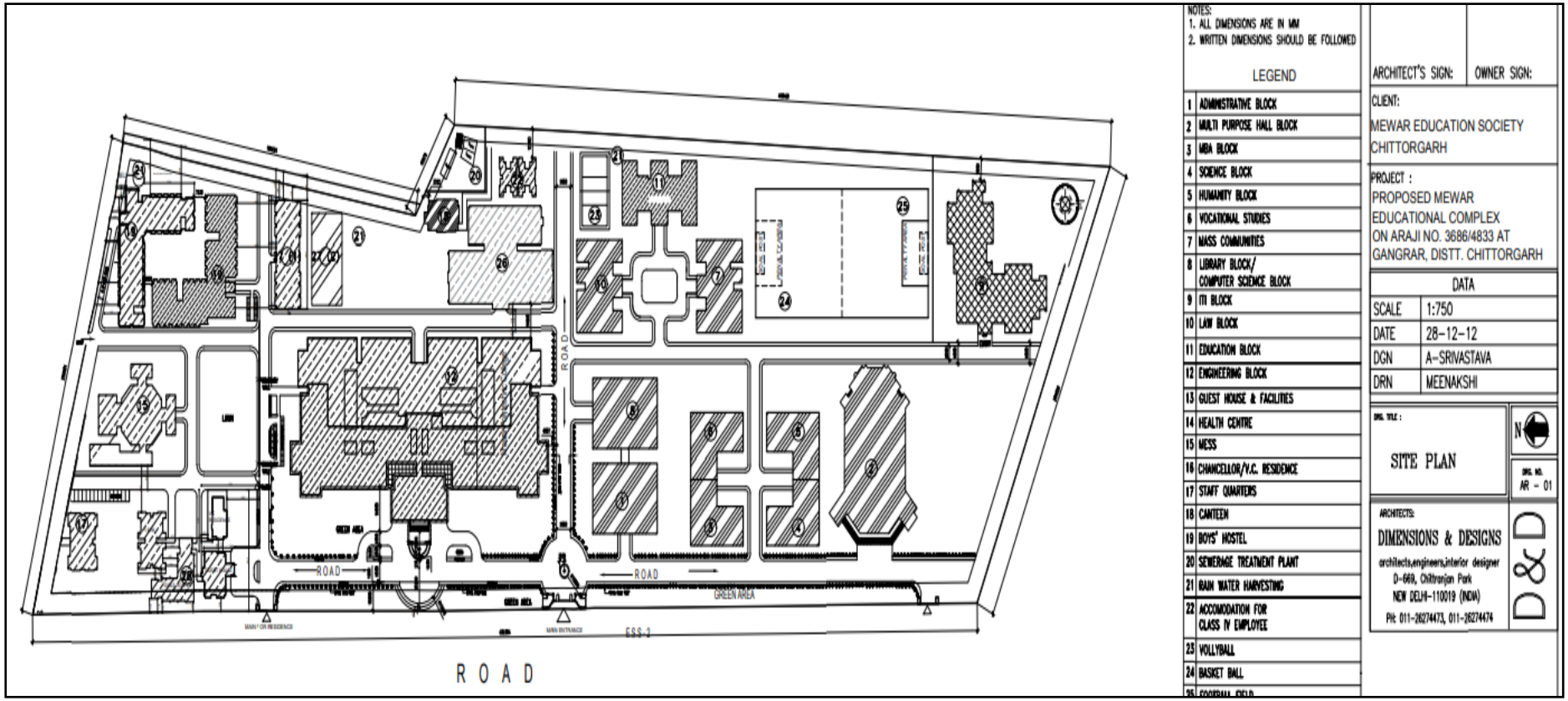


Figure 1.1: - Satellite Image of Mewar university from Google map

1.3 MEWAR UNIVERSITY LAYOUT OF VARIOUS BUILDINGS

Layout map of Mewar University



1.4Environment Auditing

Environment audits can be a highly valuable tool for an institute in a wide range of ways to improve their energy, environment, and economic performance. while reducing wastages and operating costs. Environmentaudits provide a basis for calculating the economic benefits of water conservation projects by establishing the current rates of water use and their associated cost.

1.5Objectives of Environment audit

The general objective of the environmental audit is to conduct a water audit and preparation of baseline report on water conservation measures to mitigate consumption and improve quality and sustainable practices.

The specific objectives are:

- To monitor freshwater consumption in the universityand water conservation practices.
- To assess the quantity of water, usage,the quantity of wastewater generation, and their reduction within the university.

1.6 Target Areas of Environment audit

This indicator addresses water sources, water consumption, irrigation, stormwater, appliances, and fixtures aquifer depletion, and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

1.7Methodology followed for conducting Environmentaudit

Step 1: Walkthrough survey

- Understanding of existing water sourcing, storage, and distribution facility.
- Assessing the water demand and water consumption areas/processes.
- Preparation of detailed water circuit diagram.

Step 2: Secondary Data Collection

- Analyse historic water use and wastewater generation
- Field measurements for estimating current water use
- Metered & unmetered supplies.
- Understanding of "base" flow and usage trends at the site
- Past water bills
- Wastewater treatment scheme & costs etc.

Step 3: Site Environment Audit Planning (based on on-site operations and practices)

- Preparation of water flow diagram to quantify water use at various locations
- Wastewater flow measurement and sampling plan

Step 4: Conduction of Detailed Environment Audit& Measurements

- Conduction of field measurements to quantify water/wastewater streams
- Power measurement of pumps/motors
- Preparation of water balance diagram
- Establishing water consumption pattern
- Detection of potential leaks & water losses in the system
- Assessment of productive and unproductive usage of water
- Determine key opportunities for water consumption reduction, reuse & recycle.

Step 5: Preparation of Environment Audit Report

- Documentation of collected &analysedwater balancing and measurement details
- Projects and procedures to maximize water savings and minimize water losses.
- Opportunities for water conservation based on reducing/recycling/reuse and recharge options

CHAPTER- 2
WATER CONSUMPTION AND WASTEWATER SOURCES

2.1 Details of source of fresh water and uses 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 pumpsare given in the table.

Table:2.1 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

2.2 Powermeasurement onbore well system

Table 2.2: - Power measurement of bore wells.

Sr.No.	Fresh Water Sources	Location	Motor Power(HP)	Voltage	Current	Power Factor	Power Consumption (kW)	Working (Hr./day)
1	Open Well	Back side of sanga hostel	10	405	13.1	0.801	7.4	16
2	Borewell-01	Near Open Well	5	407	12.9	0.834	7.6	16
3	Borewell-02	Back side of Mess	3	402	6.4	0.86	3.8	14
4	Borewell-03	Near Temple	7.5	405	12.2	0.899	7.7	12
5	Borewell-04	Near STP Plant	5	408	7.2	0.896	4.6	16
6	Borewell-05	Near MBA building	3	409	6.8	0.89	4.3	16
7	Transfer Pump	UG Tank Near Mess	5	408	11.2	0.889	7.0	10
8	Transfer Pump -01	UG Tank Near Khajuri	5	Under Maintenance				
9	Transfer Pump -02	UG Tank Near Khajuri	5	404	11.3	0.876	6.9	12
10	Transfer Pump	UG Tank near MBA Tank	7.5	Under Maintenance				
11	Transfer Pump	STP outlet	5	405	9.2	0.897	5.8	12

2.3 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.

2.4Water 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.

Table2.3: - Water storage tank in university campus

Sr. No	Location	Type of Tank	Unit Capacity (Litre)	Quantity	Total Capacity (Litre)	Total Capacity (Kilo Litre)
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	Bhabha 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: -				1, 70,000	1,070

2.5 Photographs of water storage tanks.

Fresh Water Storage tank

RO Treated water storage tanks

Fig:- 2.2 Water storage tank and capacity of University campus

2.6 Water use areason University Campus: -

Water is preliminary used for drinking, domestic, gardening, and clinicalactivity. 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: 2.4Details 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

2.7 Details of RO in University campus.

Table 2.5: - 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

Observation:-

All RO rejected water drain to atmosphere. It is highly recommended to collect all rejected water and reuse for gardening and toilet purpose.

2.8 Freshwaterusesforgardening

The one of major contribution from fresh water consumption is watering for other plants inInstitutedcampus.Thereisgoodpotentialforwatersavingbyadopts“AutomaticWatering 360adjustablemistingnozzleirrigationDripper’ssystem”forplants.Adjustabledripirrigation tools to provide different amounts of water depending on the water requirements ofdifferentplants. Thedripspeed can beset asforindoorand outdoor plants.

ProposedAdjustableMistingNozzleIrrigationDrippers
Proposedwatertimer

Observation:-

- It is observedthat there is directwater supply to the plant bythe pipingsystem

2.9 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 wateretc.

Table: - 2.6 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

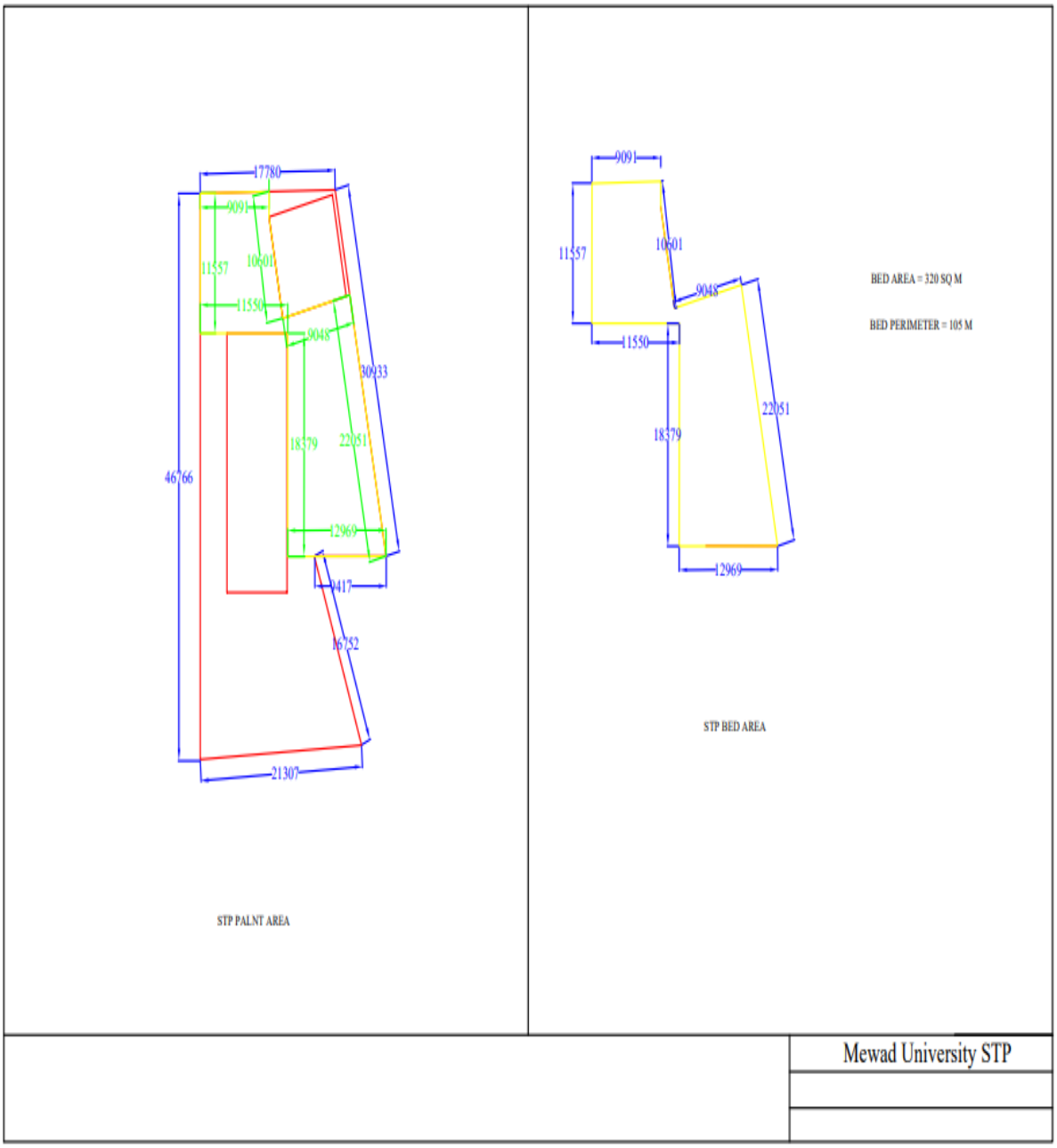
Some photographs of wastewater generation sources are given

Figure: -2.5Waste water generation sources

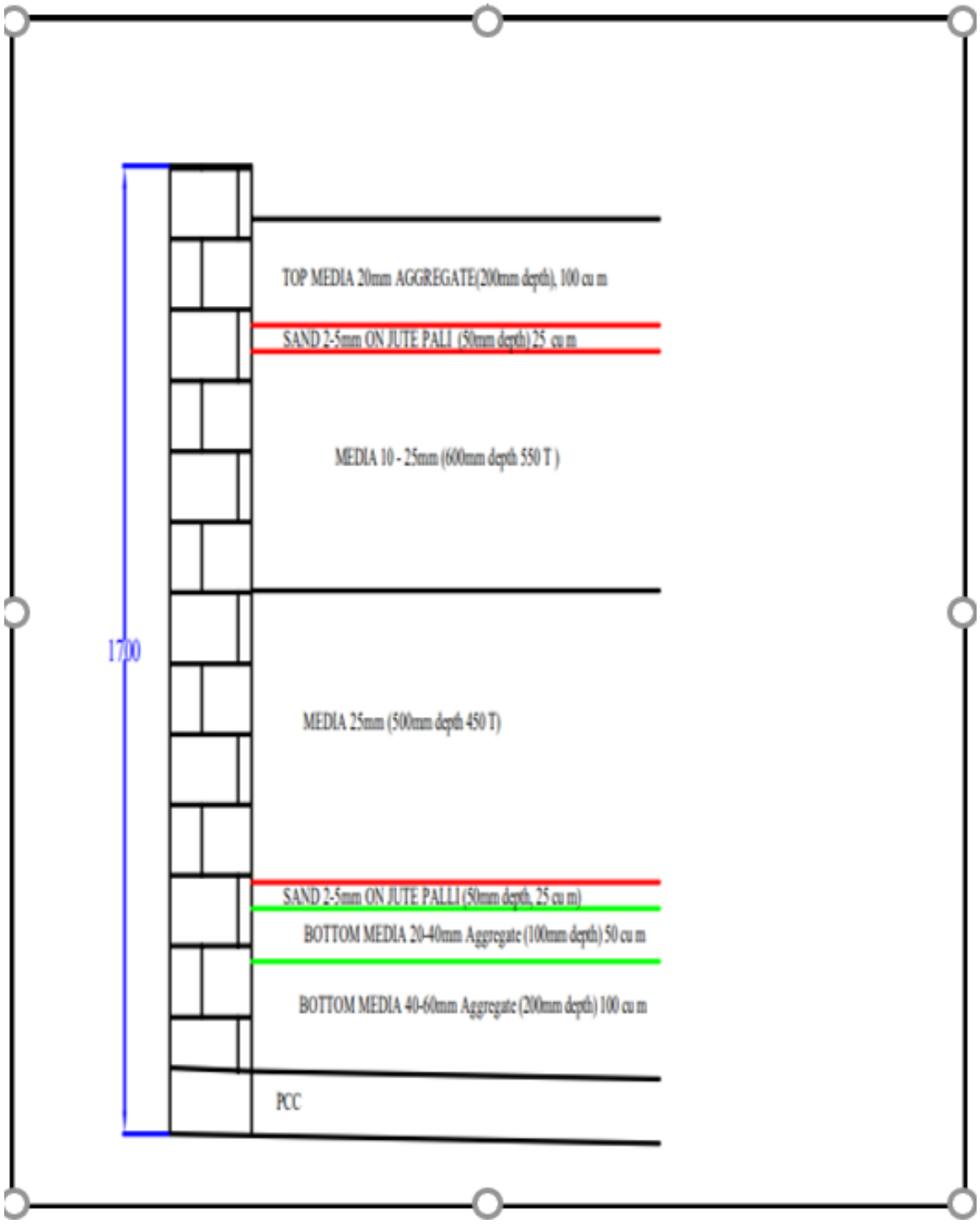
2.10 Waste water treatment plant: -

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

The layout of the STP plant: -



Design of Biological treatment system for STP



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

CHAPTER- 3
RAINWATER HARVESTING SYSTEM

3.1. 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 storagetank and use.

If rainwater is not harvested and channelizedit 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.

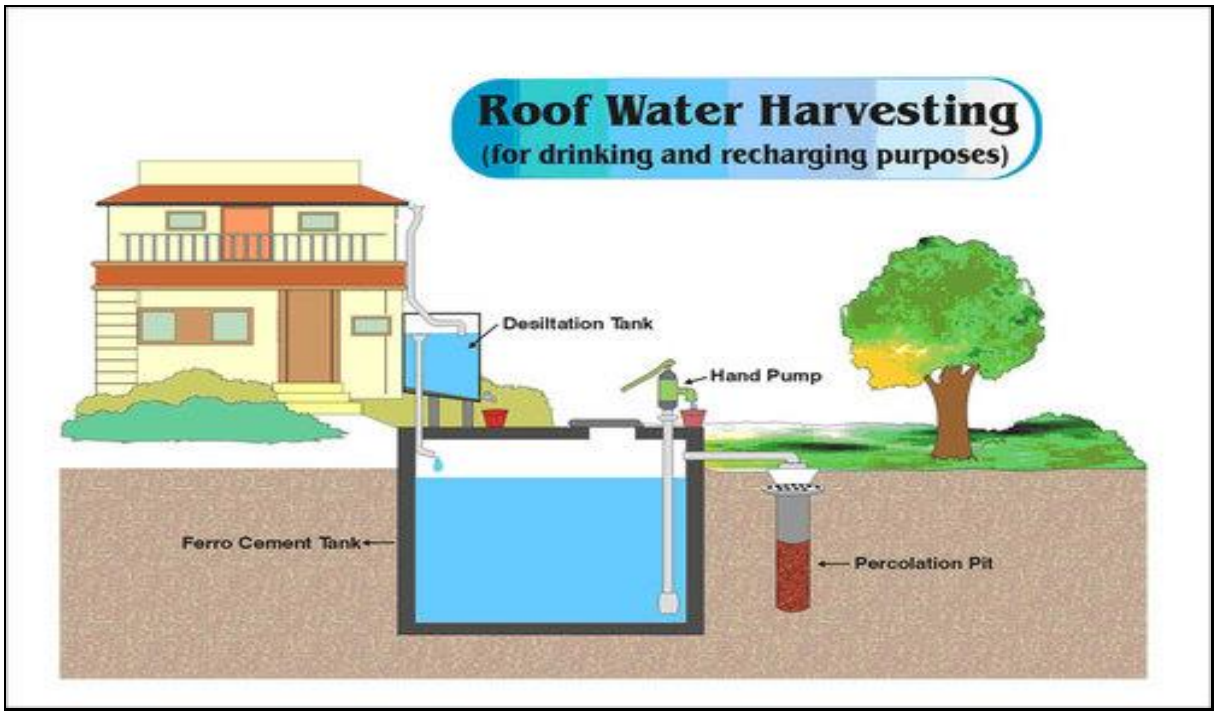


Figure: - 3.1 Components of a rooftop rainwater harvesting system

3.2 Rainwater harvesting system in MewarUniversity:

University has rainwater harvesting systemson campus.

Figure 3.2:- Rain Water Harvesting System onthe university campus

3.3 Rainwater harvesting potential of the University

The university has a total built-up area is approx. 1500 **m^2.** The average annual rainfall of 1.064 m and runoff coefficient of 0.88 is considered for commercial building. Accordingly, to the above figures and consideration, the estimated rainwater harvesting potential for the college is about 1404.48 **m^3/year**. The following Mathematical Equation is used for the calculation.

RWH Potential = Rainfall (m) x Area of catchment (m^2) x Runoff coefficient

END OF THE REPORT

THANKS