Environment Audit

Consultation Report

SHIVAJIRAO KADAM INSTITUTE OF TECHNOLOGY & MANAGEMENT

Near Ralamandal Sanctuary,
Tillore Khurd, Indore
(M.P.)

PREPARED BY
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(Academic Year 2021-22)

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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Shivajirao Kadam Institute of Technology & Management Near Ralamandal Sanctuary, Tillore Khurd, Indore (M.P.)** for giving us an opportunity to conduct energy audit for the institute.

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 the course of 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)

Empanelled Energy Auditor with MPUVN, Bhopal M.P.

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Certified Water Auditor (NPC, Govt of India)

Charted Engineer [M-1699118], The Institution of Engineers (India)

Member of ISHRAE [58150]

Certificate of Accreditation

ENERGY IS LIFE
BEE
CONSERVE IT

BUREAU OF ENERGY EFFICIENCY

Examination Registration No.: EA- 7271
Accreditation Registration No.: AEA-284

Certificate of Accreditation

This is to certify that Mr./Ms. Shri. Rajesh Kumar Singadiya having its trade/registered office at ..... has been given accreditation as accredited energy auditor. The certificate shall be effective from 9th day of May, 2018

The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

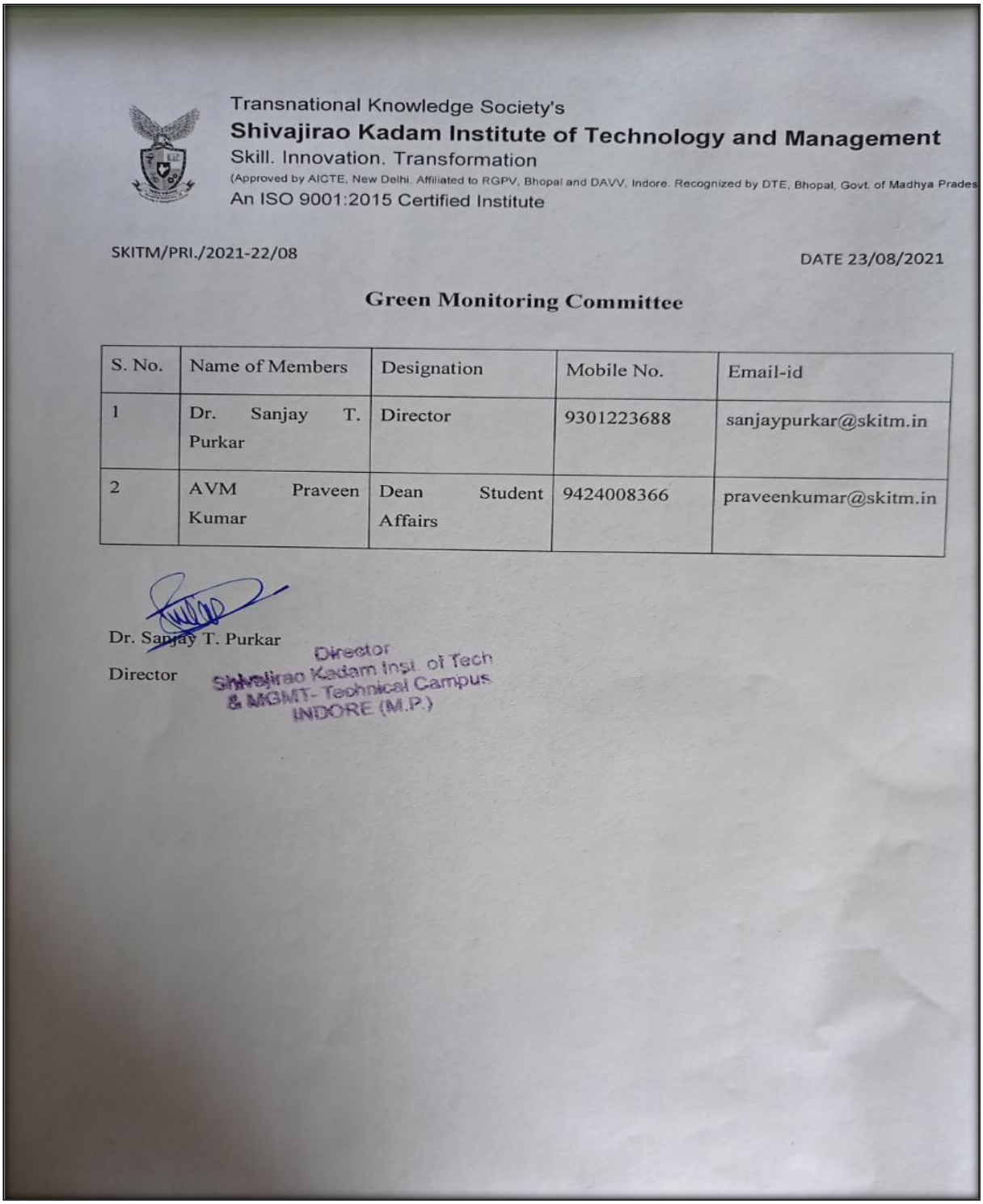
On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. 284 in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this 5th day of October, 2018

Secretary,
Bureau of Energy Efficiency
New Delhi

Green Monitoring Committee



Transnational Knowledge Society's
Shivajirao Kadam Institute of Technology and Management
Skill. Innovation. Transformation
(Approved by AICTE, New Delhi. Affiliated to RGPV, Bhopal and DAVV, Indore. Recognized by DTE, Bhopal, Govt. of Madhya Prades
An ISO 9001:2015 Certified Institute

SKITM/PRI./2021-22/08 DATE 23/08/2021

Green Monitoring Committee

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Dr. Sanjay T. Purkar
Director

Director
Shivajirao Kadam Inst. of Tech
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Audit Team

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

- **Mr. Rakesh Pathak**, [Director & Electrical Expert]
- **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- **Mrs. Laxmi Raikwar Singadiya** [Energy & Chemical Engineer]
- **Mr. Sachin Kumawat** [Sr. Project Engineer]
- **Mr. Ajay Nahra** [Engineer]
- **Mr. Charchit Pathak** [Mechanical Engineer]
- **Mr. Aakash Kumawat** [Assistant Jr. Engineer]

EXECUTIVE SUMMARY

The executive summary of the environmental 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.

RECOMMENDATION

FRESH WATER MONITORING SYSTEM:

- Installation of "Cloud based (IoT based) ground water extraction monitoring system" for borewell to quantify fresh water consumption per day in the college.
- Install water flow meters (Mechanical or Electronics) in supply network, like college old building and new building for quantify per day water consumption and waste water generation in the college campus.

WASTE WATER TREATMENT PLANT

- Waste water generated from various departments should be collect in separate waste water collection tank. It should be treated in proposed STP after that treated water reuse activity like gardening, toilet and wash room etc.

DRIP WATER IRRIGATION AND SPRINKLER SYSTEM.

- Use drip water irrigation system for plant and trees.
- Use sprinkler water system for Lawn area in the college campus.

USE EFFICIENT WATER TAPS

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

USE EFFICIENT URINAL TAPS

- Replacing existing inefficient fixtures with water sense labelled flushing urinal cansave between 0.5 to 04 litter per flush without sacrificing performance. Installation of water saving flushing urinal will not only reduce water use in facilities but also save money on water bills.

CHAPTER-1

INTRODUCTION

1.1 About College

Shivajirao Kadam Institute of Technology and Management (SKITM) was founded in the year 2019, with its first intake as SKITM in 2020, after taking over the Erstwhile Acropolis Technical Campus. SKITM is under the aegis of Transnational Knowledge Society, which was founded in the year 2008. Under the visionary leadership of renowned academician Prof. Shivajirao Kadam, the institution aims to transform the lives of its students and establish itself as the center of excellence in the state of Madhya Pradesh. The institute works on three key principles – Skill, Innovate and Transform. Our unique methodology distinguishes us from the rest of the institutions. We are highly focused on practical aspects of education, we aim to make our students ready to take up the real world challenges which the industry poses at them. We currently have 4 schools which offer B.TECH (CSE, MECH, CIVIL, EC), B.COM, BBA, Integrated BBA-MBA, B.Pharma, MBA as well as Diploma in Mechanical, Civil and Pharmacy. With the unrivalled leadership and the guidance of our Mentors, SKITM is changing the design and nature of education. SKITM will be recognized for the impact its teachings will have on its students and the community at large. Our Extensive Training Sessions, Unique Teaching Methodology, Strong Collaborations, Impactful Certifications and Partnerships make us the up and coming institute in Central India.

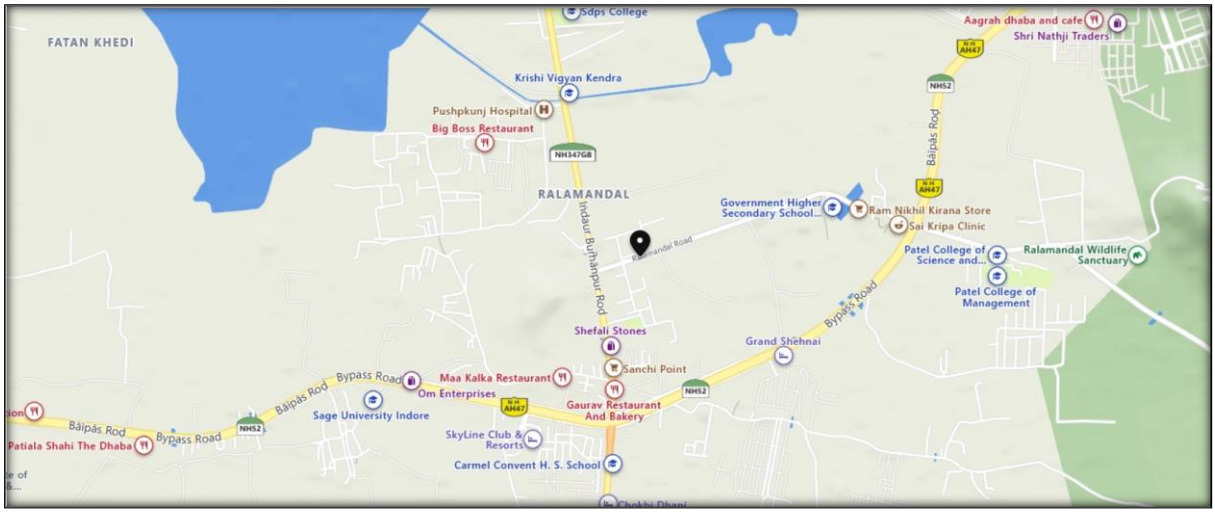


Figure - 1.1 Satellite image of SKITS Institute (Source – Google)

Vision

Holistic development of the learner through excellence in education, innovation & research.

Mission

1. To create competitive and technically empowered environment which enable students to develop and discover their potential and become competent to address industrial, societal and global challenges.
2. To achieve academic excellence in application-oriented research, novelty and creativity leading to emergence of technocrats, leaders, innovators and renowned entrepreneurs.
3. To become a top school in country where students are raised with Holistic learning for inculcating core values of professionalism, gender equality, transparency and ethics.
4. To establish partnership with globally recognized institutions and organizations to foster students with industrial exposure through extensive hands-on training.
5. To ensure overall nurturing and all-round personality development of students by continues monitoring and guidance.

1.2 Environment 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. Environment audits provide a basis for calculating the economic benefits of water conservation projects by establishing the current rates of water use and their associated cost.

1.3 Objectives 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 university and water conservationpractices.
- To assess the quantity of water, usage, the quantity of wastewater generation, andtheir reduction within the university.

1.4 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.

1.5 Methodology followed for conducting Environment audit

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

- Analyze 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 location
- Wastewater flow measurement and sampling plan

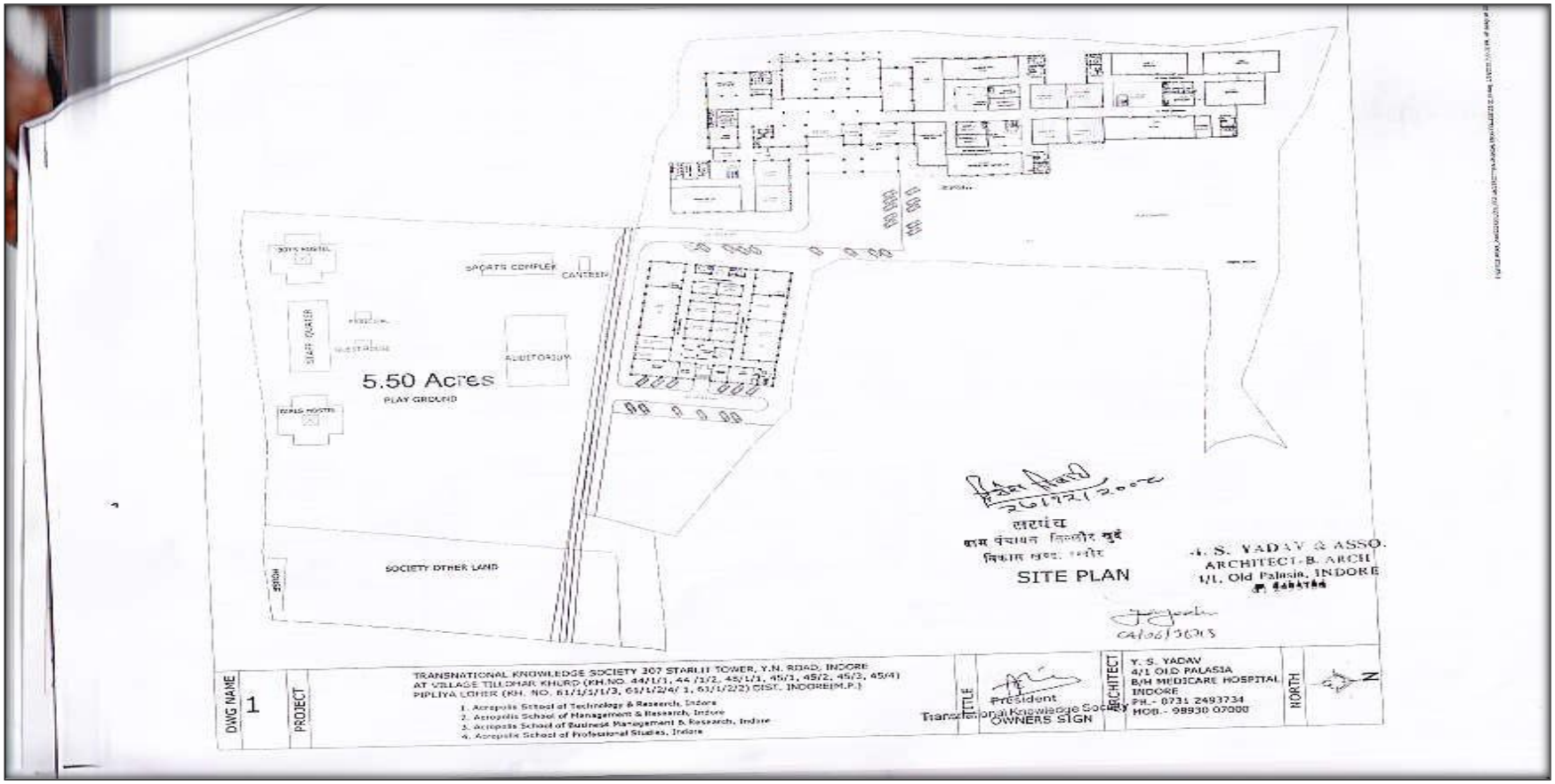
Step 4: Conduction of Detailed Environment Audit & Measurement

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

Institute Layout



CHAPTER- 2
WATER CONSUMPTION AND WASTE WATER SOURCES

2.1 Source of fresh water and use area

The main source of freshwater is borewell for the college. The freshwater is mainly used for drinking, housekeeping, gardening, domestic activity and new construction project. Details of the borewell are given in table2.1

Table:2.1 Details of Fresh water sources.

Sr. No.	Fresh Water Sources	Location	Motor Power(HP)	Remark
1	Borewell-01	Behind Engineering Block	5	For fresh water supply
2	Borewell-02	Near Pharmacy Block	5	For fresh water supply
3	Borewell-03	Near CPS Block	5	For fresh water supply

2.2 Water Accounting & Metering system

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

Fig :2.1 Fresh water supply from borewell of college campus

2.3 Water Flow Measurement

Table:2.2 Water Flow measurement.

Sr. No.	Water Sources	Location	Motor Power(HP)	Measured Water Flow Rate (m^3 / hr.)
1	Borewell-02	Near Pharmacy Block	5	12.6
2	Borewell-03	Near CPS Block	5	Under maintenance
3	RCC tank	Near garden	3	6.7

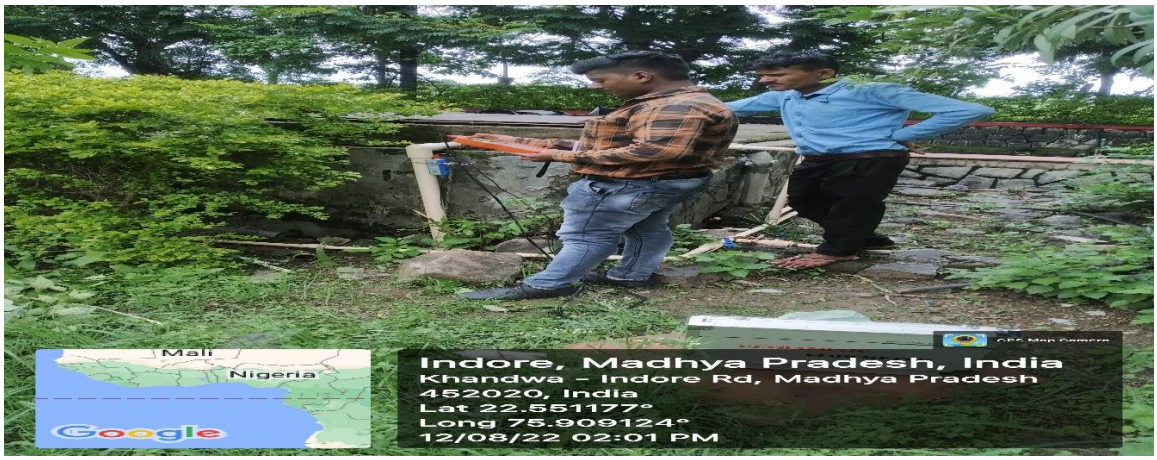


Fig :2.2 Water flow measurement in institute

2.4 Water Storge Capacity in College Campus

There is different type of tank available in college for water storage like Overhead RCC tank and PVC tanks etc.

Table: 2.3 Water Storage tank in institute

Sr. No	Location	Type of Tank	Unit Capacity (Litter)	Quantity	Total Capacity (Kilo Litter)
1	CPS Building Roof	RCC tank	6000	1	6
2	Engineering Block Roof	RCC tank	24000	1	24
3	Engineering Block Roof	RCC tank	16000	1	16
4	Pharmacy Block Roof	Sintex PVC tank	1000	1	1
5	Near Garden area	RCC tank	60000	1	60

2.5 Photographs of water storage tanks

Fig :2.3 Water storge tank in institute

2.6 Water distribution layout of institute

Audit team study the water sources and prepared water distribution flow system in college campus.

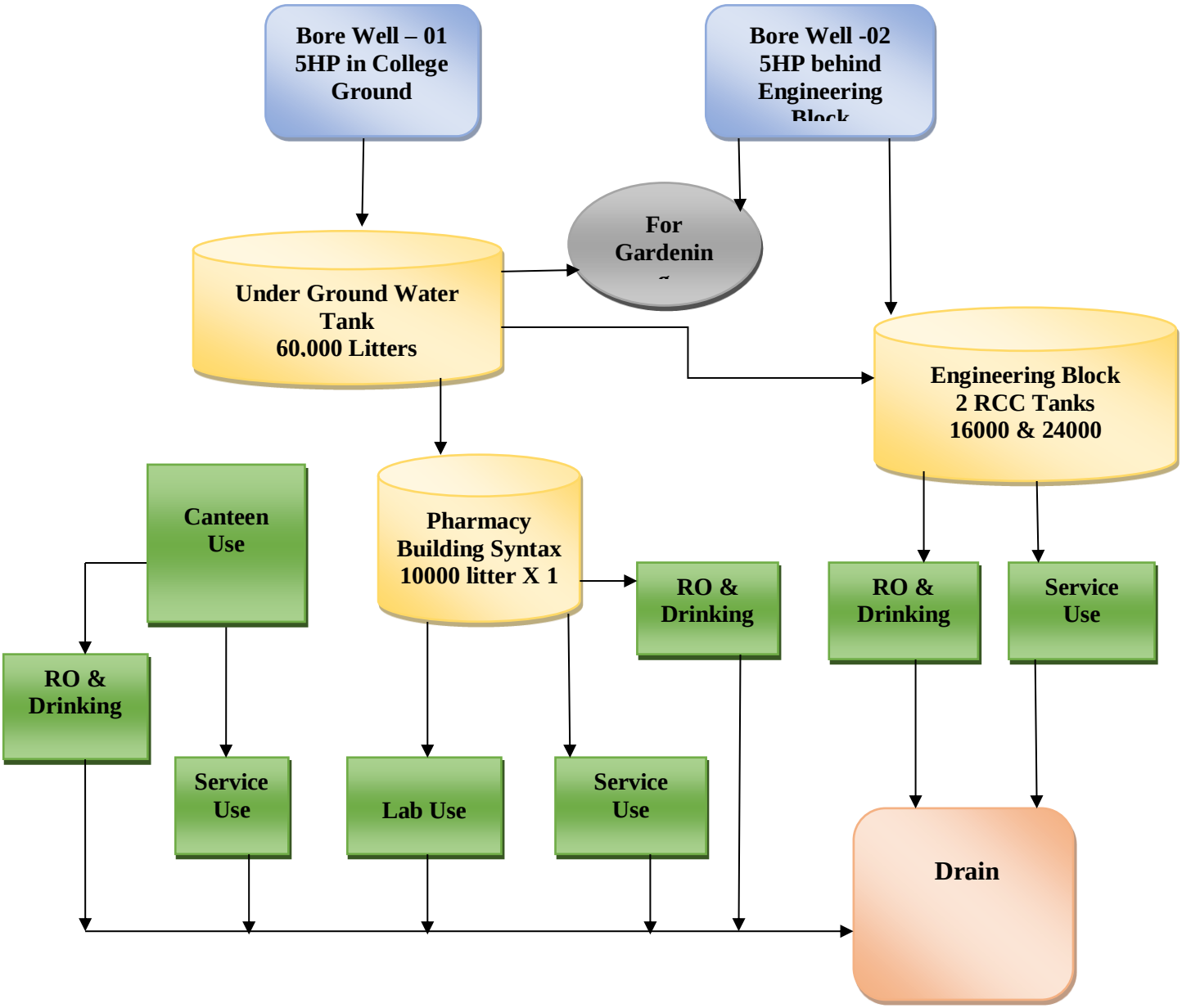


Fig :2.4 Water Flow Diagram of Institute

2.7 Water use areas in college campus

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

Table: 2.5 Details of washroom and uses taps in various areas

Sr. No.	Location (Engg. Block)	Urinal	Hand Wash	Toilet	Taps
1	Ground floor	18	10	10	13
2	1st floor	0	1	0	1
3	2nd floor	12	6	6	9
4	3rd floor	12	6	6	9
Sr. No.	**Location (Pharmacy Block)**	**Urinal**	**Hand Wash**	**Toilet**	**Taps**
1	Ground floor	8	3	2	4
2	1st floor	6	34	2	64
3	Canteen	0	3	0	6
	Total	56	63	22	106

2.8 Reverse Osmosis (RO) in college campus

Table: 2.6 Details of RO in college campus

Sr. No.	Location	RO	Water Cooler
1	Engineering Block 3rd floor	1	2
2	Engineering Block 1st floor	1	1
3	Ground Floor	1	1
4	Canteen	1	1
5	Pharmacy building ground floor	1	1

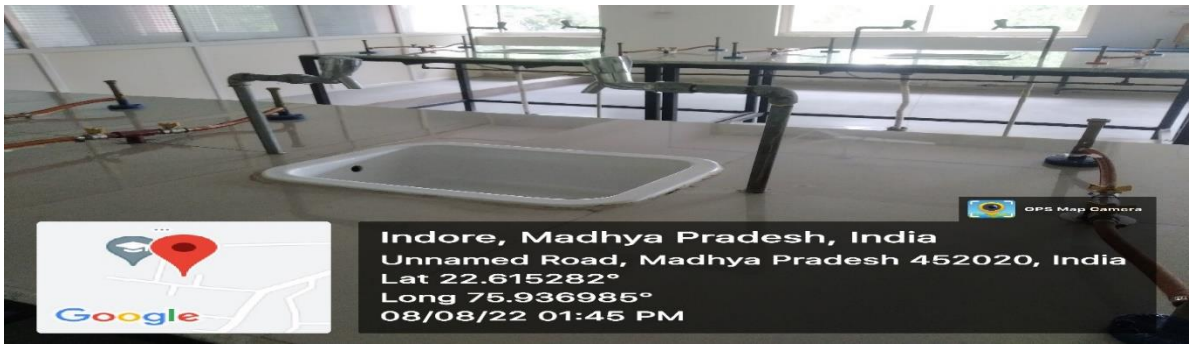


Fig :2.5 Taps ,Urinal ,Washbasin , Water cooler in institute

2.9 Fresh water uses for gardening

The one of major contribution from fresh water consumption is watering for other plants in college campus. There is good potential for water saving by adopt “Automatic Watering 360 adjustable misting nozzle irrigation Dripper’s system” for plants. adjustable drip irrigation tools to provide different amounts of water depending on the water requirements of different plants. The drip speed can be set as for indoor and outdoor plants.

Adjustable Misting Nozzle Irrigation Drippers Proposed water timer

Fig:2.6 Proposed drip water irrigation system for institute

2.10 Waste Water Generation sources

At present waste water generated from various departments canteen and clinical activity like washrooms, hand wash and washing of medical equipment’s and RO rejected etc is discharge into drain line. it should be collected is separate tank and treat in proposed STP a. After that treated water reuse activity like gardening, toilet and wash room etc.

CHAPTER- 3
RAIN WATER HARVESTING SYSTEM

3.1. Rain water harvesting systems

The 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 its runoffs quickly and flow out through storm-water drains. For storm-water management the recharge pits, percolation pits and porous trenches are constructed to allow storm water to infiltrate inside the soil.

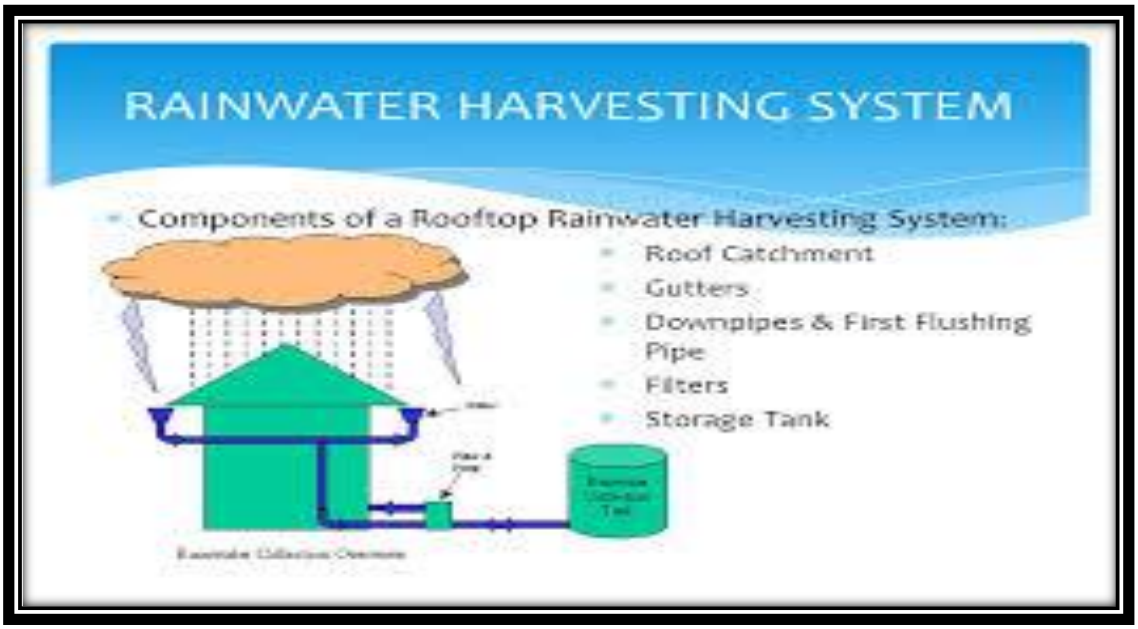


Fig.: 3.1 Components of a rooftop rainwater harvesting system

3.2 Rainwater Harvesting Potential of the institute

The college has total build-up area is approximately 1076 m^2 ,79 m^2 ,258 m^2 The average annual rainfall 251 m and runoff coefficient 0.88 are considered for commercial building. Accordingly, above figures and consideration, estimated rainwater harvesting potential for the institute is about 23,7667 m^3/year, 17,450 m^3/year, 56,987 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

Rain Water Harvesting Potential Calculation					
Sr. No.	Name of the building	Rooftop Area (m^2)	Average rain fall (m)	Runoff coefficient	Rainwater Harvesting potential (m^3/year)
1	Engg. Block	1076	251	0.88	23,7667
2	CPS Block	79	251	0.88	17,450
3	Pharmacy Building	258	251	0.88	56,987

Fig.: 3.2 Roof top of institute buildings

End of The Report
Thank you