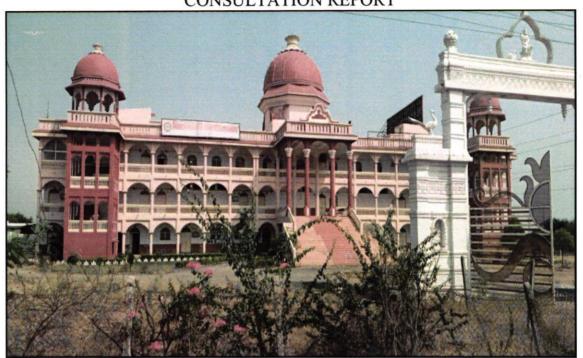




ENVIRONMENT AUDIT REPORT

CONSULTATION REPORT



Dr. R.G. Bhoyar Arts, commerce and Science College Seloo, Wardha Nagpur (M.H)

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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(2021-22)



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of Dr. R. G Bhoyar Arts, Commerce and Science College Seloo Wardha Nagpur (M.H) for giving us an opportunity to conduct Environment audit for the college.

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.

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& Science College, SELOO

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EXECUTIVE SUMMARY

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

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 distribution network, like college building, main line and gardening line for quantity per day water consumption and waste water generation in the College campus.

WASTE WATER TREATMENT PLANT

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

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 university".

WASTE WATER MEASUREMENT:

♣ Installation of "Water flow meter" on STP Plant to measure treated waste water per day.
It will also be helpful for determination of chemical & operational cost of the plants.

REPLACEMENT OF ALL OLD BOREWELL STARTER: -

♣ There are generating sparking in borewell starter during the operation. So, it is recommended to update old electrical starter panels by new updated System.

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DRIP WATER IRRIGATION SYSTEM FOR PLANTS.

USE SENSOR BASED 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 the University campus to reduce water consumption.

USE SENSOR BASED EFFICIENT URINAL TAPS: -

♣ Replacing these inefficient fixtures with water sensor labelled flushing urinal can save between 0.5 to 04 litters per flush without sacrificing performance. Installing water saving flushing urinal will not only reduce water use in facilities but also save money on water bills.

OTHER SUGGESTIONS.

Some of the very important suggestions are: -

- ♣ Prepare the water management policy, and work towards creating and implementing a strategy to reduce the water consumption.
- Conduct awareness programs for water conservation and sustainable development.
- ♣ Stablish institutional ecology policy and set an example of environmental responsibility and practices of resource conservation, recycling, waste management.
- ♣ Involve all stakeholders and encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in water conservation and sustainable development.
- Collaborate for interdisciplinary approaches to develop curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.
- Promote 3R education policy (reduces, reuse, and recycle) in campus.
- Arrange training programmes on water management system and nature conservation.
- Ensure participation of students and teachers in local water issues.
- Conduct seminars, workshops and exhibitions on water and environmental education.

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CHAPTER-1 INTRODUCTION

1.1 About College

Dr. R. G. Bhoyar Arts, Commerce & Science College (Vidyabharti College) has inspired by Hon'ble Dr. Rajesh G. Bhoyar with their innovative vision and Noble mission "Gun: Sarvatra Pujyate" which established in 2008. The college is recognized under section 2(f) & 12 (b) of the UGC Act 1956, is affiliated to Rashtrasant Tukadoji Maharaj Nagpur University and accredited with B+ by NAAC in 2017. Our institute is only in Seloo taluka, Dist.-Wardha (Maharashtra), which gives service to rural flock to spread knowledge and provide quality education. This college in committed to impart quality education and to improve overall personality of the rural youths and make them to face the challenges of the competitive modern world. The College has Under Graduate courses in all discipline and post-graduation in Botany, Zoology, Physics and Commerce as well as research centre in Commerce. The college has received Green Championship award. The institute has the Best Rural College and succeeded in caring a niche for itself in the field of education and has earned the trust and confidence of the society mainly because of its quality and value-based education. The institute is located at rural area in Seloo and caters to need of 135 villages. The campus sprawling six acres with natural environment.

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Vision

The women students through learners can contribute a lot towards National reconstruction and development, which shall finally lead us towards the balance between not only in body and spirit but also in the intellect and emotion.

Mission

To serve selflessly towards the cause of human excellence especially in character building, personality development and empowerment of women through knowledge and higher education

Academic Goals:

- ♣ To work towards the growth of institution into a centre of excellence.
- ♣ To provide the standard education in the field of Science, Home Science and Social Science to women.
- ♣ To encourage students and teachers in the pursuit of knowledge and in setting high standard of academic achievements.
- To bring women to the higher level for facing modern science age and to develop scientific and rational attitude.
- To develop free and fearless thinking leading to intellectual and moral maturity.
- To bridge the gap between educational and social needs.

Social Goals:

- ♣ To enable the women to come out from the stagnant pool of orthodoxy into the clear stream of reason, perfection, tolerance and dynamism.
- ♣ To make women aware of their social responsibilities and important role in nation building.
- ♣ To make the student aware of environmental issues and to hand over the moral responsibilities to the coming generation an eco-friendly lifestyle and earth free from pollution.
- ♣ To empower the girl students by helping them to become strong, self-reliant, socially motivated, responsible and dedicated women and better citizen of tomorrow, so as to equip them to meet the challenges in life positively.

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1.2 About College Campus:

The College is built up area 3547 sq/m with plenty of open space and sports area interspersed within academic buildings. The details of various department and building are given below:

Total Build up area				
Sr.no	Area Name	Total Area (Sqm.)		
1	Main Building (Administrative building)	2049.50		
2 Building second (Wing A)		626.04		
3	Building third (Wing B)	871.56		

Name of Teaching Department and Courses

Three Year Degree Courses

- **♣** B.A.
- ♣ B.Com. (English / Marathi Medium)
- B.Sc.

Post Graduate Courses

- ♣ M.Com. (English / Marathi Medium)
- ♣ M.Sc. (Botany / Zoology / Physics)

Place for Higher Education and research

♣ Commerce

Departments of the college.

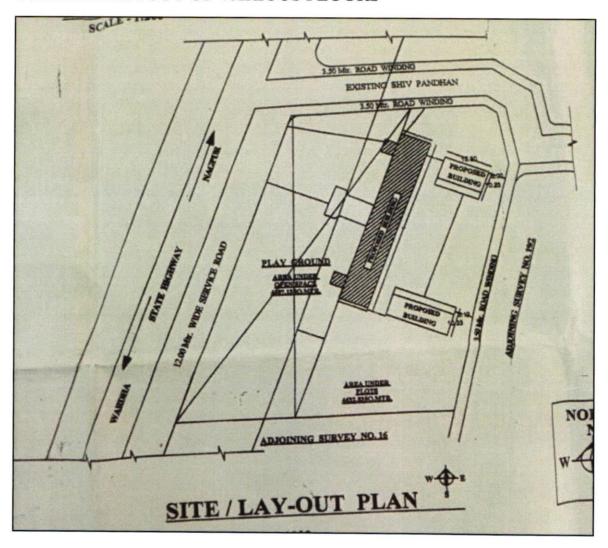
- ♣ Department of Commerce (UG and PG)
- Department of Botany (UG and PG)
- ♣ Department of Zoology (UG and PG)
- ♣ Department of Physics (UG and PG)
- Department of Microbiology
- Department of Biochemistry
- Department of Chemistry
- Department of Mathematics
- Department of Computer Science
- Department of Electronics
- Department of Arts
- Department of N.S.S.
- Department of Physical Education

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COLLEGE LAYOUT OF VARIOUS FLOORS

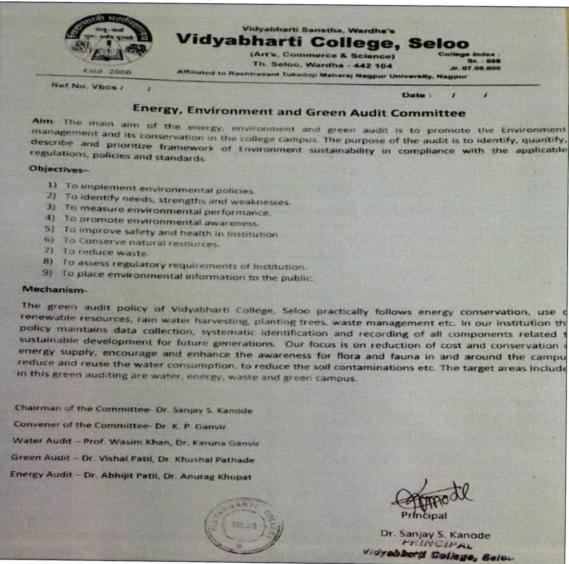








1.3 Energy Monitoring Committee



1. 4 Energy Audit Team

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

- Mr. Rakesh Pathak, [Director]
- Dr. Suresh Soni [Reviewer]
- ♣ Mrs. Laxmi Raikwar Singadiya,[Energy Engineer]
- Mr. Sachin Kumawat [Project Engineer]
- Mr. Ajay Nahra, [Site Engineer]



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1.5 About Environment Auditing

Water audits can be a highly valuable tool for institute in a wide range of ways to improve their energy, environment and economic performance. while reducing wastages and operating costs. Water 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.

1.6 Objectives of Environment audit

The general objective of water audit is to prepare a baseline report on water conservation measures to mitigate consumption, improve quality and sustainable practices.

The specific objectives are:

- ♣ To monitor the water consumption and water conservation practices.
- ♣ To assess the quantity of water, usage, quantity of waste water generation and their reduction within the college.

1.7 Target Areas of Environment audit

This indicator addresses water sources, water consumption, irrigation, storm water, 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.

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1.8 Methodology followed for conducting Environment audit

Step 1: Walk through 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 trend at site
- Past water bills

Step 3: Site Water Audit Planning (based 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 Water 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 Water Audit Report

- ♣ Documentation of collected & analysed water balancing and measurement details
- Projects and procedures to maximize water savings and minimize water losses.
- ♣ Opportunities for water conservation based on reduce/ recycle/ reuse and recharge options

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CHAPTER-2 WATER CONSUMPTION AND WASTE WATER SOURCES

2.1 Details of Source of Fresh Water and Use Areas:

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 pumps are given in table.

Sr. No	Source of Fresh Water	Location	Depth (ft/m)	Type of Pumps	Rated (HP)	Rated Flow (m ³ /hr)	Running Hr. per day
1	Borewell	College campus	320 feet	Submersible,	2	NA	4
2	Open well	College campus	68 feet	Submersible,	3	NA	NA
3	Nagar Panchayat Tap	Behind main building	NA	NA	NA	NA	_ 1

2.2 Water Accounting & Metering system:

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

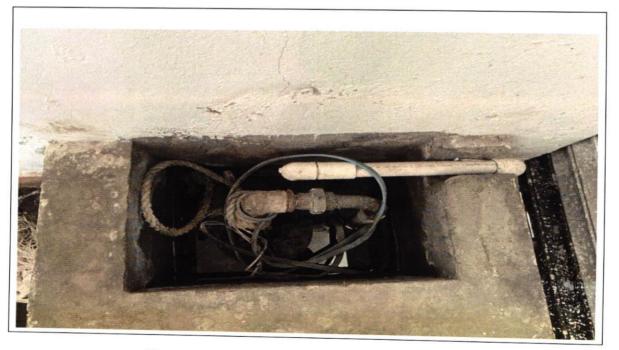


Figure 2.1: - fresh water supply for college campus

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2.3 Water Storge Capacity in College Campus: -

There is different type of tank available in college for water storage like Underground RCC tank, Overhead RCC tank etc.

Table 2.2: - Water Storage tank in college campus

Sr.n	Tank Type	Location	Size	Quantity	Capacity (M³)
1	PVC (Sintex)	Main building Terrace	Circular	1	2
2	Under Ground tank	Front space of building	Circular	1	2

Photographs of water storage tanks.



Figure 2.2: Water Storge Tank and capacity of College Campus







2.4 Water use areas in College Campus: -

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

Sr. No	Name of Building/Department/Section	No. of taps Service Water
1	Department of Chemistry	14
2	Department of Physics	03
3	Department of Botany	17
4	Department of Microbiology	15
5	Department of Biochemistry	13
6	Department of Zoology	24
7	Department of Marathi	01
8	Main water filter	01

Sr. No	Name of Building/Department/Section	Hand Wash	Urinals	Toilets
1	Main building (gents)	03	02	02
2	Main building (girls)	02	02	02
	Total	5	4	4

Sr. No	Type of Plant	Quantity	Plant Capacity (m ³ /day)
1	RO	1	20 litres
	Total	1	20



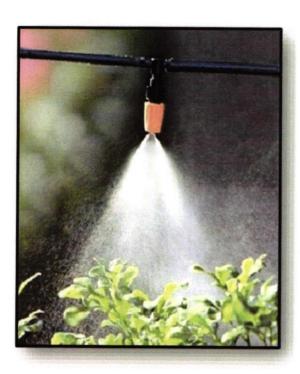
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2.5 Fresh Water uses for Gardening:

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

Automatic Water Timer Unit

Fig: 2.3 Technology for Drip Water Irrigation for plant



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2.6 Waste Water Generation sources: -

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

Sr. No	Key Water Usage Section	Type of water used (raw, treated etc.)	Water Consuming activities
1	Botanical Department	Fresh Water	Drinking and other uses
2	Zoology Department	Fresh Water	Drinking and other uses
3	Physics Department	Fresh Water	Drinking and other uses
4	Principal Office	Fresh Water	Drinking and other uses
5	Marathi Department	Fresh Water	Drinking and other uses
6	Micro Biology	Fresh Water	Drinking and other uses

Some photographs of waste water generation sources are given





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Figure 2.4: - Waste Water Generation sources

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CHAPTER- 3 RAIN WATER HARVESTING SYSTEM

3.1. Rain water Harvesting systems

College has installed 100 Cu/m Rain water harvesting system. **Its appreciable**. 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 stormwater drains. For storm-water management the recharge pits, percolation pits and porous trenches are constructed to allow storm water to infiltrate inside the soil.

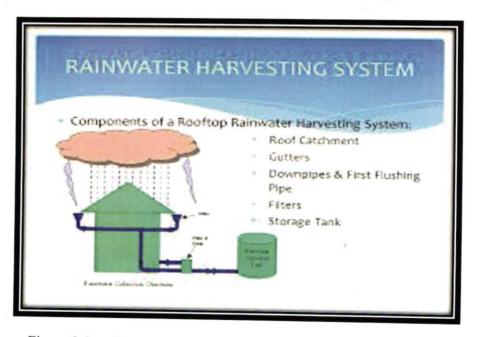


Figure 3.1 :- Components of a rooftop rainwater harvesting system

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3.2 Rain water harvesting Objectives: -

- ♣ To increase the underground water level by capturing the rooftop run-off water.
- ♣ To utilize this water for institutional needs, like for gardening and washing purpose

3.3 Importance and need for rainwater harvesting: -

- Increasing fresh water demand can fulfilled by rainwater harvesting.
- The availability of water from lakes, rivers wells etc is uncertain so collecting rainwater can solve the problem.
- ♣ During rainy season soil erosion occurs due to run-off water, this problem can be overcome by harvesting rainwater.
- Rooftop rainwater is of good quality water can be utilised for domestic purpose.
- ♣ Rainwater harvesting will reduce the chances of flood and water stagnation in urban areas.
- Reduces cost of water and electricity bill.
- Collecting the rainwater in borewell pits is easily accessible and convenient.
- ♣ The material required for rainwater harvesting are cheap, requires traditional knowledge, no need of large technical instruments and no need of any government technical assistance for repair and maintenance.

3.4 Context of rainwater harvesting

♣ Increased water level due to rainwater harvesting in borewell pit, water is utilised every day for different purposes in college campus like for making of building and wall compound. Every day for gardening, in wash rooms etc. enough amount of water is available in borewell pit.

3.5 About rain water harvesting practice in college

♣ In Vidyabharti College campus, rainwater harvesting system has been installed in main building. The terrace run-off water is collected through network of pipe lines and send to the borewell pit. The depth of borewell is 320 feet. Borewell capacity to supply water continuously is 1-2 hours/day. The borewell water is utilised throughout the year for gardening and washing purpose.

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3.6 Rain water harvesting outcomes

♣ In college campus region, there is scarcity of water due to less rainfall. This practice of rainwater harvesting solved the problem of scarcity of water as underground water level increased, which fulfil the water demand by the college campus.



Figure 3.2: - Rain water harvesting system in college premises







END OF THE REPORT



