MVP'S

ARTS & COMMERCE COLLEGE,

SOYGAON, MALEGAON, DIST - NASHIK

2021-22

Green Audit Report

PREPARED BY

ENVIRONMENT MANAGEMENT SYSTEM AUDIT TEAM,
KRT ARTS, BH COMMERCE AND AM SCIENCE COLLEGE,
NASHIK – 02

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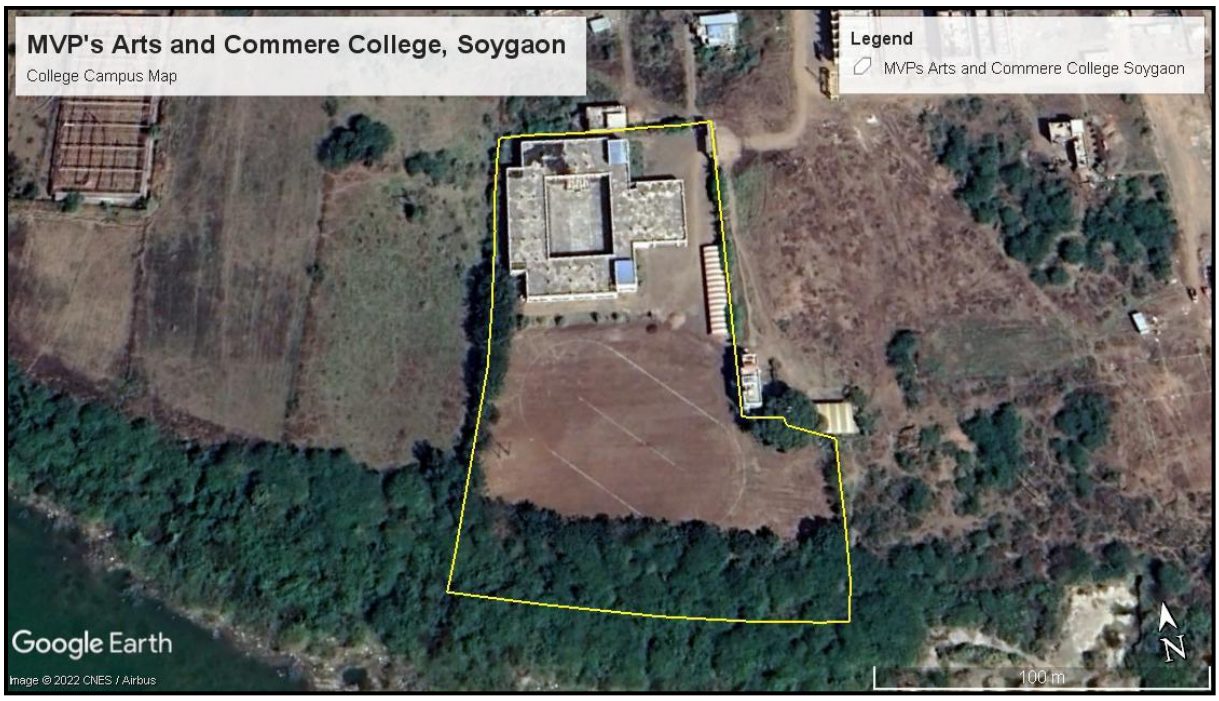
1. Introduction

1.1 About Parent Institution:

The Maratha Vidya Prasarak Samaj is one of the most prestigious centers of learning in the State of Maharashtra. It manages 477 educational institutes and it is one of the premier organizations in the jurisdiction of Savitribai Phule Pune University. At present total strength of student is around 2,00,000. The credit for the birth of M. V. P. Samaj goes to the young, enthusiastic and devoted team of social workers and educationists, Karmaveer Raosaheb Thorat, Bhausaheb Hire, Kakasaheb Wagh, Annasaheb Murkute & Ganpat Dada More who laid the foundation of the Samaj. Adv. B. G. Thakare, Adv. Vitthalrao Hande & Dr. Vasantrao Pawar are major contributor of Samaj. They were the devotees who envisioned a culture and knowledge centric society. The motto of the Samaj is 'Bahujan Hitay Bahujan Sukhay', for the wellbeing and happiness of the masses to kindle the social cause.

1.2 About College:

In the rural area of Malegaon Taluka, MVP's Arts & College, Soygaon is one of the most immerging Colleges of Maratha Vidya Prasarak Samaj,Nashik. Our institute is one of the most innovative and forward-thinking educational institutions. The credit for the 100-year gift goes to the Maratha Vidya Prasarak Samaj in Nashik, which has an exceptional reputation and dedication.



College Campus Layout

Multiple courses are offered at our college. We have eight departments, each with the best and most experienced faculty. The majority of the teachers have Ph.D., SET, and NET qualifications. They also published research papers in a number of academic journals. Arts & College, Soygaon is dedicated to providing students with a high-quality education so that they can achieve success in any field.

The core of our college is high academic standards and expectations for each student in terms of academic performance, co-curricular participation, and citizenship. We hold these high standards with pride and encourage each of our students to commit to continuing the outstanding record of accomplishments and contributions that our college students have left behind. In this age of competition, our college places a premium on students' academic abilities as well as their extracurricular activities. The college hosts several seminars and workshops for students' fundamental and technical skills on a regular basis.

1.3 Environmental Conservation Committee:

Sr. No.	Name of Member	Designation	Title in Committee
1	Dr. Shriram B Patil	Principal	Chairman
2	A.M. Pagar	Assist. Prof	Coordinator
3	H.M. Kshrisager	Assist. Prof	Member
4	N.B.Nerkar	Assist. Prof	Member
5	B.M.Ahire	Assist. Prof	Member
6	R.B.Gagurde	Assist. Prof	Member
7	Ashwini Deshmukh	Assist. Prof	Member
8	Nilesh Patil	Clerk	Member
9	Vilas Pawar	Peon	Member
10	Devendra Giri	Student	Member
11	Kaveri Pagar	Student	Member

Table 1 : Environmental Conservation Committee

Function Of Environmental Conservation Committee:

The college has established an Environmental Cell to educate student teachers about environmental issues and challenges, as well as to motivate them to spread information and educate school children and the general public about these issues.

- To raise awareness among student teachers about the Institute and environmental issues.
- To instill a sense of responsibility for the development of planet Earth, as well as an appreciation for its beauty, by giving chances to gain knowledge, skills, attitudes, and dedication to environmental preservation.
- To teach students about the interconnectedness of economic, social, and environmental concerns.
- To prepare student teachers to teach environmental education to students in the classroom through curricular and extracurricular activities.
- To improve the college campus's environment.
- To raise student awareness of the importance of environmental preservation in society.
- To handle the college's solid trash, liquid waste, and e-waste.

1.4 Objectives Of Study:

The green audit's major goal is to encourage environmental management and conservation on the college campus. The audit's goal is to identify, measure, explain, and prioritise a framework for environmental sustainability that adheres to all applicable legislation, policies, and standards. The following are the major goals of a Green Audit:

- To introduce and make students aware of real concerns of environment and its sustainability.
- To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus.
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections require high cost.
- To bring out a status report on environmental compliance.

1.5 Methodolgy

The approach for doing a green audit comprised several instruments such as questionnaire development, physical inspection of the campus, observation and study of paperwork, interviewing key people, data analysis, measurements, and suggestions.

1.6 Steps in Green Audit

- Pre-Audit
    1. Make a plan for the audit.
    2. Form an auditing team
    3. Schedule for an audit.
    4. Gather the necessary background information.
    5. On Site Visit
- On Site
    1. Understand the scope of audit
    2. Analyse the strengths and weaknesses of the internal controls
    3. Conduct the audit
    4. Evaluate the observations of audit program
    5. Prepare a report of the observations side by side
- Post-Audit
    1. Produce a draft report of the data collected
    2. Produce a final report of the observations and the inference with accuracy
    3. Distribute the final report to the management
    4. Prepare an action plan to overcome the flaws
    5. Keep a watch on the action plan

1.7 Scope of Work

The following Environmental Issues were studied for the above-mentioned campus area.

- Water Environment including rain water harvesting potential of the campus.
- Plant diversity.
- Noise Environment.
- Solid Waste Management Practices.
- Air Environment.
- Energy Audit

This study has been created based on the available data, samples, and information supplied by the Arts and Commerce College, Soygaon (Malegaon) and recommendations for improving the campus environment have been made by college officials.

1.8 Background Data

This college was founded in 2003 by the Nashik-based Maratha Vidya Prasarak Samaj. Savitribai Phule Pune University is its parent institution. Pune. It has full-fledged Art and Commerce faculties that lead to undergraduate degrees. The college is located in Soygaon and has a 3.5-acre area. Soygaon is only 1.5 km from Malegaon city and has seen an increase in student numbers over the previous 13 years from the college's nearby rural area. The college provides opportunities for students to grow in all aspects of their lives.

Objective:

- To achieve excellence among the students
- To enhance and promote all round development of students
- To develop multi-dimensional personality of students to provide higher education in arts and commerce.
- To develop sensitivity among student about social, economic, cultural and environmental.

1.9 Courses Offfered

Sr.No.	Name Of Faculty	Name Of Program	Name Of Subject
1.	Faculty Of Arts	BA	English
2.			Marathi
3.			Hindi
4.			Geography
5.			Political Science
6.			Economics
7.			History
8.			Psychology
9.	Faculty Of Commerce	B.Com	Marketing
10.			Banking
11.			Costing

Table 2. Courses Offered

1.10 Total Population of Campus:

Sr. No.	Particulars	Total population of institute (incl. Students, Permanent, Temporary staff & visitors)
1.	College Staff (Teaching and Non-Teaching	35
2.	College Students (Girls and Boys)	452
3.	Floating Population	25
	Total	512

Table 3 : Total Population of Campus

2. Water Audit

Water benefits biodiversity, agriculture, the human population, and the economy. Water scarcity and security are becoming increasingly important issues as a result of recent events in India and around the world. In recent years, Maharashtra has also been severely affected by water scarcity. As a result, water management has been included as a critical component of achieving sustainable development in the Sustainable Development Goals (SDGs).

Unprecedented strains on natural resources, particularly water, have resulted from unplanned urban growth and economic development. The growing demand for water in places like Malegaon has increased the stress on the river Girna. According to the National Water Mission's standards, metro cities should have a water supply of 150 lpcd, smaller cities/towns with sewage systems should have 135 lpcd, and cities/towns without sewage systems should have 70 lpcd.

2.1 Calculation of Water Requirement:

In the investigation, one bore well connection was identified as important sources of water. Drinking water in the college premises were obtained through the RO system. Borewell water is used in the drinking, bathrooms and garden area. As being an Arts and Commerce College there are no chemical laboratories in the college. There were no leaks or overflows of water from above tanks throughout the survey, thus there was no water loss.

❖ **Sources of Water in Campus :**

Souece of Water	Borewell
Number of times the water is uplifted from the source	2 times
Average quantity of water uplifted (Lit.)	10000

Table 4: Sources of Water

❖ **Water Storage Facility:**

Sr.No.	Storage Facility	Storage Capacity (Lit)
1.	Cement Tank	10000
2.	PVC tank 1	1000
3.	PVC tank 2	1000

Table 5: Water Storage Facility

The water is uplifted from the borewell and stored in the cement tank. Further the water is used for gardening through drip irrigation and two PVC tank located on the terrace area is filled twice a day. The water from PVC tank is used to cleaning, bathroom and drinking purpose.

Source of Water – Borewell

Water Storage Cement Tank

Overhead PVC water storage tank

Water supply through drip irrigation for gardening

Total Average requirement of water in campus:

Sr. No.	Particulars	Total population	Required Water Supply (litre per person per day)	Water Requirement (litre per day)
1.	College Staff (Teaching and Non-Teaching	35	20	700
2	College Students (Girls and Boys)	452	20	9,040
3.	Floating Population (Visitors)	25	20	500
	Total	512	-	10,240

*Note: The water requirement is calculated as per Rule of World health Organisation (WHO)

Table 6: Average requirement of Water

The data gathered from all departments is double-checked and verified. The college uses 10,240 L/day on average, with 700 L/day for staff and 9,040 L/day for students. There are 25 number of floating populations in the college that contributes about 500 L/day of water consumption.

2.2 Waste Water Management:

Water usage can be described as the amount of water consumed on campus for all activities from various water sources. This applies to all residences, academic buildings, on-campus, and on-grounds usage. Water that is moved off campus is referred to as wastewater. Based on data on water usage and the fact that around 80% of the water supplied is converted to waste water via washrooms, and other means, the campus created approximately 8,192 Lit of waste water every day.

As was revealed, there is no separate drainage system for collecting and transferring sewage and liquids from college. There is currently a combined drainage system in place that carries all liquid effluent to a sewage system. It is necessary to collect grey and black water. After minimal treatment, grey water must be used for plant irrigation.

Soak pits for waste water collection from drainage

2.3 Quality Of Water in the Campus:

Total two water sources are identified in the campus. The water is used to flush toilets, water gardens, and drinking purposes. The water is treated with a purification system before being made available for drinking. The results of the potable water tests are shown in the table below.

RO system installed in the college for drinking water

Potable water reports:

Sr. No.	Parameters	Borewell	Acceptable Limit (as per IS 10500 : 2012)	Units
1	pH	8.2	6.5-8.5	-
2	Total Dissolved Solids	463	500	mg/lit
3	Calcium	59	75	mg/lit
4	Chloride	146	250	mg/lit
5	Alkalinity	162	200	mg/lit
6	Total Hardness	185	200	mg/lit
7	E. Coli	Absent	Should be Absent	/ 100 ml
8	Total Coliform	Absent	Should be Absent	/ 100 ml

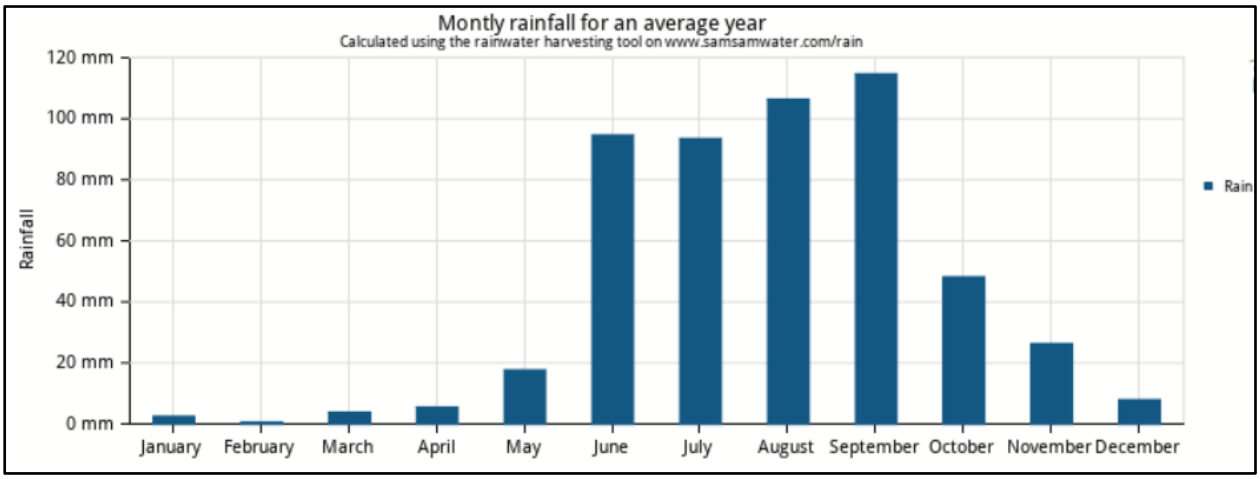
Table 7: Potable Water Report

From above analysis it can be concluded that all the parameters have readings below permissible limit for both the sources. As the water is uplifted from underground source the parameters like TDS and Hardness are near permissible limit. Thus, the drinking water is treated by RO system installed in the college.

2.4 Rainwater Harvesting Potential:

The campus buildings possess a terrace areas and paved surface. Currently, the college buildings have Rain Water Harvesting (RWH) System implementation work in progress. The campus has a potential for RWH but due to average rainfall the harvested rain water could fulfil whole requirement of college but can help to reduce the stress on upliftment of underground water. As only underground reservoirs are the main source of water for consumption, the rain water harvesting system may help the college management to fulfil the need of depended population. Keeping this as an objective of water management, installation of Rain water harvesting system work is in progress in the college campus.

Average Rainfall at Malegaon :



Graph 1: Average Rainfall of Malegaon

Sr. No.	Month	Rainfall	Runoff coefficient	Roof top area	Total Rain Water Harvested (m3)
1	January	4 mm	0.7	1763 Sq.m	4.9
2	February	0.5 mm	0.7	1763 Sq.m	0.6
3	March	8 mm	0.7	1763 Sq.m	9.8
4	April	10 mm	0.7	1763 Sq.m	12.3
5	May	19 mm	0.7	1763 Sq.m	23.44
6	June	90 mm	0.7	1763 Sq.m	111
7	July	85 mm	0.7	1763 Sq.m	104.8
8	August	110 mm	0.7	1763 Sq.m	135.7
9	September	114 mm	0.7	1763 Sq.m	140.6
10	October	50 mm	0.7	1763 Sq.m	61.7
11	November	30 mm	0.7	1763 Sq.m	37.02
12	December	10 mm	0.7	1763 Sq.m	12.3

Table 8: Average Rainfall of Malegaon

(This calculation is based on the average monthly rainfall. The actual rainfall differs from month to month and year to year. The amount of available water and filling of the tank might therefore be different and change from year to year.)

Rainwater Collection Pipe

Rainwater Collection Pit

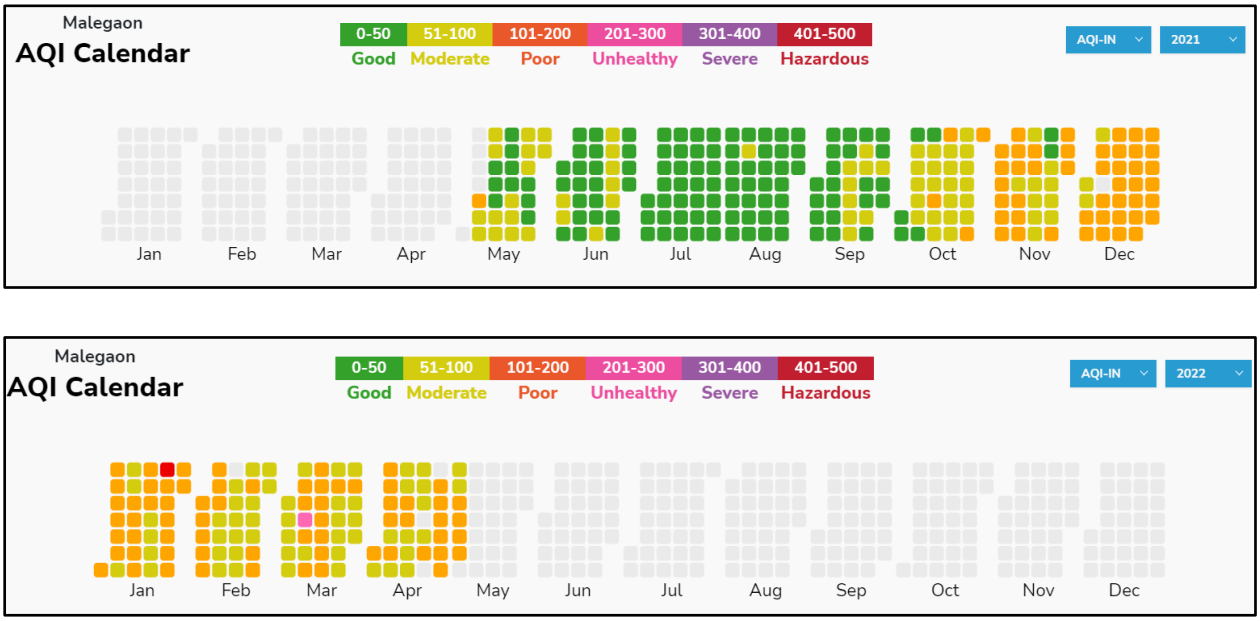
A flat roof has a runoff coefficient of 0.7, which means that 70% of the rain can be harvested. Based on this runoff coefficient and a roof area of 1762.9 square metres a volume of 617 litres (0.5 mm x 1762.9 m^3 x 0.7) of water can be collected in the driest month (February) and 141420 litres (114.6 mm x 30 m^3 x 0.7) in the wettest month (September).

The total amount of water that can be collected from this roof, 642400 litres, is not enough to fulfil the total yearly water demand of 3737600 litres. However, it might still be worthwhile to construct a rainwater harvesting system. With a storage reservoir of 294700 litres (294.7 m3) a rainwater harvesting system could provide 1760 litres of water per day, which is 17% of the total demand.The storage reservoir will be full in and then slowly drain until it is (almost) empty at the end of May.

3. Environmental Quality Audit

3.1 Air Quality Audit

The health of the students, instructors, and staff at the academic institute is dependent on the air quality. Windstorms, pollen grains, natural dust, traffic emissions, generators, fires, and laboratory smells, among other things, are all causes of air pollution on the college campus. But in the present study whole city is considered and the data is extracted from nearby government air quality monitoring stations.



Air Quality Index From May 2021 To April 2022

Sr. No.	Parameter	Result	NAAQS 2009	Unit
1	Average Wind	19.4	-	Km/h
2	Wind Direction	W-E	-	-
3	Pressure	1008	-	mb
4	Temperature	43/20	-	^{o}C
5	Sulphur Dioxide	05	80	$\mu g/m^3$
6	Nitrogen Dioxide	05	80	$\mu g/m^3$
7	Carbon Monoxide	03	4	mg/ m^3
8	Particulate matter < 10µm	166	100	$\mu g/m^3$
9	Particulate matter < 2.5 m	49	60	$\mu g/m^3$
10	Ozone	24	180	$\mu g/m^3$

Table 9 : Air Quality Index

3.1.1 Causes of Air Pollution in Nashik :

(i) The primary causes of outdoor air pollution are solid, liquid particles called aerosols & gas from vehicles emissions, construction activities, factories, burning stubble & fossil fuels and wildfire, etc.

(ii) Main causes of indoor air pollution are harmful gases from cooking fuels (such as wood, crop wastes, charcoal, coal and dung), damp, mould smoke, chemicals from cleaning materials, etc.

3.2 Noise Quality Audit

One of India's most critical environmental issues is noise pollution, although most of us are unaware of the harm it brings. We are all exposed to loud noises for lengthy periods of time in India, both on a daily basis and during festival seasons such as Ganesh Festival, Diwali, and others throughout the year. Unwelcome noises like horns, other traffic noise, loudspeakers, and, of course, residential noise like television and music system sounds are inevitable on a daily basis. There is a common idea in our country that happiness can only be shown by making loud noises.

Sr. NO.	Location	Avg Noise Level dB (A)	Noise Standards dB (A)*
1.	Play Ground	61.00	50
2.	1st Floor Porch	52.33	50
3.	Classroom	54.31	50
4.	Main gate	55.45	50
5.	Administrative Office	57.23	50
6.	Parking	55.08	50

*Note: Ambient Air Quality Standards in respect of Noise dB (A), in accordance with Noise Pollution Regulation and Control) amendment rules, 2000 Silent Zone

Table 10: Noise Quality Index

The institution has explored a variety of methods to eliminate sound pollution on campus or to avoid producing noise. The campus has been designated as a Silent Zone, and pupils have been educated using silent zone signs. Students have been instructed to use their cellphones in silent mode. So that sound pollution is decreased, suggestion boards for keep

silence have been placed across the campus. The trees have been planted on the college campus to minimise the intensity of noise pollution; thus, sound pollution levels will be lower in the future.

3.3 Solid Waste Audit:

Solid waste generation and management has been a major issue in recent years. The rate of solid waste generation is extremely significant, but we lack adequate technologies to manage the garbage generated. All non-liquid garbage is classified as solid waste. If solid trash is not properly disposed of, it can cause serious health problems as well as an unpleasant living environment. As a result, it is critical to properly manage solid waste in order to lessen the pressure on waste management systems. The goal of this inventory is to determine the amount, volume, type, and present management practise of solid waste generated on the Arts and Commerce college Soygaon. This study will aid in the continued management of solid waste and the construction of a green campus.

3.3.1 Generation of Solid Waste:

Category wise solid waste generation (kg / month)

Category of waste	Paper waste	Plastic	Biodegradable-waste	Construction waste	Glass waste	Total solid waste
Quantity	70.0	10.0	10.00	50.0	1.0	141.00

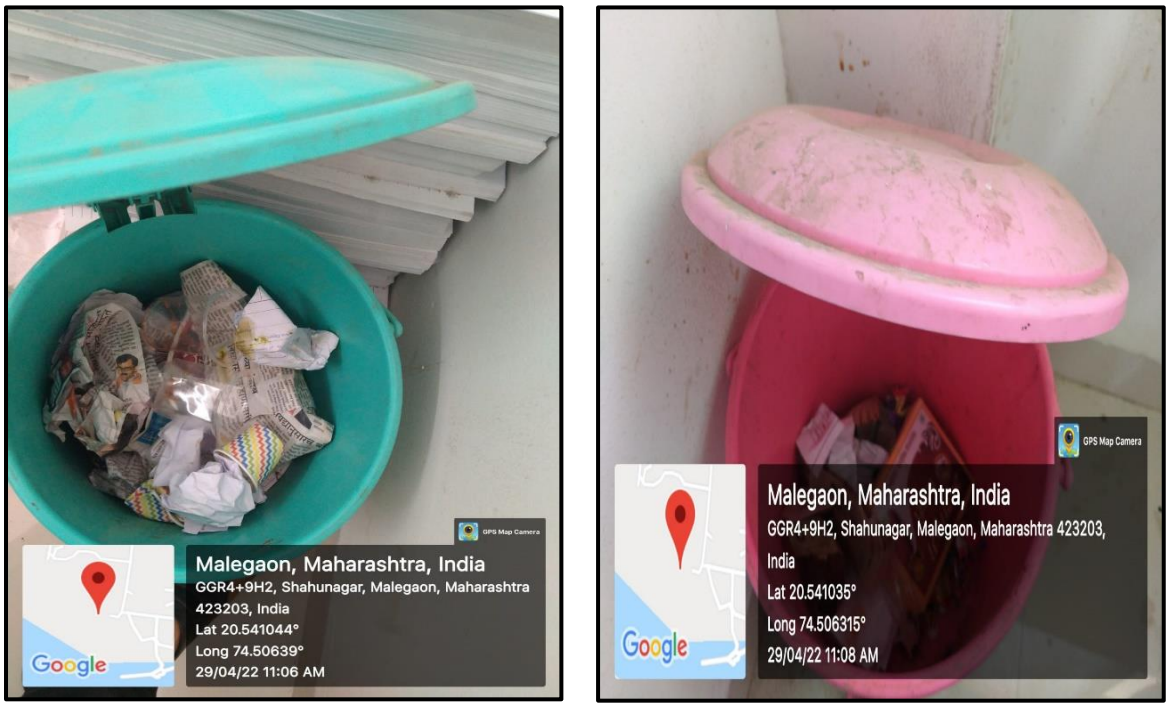
Table 11 : Category Wise Solid Waste Generation

Throughout the study period 141.00 kg of solid waste was generated. On the basis of obtained results in which highest quantity of solid waste is paper-waste and is about 70 kg/month. Construction waste is at second place amounting 50.00 kg/month because the building is under construction for its first floor and Glass waste is lowest and is 1.0 kg/month.

3.3.2 Seggregation of Solid waste

Sr. No.	Specification (Y/N)	Segregated (Y/N)	Recycled (Y/N)	Reuse (Y/N)	Remark
1.	Paper	Y	Y	N	Paper Trash Collector
2.	Plastic	Y	N	Y	Given to Corporation (Ghanta Gaadi)
3.	E Waste	Y	N	N	Submitted to Institute
4.	Glass	Y	N	N	Given to Corporation (Ghanta Gaadi)
5.	Metals	Y	N	N	Given to Corporation (Ghanta Gaadi)
6.	Plant waste	Y	N	Y	Vermicomposting

Table 12 : Seggregation of Solid Waste



Dustbins used in College Campus

3.3.3 Vermicomposting plant for biodegradable waste processing

College has made the manure and used for plant situated around college. The institution has implemented two vermiculture composting unit with plant capacity of 5 Kg respectively. The major goal is to limit the amount of disposable garbage on campus. The species used for

Vermicomposting is *Eisenia foetida*. It is utilised as manure in the garden and lawns when the vermicomposting process is completed.

3.4 E-Waste:

E-waste generation is evident in every educational institution. Particularly at the college level, there are less equipment and instruments in use for administrative and scientific purposes. In administrative work, computers, printers, and Xerox machines are required. The wire necessary for connecting is likewise thrown away with the e trash.

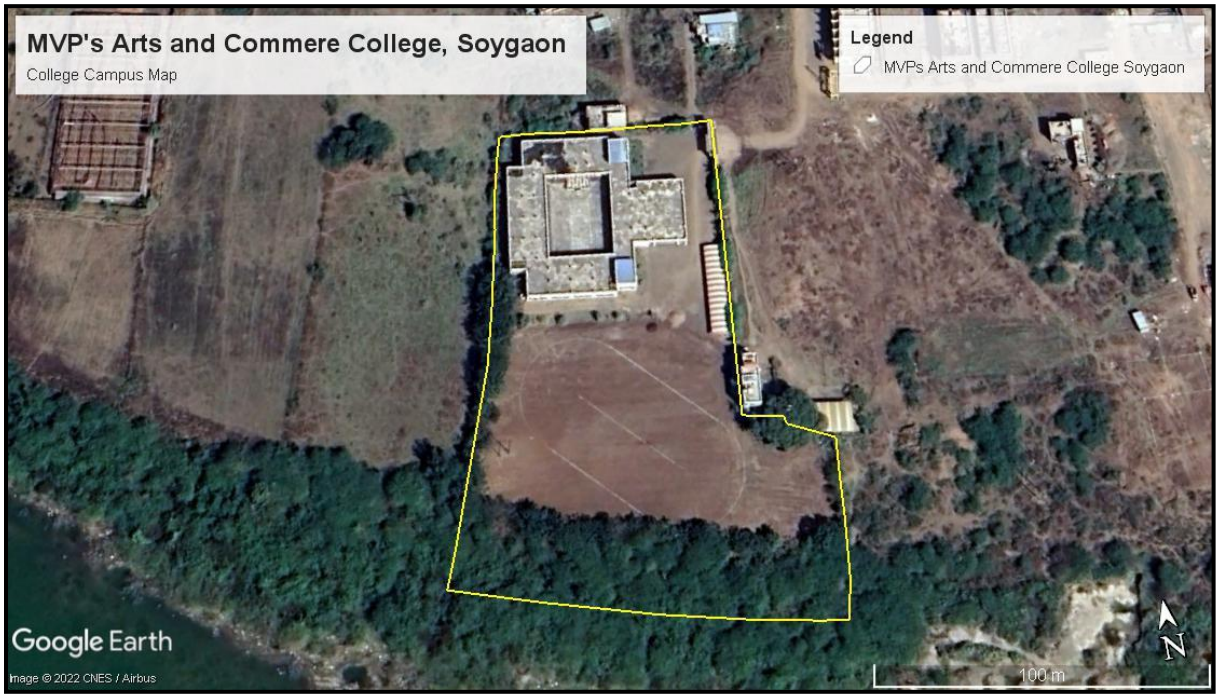
Generation of E –waste at the various departments

Department	E-waste collected (kg/year)
Office	**4**
Premises	**6**
Total	**10**

Table 13: Generation of E-waste

4. Green Cover of College Campus

As we face increasing climate and environmental issues, green campuses are becoming increasingly important. Through both practical reforms and the teaching they give, larger institutions have the ability to positively contribute to the climate change movement.



Google Map showing MVP's Arts and College Map

A green area is defined as any place with grass, trees, or horticulture. Tree canopy analysis is a good way to estimate how much green cover there is in a given area. Canopy cover is the covering created by the branches and crowns of plants or trees (green cover). Green cover refers to the percentage of a given area of the ground that is covered by tree crowns. According to earlier national forest policy and the National Mission for Green India (GIM), one of eight missions under the National Action Plan on Climate Change (NAPCC), 33 percent of total accessible land should be covered by vegetation. Because plants and trees are the best carbon sinks, it will aid in the decrease of greenhouse gas emissions. Green cover of the college campus is calculated by using following formula:

$$Green\ Cover\ (\%) = \frac{Total\ Green\ Cover\ in\ sq.meter}{Total\ area\ of\ campus\ in\ sq.meter}\ x\ 100$$

Green Cover Calculations

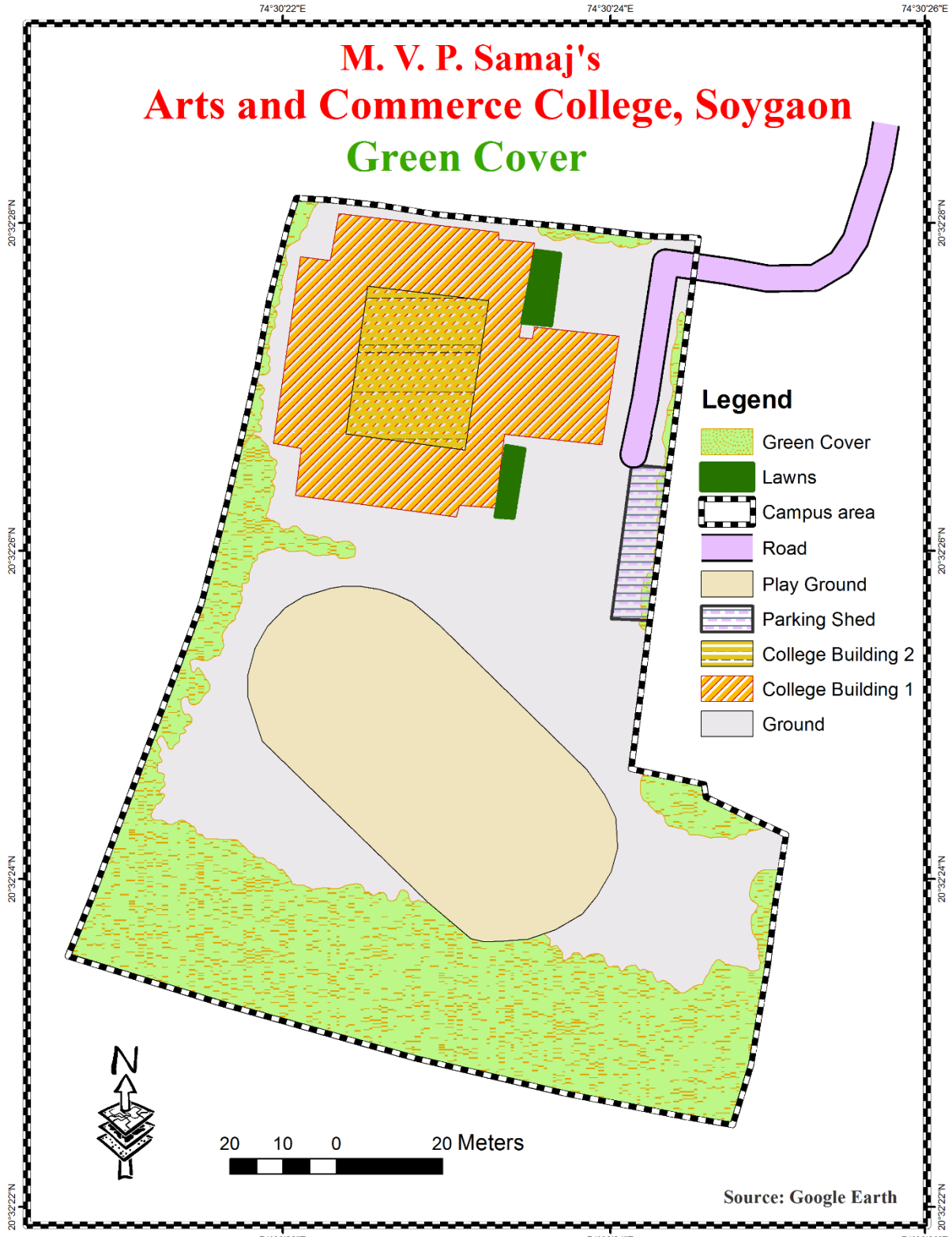
Total Area of Campus (sq.meter)	14350
Total Green Cover (sq. meter)	4330
Percent Green Cover	30.17

Table 14: Calculations of Green Cover

The college campus has a total size of 14350 square metres, according to information acquired during the site visit. Out of the entire accessible space, there are approximately 2450 square metres under construction and 11900 square metres of open space. Using Google Earth Pro, tree canopies are scanned and the area of each tree canopy is calculated. The tree canopy cover is predicted to be 4330 square metres, which comprises about 30.17 percent of the total open space.

Photo Showing Ornamental Plants Present in College Campus

Photo showing some beautiful flowering plants present on campus



Green Cover Map of the College Campus

Total green cover in the MVP Samaj's Arts and Commerce College, Soygaon campus is less than required 33 percentage. The college has made an attempt to increase the number of

canopy trees on campus. These trees are still young, but they have the potential to provide a lot of green on the college campus in a few years.

Trees are not only important, but they are also essential for survival. They produce oxygen, filter CO_2, prevent soil erosion, and maintain ecological equilibrium, among other things. They also give us with food, housing, and a variety of other necessities. The tree selection is critical while plating trees on campus. Increased canopy coverage from trees helps to reduce the urban heat island effect. Pedestrians will benefit from the shade provided by trees, which will provide relief from the heat. They will also provide shade to surrounding buildings, decreasing the need for air conditioning.

Photo Showing use of Drip irrigation for irrigating Plants

Photo Showing Lawn Grass and plantation done along Compound wall

List of available trees on college campus:

Sr. No.	Local Name	Botanical Name	Family	No. of Plants
1.	Gulab	*Rosa rubigninosa*	Rosaceae	06
2	Khrismas Tree	*Araucaria columnar is*	Araucariaceae	02
3.	Son Chapha	*Michelia champaca*	Magnoliaceae	03
4.	Kadulimb	*Azadiracta Indica*	Arecaceae	03
5.	Pam Tree	*Arecaceae*	Arecaceae	09
6.	Kaner	*Cascabla thevetia*	Apocynaceae	02
7.	Ratrani	*Cestrum Nocturnum*	Solanaceae	04
8.	Sitaphal	*Anona Squamosa*	Annonaceae	03
9.	Babhul	*Acacia Nilotica*	Fabaceae	05
10.	Aavala	*Emblica Officinalis*	Euphorbiaceae	02
11.	Boganvel	*Bougainvillea glabra*	Nyctaginaceae	03
12.	Subabhul	*Leucaena Leucocephova*	Fabaceae	05
13.	Bamboo	*Bamboosa Aridinarifolia/ Bambusa vulgaris*	Poaceae	06
14.	Gulmohar	*Delonix regia*	Fabaceae	03

15.	Ashok	*Saraca Monosperma*	Poaceae	06
16.	Palas Papda	*Butea Monosperma*	Fabaceae	04
17	Saptaparni	*Alstonia Schlaris*	Apocynaoeae	04
18	Vad	*Ficus Benghalensis*	Moraceae	03
19	Sadafuli	*Catheranthus Roseus*	Apocynaoeae	05
20	Chinese Lxora	*lxora Chinensis*	Red pentas	02
21	Parijatak	*Coral Jamine*	Verbenaceae	03
22	Aragvadha	*Cassia Fistula*	Caesal Piniqceae	02
			Total	85

Table 15: List of Available Trees

5. Energy Audit

5.1 Introduction of Energy Audit

The need for Energy has increased significantly as the economy has risen. Furthermore, the high energy intensity of several sectors is a source of worry. In such a setting, the efficient use of energy resources and their conservation become critical for reducing wasteful consumption and ensuring long-term development. Recognizing that efficient energy usage and conservation is the most cost-effective way to satisfy rising energy demand, the Indian government adopted the Energy Conservation Act, 2001 and formed the Bureau of Energy Efficiency in March 2002.

The Act establishes and strengthens the delivery system for energy efficiency services in the country and provides much-needed coordination among the various authorities. Energy conservation is a national cause. We must all join hands and make every effort to make India an Energy-efficient economy and society so that we can compete not only in our local market but also in the international market.

An energy audit is an inspection, survey, and analysis of energy flow for energy conservation in a building, process, or system to reduce the amount of energy input into the system without negatively affecting the output(s). An energy audit is the first step in identifying opportunities to reduce energy expenses and carbon footprints in commercial and industrial real estate.

As per The Energy Conservation Act, 2001, Act No. 52 of 2001, *"energy audit" means the verification, monitoring and analysis of the use of energy, including submission of a technical report containing recommendations for improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption;'*

5.2 Objectives of Study

The green audit's major goal is to encourage environmental management and conservation on the college campus. The audit's goal is to identify, measure, explain, and prioritise a framework for environmental sustainability that adheres to all applicable legislation, policies, and standards. The following are the major goals of a Green Audit:

The primary objectives of Energy Audits are;

- To study the present level of Energy Consumption
- To assess the various equipment/facilities from the Energy efficiency aspect
- To study Scope for the usage of Renewable Energy
- To study various measures to reduce the Energy Consumption

5.3 Methodology

The methodology adopted for this audit is

- Formation of audit Team for specific areas and end-use.
- Visual inspection and data collection
- Observations on the general condition of the facility and equipment and quantification
- Identification/verification of energy consumption and other parameters by Measurements
- Detailed calculations, analyses, and assumptions Validation
- Potential energy-saving opportunities
- Suggestions for Implementation
- As the first step in this regard, one team of 2 Energy Auditor from the KTHM College, Nashik, were formed and assigned a particular area or application of Energy on the campus. The activity was organized as per the request received from MVP's, Arts and Commerce College, Soygaon, Malegaon (Nashik).

The approach for doing a Energy audit comprised several instruments such as questionnaire development, physical inspection of the campus, observation and study of paperwork, interviewing key people, data analysis, measurements, and suggestions.

5.4 Steps in Green Audit:

- Pre-Audit
    1. Make a plan for the audit.
    2. Form an auditing team
    3. Schedule for an audit.

4. Gather the necessary background information regarding institute and Energy Audit.

- On Site
    1. Understand the scope of audit
    2. Analyse the strengths and weaknesses of the internal controls
    3. Conduct the audit
    4. Evaluate the observations of audit program
    5. Prepare a report of the observations side by side
- Post-Audit
    1. Produce a draft report of the data collected
    2. Produce a final report of the observations and the inference with accuracy
    3. Distribute the final report to the management
    4. Prepare an action plan to overcome the flaws
    5. Keep a watch on the action plan

5.5 Scope of Work:

The following Environmental Issues were studied for the above-mentioned campus area.

- Present level of Energy Consumption Energy Audit
- Assess the various equipment/facilities from the Energy efficiency aspect
- Scope for the usage of Renewable Energy
- Various measures to reduce the Energy Consumption

This study has been prepated based on the available data, samples, and information supplied by the MVP Samaj's, Arts and Commerce College, Soygaon, Malegaon Nashik and recommendations for improving the efficiaent use of Energy have been made by college officials.

5.6 Energy Consumption Analysis

The College using Electricity as a main Energy Source. Sectioned load for College is 97 KV.

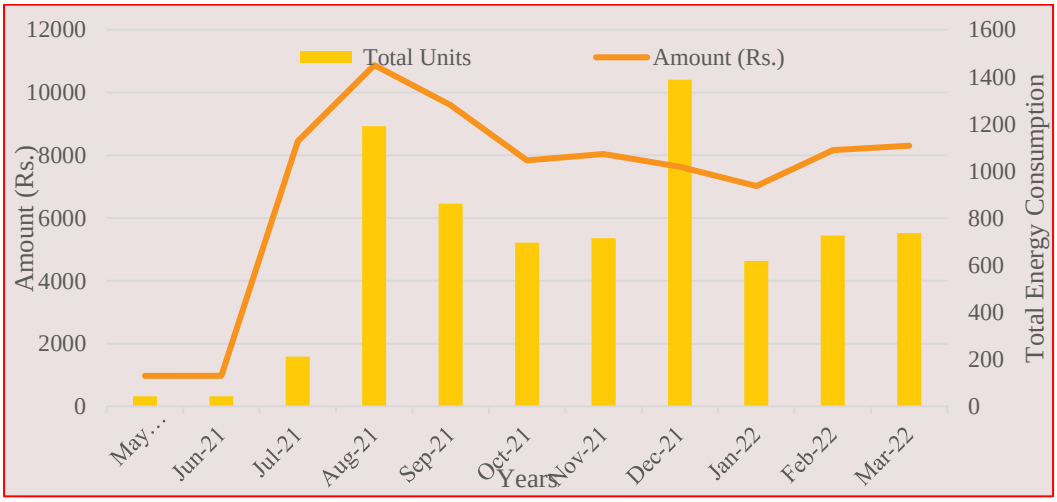
Electricity Bill Analysis of the College:

Months	Total Units	Amount (Rs.)
May-21	43	974.89
Jun-21	43	978.31
Jul-21	211	8450
Aug-21	1190	10871.71
Sep-21	861	9603.13
Oct-21	695	7833.01
Nov-21	715	8043.97
Dec-21	1387	7629.45
Jan-22	618	7020.82
Feb-22	726	8160
Mar-22	737	8307.78
Average	657	7079

*Data Source: Electricity Bill Provided by College

Table 16: Electricity Consumption and Bill Analysis

As per the above table, the average monthly Electricity Consumption is 657 per Units month, and The Average Monthly Electricity Bill is Rs. 7079. There is major fluctuations in Electricity Consumption in the College duu to summer and Diwali Vacation.



Graph 2: Electricity Consumption and Bill Analysis

5.7 Analysis of Connected Load List:

Sr. No	Area/Dept	Type of fitting	Light type LED/Con	Watt	Nos.	Ceiling Fan (60 Watt	computers	Printers/Scaner	Other	LUX WITH LIGHT	Daylight	Operating Hours
1	Principal cabin	Con	LED	18	1	1	1		LED TV, I Biometric Machine	381	300	7
2	IQAC	Cas-Cap	LED	18	2	1	2	2	Spekers-1	300	250	7
3	StaffRoom	Cas-Cap	LED	18	4	2	1			210	140	7
4	Library	Cas-Cap	LED	18	2	2	1			250	145	7
5	Computer Lab	Cas-Cap	LED	18	2	1	11		Server Cabinate-1	288	210	7
6	Washroom Gents	Cas-Cap	LED	18	1					-	-	-
7	Block 1	Cas-Cap	LED	18	2	3				210		7
8	Block 2	Cas-Cap	LED	18	2	4				280		7
9	Block 3	Cas-Cap	LED	18	2	3				280		7
10	Block 4	Cas-Cap	LED	18	2	2				220		7
11	Washroom Ladies	Cas-Cap	LED	18	2					100		7
12	Block 5	Cas-Cap	LED	18	2	2				220		7
13	Block 6	Cas-Cap	LED	18	2	2				220		7
14	Gymkhana	Cas-Cap	LED	18	2	2				270		7
15	Office	Cas-Cap	LED	18	2	2			Copy Machine-1	250	170	7
16	Exam	Cas-Cap	LED	18	4	3	3	3		250	70	7
17	Poarch	Cas-Cap	LED			2				1000	1000	10
18	Outer	Cas-Cap	LED	100	5	-				1000	1000	10

Table 17: Collected Load List

Observations:

- The Institute has about 39 LED lights, which is more Energy Efficient than fluorescent tube lights. All LED tube lights are fitted with electronic ballast.
- The College has 32 fans in different Classrooms, Staffroom, and offices. All fans are fitted with an electronic regulator.
- Percentage of lighting power requirement met through LED bulbs

  = (Lighting power requirement met through LED bulbs / Total lighting power requirement) X 100

  = 39/39

  = 100%

5.8 Analysis of Operating Hours:

Sr. No	Area/Dept	Type of fitting	Light type LED/Con	Watt	Nos.	Ceiling Fan (60 Watt	computers	Printers/Scaner	Other	Operating Hours
1	Principal cabin	Con	LED	18	1	1	1		LED TV, I Biometric Machine	7
2	IQAC	Cas-Cap	LED	18	2	1	2	2	Spekers-1	7
3	StaffRoom	Cas-Cap	LED	18	4	2	1			7
4	Library	Cas-Cap	LED	18	2	2	1			7
5	Computer Lab	Cas-Cap	LED	18	2	1	11		Server Cabinate-1	7
6	Washroom Gents	Cas-Cap	LED	18	1					-
7	Block 1	Cas-Cap	LED	18	2	3				7
8	Block 2	Cas-Cap	LED	18	2	4				7
9	Block 3	Cas-Cap	LED	18	2	3				7
10	Block 4	Cas-Cap	LED	18	2	2				7
11	Washroom Ladies	Cas-Cap	LED	18	2					7
12	Block 5	Cas-Cap	LED	18	2	2				7
13	Block 6	Cas-Cap	LED	18	2	2				7
14	Gymkhana	Cas-Cap	LED	18	2	2				7
15	Office	Cas-Cap	LED	18	2	2			Copy Machine-1	7
16	Exam	Cas-Cap	LED	18	4	3	3	3		7
17	Poarch	Cas-Cap	LED			2				10
18	Outer	Cas-Cap	LED	100	5	-				10

Table 18: Analysis of Operating Hours

Observation:

- Objectives for reducing energy, Water and Fuel consumption are sufficient.
- Energy-efficient equipment's are being used to replace the old non-energy efficient LED Lights.
- Regular monitoring of Equipment and immediate rectification of any problems is being done.

5.9 Analysis of Light Intensity in Classrooms, Offices and Workshops:

Sr. No	Area/Dept	Type of fitting	Light type LED/Con	Watt	Nos.	LUX WITH LIGHT	Daylight	Operating Hours
1	Principal cabin	Con	LED	18	1	381	300	7
2	IQAC	Cas-Cap	LED	18	2	300	250	7
3	StaffRoom	Cas-Cap	LED	18	4	210	140	7
4	Library	Cas-Cap	LED	18	2	250	145	7
5	Computer Lab	Cas-Cap	LED	18	2	288	210	7
6	Washroom Gents	Cas-Cap	LED	18	1	-	-	-
7	Block 1	Cas-Cap	LED	18	2	210		7
8	Block 2	Cas-Cap	LED	18	2	280		7
9	Block 3	Cas-Cap	LED	18	2	280		7
10	Block 4	Cas-Cap	LED	18	2	220		7
11	Washroom Ladies	Cas-Cap	LED	18	2	100		7
12	Block 5	Cas-Cap	LED	18	2	220		7
13	Block 6	Cas-Cap	LED	18	2	220		7
14	Gymkhana	Cas-Cap	LED	18	2	270		7
15	Office	Cas-Cap	LED	18	2	250	170	7
16	Exam	Cas-Cap	LED	18	4	250	70	7
17	Poarch	Cas-Cap	LED			1000	1000	10
18	Outer	Cas-Cap	LED	100	5	1000	1000	10

Table 19: Analysis of Light Intensity in Classrooms, Offices and Workshop

Observations:

1. Lux light level is sufficient in the Campus, where students spend most of their time and focus on learning.
2. College installed LED lighting systems which is a good option for Energy Consumption. These systems provide energy-efficient lighting and reduce maintenance costs to a minimum.
3. Natural lighting is considered for corridors, Office, Exam and IQAC.

6. Other Activities

6.1 Various Environment Awareness Programmes Arranged by the College

6.1.1 Tree plantation and watering the plants at Galne, Nashik.

To create awareness among the young students about Environment Conservation and importance of trees the college has taken initiative for tree plantation programme. The programme was conducted at a hill located at Galne.

Tree Plantation by Students.

6.1.2 Awareness Programme on Environment day :

Students were made aware about various Environmental issues and an awareness exam was conducted in the campus

6.1.3 Visit To Waste Water Treatment Plant:

A visit was arranged to Waste water treatment plant to study various waste water treatment processes.

6.2 Management Of Human Health And Safety

The college has given special priority for human health and safety. The following various factors help to manage human health and safety.

6.2.1 Separate Toilet facility

Separate toilets are available for students and staff in the college.

7. Audit Findings and Recommendation

7.1 Green Audit

- In accordance with the green audit guidelines Colleges should create and publish their own environmental policies. The college should establish internal procedures to ensure that it complies with environmental requirements, and responsibility for putting those standards into effect should be assigned.
- According to the Solid Waste Management Rule 2016, the college must implement a suitable segregation system, thus the number of dustbins should be increased in proportion to the number of students. Waste should be recycled and reused whenever possible.
- The college campus has a large number of trees, the leaves of a large number of trees, lying in their natural state in campus, which, if properly managed, can bring financial benefits. As such, it can be used for composting.
- The college should celebrate one day of the month as No Vehicle Day
- Emphasis should be placed on the purchase of environmentally friendly materials during the procurement of materials and a policy should be formulated accordingly.
- In order to create interest in environment among the students, it is necessary to organize various environment days in the college and celebrate it with enthusiasm. These mainly include water conservation, tree planting, celebration of Pollution Control Day, celebration of Ozone Day, etc.
- All vehicles accessing the campus must have a PUC certificate, which will be checked by security.
- Plant used for beautification or a plant used for tree planting in a college campus, must select indigenous plants only.
- In order to keep the atmosphere and air clean, 33% of the total campus of the college should be covered with trees. At present 28 per cent of the premises are covered with trees.
- 80 percent of the entire amount of ground water taken must be returned to the ground using Artificial Recharge Structures on campus.
- Display boards for turning off the taps and lights should be placed in a suitable location.
- Flexes on following public awareness about Environmental Conservation should be

placed at appropriate places within college campus:

- Individual Role Related to Environmental Conservation.
- Importance of Trees.
- Benefits of Organic Farming.
- Keep Silence.

7.2 Energy Audit

Based on the analysis of Power Consumption data, Certain steps have been recommended to improve the campus's energy efficiency. Complete cost analysis of the implementation of the recommended measure has been performed wherever necessary. Also, the general measure of energy efficiency has been listed. Described below are some crucial recommendations for better energy efficiency:

7.2.1 Consolidation of Audit Findings:

1) The communication process for awareness concerning energy conservation is found adequate.
2) Average Power factor is maintained.
3) The monthly use of Electricity in the College is not very high.
4) Objectives for reducing energy, Water and Fuel consumption are sufficient.
5) Regular monitoring of Equipment and immediate rectification of any problems.

7.2.2 Recommendations:

a. Replacing LED Monitors with LCD Monitors

LCD monitors consume 150 W, while LED monitors consume only 50W. The saving of 25 W per monitor is considerable, but the LED monitor is also costlier by Rs. 2000. (approx.)

b. Use of Master Switch outside each room.

Installation of a Master switch outside a room can make it easy for a person to switch off all the room's applications in case someone forgets to switch off while leaving the room. This can help improve energy efficiency.

c. Use of Motion sensors in Toilets and Staffroom:

Toilets and Staffroom have a large potential for saving energy by using automated tools. Motion sensors can be used to switch on the lights when there is no movement automatically. This can gradually be reducing the total load in the toilets.

d. Hibernating

Utilizing Hibernating feature to power down computers outside of class/work hours will reduce the current wasted Energy associated with keeping computers powered on when the building is unoccupied.

e. Conduct more save energy awareness programs for students and staff.

Conduct more save energy awareness programs for students and staff.

f. Energy Substitutions:

As in the Campus, there is a huge consumption of Electrical Energy, which is not economical. Instead of using electrical energy, switch to an alternative energy source, solar power.

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