ENVIRONMENTAL AUDIT REPORT

OF

SEVADAL MAHILA MAHAVIDYALAYA

SAKKARDARA SQUARE UMRER ROAD,

NAGPUR- 440 024

Year: 2021-2022

Prepared by:

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com

Principal
Sevadal Mahila Mahavidyalaya
Umred Road, Nagpur-9.

MAHARASHTRA ENERGY DEVELOPMENT AGENCY
An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-14/1577 22nd April, 2021

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm	:	**M/s Enrich Consultants** Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune - 411009.
Registration Category	:	*Empanelled Consultant for Energy Conservation Programme for Class 'A'*
Registration Number	:	***MEDA/ECN/2021-22/Class A/EA-03***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

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Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SMM/21-22/16 Date: 21/04/2022

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Sevadal Mahila Mahavidyalaya, Nagpur in the Academic year 2021-22.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Provision of Separate bins for Dry & Wet Waste
- The College has installed septic tanks and cleans periodically.
- Implementation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of awareness by Display of Posters on Resource Conservation

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management Sevadal Mahila Mahavidyalaya, Nagpur for awarding us the assignment of Environmental Audit of their Campus for the Academic Year: 2021-22.

We are thankful to all the Principal and Staff members for helping us during the field study.

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EXECUTIVE SUMMARY

1. **Sevadal Mahila Mahavidyalaya, Nagpur** consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office & other facilities.

2. **Various Pollution due to College Activities:**

   - **Air pollution:** Mainly CO_2 on account of Electricity Consumption
   - **Solid Waste:** Bio degradable Garden Waste
   - **Liquid Waste:** Human liquid waste

3. **Present Energy Consumption & CO_2 Emission:**

No	Parameter/ Value	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	4833	4.3497
2	Maximum	568	0.5112
3	Minimum	240	0.216
4	Average	402.75	0.362475

4. **Various initiatives taken for Energy Conservation:**

   - Usage of Energy Efficient LED Lighting
   - Maximum Usage of Day Lighting

5. **Usage of Renewable Energy & Reduction in CO_2 Emission:**

   - As on today College has proposed to install 10 kWp capacities solar rooftop projects on the college building.
   - College has installed solar street light systems in the premises.

6. **Indoor Air Quality Parameters:**

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	67	41	48
2	Minimum	32	24	33

7. **Indoor Comfort Conditions:**

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	40.2	46	325	39
2	Minimum	33	37	202	30

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8. Waste Management:

8.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper, plastic waste is handed over to Authorized waste collecting agent for further recycling.

8.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

8.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

8.4 E-Waste Management:

The E-Waste is disposed of through Authorized E-Waste collecting agency.

9. Rain Water Management:

The College has installed the Rainwater Management project; the rain water falling on the terrace is collected and is used for increasing the underground water table.

10. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Display of Posters on Resource Conservation

11. Notes &Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO_2into atmosphere

12. References:

- For CO_2 Emissions: www.tatapower.com
- For Energy Saved by Solar Thermal Water Heating System: www.mahaurja.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI &Water Quality Standards: www.cpcb.com

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ABBREVIATIONS

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LPD	:	Liters per Day
LED	:	Light Emitting Diode
AQI	:	Air Quality Index
PM-2.5	:	Particulate Matter of Size 2.5 Micron
PM-10	:	Particulate Matter of Size 10 Micron
CPCB	:	Central Pollution Control Board
ISHRAE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

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CHAPTER-I
INTRODUCTION

1.1Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Table No-1: Relevant Environmental Laws in India:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Table No-2: Some Important Environmental Rules in India:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules

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2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 Table No-3: National Environmental Plans & Policy Documents:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives:

1. Study Resource Consumption& CO_2 Emissions
2. Study of CO_2 Emission Reduction
3. Study of Indoor Air Quality Parameters
4. Study of Indoor Comfort Condition Parameters
5. Study of Waste Management
6. Study of Rain Water Harvesting
7. Study of Environment Friendly Initiatives

1.3 General Details of College: Table No 4:

No	Head	Particulars
1	Name of Institution	Sevadal Mahila Mahavidyalaya
2	Address	Sakkardara Square Umrer Road, Nagpur 440 024
3	Affiliation	Rashtra Sant Tukodoji Maharaj,Nagpur, University

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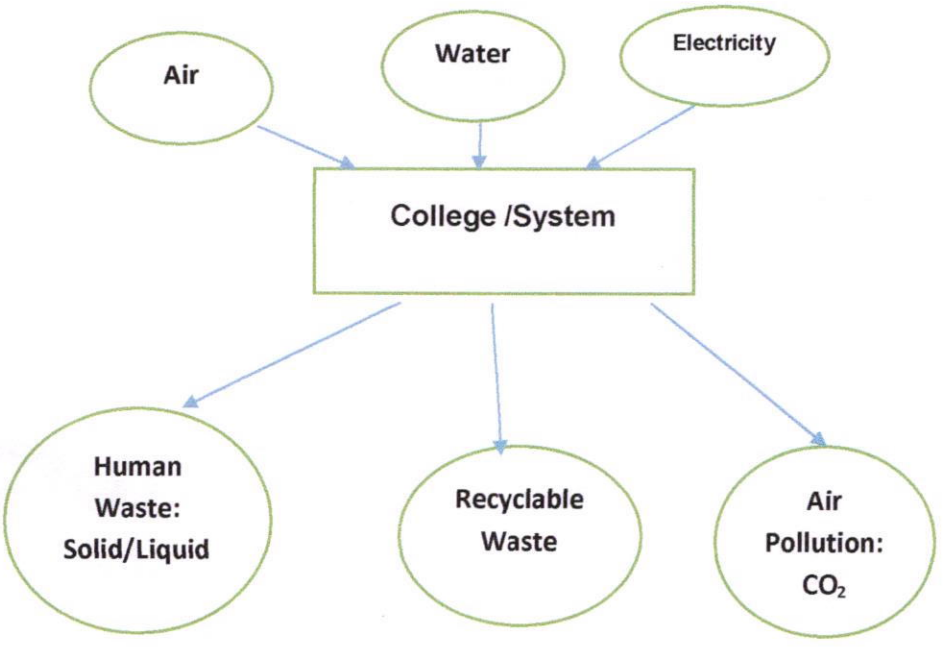
CHAPTER-II
STUDY OF CONSUMPTION OF RECOURCES & CO_2 EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.
Chart No 1: Representation of College as System & Study of Resources & Waste



Now we compute the Generation of CO2 on account of consumption of Electrical Energy.

The basis of Calculation for CO_2 emissions due to usage of Electrical Energy are as under

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

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Table No 5: Study of Consumption of Electrical Energy & CO_2 Emissions: 2020-21:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-21	350	0.315
2	May-21	240	0.216
3	Jun-21	253	0.2277
4	Jul-21	340	0.306
5	Aug-21	413	0.3717
6	Sep-21	568	0.5112
7	Oct-21	489	0.4401
8	Nov-21	491	0.4419
9	Dec-21	533	0.4797
10	Jan-22	355	0.3195
11	Feb-22	284	0.2556
12	Mar-22	517	0.4653
13	Total	4833	4.3497
14	Maximum	568	0.5112
15	Minimum	240	0.216
16	Average	402.75	0.362475

Chart No 2: Month wise CO_2Emissions:

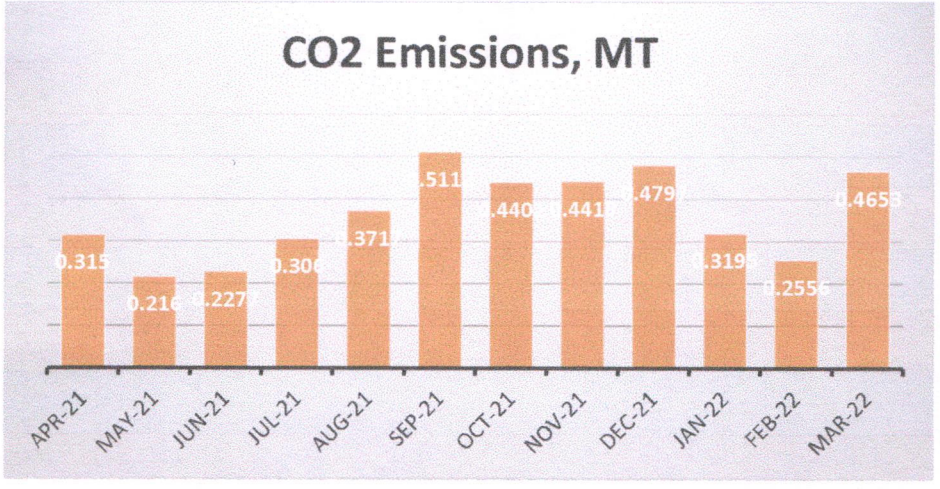

Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO2 Emissions, MT
1	Total	4833	4.349
2	Maximum	568	0.511
3	Minimum	240	0.216
4	Average	402.75	0.362

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CHAPTER III
STUDY OF CO_2 EMISSION REDUCTION

As on today College has install solar street light in the premises and process for installation of 10 kWp solar rooftop on the college building is in process.

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CHAPTER IV
STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

Air quality is a measure of the suitability of air for breathing by people, plants and animals.

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 '**air pollution**' has been defined as **'the presence in the atmosphere of any air pollutant**.'

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the **AQI** requires an **air monitor** and an **air pollutant** concentration over a specified **averaging period**.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10micron

Table No 8: Indoor Air Quality Parameters:

No	Locations	AQI	PM2.5	PM10
Ground Floor				
1	Guest Room	47	31	34
2	Central Library	49	29	34
3	Physical Education Department	44	30	37
4	Examination Dept.	41	32	39
5	Computer Science Dept.	55	31	48
First Floor				

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6	Auditorium	54	34	48
7	Principal's Office	50	37	47
8	HOD and Staff Room, Social Science	62	35	46
9	Seminar Hall	67	34	43
10	English Language Laboratory	51	38	44
11	PG Laboratory - Environment Science Department	57	38	41
12	HOD – Zoology Department	59	41	40
Second Floor				
13	Microbiology Research Laboratory	47	31	36
14	UG Laboratory – Biotechnology Department	46	32	37
15	HOD – Microbiology Department	48	35	36
16	HOD and Staff – Botany Department	49	34	36
17	Class Room -214	48	33	35
18	Class Room-215	51	34	36
19	Class Room-216	57	35	35
Third Floor				
20	Class Room -302	62	41	47
21	Class Room-303	61	40	46
22	Class Room-304	59	39	42
23	Class Room-305	57	35	38
24	Class Room-307	57	32	35
25	Class Room-308	58	37	35
26	**Maximum**	67	41	48
27	**Minimum**	32	24	33

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CHAPTER V
STUDY OF INDOOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No9: Study of Indoor Comfort Condition Parameters:

No	Locations	Temperature (°C)	Humidity (%)	Lux Level	Noise Level (dB)
Ground Floor					
1	Guest Room	37	39	260	34
2	Central Library	36	44	271	31
3	Physical Education Department	36	44	252	32
4	Examination Dept.	36.5	42	210	31
5	Computer Science Dept.	34	44	221	35
First Floor					
6	Auditorium	37	40	202	32
7	Principal's Office	36	40	244	33
8	HOD and Staff Room, Social Science	38	41	270	32
9	Seminar Hall	39	40	244	33
10	English Language Laboratory	37	40	259	31
11	PG Laboratory - Environment Science Department	38.5	40	230	30
12	HOD – Zoology Department	37.1	41	225	33
Second Floor					
13	Microbiology Research Laboratory	38.5	41	241	32
14	UG Laboratory – Biotechnology Department	39	41	248	32
15	HOD – Microbiology Department	38	40	255	31
16	HOD and Staff – Botany Department	38	43	254	35
17	Class Room -214	38.2	41	280	32
18	Class Room-215	38.5	42	270	33
19	Class Room-216	37.9	44	280	32
Third Floor					
20	Class Room -302	40.1	39	315	39

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21	Class Room-303	40	39	312	31
22	Class Room-304	40.2	37	299	35
23	Class Room-305	40	37	320	32
24	Class Room-307	40	39	325	34
25	Class Room-308	39.9	38	321	35
26	**Maximum**	40.2	46	325	39
27	**Minimum**	33	37	202	30

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CHAPTER VI
STUDY OF WASTE MANAGEMENT

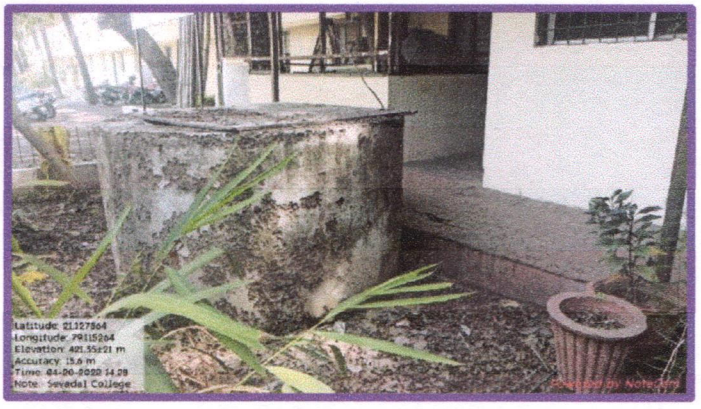
6.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

Photograph of Waste Collection Bins:

6.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



6.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

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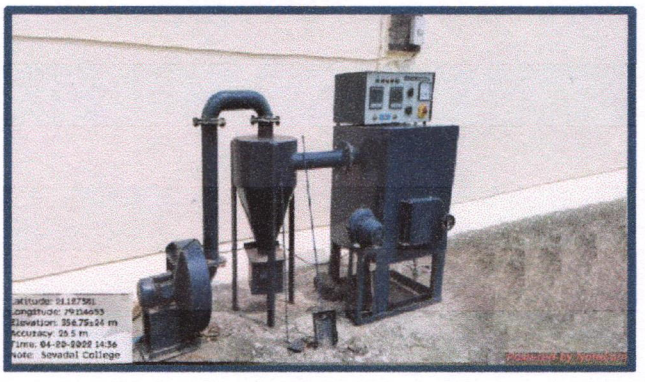
6.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

6.5 Sanitary Waste Incinerator:

The College has installed Sanitary Waste Incinerator for sanitary waste disposal.



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CHAPTER-VII
STUDY OF RAIN WATER MANAGEMNT

The College has implemented the Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to increase the underground water table.

Photograph of Rain water Harvesting Pipe:

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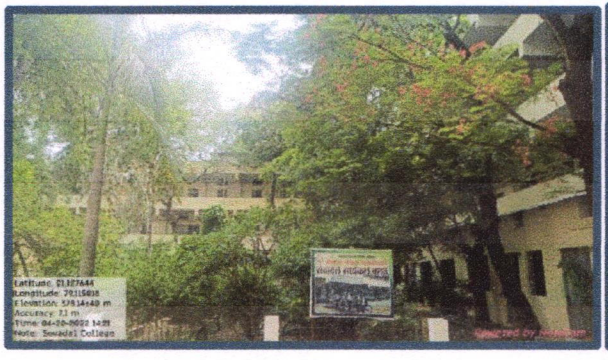
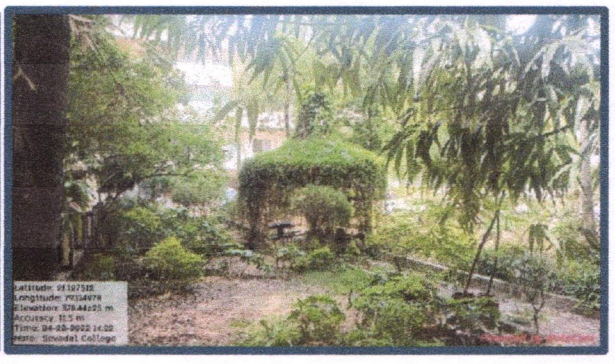
CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has well maintained Tree Plantation in the campus.

Photograph of Tree plantation:

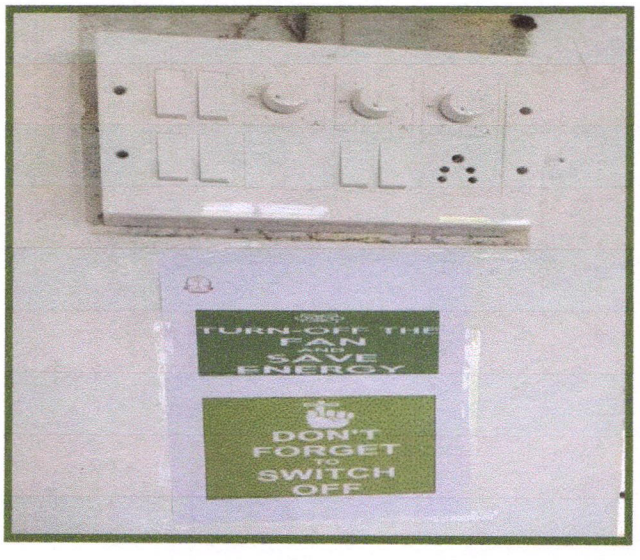




8.2 Creation of Awareness about Energy Conservation:

The College has displayed posters emphasizing on importance of Energy Conservation.

Photograph of Poster on Energy Conservation:



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ANNEXURE-I:
VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR COMFORT STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Water Quality Standards:

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between **6.5 to 8.5** Dissolved Oxygen **6 mg/l or more**
2	Drinking water source after conventional treatment and disinfection	pH between **6 to 9** Dissolved Oxygen **4 mg/l or more**
3	Outdoor Bathing (Organized)	pH between **6.5 to 8.5** Dissolved Oxygen **5 mg/l or more**
4	Controlled Waste Disposal	pH between **6 to 8.5**

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3. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

4. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33^0C
2	Humidity	Less Than 70%

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