ENVIRONMETAL AUDIT REPORT

Of

Shri Wagheshwar Gramvikas Pratishthan's,

Shri Vasantrao Pharate Patil Arts, Commerce & Science College,

Mandavgan Pharata, Taluka: Shirur, District: Pune

Year: 2021-22

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
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MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
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Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
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ECN/2022-23/CR-43/1709 10th May, 2022

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 Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : ***MEDA/ECN/2022-23/Class A/EA-32.***

- 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 **09th May, 2024** 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)

ENGRESS SERVICES

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Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/ SVPPACSC /21-22/03 Date: 20/6/2022

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Shri Wagheshwar Gramvikas Pratishthan's Shri Vasantrao Pharate Patil Arts, Commerce & Science College, Mandavgan Pharate, Taluka: Shirur, District: Pune in the year 2021-22.

The College has adopted Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Solar Thermal Water Heating System at Hostel.
- Segregation of Waste at source
- Installation of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Installation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of awareness on Clean India by Display of Posters

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

For Engress Services,

A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Shri Wagheshwar Gramvikas Pratishthan's Shri Vasantrao Pharate Patil Arts, Commerce & Science College, Mandavgan Pharate, Taluka: Shirur, District: Pune, for awarding us the assignment of Environmental Audit of their Mandavgan campus for the Year: 21-22.

We are thankful to all staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Shri Wagheshwar Gramvikas Pratishthan's Shri Vasantrao Pharate Patil Arts, Commerce & Science College, Mandavgan Pharate, Taluka: Shirur, District: Pune consumes Energy in the form of **Electrical Energy;** used for various gadgets, Office & other facilities.

2. Pollution due to Day to Day Activities:

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

3. Energy Purchased & CO_2 Emission:

No	Parameter	Energy Consumed, kWh	CO_2 emissions, MT
1	Total	13436	12.09
2	Maximum	1269	1.14
3	Minimum	985	0.89
4	Average	1119.67	1.01

4. Various Measures Adopted for Environmental Conservation:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of Solar Thermal Water Heating System at Hostel.

5. Usage of Renewable Energy:

- The College has installed Solar Thermal Water Heating System at Hostel.

6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	53	32	40
2	Minimum	43	24	27

7. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	29.1	59.1	189	45
2	Minimum	28.8	58.8	98	39.6

8. Waste Management:

8.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste like Paper waste, Plastic Waste is handed over to authorized agency.

8.2 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, for disposal of Sanitary Waste.

8.3 E-Waste Management:

It is recommended to dispose of the E-Waste through Authorized Agency.

9. Rain Water Management:

The College has installed Rainwater Management Project. The rain water falling on the terrace is collected through pipes and is used to increase the underground water table.

10. Eco Friendly Practices:

- Internal Tree Plantation
- Creation of Awareness on Clean India by Display of Posters

11. Assumption:

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

12. References:

1. For CO_2 calculations: www.tatapower.com
2. For Various Indoor Air Parameters: www.ishrae.com
3. For AQI & Water Quality Standards: www.cpcb.com

ABBREVIATIONS

SWGP	:	Shri Wagheshwar Gramvikas Pratishthan
AQI	:	Air Quality Index
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
MT	:	Metric Ton
CO_2	:	Carbon Di Oxide
ISHRAE	:	The Indian Society of Heating, Refrigerating & Air conditioning Engineers
CPCB	:	Central Pollution Control Board
LPD	:	Liters Per Day
NSS	:	National Service Scheme
PM	:	Particulate Matter

CHAPTER-I
INTRODUCTION

1.1 Important 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. Relevant Environmental Laws in India: Table No-1:

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

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

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

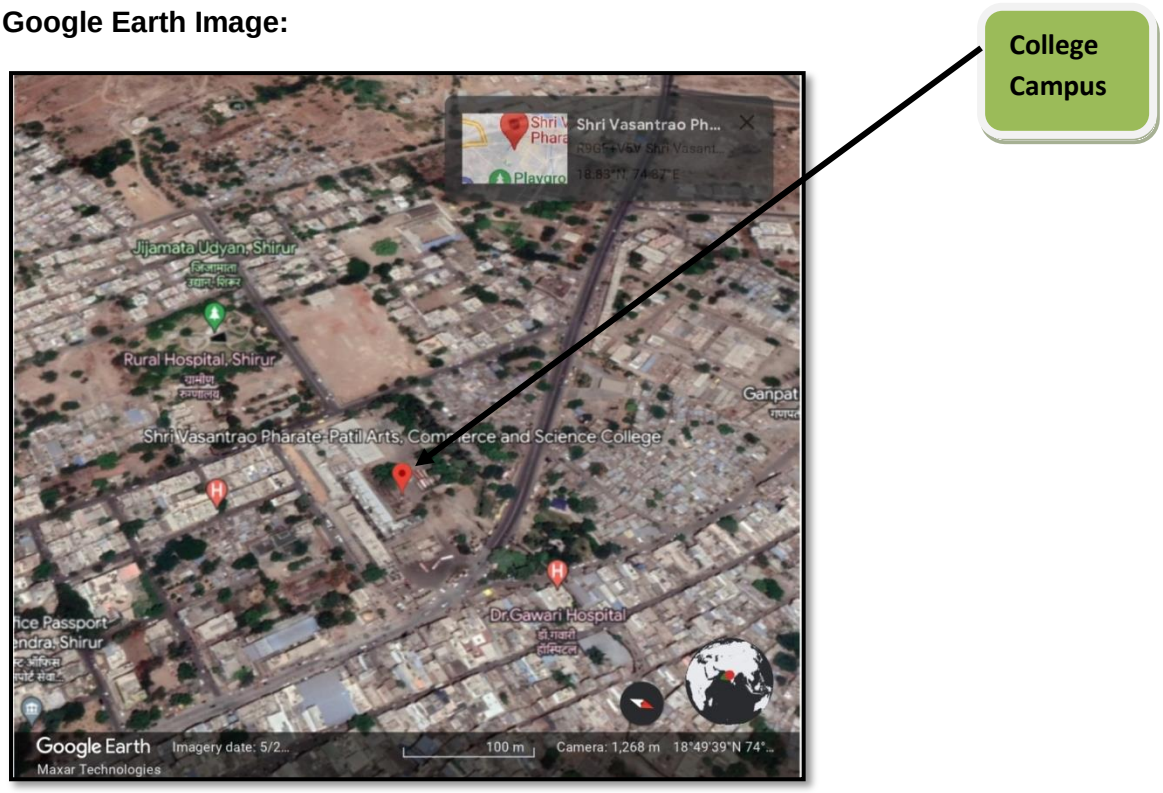
1.1.6 National Environmental Plans & Policy Documents: Table No-3:

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 College)
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. To study Recourse Consumption and CO_2 Emission
2. To Study CO_2 Emission Reduction
3. To Study Indoor Air Quality
4. To study Indoor Comfort Parameters
5. To Study Waste Management Practices
6. To Study Rain Water Management
7. To study Environment Friendly Practices

1.3 Google Earth Image:



1.4 Table No 4: General Details of College:

No	Head	Particulars
1	Name	Shri Wagheshwar Gramvikas Pratishthan's Shri Vasantrao Pharate Patil Arts, Commerce & Science College,
2	Address	Mandavgan Pharate, Taluka: Shirur, District: Pune 412 211
3	Affiliation	Savitribai Phule Pune University

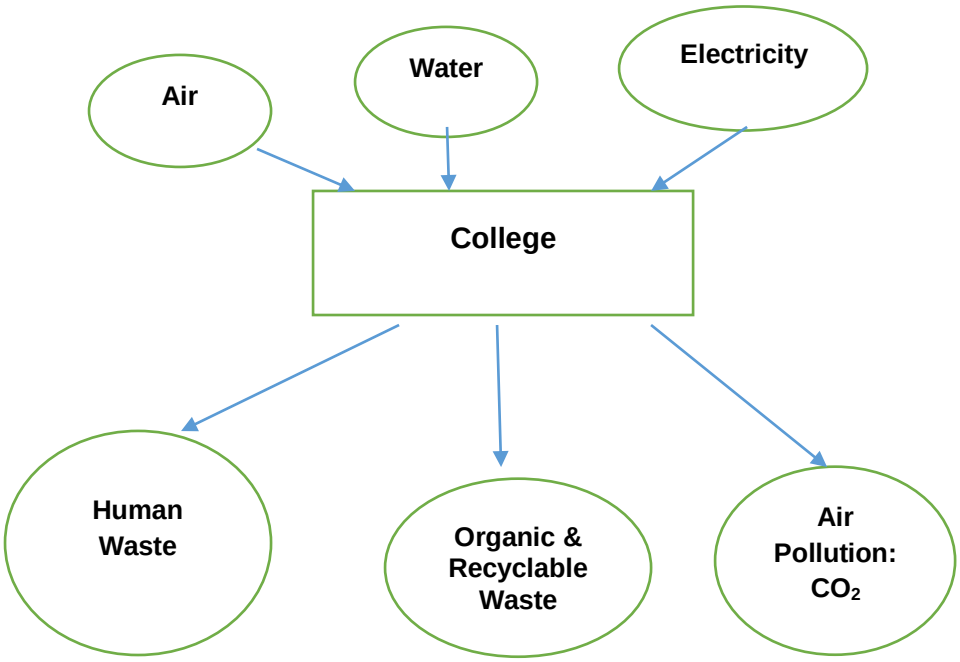
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The College consumes following Natural/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:



We compute the Generation of CO_2 on account of consumption of Electrical Energy as under. The basis of Calculation for CO_2 emissions due to Electrical Energy are: 1 Unit (kWh) of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere.

Table No 5: Electrical Energy Usage & CO_2 Emission: 21-22:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-21	1200	1.08
2	May-21	1150	1.04
3	Jun-21	1269	1.14
4	Jul-21	1129	1.02
5	Aug-21	985	0.89
6	Sep-21	1025	0.92

7	Oct-21	1135	1.02
8	Nov-21	1201	1.08
9	Dec-21	996	0.90
10	Jan-22	1032	0.93
11	Feb-22	1105	0.99
12	Mar-22	1209	1.09
13	Total	13436	12.09
14	Maximum	1269	1.14
15	Minimum	985	0.89
16	Average	1119.67	1.01

Chart No 2: To study CO_2 Emission:

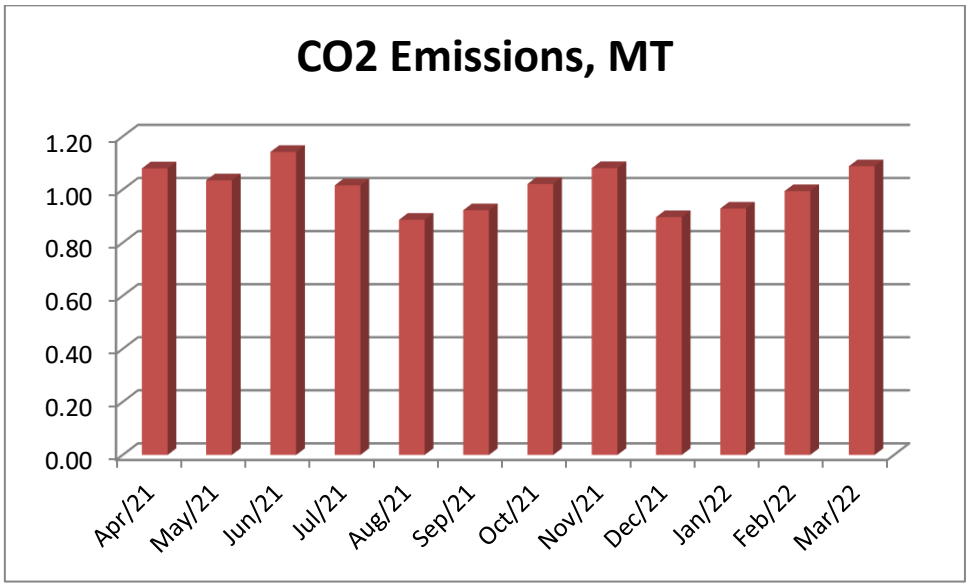


Table No 6: Important parameters:

No	Parameter	Energy Purchased, kWh	CO_2 Emissions, MT
1	Total	13436	12.09
2	Maximum	1269	1.14
3	Minimum	985	0.89
4	Average	1119.67	1.01

CHAPTER-III
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Solar Thermal Water Heating System at the Hostel Block

The College has yet to install Roof top Solar PV Plant.

Photograph of Roof Top Solar Thermal Water Heating System:

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**.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 '**air pollutant**' has been defined as **'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment**

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
3. PM 2.5- Particulate Matter of Size 2.5

Table No 7: Indoor Air Quality Parameters:

No	Location	AQI	PM2.5	PM10
1	Principal Sir Cabin	50	30	33
2	Admin Section	51	31	36
3	Corridor	52	32	40

	Ground Floor			
4	Class Room-1	53	31	40
5	Staff Room-2	46	28	33
6	Exam Control Room	43	24	34
7	Class Room	45	29	34
	First Floor			
8	Class Room-7	44	25	28
9	Class Room-8	45	27	37
10	Class Room-9	51	31	38
11	Class Room-12	46	27	34
	Second Floor			
12	Computer Lab	46	28	37
13	Electronics Lab	45	24	27
14	Library	46	24	28
15	Reading Hall	50	30	37
	Maximum	53	32	40
	Minimum	43	24	27

CHAPTER-V
STUDY OF INDOOR AIR 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 No 8: Study of Indoor Comfort Parameters:

No	Location	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Principal Sir Cabin	28.9	59	189	42.3
2	Admin Section	28.9	58.8	167	41
3	Corridor	28.9	58.8	156	42
	Ground Floor				
4	Class Room-1	29	59	147	45
5	Staff Room-2	29	59	139	44.8
6	Exam Control Room	29	59.1	164	44.6
7	Class Room	29	59	149	44.3
	First Floor				
8	Class Room-7	28.8	59	136	45
9	Class Room-8	28.8	59	154	43.6
10	Class Room-9	28.9	58.9	164	44.7
11	Class Room-12	28.9	58.9	98	39.6
	Second Floor				
12	Computer Lab	28.9	59	164	41.8
13	Electronics Lab	29	59	136	41.6
14	Library	29	59.1	155	42
15	Reading Hall	29.1	58.8	159	40
	Maximum	29.1	59.1	189	45
	Minimum	28.8	58.8	98	39.6

CHAPTER-VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Waste is segregated at source. Waste bins are located at various locations

Photograph of Separate Waste Collection Bin:

6.2 Sanitary Waste Management:

The College has installed Sanitary Waste Incinerator, for disposal of Sanitary Waste.

Photograph of Sanitary Waste Incinerator:

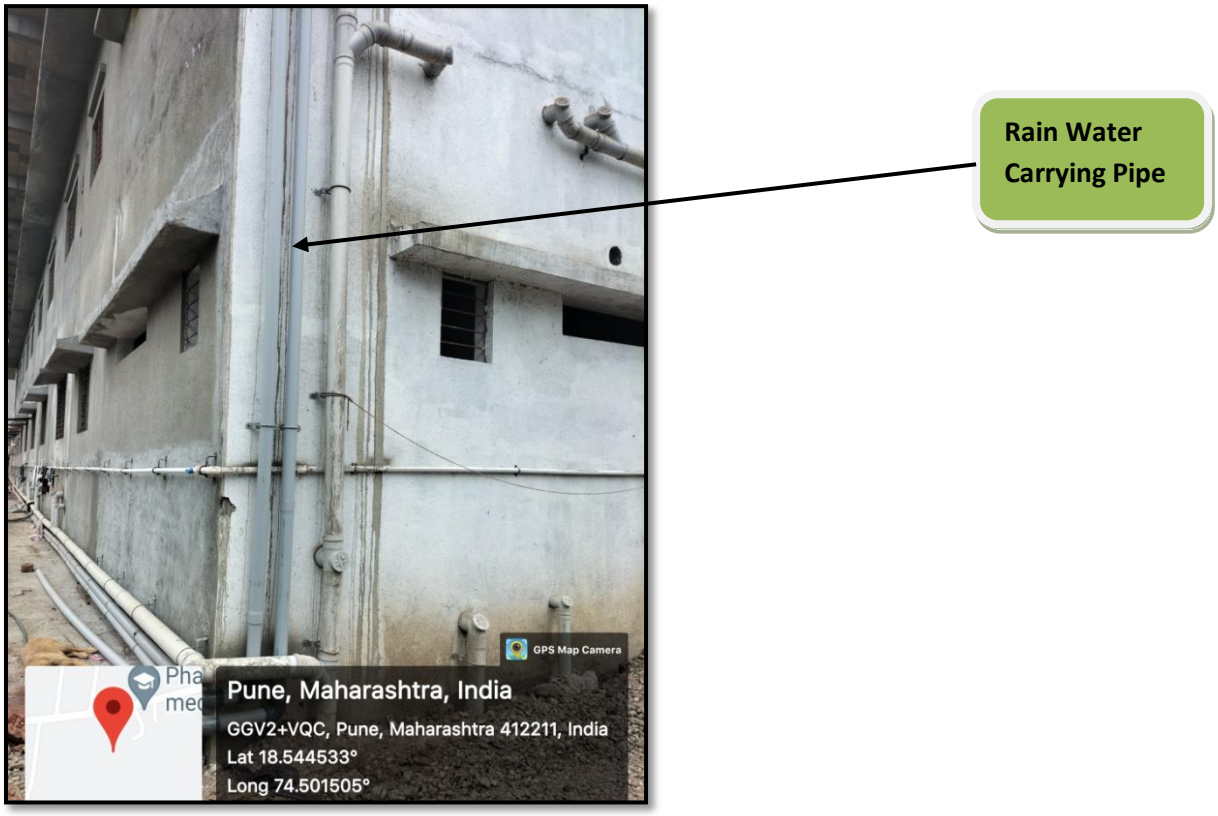
6.3 E-Waste Management:

It is recommended to dispose of the E-Waste through Authorized Agency.

CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT

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 Carrying Pipe:



CHAPTER VIII
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has well maintained Tree plantation.

Photograph of Tree Plantation:

8.2 Creation of Awareness by Display of Posters:

The College has displayed posters on Clean India.

Photograph of Poster Display Board on Resource Conservation:

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**

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 33^0 C
2	Humidity	Less Than 70%