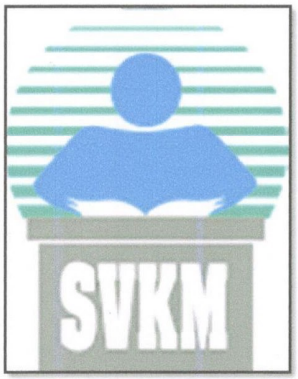
ENVIRONMENTAL AUDIT REPORT

of

SHRI VILE PARLE KELAVANI MANDAL'S

INSTITUTE OF PHARMACY, DHULE

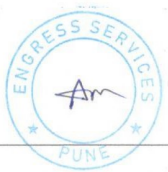


Year: 2022-23

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

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: eec@mahaurja.com, Web: www.mahaurja.com

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

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SVPKMIOP/22-23/03 Date: 22/2/2023

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Shri Vile Parle Kelavani Mandal's Institute of Pharmacy, Dhule in the Year 2022-23.

The Institute has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Installation of 72 kWp Capacity Roof Top Solar PV Plant
- Segregation of Waste at Source
- Provision of Sanitary Waste Incinerator
- Installation of Sewage Treatment Plant
- Installation of Rain Water Management Project
- Medicinal Plant Garden
- Creation of Awareness by Display of Posters on importance of Resource Conservation & Clean & Green Campus
- Provision of E Vehicles.
- Celebration of World Environment Day

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

For Engress Services,

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

ENGRESS SERVICES PUNE

INDEX

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of, Shri Vile Parle Kelavani Mandal's Institute of Pharmacy, Dhule for awarding us the assignment of Environmental Audit of their Pimpri campus for the Year: 2022-23.

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

EXECUTIVE SUMMARY

1. Shri Vile Parle Kelavani Mandal's Institute of Pharmacy, Dhule consumes Energy in the form of **Electrical Energy and LPG;** used for various gadgets, office & other facilities.

2. Pollution caused due to Institute Activities:

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

3. Present Energy Consumption & CO_2 Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	56431	133	51
2	Maximum	7633	12	6.90
3	Minimum	1030	9	0.96
4	Average	4703	11	4.26

4. Various projects implemented for Environmental Conservation:

- Installation of **72 kWp** Roof Top Solar PV Plant.
- Implementation of Sewage Treatment Plant.
- Rain Water Management & Water Conservation Project

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

- The College has installed Roof Top Solar PV Plant of Capacity **72kWp**.
- The Electrical Energy generated in 22-23 is **86400 kWh.**
- Reduction in CO_2 Emissions in 2022-23 works out to be **78 MT.**

6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	119	64	86
2	Minimum	100	58	72

7. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	22.1	41	206	45
2	Minimum	21.8	40	136	39

8. Waste Management:

8.1 Segregation of Waste at Source:

The waste is segregated at source. There are separate bins for collection at various points and the Waste is handed over to Municipal Corporation for further action.

8.2 Sanitary Waste Management:

The Institute has installed Sanitary Waste Incinerator, to dispose of the Sanitary Waste.

8.3 Liquid Waste Management:

The Institute has installed Sewage Treatment Plant. The treated water is used for flushing purpose.

8.4 Laboratory Liquid Waste Management:

The Chemical Laboratory Liquid Waste Quantity is very negligible.

8.5E Waste Management:

The Institute authorities have entered in to a Memorandum of Understanding with HP Customer Support for disposal of E Waste.

9. Rain Water Management & Water Conservation:

The rain water falling on the terrace is collected through pipes and is used for increasing the underground water table. A soak tank is provided for collection of drained water. An open well is there, wherein the rain water is collected by gravity is stored and is used for gardening purpose.

10. Environmental Friendly Initiatives:

- Internal Tree Plantation & Medicinal Plant Garden
- Creation of Awareness by Display of Posters on Plastic Ban, Clean & Green Campus.
- Conducting various Environment Conservation Awareness Activities on the occasion of World Environment Day

11. Assumptions:

- **1 kWh** of Electrical Energy releases **0.9 Kg** of CO_2 into atmosphere
- **1 Kg** of LPG releases **2.68 Kg of** CO_2 into atmosphere
- Average Energy generated by **1 kWp** Solar PV Plant : **4kWh/Day**
- Annual Solar Energy Generation Days: **300 Nos**

12. References:

- For CO_2 Emissions: www.tatapower.com
- For Roof Top Solar Energy Generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI &Water Quality Standards: www.cpcb.com

ABBREVIATIONS

SVKM	:	Shri Vile Parle Kelavani Mandal
Kg	:	Kilo Gram
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
KLPD	:	Kilo Litres 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

CHAPTER-I
INTRODUCTION

1.1Important Definitions:

1.1.1Environment: 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 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 Audit Methodology:

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

1.3 General Details of Institute: Table No:4

No	Head	Particulars
1	Name of the Institution	Shri Vile Parle Kelavani Mandal's Institute of Pharmacy
2	Address	Mumbai Agra Highway,Dhule-424001
3	Year of Establishment	2017
4	Affiliation	Dr. Babasaheb Ambedkar Technological University, Lonere

1.4 Google Earth Image:

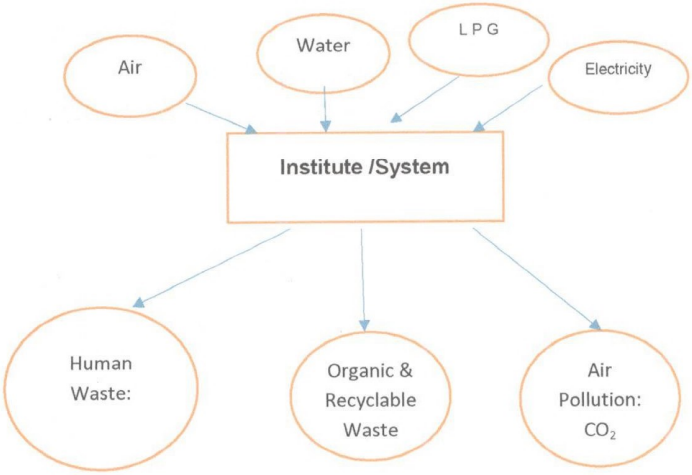
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION& CO_2 EMISSION

The Institute consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

We try to draw a schematic diagram for the Institute System & Environment as under.

Chart No 1: Representation of Institute as System:



Now we compute the Generation of CO_2 on account of consumption of Electrical Energy. The basis of Calculation for CO_2 emissions due to LPG & Electrical Energy are as under

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
- **1 Kg** of LPG releases **2.68 Kg of CO_2** into atmosphere.

Table No 5: Study of Consumption of Energy & CO_2 Emissions: 22-23:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Feb-22	1030	12	0.96
2	Mar-22	1470	12	1.35
3	Apr-22	5819	9	5.26
4	May-22	4923	12	4.46

5	Jun-22	7633	11	6.90
6	Jul-22	6104	12	5.53
7	Aug-22	5287	12	4.79
8	Sep-22	7128	12	6.45
9	Oct-22	5344	11	4.84
10	Nov-22	4038	9	3.66
11	Dec-22	3739	11	3.39
12	Jan-23	3915	10	3.55
13	Total	56431	133	51
14	Maximum	7633	12	6.90
15	Minimum	1030	9	0.96
16	Average	4703	11	4.26

Chart No 2: Study of CO_2 Emission:

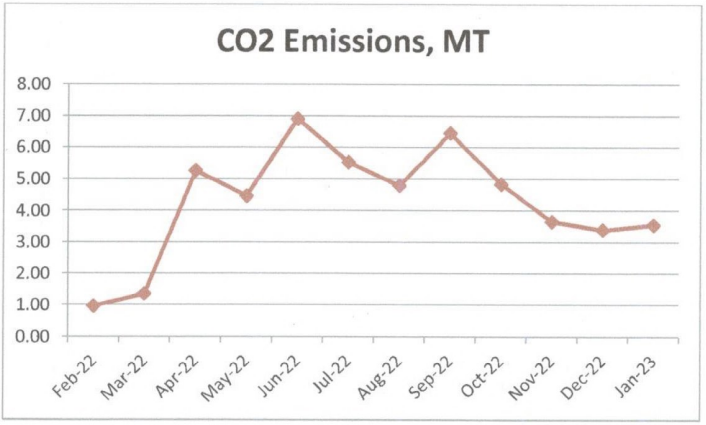


Table No6: Various Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	56431	133	51
2	Maximum	7633	12	6.90
3	Minimum	1030	9	0.96
4	Average	4703	11	4.26

CHAPTER IV
STUDY OF CO_2EMISSION REDUCTION

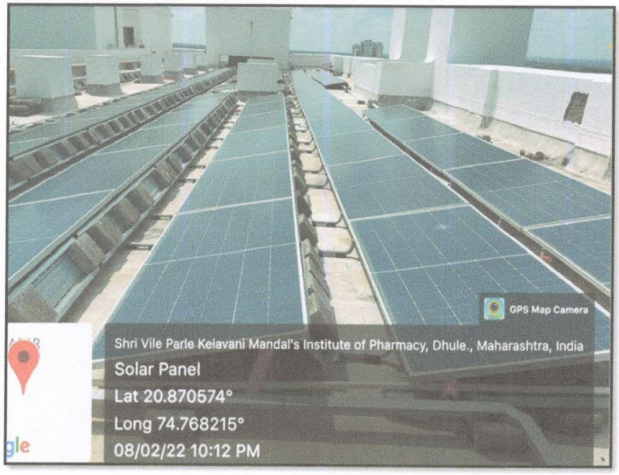
The Institute has installed Roof Top Solar PV Plant of Capacity **72 kWp**.

In the following Table, we compute the Annual Reduction in CO_2 Emissions due to installation of Roof Top Solar PV Plant.

Table No 7: Computation of Annual Reduction in CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	72	kWp
2	Energy Generated in per kWp	4	4 kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 22-23	**86400**	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	**Qty of CO_2 Saved by Solar PV Plant =(4)*(5) /1000**	**78**	**MT of CO_2**

Photograph of Roof Top Solar PV Plant:



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 litres** 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 liveability.

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 micron
3. PM-10- Particulate Matter of Size 10micron

Table No 8: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
	Ground Floor			
1	Principal cabin	103	62	81

2	Admin office	106	62	79
3	Pharmaceutics Lab I	102	61	80
4	Classroom 1	103	62	82
	First Floor			
5	Exam room	106	62	81
6	Chemistry lab I	110	63	84
7	Seminar hall	110	63	79
8	Computer lab	106	63	80
	Second Floor			
9	Faculty cabin 1	100	60	75
10	Class room non. 301	103	60	78
11	HAP lab	113	64	86
12	Library	103	60	79
	Third Floor			
13	Office	103	61	72
14	Pharmaceutics lab	102	61	73
15	Pharma chemistry lab	106	61	81
16	Research lab	103	60	78
	Fourth Floor			
17	Pharmaceutics Lab 1	105	58	73
18	PG Lab	110	60	76
19	Animal house	119	62	82
20	Classroom 2	105	58	73
	Maximum	**119**	**64**	**86**
	Minimum	**100**	**58**	**72**

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	Location	Temperature, 0C	Humidity, %	Lux Level	Noise Level, dB
	Ground Floor				
1	Principal cabin	22	40	139	41.9
2	Admin office	21.9	41	163	42
3	Pharmaceutics Lab	22	41	152	41
4	Classroom	22	41	148	42.6
	First Floor				
5	Exam room	21.9	40	175	42.6
6	Pharmaceutical Chemistry lab	21.9	40	203	42
7	Seminar hall	22	41	206	43.9
8	Computer lab	22.1	41	196	44
	Second Floor				
9	Faculty cabin	22	41	147	44.1
10	Class room	22	41	195	43.1
11	HAP lab	22.1	40	169	44
12	Library	22	41	172	42.9
	Third Floor				
13	Office	21.9	40	174	45
14	Pharmaceutics lab	21.8	40	147	45
15	Pharma chemistry lab	21.8	40	159	42.9
16	Quality Assurance Lab	21.9	41	152	39.9
	Fourth Floor				
17	Pharmaceutics Lab	22	41	136	39
18	Pharmaceutical chemistry lab	22	41	168	42

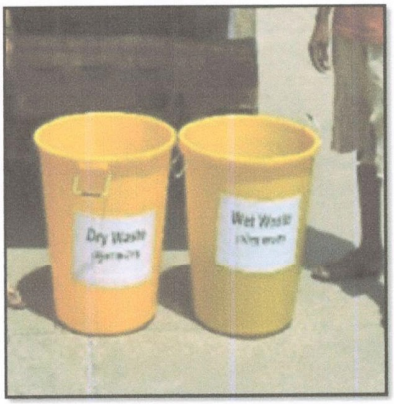
19	Animal house	21.8	41	146	41.9
20	Classroom 2	21.9	40	145	42
	Maximum	**22.1**	**41**	**206**	**45**
	Minimum	**21.8**	**40**	**136**	**39**

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The waste is segregated at source. There are separate bins for collection at various points and the Waste is handed over to Municipal Corporation for further action.

Photograph of Waste Collection Bins:



6.2 Sanitary Waste Management:

The Institute has installed Sanitary Waste Incinerator, to dispose of the Sanitary Waste.

Photograph of Sanitary Waste Incinerator:

6.3 Liquid Waste Management:

The Institute has installed Sewage Treatment Plant of Capacity 600m^3/Day. The treated water is used for flushing purpose.

Photograph of Sewage Treatment Plant:

6.4 Laboratory Liquid Waste Management:

The Chemical Laboratory Liquid Waste Quantity is very negligible.

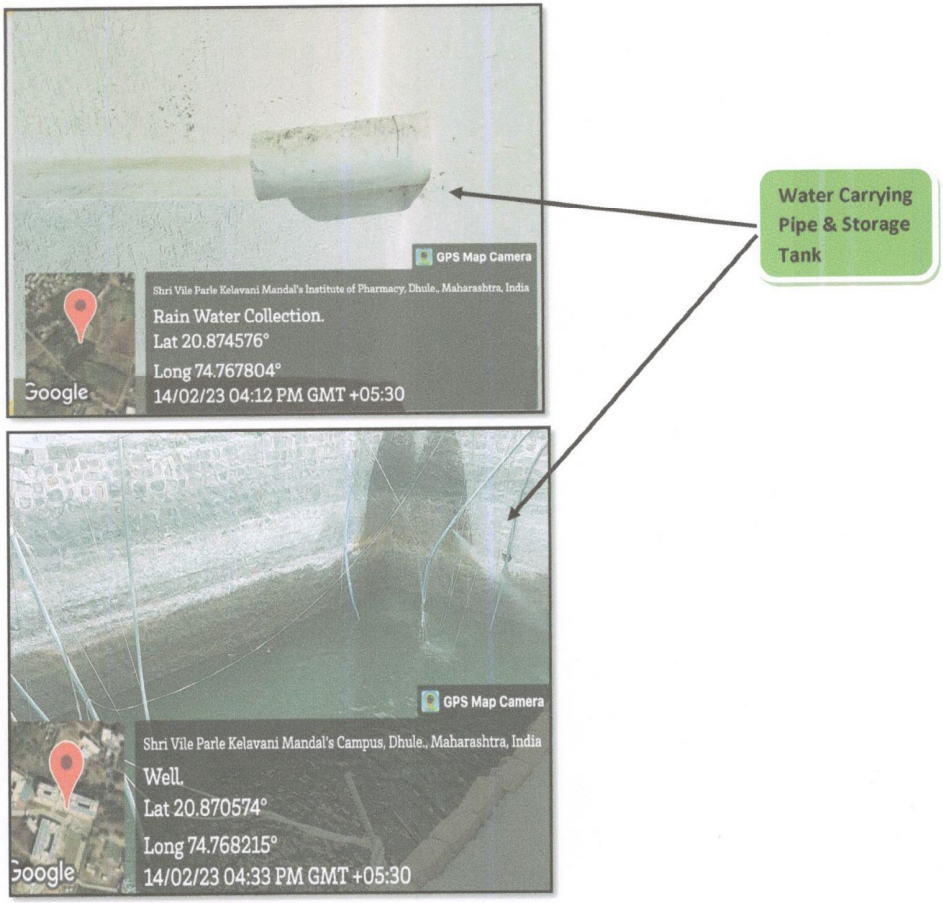
6.5 E Waste Management:

The Institute authorities have entered in to a Memorandum of Understanding with HP Customer Support for disposal of E Waste.

CHAPTER-VII
STUDY OF RAIN WATER MANAGEMENT & WATER CONSERVATION

The rain water falling on the terrace is collected through pipes and is used for increasing the underground water table. A soak tank is provided for collection of drained water. An open well is there, wherein the rain water is collected by gravity is stored and is used for gardening purpose.

Photograph of Underground Rain Water Pipe and Water Collection Tank:



CHAPTER-VIII
STUDY OF ENVIRONMENTAL FRIENDLY PRACTICES

8.1 Internal Tree Plantation:

The Institute has well maintained Medicinal Plant Garden.

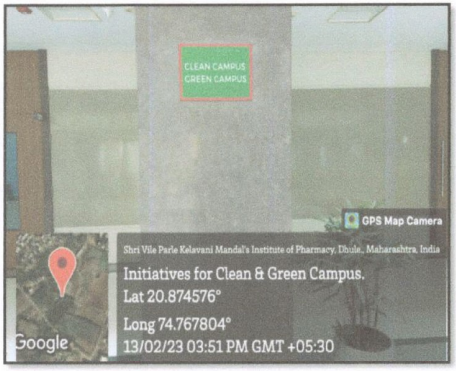
Photograph of Medicinal Plants in the campus:

Photograph of Trees in the campus:

8.2 Creation of Awareness on Importance of Resource Conservation & Clean & Green Campus:

The Institute has displayed Poster emphasizing the importance of Saving Trees and Clean & Green Campus.

Photograph of Poster on Saving Trees and Clean & Green Campus:



8.3 Usage of E Vehicle in the Campus:

The Institute has an E Vehicle in the campus for travelling inside the campus.

Photograph of E Vehicle:

8.4 Celebration of World Environment Day:

On the occasion of World Environment Day on 4/6/2022, the Institute conducted various activities.

The major events include:

- Rangoli Competition
- Competition on innovative ideas on Water Conservation
- E Poster competition on Only One Earth
- Cycle Rally
- Idea Competition

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 33^0C
2	Humidity	Less Than 70%