ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com
UDYAM Regn. No: UDYAM-MH-26-0135636,
MEDA Regn. No: ECN/2023-24/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

GREEN AUDIT CERTIFICATE

Certificate No: ES/NKC/23-24/02 **Date: 18/5/2024**

This is to certify that we have conducted Green Audit at Malad Kandivli Education Society's Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai 400 064 in the year: 2023-24.

The College has adopted following Green & Sustainable Practices:

- Usage of Energy Efficient LED Lighting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Installation of Roof Top Solar PV Plant of Capacity 1 kWp
- Sensor Based Operation of Lighting in Wash Rooms
- Segregation of Waste at source
- Bio Tumbler Unit for conversion of Organic Waste
- Installation of Effluent Treatment Plant for treatment of Waste Water
- Sensor Based Water Tap operation of Wash Basins
- Implementation of Rain Water Management Project
- Good Internal Road
- Tree Plantation in the Campus
- Provision of Ramp, Wheel Chair and Lift for Divyangajan
- Creation of awareness on Plastic Ban 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,

Mehendale

A Y Mehendale,
B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

ENGRESS SERVICES PUNE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com
UDYAM Regn. No: UDYAM-MH-26-0135636,
MEDA Regn. No: ECN/2023-24/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENERGY AUDIT CERTIFICATE

Certificate No: ES/NKC/23-24/01 **Date: 18/5/2024**

This is to certify that we have conducted Energy Audit at Malad Kandivli Education Society's Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai 400 064 in the year: 2023-24.

The College has adopted following Energy Efficient Practices:

- Usage of Energy efficient LED Lighting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Installation of Roof Top Solar PV Plant of Capacity 1 kWp
- Sensor Based Operation of Lighting in Wash Rooms

We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

For Engress Services,

ENGRESS SERVICES * PUNE *

A Y Mehendale,
B E-Mechanical, M Tech- Energy
BEE Certified Energy Auditor, EA-8192

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com
UDYAM Regn. No: UDYAM-MH-26-0135636,
MEDA Regn. No: ECN/2023-24/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/NKC/23-24/03 **Date: 18/5/2024**

This is to certify that we have conducted Environmental Audit at at Malad Kandivli Education Society's Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai 400 064 in the year: 2023-24.

.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Lighting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Installation of Roof Top Solar PV Plant of Capacity 1 kWp
- Sensor Based Operation of Lighting in Wash Rooms
- Segregation of Waste at source
- Bio Tumbler Unit for conversion of Organic Waste
- Installation of Effluent Treatment Plant for treatment of Waste Water
- Sensor Based Water Tap operation of Wash Basins
- Implementation of Rain Water Management Project
- Tree Plantation in the Campus
- Creation of awareness on Plastic Ban 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 & Eco Friendly.

For Engress Services,

A Y Mehendale,
B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

ENGRESS SERVICES PUNE

GREEN AUDIT REPORT

Malad Kandivli Education Society's,

Nagindas Khandwala College of Commerce, Arts & Management Studies and

Shantaben Nagindas Khandwala College of Science,

Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai 400 064

MKES

KHANDWALA COLLEGE

LEARNERS BECOMING LEADERS

Year: 2023-24

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society

Near Muktangan English School, Parvati, Pune 411009

Phone: 09890444795 Email: engress123@gmail.com

ENGRESS SERVICES PUNE

Registration Certificates: UDYAM, MEDA, ASSOCHAM GEM-CP, ISO: 9001 & 14001:

भारत सरकार
Government of India
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
Ministry of Micro, Small and Medium Enterprises

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-MH-26-0135636
NAME OF ENTERPRISE	ENGRESS SERVICES

TYPE OF ENTERPRISE *

S.No.	Classification Year	Enterprise Type	Classification Date
1	2023-24	Micro	03/02/2024
2	2022-23	Micro	26/06/2022
3	2021-22	Micro	27/07/2021

MAJOR ACTIVITY: SERVICES

SOCIAL CATEGORY OF ENTREPRENEUR: GENERAL

NAME OF UNIT(S)

S.No.	Name of Unit(s)
1	Engress Services

OFFICAL ADDRESS OF ENTERPRISE

Flat Door/Block No.	26	Name of Premises/ Building	Yashashree
Village/Town	Pune	Block	1
Road/Street/Lane	Laksmanya Nagar,Nirmal Bang Soc	City	Pune
State	MAHARASHTRA	District	PUNE, Pin 411009
Mobile	8767447244	Email:	engress123@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE: 13/04/2021

DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS: 13/04/2021

NATIONAL INDUSTRY CLASSIFICATION CODE(S)

S.No.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	70 - Activities of head offices; management consultancy activities	7020 - Management consultancy activities	70200 - Management consultancy activities	Services

DATE OF UDYAM REGISTRATION: 27/07/2021

ASSOCHAM

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June, 2022

He/she is now eligible to evaluate the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dhabhar
Chairman, GEM

GEM CP 21/769

Deepak Sood
Secretary General, ASSOCHAM

Certificate of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES

has been assessed and found to conform to the requirements of
ISO 9001:2015
for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

Certificate No: 23 QSC 13
Initial Registration Date: 27/03/2023 — Issuance Date: 27/03/2023
Date of Expiry: 26/03/2026
1st Survey Due: 27/02/2024 — 2nd Survey Due: 27/02/2025

cms EGAC IAF

Director

Magnitude Management Services Pvt. Ltd.

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 35800459
Email: xxx@mahaurja.com, Web: www.mahaurja.com

MEDA/CN/2022-23/CR-41/1709 — 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 Maktargan English School,
Parvati, Pune – 411 009

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

Registration Number : *MEDA/CN/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)

Certificate of Registration

This is to Certify that
Environmental Management System of

ENGRESS SERVICES

has been assessed and found to conform to the requirements of
ISO 14001:2015
for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

Certificate No: 21 EK 0 26
Initial Registration Date: 28/03/2021 — Issuance Date: 28/03/2021
Date of Expiry: 28/03/2024
1st Survey Due: 28/02/2022 — 2nd Survey Due: 28/02/2023

cms EGAC IAF

Director

Magnitude Management Services Pvt. Ltd.

INDEX

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Malad Kandivli Education Society's Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai for awarding us the assignment of Green Audit of their campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1. Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai, consumes Energy in the form of **Electrical Energy;** used for equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**173812**	kWh
2	Annual CO_2 Emissions	**161.65**	MT

3. Usage of Renewable Energy:

- Energy generated by **1 kWp** Solar PV Plant in 2023-24 is **1200 kWh**
- Reduction in CO_2 Emissions due to Solar PV Plant in 2023-24 is **1.12 MT**

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Installation of Bio Tumbler Unit
3	Waste Water	Installation of Effluent Treatment Plant
4	E Waste	Provision of Dedicated E Waste Collection Bin

5. Rain Water Management:

The College has installed the Rain water Management Project. The Rain Water falling on the terrace is stored in an underground Storage Tank and further used for domestic purpose.

6. Green & Sustainable Practices:

- Good internal road & Internal tree plantation
- Sensor based Water Tap operation of Wash Basins
- Provision of Ramp for Divyangajan
- Creation of Awareness on Plastic Ban by Display of Posters

7. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg of CO_2** into atmosphere
2. Solar Energy Generated by Solar PV Plant: **4 kWh/kWh/Day**
3. Annual Solar Energy Generation Days: **300 Nos**

8. Reference:

- For CO_2 Emission Computation: www.ccd.gujarat.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
Qty	Quantity

CHAPTER-I
INTRODUCTION

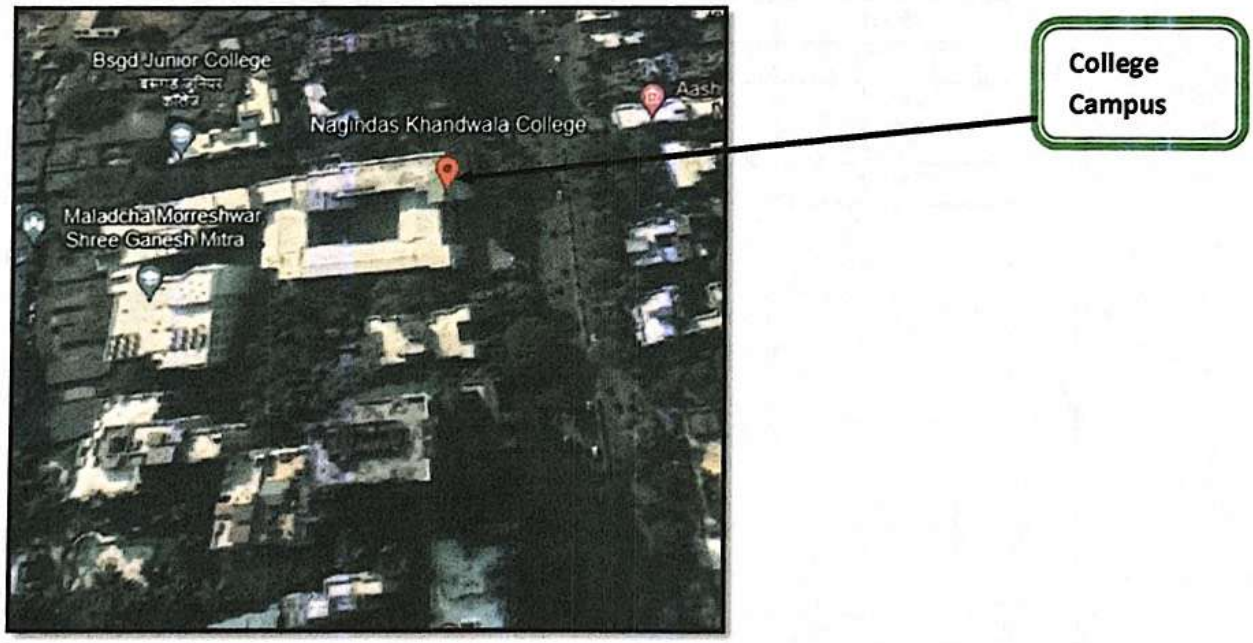
1.1 Introduction:

A Green Audit is conducted at Malad Kandivli Education Society's Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai.

1.2 Key Study Points:

No	Particulars
1	Study of Present Energy Consumption & CO_2 Emission
2	Study of Usage of Renewable Energy
3	Study of Waste Management Practices
4	Study of Rain Water Management
5	Study of Green & Sustainable Initiatives

1.3 College Location Image:



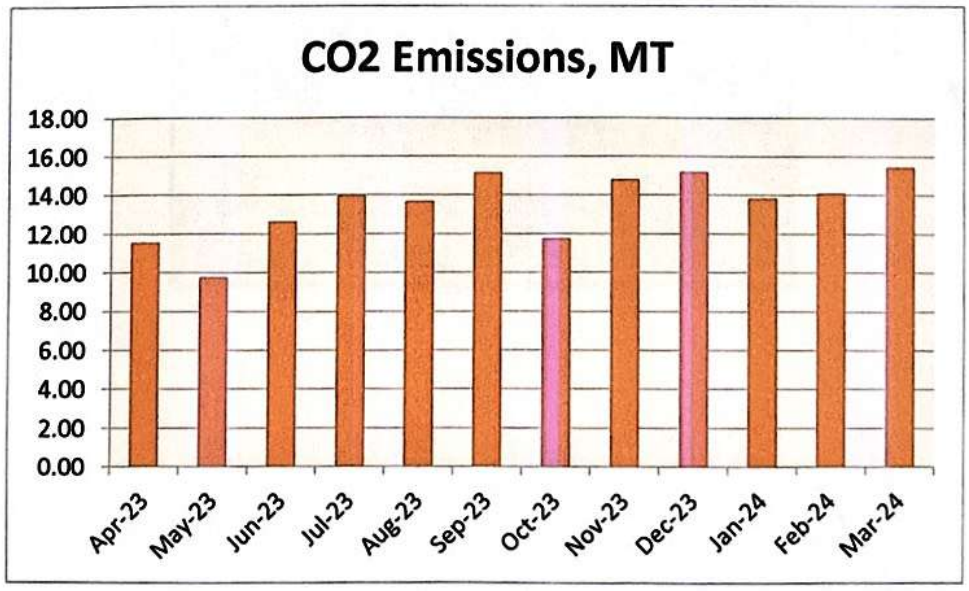
CHAPTER-II
STUDY OF ENERGY CONSUMPTION & CO_2 EMISSION

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions: 1 kWh** of Electrical Energy releases **0.93 Kg of CO_2** into atmosphere.

Table No 1: Month wise Energy Consumption & CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-23	12410	11.54
2	May-23	10468	9.74
3	Jun-23	13583	12.63
4	Jul-23	14984	13.94
5	Aug-23	14686	13.66
6	Sep-23	16284	15.14
7	Oct-23	12612	11.73
8	Nov-23	15904	14.79
9	Dec-23	16316	15.17
10	Jan-24	14838	13.80
11	Feb-24	15143	14.08
12	Mar-24	16584	15.42
13	Total	173812	161.65
14	Maximum	16584	15.42
15	Minimum	10468	9.74
16	Average	14484.33	13.47

Chart No 1: Month wise CO_2 Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof top Solar PV Plant of Capacity 1 kWp.

Now we compute the Energy generated by the Solar PV Plant and Reduction in CO_2 Emissions.

Table No 2: Computation of CO_2 Emission Reduction:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	1	kWp
2	Energy Generated in per kWp	4	kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 2022-23	1200	kWh
5	1 kWh of Electrical Energy saves	0.93	Kg/kWh
6	**Qty of CO_2 Saved by Solar PV Plant =(4)*(5) /1000**	**1.12**	**MT of CO_2**

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF WASTE MANAGEMENT

In this Chapter, we present the Waste Management Practices, followed by the College.

Details of Waste Management Practices:

No	Head	Observation	Photograph
1	Solid Waste	Segregation of Waste at Source: Provision of Waste Collection Bins	Waste Collection Bin: 
2	Organic Waste	Provision of Bio Tumbler Units or conversion of Organic Waste, into Bio Compost	Bio Composting Tumbler Unit: 
3	Waste Water	Provision of Effluent Treatment Plant	Effluent Treatment Plant: 

4	E Waste	Provision of E Waste Collection Bin & disposal through Authorized Agency	**Dedicated E Waste Collection Bin** 

CHAPTER-V
STUDY OF WATER MANAGEMENT

1. Water Resource Details:

There are two Resources of Water, namely:

- Municipal Water
- Bore well

2. Water Storage Details:

There are 2 underground & 2 Overhead Water Tanks, for Domestic & Flushing purpose respectively.

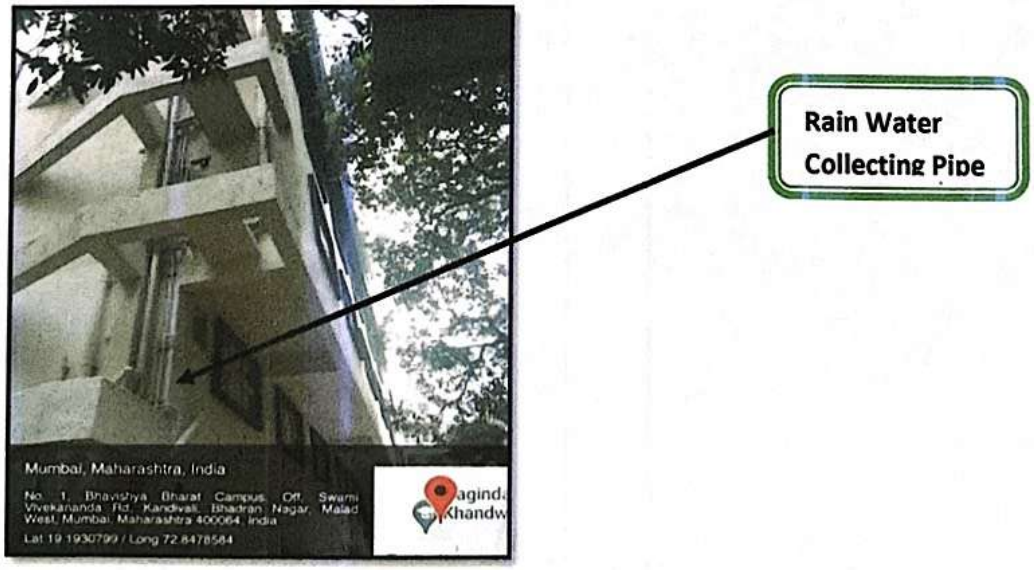
Table No 3: Water Tank Details: At E Building:

No	Location	Water Usage	Capacity Liters
1	**Underground Storage Tanks**		
	A	Domestic Purpose	6500
	B	Flushing Purpose	8000
2	**Overhead Storage Tanks**		
	A	Domestic Purpose	9000
	B	Flushing Purpose	21100

3. Rain Water Management:

The College has installed the Rain water Management Project. The Rain Water falling on the terrace is stored in an underground Storage Tank and further used for domestic purpose.

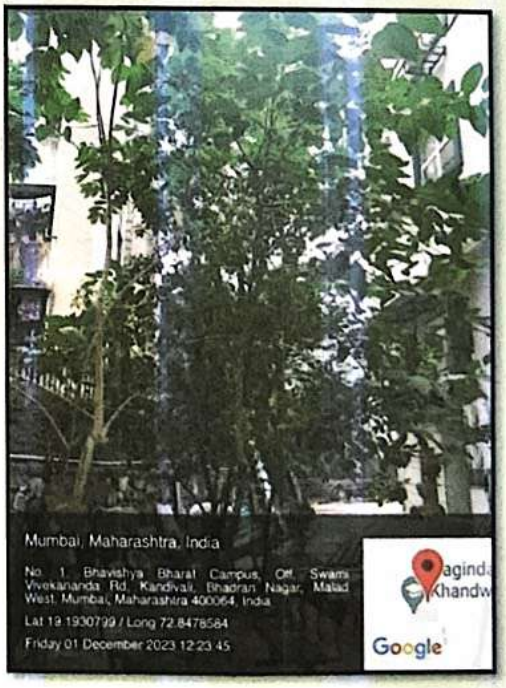
Photograph of Rain Water Collecting Pipe:

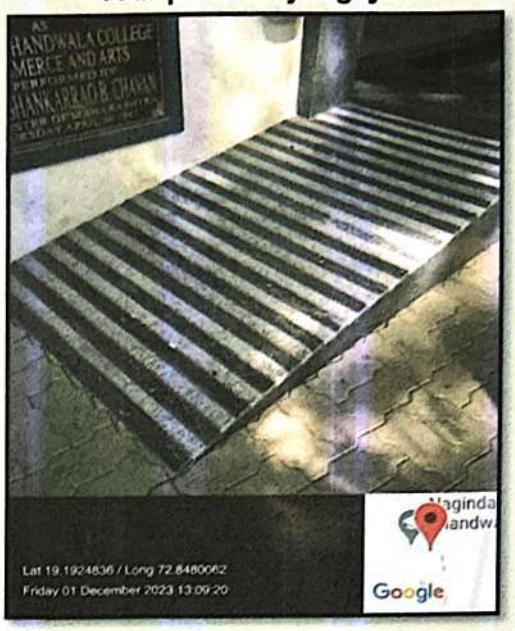
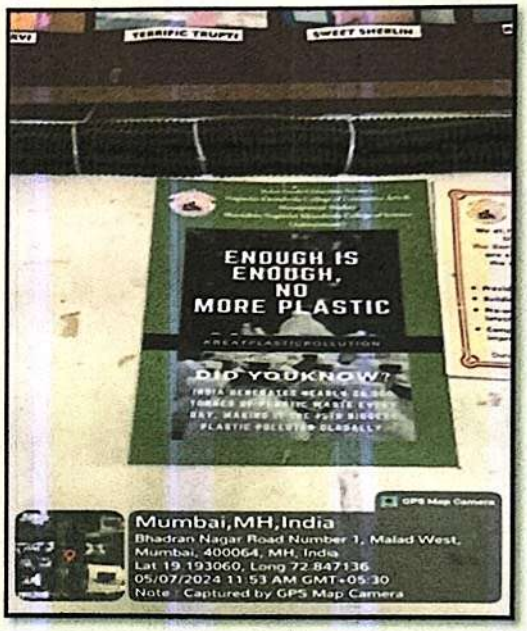


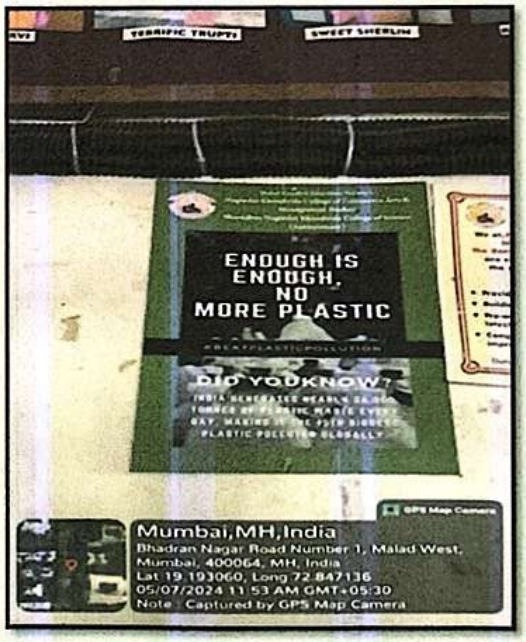
CHAPTER-VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

In this Chapter, we present the Green & Sustainable Practices followed by the College.

Green & Sustainable Practices:

No	Head	Observation	Photograph
1	Easy Movement of Stake Holders	Provision of Good Internal Road within the Campus	**Internal Road:** 
2	Tree Plantation	Internal Tree Plantation in the Campus	**Internal Tree Plantation:** 

3	**Facilities for Divyangajan**	Provision of Ramp & Lift for Divyangajan	**Ramp for Divyangajan:** 
4	**Creation of Awareness among Stake Holders**	Display of Poster on Ban on Plastic	**Poster on Ban on Plastic:** 

3	**Facilities for Divyangajan**	Provision of Ramp & Lift for Divyangajan	**Ramp for Divyangajan:** 
4	**Creation of Awareness among Stake Holders**	Display of Poster on Ban on Plastic	**Poster on Ban on Plastic:** 

ENERGY AUDIT REPORT

Malad Kandivli Education Society's,

Nagindas Khandwala College of Commerce, Arts & Management Studies and

Shantaben Nagindas Khandwala College of Science,

Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai 400 064

MKES

KHANDWALA COLLEGE

LEARNERS BECOMING LEADERS

Year: 2023-24

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society

Near Muktangan English School, Parvati, Pune 411009

Phone: 09890444795 Email: engress123@gmail.com

ENGRESS SERVICES PUNE

REGISTRATION CERTIFICATES: BEE, UDYAM, MEDA, ISO-9001 & 14001:

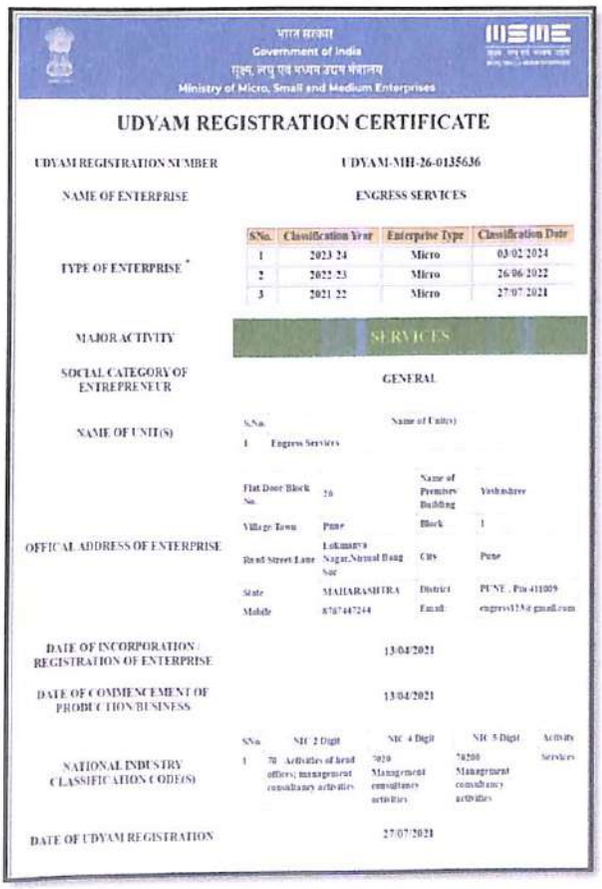
Maharashtra Energy Development Agency

CERTIFICATE OF REGISTRATION
FOR CLASS "A"

Regn. No. EA 8192 No. 2942

National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

Achyut Yashavant Mehendale
Yashavant



भारत सरकार
Government of India
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
Ministry of Micro, Small and Medium Enterprises

MSME

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-MH-26-0135636
NAME OF ENTERPRISE	ENGRESS SERVICES

TYPE OF ENTERPRISE *

S.No.	Classification Year	Enterprise Type	Classification Date
1	2023-24	Micro	03/02/2024
2	2022-23	Micro	26/06/2022
3	2021-22	Micro	27/07/2021

MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL

NAME OF UNIT(S)

S.No.	Name of Unit(s)
1	Engress Services

OFFICAL ADDRESS OF ENTERPRISE

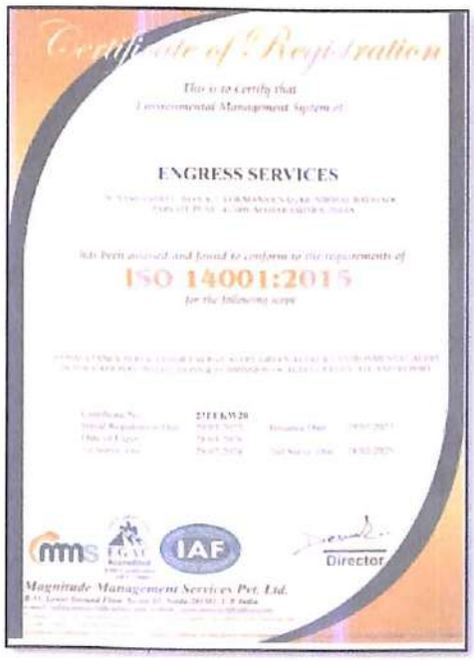
Flat Door Block No.	26	Name of Premises Building	Yashodeep
Village Town	Pune	Block	1
Road Street Lane	Lokmanya Nagar,Nirmal Baug Soc	City	Pune
State	MAHARASHTRA	District	PUNE , Pin 411009
Mobile	8767447244	Email	engress123@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	13/04/2021
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	13/04/2021

NATIONAL INDUSTRY CLASSIFICATION CODE(S)

S.No.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	70 Activities of head offices; management consultancy activities	7020 Management consultancy activities	70200 Management consultancy activities	Services

DATE OF UDYAM REGISTRATION	27/07/2021



Certificate of Registration

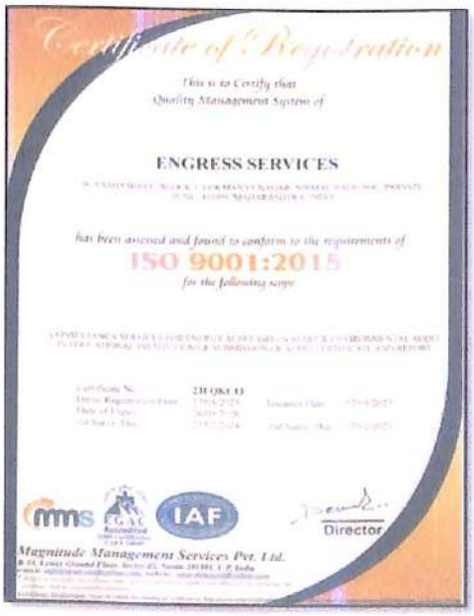
This is to Certify that
Environmental Management System of

ENGRESS SERVICES

has been assessed and found to conform to the requirements of
ISO 14001:2015
for the following scope

Director

Magnitude Management Services Pvt. Ltd.



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Magnitude Management Services Pvt. Ltd.

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We Engress Services, Pune, express our sincere gratitude to the management of Malad Kandivli Education Society's Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai for awarding us the assignment of Energy Audit of their campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1. Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai, consumes Energy in the form of Electrical Energy; used for equipment.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**281.51**	kW
2	Annual Energy Purchased	**173812**	kWh

3. Per Capita Energy Consumption:

No	Particulars	Value	Unit
1	Total Annual Energy Consumed	173812	kWh
2	Energy Generated by Solar PV Plant	1200	kWh
3	Total Energy Consumed =1+2	**175012**	kWh
4	Total No Of students	**6461**	Nos
5	Per Capita Energy Consumption Index =(3) / (4)	**27.08**	kWh/Annum

4. Study of Lighting Power Density & % Usage of LED Lighting:

No	Particulars	Value	Unit
1	Lighting Power density	**1.92**	W/m^2
2	% of Usage of LED Lighting to Total Lighting Load	**100**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings & BEE STAR Rated Equipment
- Sensor based operation of lights in Washrooms
- Installation of Roof Top Solar PV Plant of Capacity **1 kWp**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg of CO_2** into atmosphere
2. Solar Energy Generated by Solar PV Plant: **4 kWh/kWh/Day**
3. Annual Solar Energy Generation Days: **300 Nos**

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO_2 Emission Computation: www.ccd.gujarat.gov.in
- Roof Top Solar PV Energy Generation: www.solarrooftop.gov.in

ABBREVIATIONS

BEE	:	Bureau of Energy Efficiency
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Introduction:

An Energy Audit is conducted at Malad Kandivli Education Society's Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai.

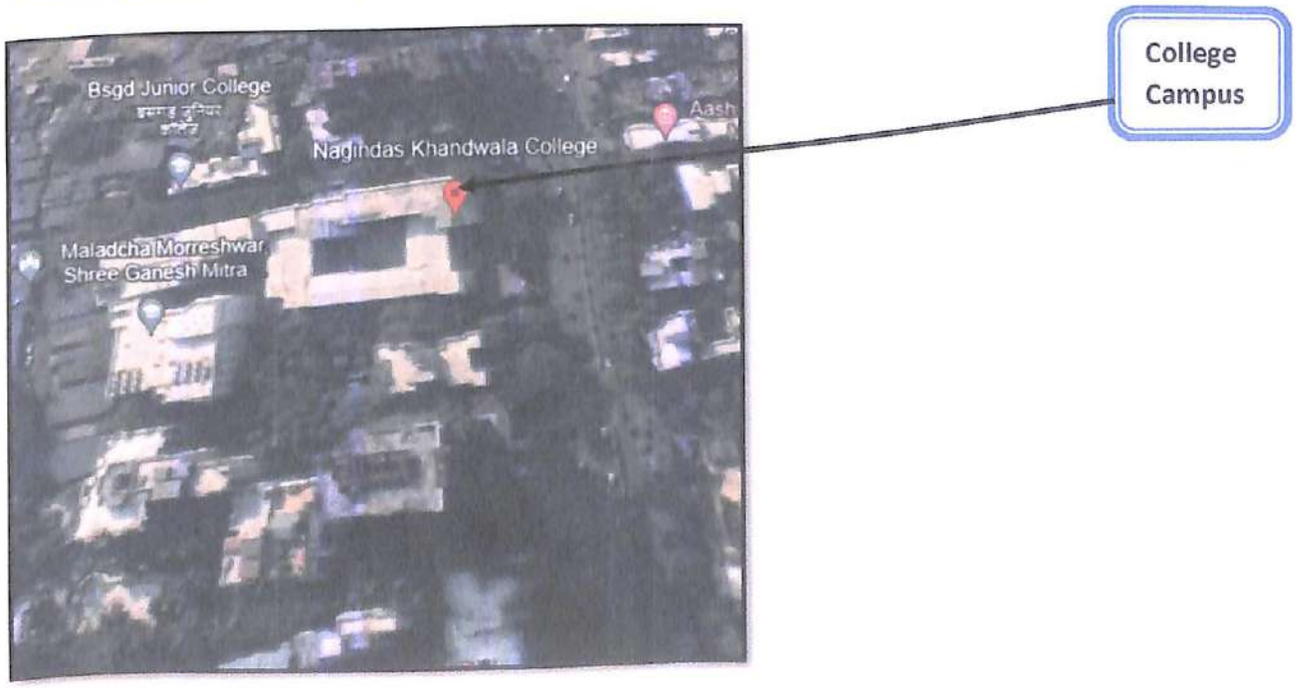
The guidelines followed for conducting the Energy Audit are:

- BEE India's Energy Conservation Building Code: ECBC-2017
- Maharashtra Energy Development Agency (www.mahaurja.com)
- Tata Power: www.tatapower.com

1.2 Key Study Points:

No	Particulars
1	Study of Present Connected Load
2	Study of Present Energy Consumption
3	Study of Per Capita Energy Consumption
4	Study of Lighting
5	Study of Energy Efficiency & Renewable Energy

1.3 College Location Image:



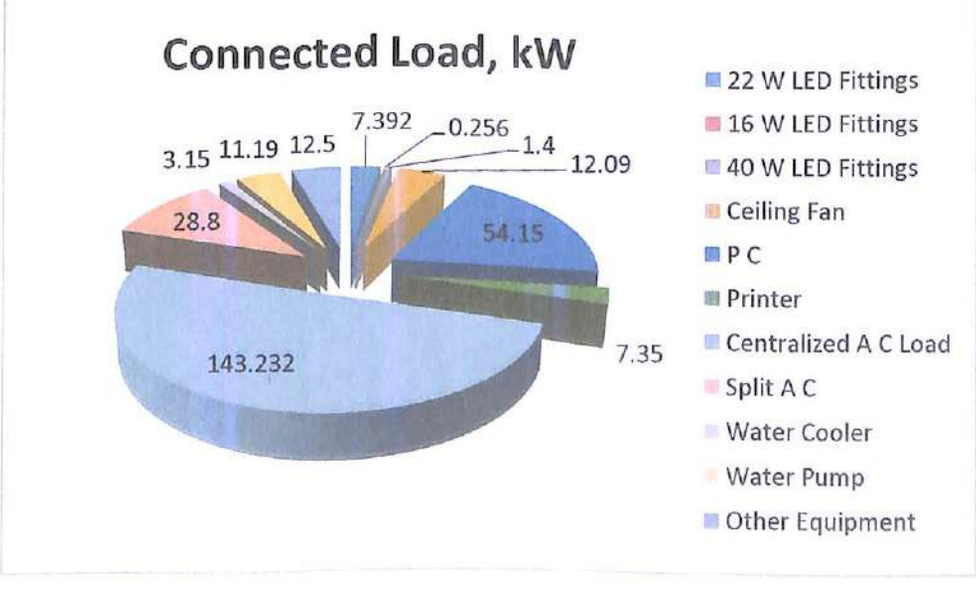
CHAPTER-II
STUDY OF CONNECTED LOAD

The major contributors to the connected load of the College include:

Table No 1: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/unit	Load, kW
1	22 W LED Fittings	336	22	7.392
2	16 W LED Fittings	16	16	0.256
3	40 W LED Fittings	35	40	1.4
4	Ceiling Fan	186	65	12.09
5	P C	361	150	54.15
6	Printer	42	175	7.35
7	Centralized A C Load	Lot	143232	143.23
8	Split A C	16	1800	28.8
8	Water Cooler	9	350	3.15
9	Water Pump	2	5595	11.19
10	Other Equipment	50	250	12.5
11	**Total**			**281.51**

Chart No 1: Study of Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electrical Energy Consumption.

Table No 2: Electrical Energy Consumption Analysis- 2023-24:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-23	12410	11.54
2	May-23	10468	9.74
3	Jun-23	13583	12.63
4	Jul-23	14984	13.94
5	Aug-23	14686	13.66
6	Sep-23	16284	15.14
7	Oct-23	12612	11.73
8	Nov-23	15904	14.79
9	Dec-23	16316	15.17
10	Jan-24	14838	13.80
11	Feb-24	15143	14.08
12	Mar-24	16584	15.42
13	Total	173812	161.65
14	Maximum	16584	15.42
15	Minimum	10468	9.74
16	Average	14484.33	13.47

Chart No 2: Variation in Monthly Energy Consumed, kWh:

CHAPTER-IV
STUDY OF PER CAPITA ENERGY CONSUMPTION

Per Capita Energy Consumption Index: Per Capita Energy Consumption Index of an educational Institute/College is its Annual Energy Consumption in Kilo Watt Hours per student studying in the Institute/College.

It is determined by:

$$\text{Per Capita Energy Consumption Index} = \frac{\text{(Annual Energy Consumption in kWh)}}{\text{(Total No of students studying)}}$$

Now we compute the EPI for the College as under:

Table No 3: Computation of Per Capita Energy Consumption Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	173812	kWh
2	Energy Generated by Solar PV Plant	1200	kWh
3	Total Energy Consumed =1+2	**175012**	kWh
4	Total No of students	**6461**	Nos
5	Per Capita Energy Consumption Index =(3) / (4)	**27.08**	kWh/Annum

CHAPTER-V
STUDY OF LIGHTING

Terminology:

1. **Lumen** is a unit of light flow or luminous flux. The lumen rating of a lamp is a measure of the total light output of the lamp. The most common measurement of light output (or luminous flux) is the lumen. Light sources are labeled with an output rating in lumens.

2. **Lux** is the metric unit of measure for illuminance of a surface. One lux is equal to one lumen per square meter.

3. **Circuit Watts** is the total power drawn by lamps and ballasts in a lighting circuit under assessment.

4. **Installed Load Efficacy** is the average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. Unit: lux per watt per square metre (lux/W/m²)

5. **Lamp Circuit Efficacy** is the amount of light (lumens) emitted by a lamp for each watt of power consumed by the lamp circuit, i.e. including control gear losses. This is a more meaningful measure for those lamps that require control gear. Unit: lumens per circuit watt (lm/W)

6. **Lighting Power Density**: It is defined as Total Lighting Load in a room divided by the Area of that Room in square meters.

In this Chapter we compute the Lighting Power density and the percentage usage of LED Lighting to total Lighting Load of the College.

Table No 4: Computation of Lighting Power Density:

No	Particulars	Value	Unit
1	No of 22 W LED Tube Lights in Class Room	08	Nos
2	Demand of 22 W LED Tube Lights	22	W/Unit
3	Lighting Load in the Class Room= **(1) * (2)**	**176**	W
4	Area of Class Room	**91.55**	m^2
5	Lighting Power Density = **(3)/ (4)**	**1.92**	W/m^2

Table No 5: Percentage Usage of LED Lighting to Total Lighting Load:

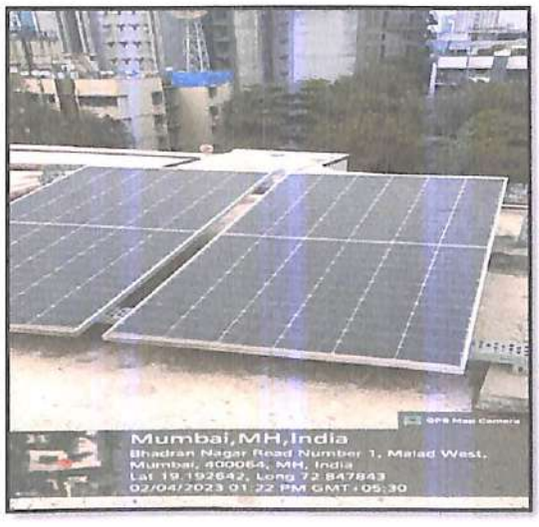
No	Particulars	Value	Unit
1	No of 16 W LED Fittings	16	Nos
2	Load of 16 W LED Fitting	16	W/unit
3	Total Load of 16 W LED Fittings	**0.256**	kW
4	No of 22 W LED Fittings	336	Nos
5	Load of 22 W LED Fitting	22	W/unit
6	Total Load of 22 W LED Fittings	**7.392**	kW
7	No of 40 W LED Fittings	35	Nos
8	Load of 40 W LED Fitting	40	W/unit
9	Total Load of 40 W LED Fittings	**1.4**	kW
10	Total LED Lighting Load= 3+6+9	**9.048**	kW
11	Total Lighting Load= 3+6+9	**9.048**	kW
12	Usage of LED to Total Lighting Load=**10*100/11**	**100**	%

CHAPTER-VI
STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **1 kWp**.

Photograph of Roof Top Solar PV Plant:



6.2 Energy Efficiency Measures Adopted:

- Usage of Energy Efficient LED Fittings
- Usage of BEE STAR Rated ACs

Photograph of Sensor Based Lighting Operation and BEE STAR Rated AC:

ENVIRONMENTAL AUDIT REPORT

Malad Kandivli Education Society's,

Nagindas Khandwala College of Commerce, Arts & Management Studies and

Shantaben Nagindas Khandwala College of Science,

Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai 400 064

MKES

KHANDWALA COLLEGE

LEARNERS BECOMING LEADERS

Year: 2023-24

Prepared by:

ENGRESS SERVICES

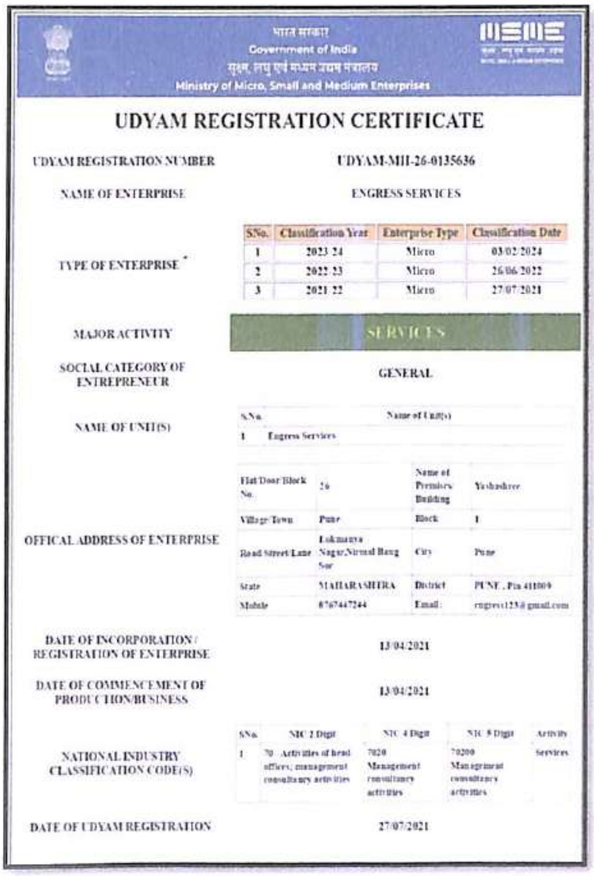
Yashashree, 26, Nirmal Bag Society

Near Muktangan English School, Parvati, Pune 411009

Phone: 09890444795 Email: engress123@gmail.com

ENGRESS SERVICES PUNE

Registration Certificates: UDYAM, MEDA, ASSOCHAM GEM-CP, ISO: 9001 & 14001:


भारत सरकार
Government of India
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
Ministry of Micro, Small and Medium Enterprises

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-MH-26-0135636
NAME OF ENTERPRISE	ENGRESS SERVICES
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL
DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	13/04/2021
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	13/04/2021
DATE OF UDYAM REGISTRATION	27/07/2021

TYPE OF ENTERPRISE

S.No.	Classification Year	Enterprise Type	Classification Date
1	2023-24	Micro	03/02/2024
2	2022-23	Micro	26/06/2022
3	2021-22	Micro	27/07/2021

NAME OF UNIT(S)

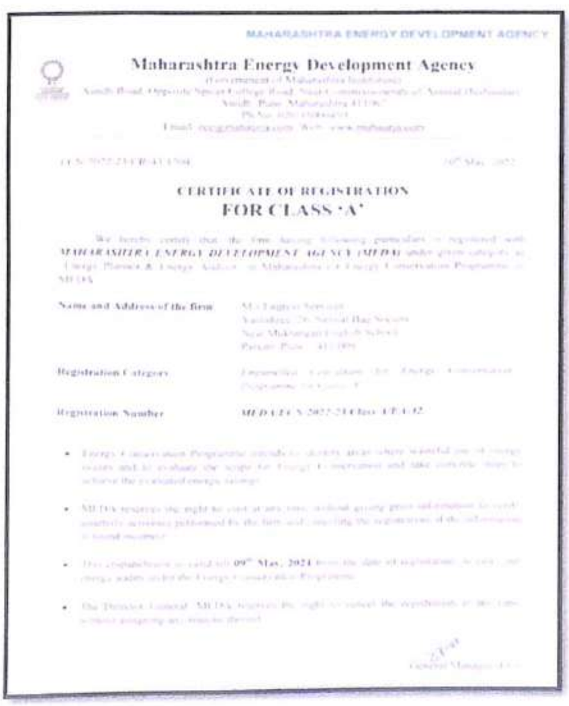
S.No.	Name of Unit(s)
1	Engress Services

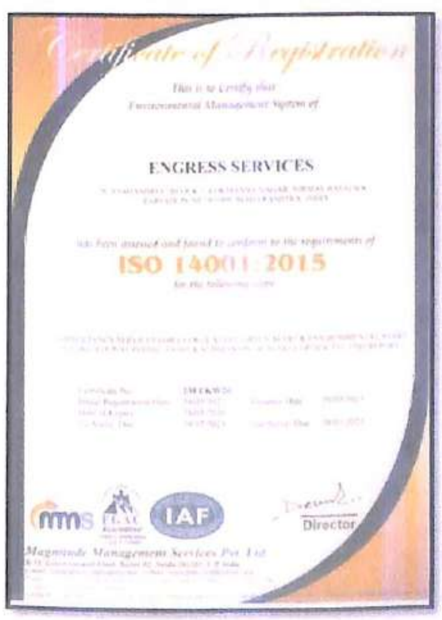
OFFICIAL ADDRESS OF ENTERPRISE

Flat/Door/Block No.	26	Name of Premises/ Building	Yashashree
Village/Town	Pune	Block	1
Road/Street/Lane	Lokmanya Nagar,Nirmal Baug Sor	City	Pune
State	MAHARASHTRA	District	PUNE, Pin:411009
Mobile	8767447244	Email:	engress123@gmail.com

NATIONAL INDUSTRY CLASSIFICATION CODE(S)

SNo.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	70 - Activities of head offices; management consultancy activities	7020 - Management consultancy activities	70200 - Management consultancy activities	Services





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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Malad Kandivli Education Society's Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai for awarding us the assignment of Environmental Audit of their campus for the Year: 2023-24.

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

EXECUTIVE SUMMARY

1. Nagindas Khandwala College of Commerce, Arts & Management Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S. V. Road, Malad (W), Mumbai, consumes Energy in the form of Electrical Energy; used for equipment

2. Pollution due to College Activities:

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

3. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	173812	kWh
2	Annual CO_2 Emissions	161.65	MT

4. Usage of Renewable Energy:

- Usage of Energy Efficient Electrical Equipment
- Installation of Roof Top Solar PV Plant
- Bio Tumbler Unit and Effluent Treatment Plant for Waste management
- Implementation of Rain Water Management Project

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	56	34	38
2	Minimum	49	30	28

6. Indoor Lux & Noise Level Parameters:

No	Parameter/Value	Lux Level	Noise Level, dB
1	Maximum	232	46.1
2	Minimum	216	44.9

7. Waste Management:

No	Head	Initiative
1	Solid Waste	Segregation of Waste at source

2	Organic Waste	Installation of Bio Tumbler Unit
3	Waste Water	Installation of Effluent Treatment Plant
4	E Waste	Provision of Dedicated E Waste Collection Bin

8. Rain Water Management:

The College has installed the Rain water Management Project. The Rain Water falling on the terrace is stored in an underground Storage Tank and further used for domestic purpose.

9. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Sensor based Water Tap operation of Wash Basins
- Creation of awareness on Ban on Plastic by Display of Posters

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.93 Kg of CO_2** into atmosphere
2. Solar Energy Generated by Solar PV Plant: **4 kWh/kWh/Day**
3. Annual Solar Energy Generation Days: **300 Nos**

11. References:

1. For Various Indoor Air Parameters: www.ishrae.com
2. For AQI Quality Standards: www.cpcb.com
3. For CO_2 Emission Computation: www.ccd.gujarat.gov.in
4. Roof Top Solar PV Energy Generation: www.solarrooftop.gov.in

ABBREVIATIONS

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
PM	:	Particulate Matter

CHAPTER-I
INTRODUCTION

1. Important Definitions:

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

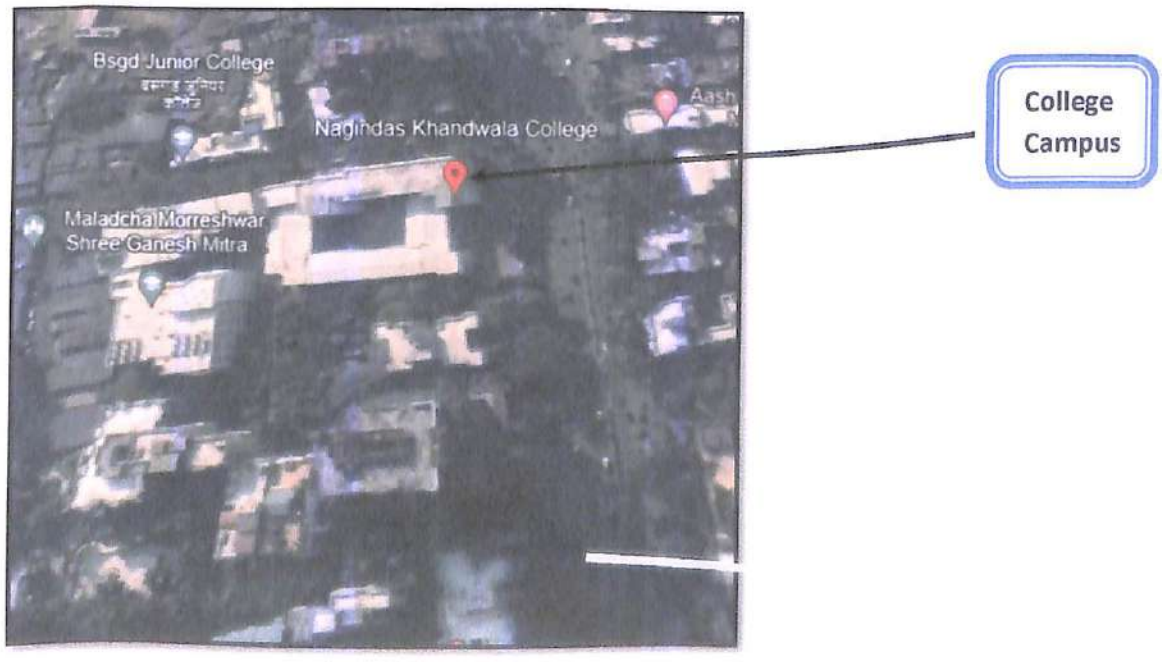
1.2. Environmental Audit: Definition:

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

1.2 Key Study Points:

No	Particulars
1	Study of Present Resource Consumption & CO_2 Emission
2	Study of Usage of Renewable Energy
3	Study of Indoor Air Quality
4	Study of Indoor Lux & Noise Level
5	Study of Water Management
6	Study of Waste Management Practices
7	Study of Environment Friendly Practices

1.3 College Location Image:



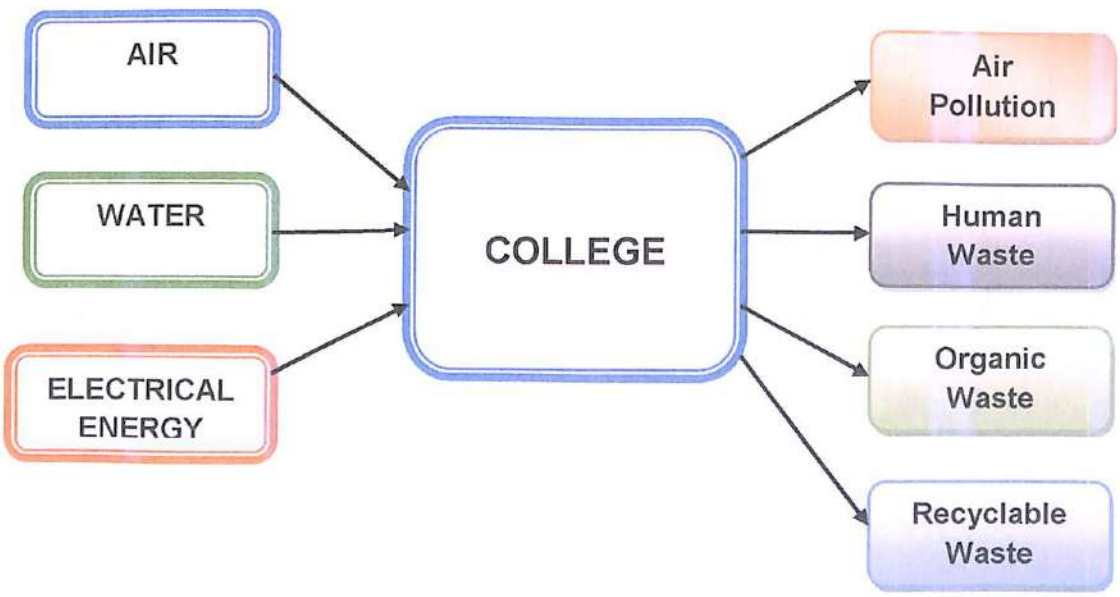
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The College 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 Resource Requirement & Waste of a College:



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 Electrical Energy is as under.

- **1 kWh** of Electrical Energy releases **0.93 Kg of CO_2** into atmosphere

Table No 1: Study of Purchase of Energy & CO_2 Emissions: 23-24:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-23	12410	11.54
2	May-23	10468	9.74
3	Jun-23	13583	12.63
4	Jul-23	14984	13.94
5	Aug-23	14686	13.66
6	Sep-23	16284	15.14
7	Oct-23	12612	11.73
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9	Dec-23	16316	15.17

10	Jan-24	14838	13.80
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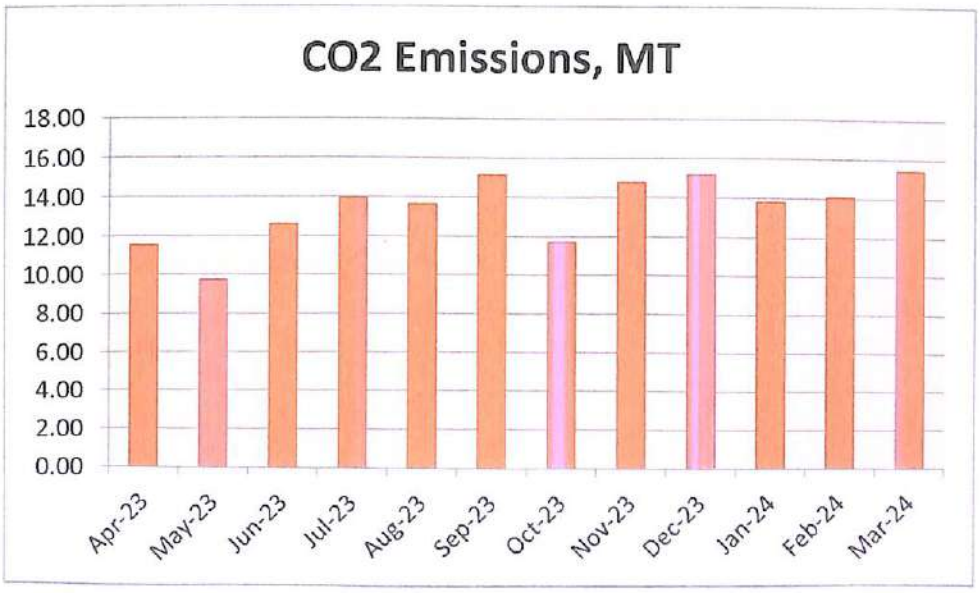
13	Total	173812	161.65
14	Maximum	16584	15.42
15	Minimum	10468	9.74
16	Average	14484.33	13.47

Chart No 2: Month wise CO_2 Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The College has installed Roof top Solar PV Plant of Capacity 1 kWp.

Now we compute the Energy generated by the Solar PV Plant and Reduction in CO_2 Emissions.

Table No 2: Computation of CO_2 Emission Reduction:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	1	kWp
2	Energy Generated in per kWp	4	kWh/kWp
3	Annual Solar Energy generation Days	300	Nos
4	Energy Generated in the Year: 2022-23	**1200**	kWh
5	1 kWh of Electrical Energy saves	**0.93**	Kg/kWh
6	**Qty of CO_2 Saved by Solar PV Plant =(4)*(5) /1000**	**1.12**	**MT of CO_2**

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF INDOOR AIR QUALITY

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

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

3. **Air Quality Index: Air Quality Index (AQI)** is a number used by government agencies to measure the **Air Pollution** levels and communicate it to the population.

In this Chapter, we present three important Parameters: **AQI**- Air Quality Index, **PM-2.5**- Particulate Matter of Size 2.5 micron and **PM-10**- Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM2.5	PM10
1	Principal Cabin	49	30	28
2	Library	50	30	31
3	Admin Office	53	33	37
4	Classroom-1	56	34	38
5	Classroom-2	51	31	32
	Maximum	**56**	**34**	**38**
	Minimum	**49**	**30**	**28**

Table No 4: Air Quality Index Values & Concentration of PM 2.5 & PM10: (By CPCB):

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 +

Conclusion:

From the above measured values, we conclude that the observed values of AQI, PM-2.5 & PM-10 are in the **Satisfactory Range**, as per the guidelines given by Central Pollution Control Board.

CHAPTER V
STUDY OF INDOOR LUX & NOISE PARAMETERS

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

Table No 5: Study of Indoor Comfort Condition Parameters:

No	Location	Lux Level	Noise Level, dB
1	Principal Cabin	232	45
2	Library	224	44.9
3	Admin Office	219	45.6
4	Classroom-1	223	46.1
5	Classroom-2	216	46
	Maximum	**232**	**46.1**
	Minimum	**216**	**44.9**

Recommended Lux & Noise Level: As per BEE & ISHRAE Guidelines:

A) Noise Level Reference:		
No	**Location**	**Noise Level Range, dB**
1	Offices	45-50
2	Occupied Class Room	40-45
3	Libraries	35-40
B) Reference Lux Level, Lumens:		
1	For Class Rooms	**200 Plus**
2	For Reading Rooms	**200 Plus**

Conclusion:

From the above measured values, we conclude that:

- The Noise Level is within the prescribed Limit
- The Lux Level at various locations is Okay

CHAPTER VI
STUDY OF WATER MANAGEMENT

1. Water Resource Details:

There are two Resources of Water, namely:

- Municipal Water
- Bore well

2. Water Storage Details:

There are 2 underground & 2 Overhead Water Tanks, for Domestic & Flushing purpose respectively.

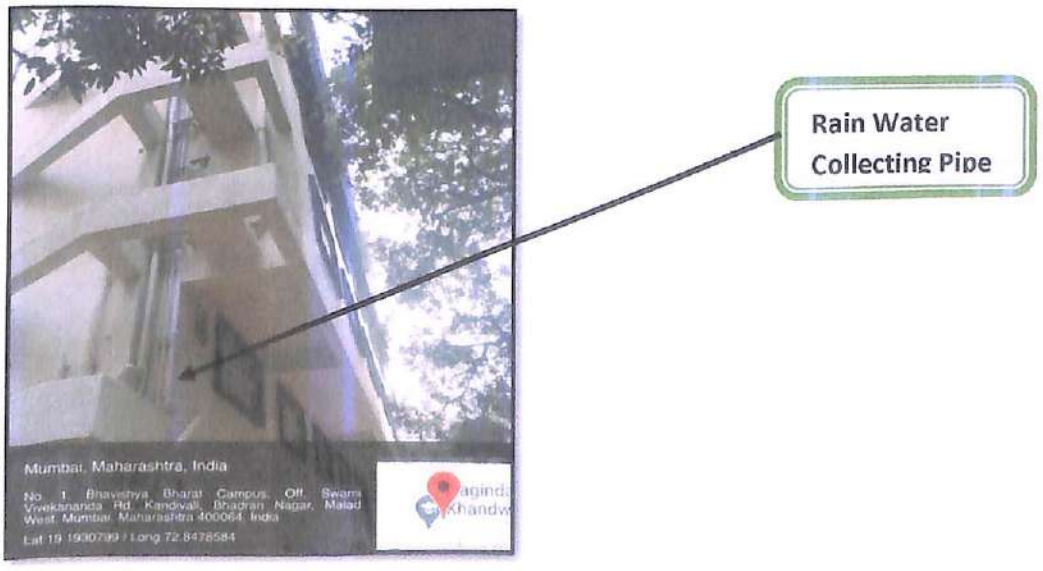
Table No 6: Water Tank Details: At E Building:

No	Location	Water Usage	Capacity Liters
1	**Underground Storage Tanks**		
	A	Domestic Purpose	6500
	B	Flushing Purpose	8000
2	**Overhead Storage Tanks**		
	A	Domestic Purpose	9000
	B	Flushing Purpose	21100

3. Rain Water Management:

The College has installed the Rain water Management Project. The Rain Water falling on the terrace is stored in an underground Storage Tank and further used for domestic purpose.

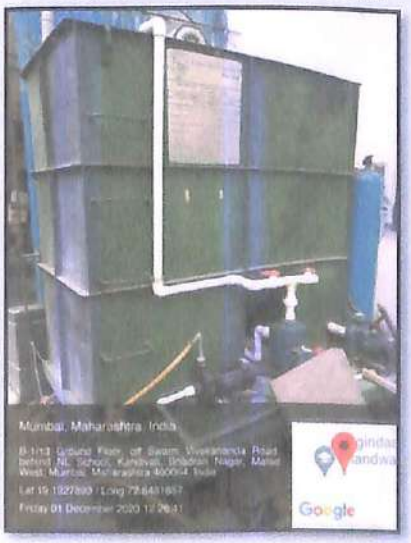
Photograph of Rain Water Collecting Pipe:



CHAPTER-VII
STUDY OF WASTE MANAGEMENT

In this Chapter, we present the Waste Management Practices, followed by the College.

Details of Waste Management Practices:

No	Head	Observation	Photograph
1	**Solid Waste**	Segregation of Waste at Source: Provision of Waste Collection Bins	**Waste Collection Bin:** 
2	**Organic Waste**	Provision of Bio Tumbler Units or conversion of Organic Waste, into Bio Compost	**Bio Composting Tumbler Unit:** 
3	**Waste Water**	Provision of Effluent Treatment Plant	**Effluent Treatment Plant:** 

4	E Waste	Provision of E Waste Collection Bin & disposal through Authorized Agency	Dedicated E Waste Collection Bin 

CHAPTER-VIII
STUDY OF ECO FRIENDLY PRACTICES

In this Chapter, we present the Eco Friendly Practices, followed by the College.

Details of Eco Friendly Practices:

No	Head	Observation	Photograph
1	**Tree Plantation**	Tree Plantation in the Campus	**Internal Tree Plantation:** 
2	**Creation of Awareness among Stake Holders**	Display of Poster on Ban on Plastic	**Poster on Ban on Plastic:**