

ENVIRONMENTAL AUDIT REPORT

of

YASHAWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY,

Dnyangangotri, Near Gangapur Dam, Nashik 422 222



Year: 2022-23

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
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ENGRESS SERVICES

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ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/YCMOU/22-23/03

Date: 10/7/2023

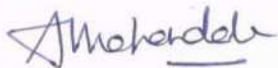
This is to certify that we have conducted Environmental Audit at Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam, Nashik in the year 2022-23.

The University has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Usage of BEE STAR Rated Equipment
- Installation of 218.184 kWp off Grid Solar PV Plant
- Installation of 27000 LPD Solar Thermal Water Heating System.
- Segregation of Waste at source
- Vermi Composting Arrangement for Conversion of Organic Waste
- Installation of Sanitary Waste Incinerator
- Construction of Internal Bandhara of Capacity 26.2 Million Liters
- Construction of Farm pond
- Rain Water Harvesting project for making use of rain water falling on terrace
- Tree Plantation in the campus
- Creation of Awareness on Clean & Green Campus by Display of Boards
- Usage of Solar Powered E Vehicle in the Campus

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,

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



REGISTRATION CERTIFICATES

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spore College Road, Near Government College of Animal Husbandry,
Aundh, Pune, Maharashtra 411007
Ph. No. 020-25004450
Email: energy@maheda.com, Web: www.maheda.com

ECN/2022/21XW-431769 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
Yashdatta, 26, Narmad Bag Society,
Near Mukteswar English School,
Parvati, Pune - 411 009

Registration Category Empowered Consultant for Energy Conservation
Programme for Class 'A'

Registration Number MEDA/ECN/2022-21XW-434-52

- Energy Conservation Programme intends to identify areas where wasteful use of energy occur 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 suspending the registration, if the information is found incorrect.
- This registration is valid till 09th Mar, 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.

(Signature)
General Manager (EC)

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 execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

(Signature) Pankaj R. Dharkar
Chairman, GEM

(Signature) Deepak Sood
Secretary General, ASSOCHAM

GEM CP 22/788

MEDA Registration Certificate

Certificate of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES

26, YASHDATT, BLOCK 1, LOKMANYU NAGAR, NERIMBE ROAD SOC, PARVATI,
PUNE-411009, MAHARASHTRA, INDIA

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

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

Certificate No. **23E0KC13** Issuance Date: **23/03/2023**
Initial Registration Date: **26/03/2023**
Date of Expiry: **23/03/2024** 2nd Surve. Due: **23/03/2023**

(Signature)
Director

Magnitude Management Services Pvt. Ltd.
B-15, Lower Ground Floor, Sector 63, Noida-201301, U.P. India
Email: magnitude@mmgms.com, Website: www.magnitude.com
A member of magnitude management services group of companies, which is a part of the magnitude group.

ISO: 9001-2015 Certificate

ASSOCHAM GEM CP Certificate

Certificate of Registration

This is to Certify that
Environmental Management System of

ENGRESS SERVICES

26, YASHDATT, BLOCK 1, LOKMANYU NAGAR, NERIMBE ROAD SOC,
PARVATI, PUNE - 411009, MAHARASHTRA, INDIA

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

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

Certificate No. **23E0KW26** Issuance Date: **29/03/2023**
Initial Registration Date: **29/03/2023**
Date of Expiry: **29/03/2024** 2nd Surve. Due: **29/03/2023**

(Signature)
Director

Magnitude Management Services Pvt. Ltd.
B-15, Lower Ground Floor, Sector 63, Noida-201301, U.P. India
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A member of magnitude management services group of companies, which is a part of the magnitude group.

ISO: 14001-2015 Certificate

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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam, Nashik 422 222 for awarding us the assignment of Environmental Audit of their Nashik Campus, for the Year: 2022-23.

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



EXECUTIVE SUMMARY

1. Yashwantrao Chavan Maharashtra Open University, Nashik Energy in two forms, namely: Electrical Energy, Diesel.

2. Pollution due to University Activities:

- **Air pollution:** Mainly CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	527744	kWh
2	Annual Diesel Consumed	9600	Liters
3	Annual CO ₂ Emissions	500.70	MT

4. Renewable Energy Usage & Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Solar PV Plant Capacity	218.184	kWp
2	Energy generated in 22-23	261820.8	kWh
3	Reduction in Annual CO ₂ Emissions	235.34	MT

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	36	22	28
2	Minimum	20	13	16

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	27.6	48	145	42
2	Minimum	26.9	46.9	105	39

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic waste	Provision of Vermi Composting Facility
3	Sanitary Waste	Provision of Sanitary Waste Incinerator
4	E Waste	Disposed of through Authorized Agency

8. Rain Water Harvesting:

The University has installed Rain Water Harvesting Project in three ways:

1. Construction of Bandhara of Capacity 26.2 Million Liters
2. Construction of Farm Pond
3. Rain Water Harvesting of Water falling on Terrace.

9. Environment Friendly Initiatives:

1. Tree Plantation in the campus
2. Creation of Awareness on Green & Clean Campus by display of Boards
3. Paperless Campus Initiatives
4. Solar Powered E Vehicle Usage

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **1 Liter of Diesel** releases **2.68 Kg of CO₂** into atmosphere.

11. References:

- For CO₂ Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI & Water Quality Standards: www.cpcb.com

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

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:

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

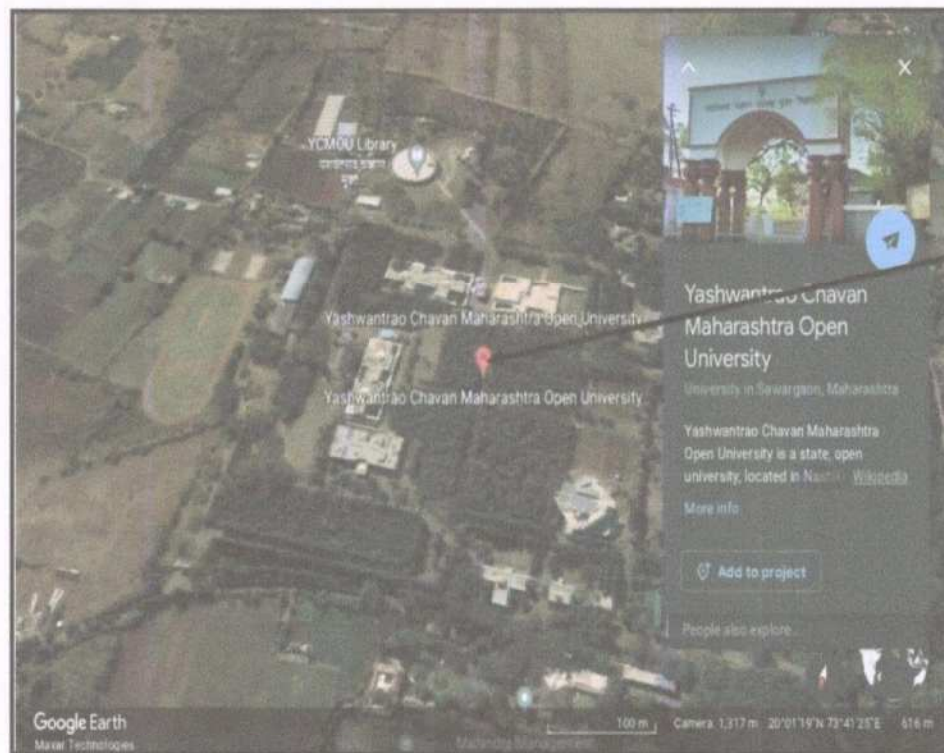
According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment"

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

1.4 Audit Procedural Steps:



1.5 University Location Image:



University
Campus

CHAPTER-II

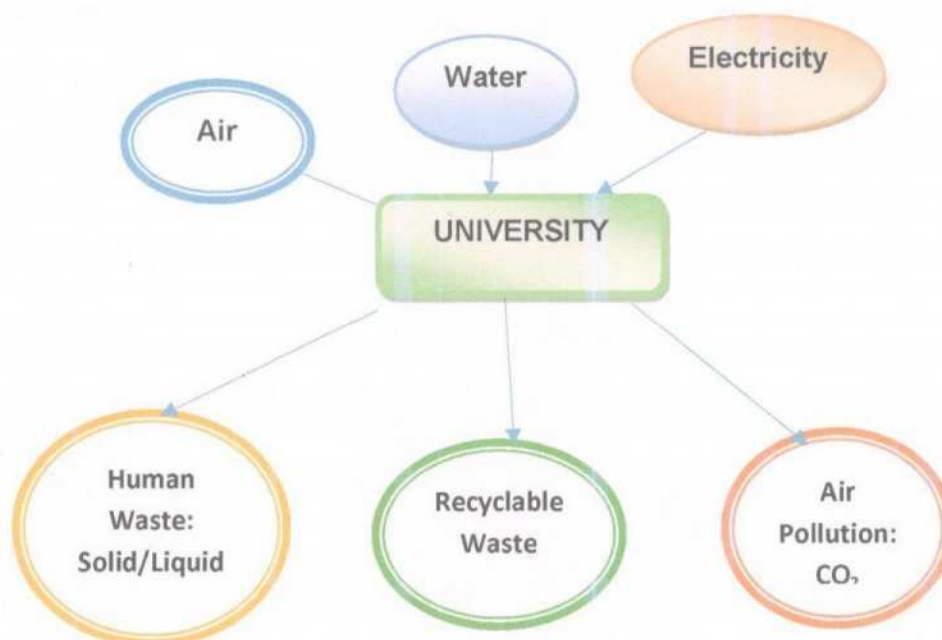
STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The University consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

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

Chart No 1: Representation of University as System & Study of Resources & Waste



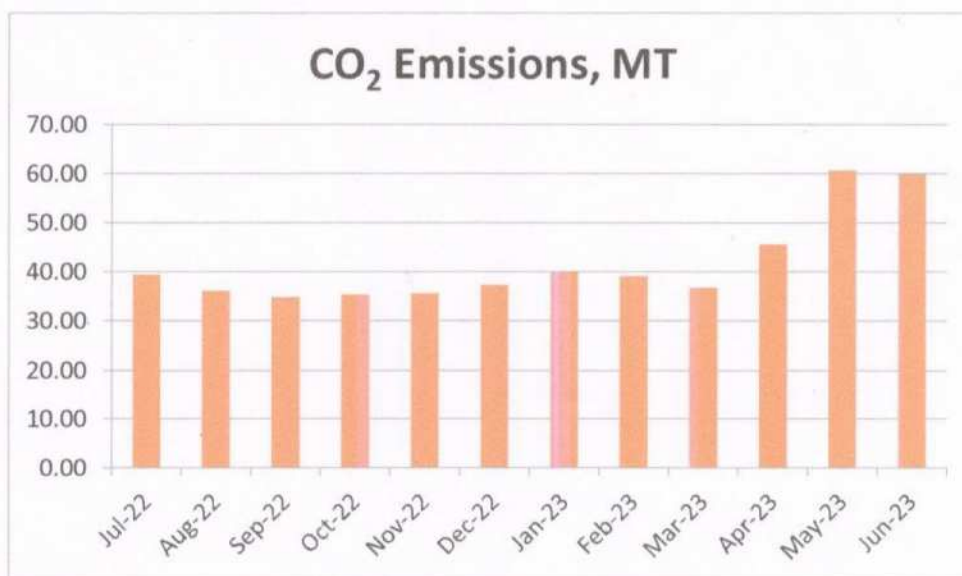
Now we compute the Generation of CO₂ on account of consumption of Electrical Energy & Diesel. The basis of Calculation for CO₂ emissions due to Electrical Energy is as under.

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
- 1 Liter of Diesel releases 2.68 Kg of CO₂ into atmosphere

Table No 1: Study of Purchase of Energy & CO₂ Emissions: 22-23:

No	Month	Energy Purchased, kWh	Diesel Consumed, Liters	CO ₂ Emissions, MT
1	Jul-22	41443	800	39.44
2	Aug-22	35748	1500	36.19
3	Sep-22	31888	2300	34.86
4	Oct-22	38101	400	35.36
5	Nov-22	39147	150	35.63
6	Dec-22	40366	350	37.27
7	Jan-23	43706	200	39.87
8	Feb-23	42891	200	39.14

9	Mar-23	38269	900	36.85
10	Apr-23	48573	700	45.59
11	May-23	63837	1200	60.67
12	Jun-23	63775	900	59.81
13	Total	527744	9600	500.70
14	Maximum	63837	2300	60.67
15	Minimum	31888	150	34.86
16	Average	43978.67	800	41.72

Chart No 2: Month wise CO₂ Emissions:

CHAPTER III

STUDY OF USAGE OF RENEWABLE ENERGY

3.1 The University has installed:

- Roof Top Solar PV Plant on various Buildings, Solar Street Lights, Solar Based Traffic Signals & Solar High Mast Lights.
- The Total Installed Solar PV Capacity is **218.184 kWp**
- Solar Thermal Water Heating System of Capacity **27000** Liters per Day
- The University is also installing Grid Connected Solar PV Plant of Capacity **300 kWp**

3.2 Table No 2: Reduction in CO₂ Emissions due to Usage of Solar Energy:

No	Particulars	Value	Unit
1	Total Installed Solar PV Capacity	218.184	kWp
2	Average Energy generated per Day	4	kWh/kWp
3	Annual Solar Generation Days	300	Nos
4	Annual Energy Generated = 1*2*3	261820.8	kWh/kWp
5	1 kWh of Energy is equivalent to	0.9	Kg of CO ₂
6	Annual Reduction in CO ₂ Emissions = 4*5/1000	235.64	MT

Photograph of Roof Top Solar PV Plant & 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.

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

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.

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 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	CIQA Office	33	13	21
2	Admin Section	25	15	16
3	Academics Section	31	18	20
4	Library	36	22	28
5	KVK Section	20	15	19
6	Executive Engineer Office	26	16	16
7	School of Health Sciences	27	16	21
8	Student Service Section	31	18	28
	Maximum	36	22	28
	Minimum	20	13	16

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 No 4: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, OC	Humidity, %	Lux Level	Noise Level, dB
1	CIQA Office	27	47	120	40
2	Admin Section	27.1	46.9	129	41
3	Academics Section	27	47	145	42
4	Library	26.9	47.1	129	40
5	KVK Section	27.2	46.9	131	39
6	Executive Engineer Office	27.3	47	130	41
7	School of Health Sciences	27.5	47.1	145	40
8	Student Service Section	27.6	48	105	39
	Maximum	27.6	48	145	42
	Minimum	26.9	46.9	105	39

CHAPTER VI

STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The recyclable Waste, like paper, plastic waste is segregated at source and is handed over to Authorized Agency.

Photograph of Waste collection Bin:



6.2 Vermi Composting Plant:

The University has Vermi-composting facility & about 100 MT of Vermi compost is produced annually and is used in the own campus.

Photograph of Vermi Composting Plant:



6.3 Sanitary Waste Management:

The University has installed a Sanitary Waste Incinerator, for disposal of Sanitary Waste generated.

Photograph of Sanitary Waste Incinerator:



6.4 E Waste Management:

The E Waste is disposed of through Authorized Agency, M/s. Arihant E-Recycling Pvt. Ltd.

CHAPTER-VII

STUDY OF RAIN WATER HARVESTING

The University has implemented the Rain Water Harvesting Project by three ways, namely:

1. Yashwant Bandhara
2. Farm Pond and
3. Collecting the rain water from terrace & using the same for Bore well recharging.

6.1 Yashwant Bandhara: The Water Storage capacity is about **26.2 Million Liters**.

Photograph of Yashwant Bandhara:



6.2 Farm Pond:

The University has a farm pond which can store approximately -- million liters of Water. This farm pond has helped the nearby farmers, as the underground water level has increased substantially due to this farm pond.

6.3 Rain water harvesting from Terrace at Main Building:

The rain water falling on the terrace is used to recharge the bore well.

Photograph of Rain Water Collecting Pipe from Terrace:



CHAPTER-VIII

STUDY OF ECO FRIENDLY INITIATIVES

6.1 Internal Tree Plantation:

The University has well maintained lawn and landscaped garden in the campus.

Photograph of Internal Road & Tree plantation:



6.2 Creation of Awareness about Clean & Green Campus:

The University has displayed posters emphasizing on importance of Clean & Green Campus.

Photograph of Poster on Clean & Green Campus:



6.3 Paperless Office Initiatives:

The University is taking various measures to make the Day-to-Day operations Paper less. There about Thirteen sections/operations wherein software based solutions are adopted are:

- E-Books Down load
- YCMOU Regional Centers
- Finance
- Admission
- Results
- Migration
- Grievances
- Scanned copy of Mark list, to name a few
- Revaluation of Answer Book
- E-Tenders

6.4 Usage of E Vehicle in the Campus:

The University has Solar Power, E Vehicle. It is used for internal transportation. Photograph of Solar Powered E Vehicle:



ANNEXURE-I:**VARIOUS AIR QUALITY, NOISE & 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 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

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

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