

ENVIRONMENTAL AUDIT REPORT
of
SIPNA SHIKSHAN PRASARAK MANDAL AMRAVATI'S
Arts Science & Commerce College
Chikhaldara



Year: 2021-22

Prepared by:

Engress Services

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MAHARASHTRA ENERGY DEVELOPMENT AGENCY



Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

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ECN/2022-23/CR-43/1709

10th May, 2022

**CERTIFICATE OF REGISTRATION
FOR CLASS 'A'**

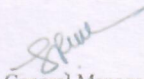
We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

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

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

Ref: ES/SSPMAASCCC/21-22/03

Date: 13/5/2022

CERTIFICATE

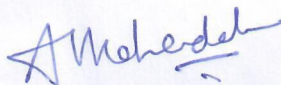
This is to certify that we have conducted Environmental Audit at Sipna Shikshan Prasarak Mandal Amravati's Arts, Science & Commerce College, Upper Plateau Chikhaldara 444807, in the year 2021-22.

The College has adopted following Green Initiatives:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Segregation of Waste at source
- Provision of Bio Composting Pit
- Implementation of Rain Water Harvesting Project
- Development of Ethno botanical Garden with important medicinal plants
- Arranging various Environmental awareness Programs for students
- Wasteland restoration by Green, Medicinal Plants, Bee flora
- Creation of Awareness by Display of Poster on Swatcchh & Swastha Bharat

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



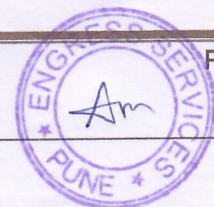
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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Sipna Shikshan Prasarak Mandal Amravati's Arts, Science & commerce college, Upper Plateau Chikhaldara 444807, for awarding us the assignment of Environmental Audit of their Chikhaldara campus for the Year: 2021-22.

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



EXECUTIVE SUMMARY

1. Sipna Shikshan Prasarak Mandal Amravati's Arts Science & Commerce College, Chikhaldara 444 807 consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Pollution due to College Activities:

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

3. Present Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	4412	3.97
2	Maximum	759	0.68
3	Minimum	180	0.16
4	Average	401	0.36

4. Various initiatives taken for Energy Conservation:

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

5. Usage of Renewable Energy:

The College has yet to install Roof Top Solar PV Plant. Therefore as on the Date, the usage of Alternate Energy to Annul Energy requirement works out to be nil.

6. Indoor Air Quality:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	46	36	44
2	Minimum	25	10	12

7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	30.9	69	176	45
2	Minimum	27.4	60	52	38.1

8. Waste Management:

8.1 Segregation Waste at Source:

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

8.2 Organic Waste Management:

The College has installed a Bio Composting Pit and the organic Waste is composted in the Plant, which is further used in the own garden.

8.3 Liquid Waste Management:

For treatment of laboratory chemicals, the College has a soak tank wherein the laboratory liquid waste is first mixed with water and then drained to the soak Tank which contains layers of sand and activated carbon.

8.4 E-Waste Management:

It is recommended to handover the E Waste through Authorized E-Waste collecting agency.

9. Rain Water Harvesting:

The College has installed Rain Water Harvesting Project, wherein the Rain Water falling on the terrace is collected and is stored in a separate Water Storage Tank. The Water is further used for domestic purpose.

10. Environment Friendly Initiatives:

- Development of Ethno botanical Garden with important medicinal plants
- Arranging various Environmental awareness Programs for students
- Wasteland restoration by Green, Medicinal Plants, Bee flora
- Creation of Awareness by Display of Poster on Swatcchh & Swastha Bharat

11. Notes & Assumptions:

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

12. References:

- For CO₂ Emissions: www.tatapower.com
- For indoor Air Quality: www.cpcb.com
- For Various Indoor Air Parameters: www.ishrae.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

1.1 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 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"

1.1.3. 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 Objectives:

1. To study Resource Consumption & CO₂ Emissions
2. To Study CO₂ Emission Reduction
3. To study Indoor Comfort Condition Parameters
4. To Study of Waste Management
5. To Study of Rain Water Harvesting
6. To Study of Sustainable Initiatives

1.3 Aerial View of the College:



1.4 General Details of College: Table No 4:

No	Head	Particulars
1	Name of Institution	Sipna Shikshan Prasarak Mandal Amravati's Arts Science & Commerce College
2	Address	Upper Plateau, Chikhaldara 444807
3	Affiliation	Sant Gadgebaba Amravati University



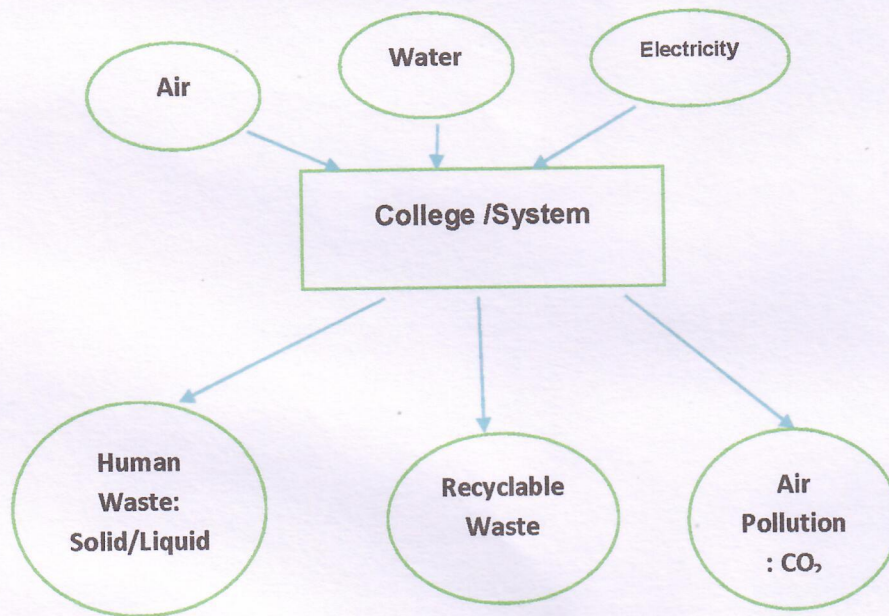
CHAPTER-II STUDY OF CONSUMPTION OF RESOURCES & CO₂ EMISSION

2.1 The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

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

2.2 Chart No 1: Representation of Institute as a System:



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. As the Facility was closed, we consider the consumption of only College building. The basis of Calculation for CO₂ emissions due to Electrical Energy are as under

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

Table No 5: Study of Consumption of Electrical Energy & CO₂ Emissions: 21-22:

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Jun-21	303	0.27
2	Jul-21	237	0.21
3	Aug-21	180	0.16
4	Sep-21	511	0.46
5	Oct-21	275	0.25
6	Nov-21	344	0.31



7	Dec-21	429	0.39
8	Jan-22	336	0.30
9	Feb-22	370	0.33
10	Mar-22	759	0.68
11	Apr-22	668	0.60
12	Total	4412	3.97
13	Maximum	759	0.68
14	Minimum	180	0.16
15	Average	401	0.36

Chart No 2: Month wise CO₂ Emissions:

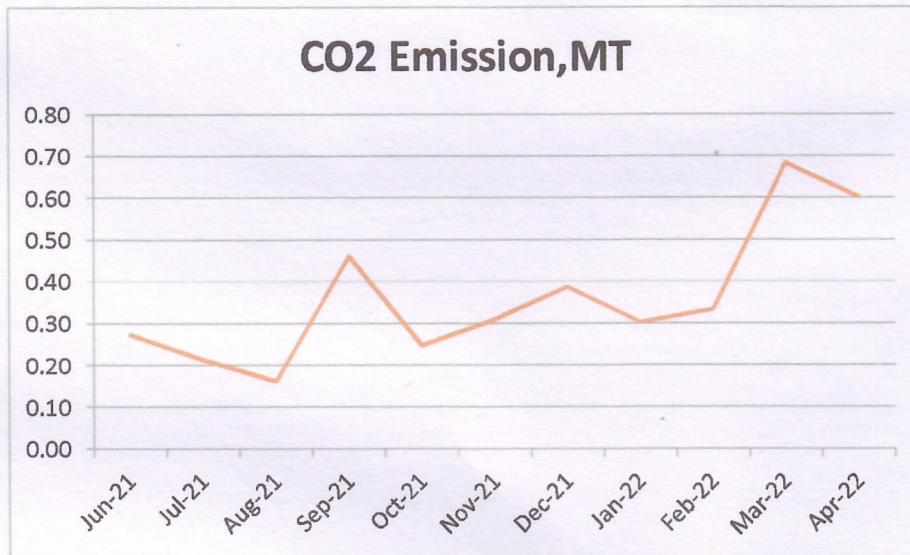


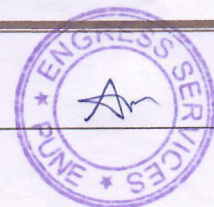
Table No 6: Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	4412	3.97
2	Maximum	759	0.68
3	Minimum	180	0.16
4	Average	401	0.36

CHAPTER III

STUDY OF CO₂ EMISSION REDUCTION

The College has yet to install Roof Top Solar PV Plant. Therefore as on the Date, the usage of Alternate Energy is nil.



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

Table No 7: Indoor Air Quality Parameters:

No	Location	AQI	PM 2.5	PM 10
1	Office	40	24	30
2	Env. Science Dept	36	22	28



3	Library	42	24	34
4	Comp. Lab	43	26	27
5	Botany Dept	45	28	30
6	Physics Dept	35	21	27
7	Class Room	27	16	27
8	Physical Education	46	28	44
9	Food Science	43	10	12
10	Industrial Dept	33	21	27
11	Geology	41	36	32
12	Staff	25	15	22
13	Seminar Hall	30	18	24
14	Maximum	46	36	44
15	Minimum	25	10	12



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 8: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, °C	Humidity, %	LUX Level	Noise Level, dB
1	Office	27.4	68	145	41
2	Env. Science Dept	28.7	63	125	39.6
3	Library	29.6	69	92	45
4	Comp. Lab	29.4	63	89	40.5
5	Botany Dept	30.4	62	134	40.6
6	Physics Dept	30.8	61	63	39.6
7	Class Room	30.7	62	82	40.6
8	Physical Education	30	62	52	40.5
9	Food Science	30.5	60	52	41.6
10	Industrial Dept	30.4	60	83	41.3
11	Geology	30.9	60	71	41.3
12	Staff	29.8	64	69	38.1
13	Seminar Hall	29.2	63	176	41.3
14	Maximum	30.9	69	176	45
15	Minimum	27.4	60	52	38.1

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation Waste at Source:

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

Photograph of Waste Collection Bin:



6.2 Organic Waste Management:

The Bio degradable waste like leafy waste is composted in a Bio Composting Pit.

Photograph of Bio Composting Pit:



Bio
Composting Pit

6.3 Liquid Waste Management:

For treatment of laboratory chemicals, the College has a soak tank wherein the laboratory liquid waste is first mixed with water and then drained to a soak Tank which contains layers of sand and activated carbon.

Photograph of Liquid Waste Soak Tank arrangement:



6.4 E-Waste Management:

It is recommended to handover the E Waste through Authorized E-Waste collecting agency.

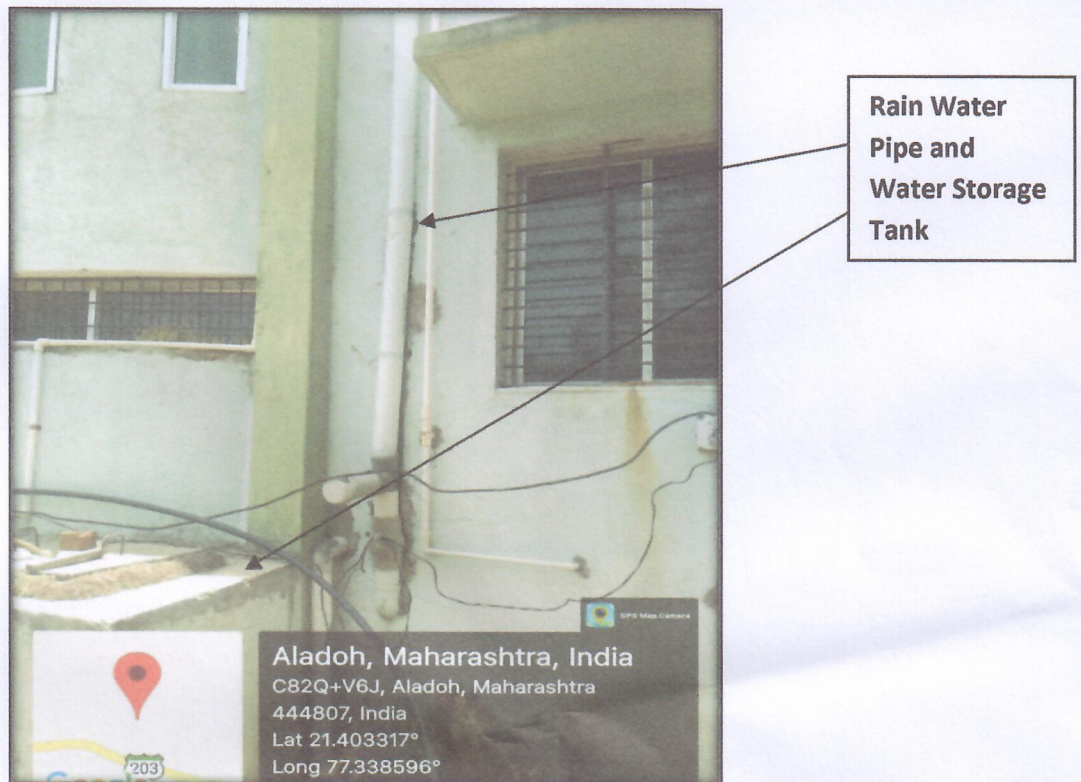
CHAPTER-VII STUDY OF RAIN WATER HARVESTING

The College has installed Rain Water Harvesting Project, wherein the Rain Water falling on the terrace is collected and is stored in a separate Water Storage Tank.

Water Storage Tank Details:

- Area of Tank: 1939 sq. ft.
- Tank Height: 2 meters
- Water Storage Capacity: 360400 Liters

Photograph of Rain Water Storage Tank Facility:



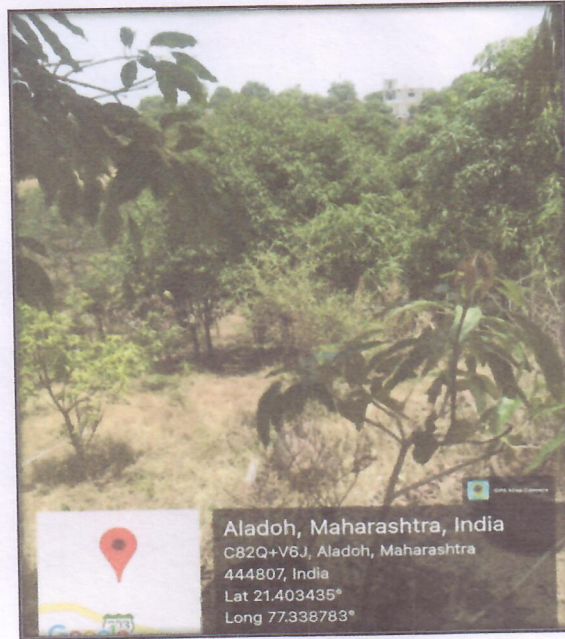
The Water is used for Girls Hostel & for Gardening purpose.

CHAPTER-VIII STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness on Swatcchh & Swastha Bharat Abhiyan:

The College is creating awareness on importance of Cleanliness, Hygiene and Good Health under the Swatcchh & Swastha Bharat Abhiyan.

Photograph of Poster on Swatcchh & Swastha Bharat Abhiyan:



8.3 Other Environment Friendly Initiatives:

- Development of Ethno botanical Garden with important medicinal plants
- Arranging various Environmental awareness Programs for students
- Wasteland restoration by Green, Medicinal Plants, Bee flora



**ANNEXURE-I:
RECOMMENDED 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°C
2	Humidity	Less Than 70%