

ENVIRONMENTAL AUDIT REPORT
of
Jayawant Shikshan Prasarak Mandal's
Kautilya Institute of Management & Research,
Wagholi, Pune



Year: 2021-22

Prepared by:

ENGRESS SERVICES

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

Ref: ES/KIMR/21-22/03

Date: 11/5/2022

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Jayawant Shikshan Prasarak Mandal's Kautilya Institute of Management & Research, Wagholi, Pune, in the Academic year 2021-22

The Institute has adopted following Green Initiatives:

- Usage of Energy Efficient LED Light Fitting
- Usage of BEE STAR Rated Energy Efficient Equipment
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp
- Segregation of Waste at Source
- Installation of Organic Converter Unit
- Installation of Sewage Treatment Plant
- Implementation of Rain Water Harvesting Project
- Tree Plantation in the campus
- Display of Posters on Energy & Water Conservation

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

INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	8
1	Introduction	9
2	Study of Resource Consumption & CO ₂ Emission	12
3	Study of CO ₂ Emission Reduction	14
4	Study of Indoor Air Quality	15
5	Study of Indoor Comfort Condition Parameters	17
6	Study of Waste Management	19
7	Study of Rain water Harvesting	21
8	Study of Environment Friendly Initiatives	22
	Annexure	
I	Various Standards in respect of Indoor Air Quality, Water, Noise & Indoor Comfort Condition	23

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Jayawant Shikshan Prasarak Mandal's Kautilya Institute of Management & Research, Wagholi, Pune for awarding us the assignment of Environmental Audit of their Campus for the Year: 2021-22.

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

EXECUTIVE SUMMARY

1. Jayawant Shikshan Prasarak Mandal's Kautilya Institute of Management & Research, Wagholi, Pune consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office & other facilities.

2. Pollution due to Institute 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 Emissions:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	32876	30
2	Maximum	3983	3.58
3	Minimum	1709	1.54
4	Average	2740	2.47

4. Various initiatives taken for Energy Conservation:

- Usage of Energy Efficient BEE STAR Rated Equipment
- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting
- Installation of Roof Top Solar PV Plant of Capacity 10 kWp.

5. Usage of Renewable Energy & Reduction in CO₂ Emissions:

- The Institute has installed Roof Top Solar PV Plant of Capacity **10kWp**.
- The Electrical Energy generated in 21-22 is **12000 kWh**.
- Reduction in CO₂ Emissions in 21-22 works out to be **10.8MT**.

6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	113	63	79
2	Minimum	76	46	58

7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	29.1	41	159	63
2	Minimum	28.9	40	99	41

8. Waste Management:

8.1 Segregation of Waste at Source:

The Waste is segregated at Source and the recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

8.2 Organic Waste Management:

The Institute has installed an Organic Waste Converter unit to convert the Bio degradable waste into compost.

8.3 Liquid Waste Management:

The Institute has installed a Sewage Treatment Plant of Capacity 500 m³/Day. The treated water is used for internal gardening purpose.

8.4 E Waste Management:

The E Waste is disposed of through Authorized Agency.

9. Rain Water Harvesting:

The Institute has installed the Rainwater harvesting project; the rain water falling on the terrace is collected and is used for recharging the bore well.

10. Environment Friendly Initiatives :

- Maintenance of Internal Garden
- Display of Posters on Resource Conservation

11. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. Average Energy generated by **1 kWp** Solar PV Plant: **4 kWh/Day**
3. Annual Solar Energy Generation Days: **300 Nos.**

12. References:

- For CO₂ 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

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 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 Objectives:

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

1.3 General Details of Institute: Table No 4:

No	Head	Particulars
1	Name of Institution	Jayawant Shikshan Prasarak Mandal's Kautilya Institute of Management & Research
2	Address	Wagholi, Pune 411 046
3	Affiliation	Savitribai Phule Pune University

1.4 Google Earth Image:



Institute Building

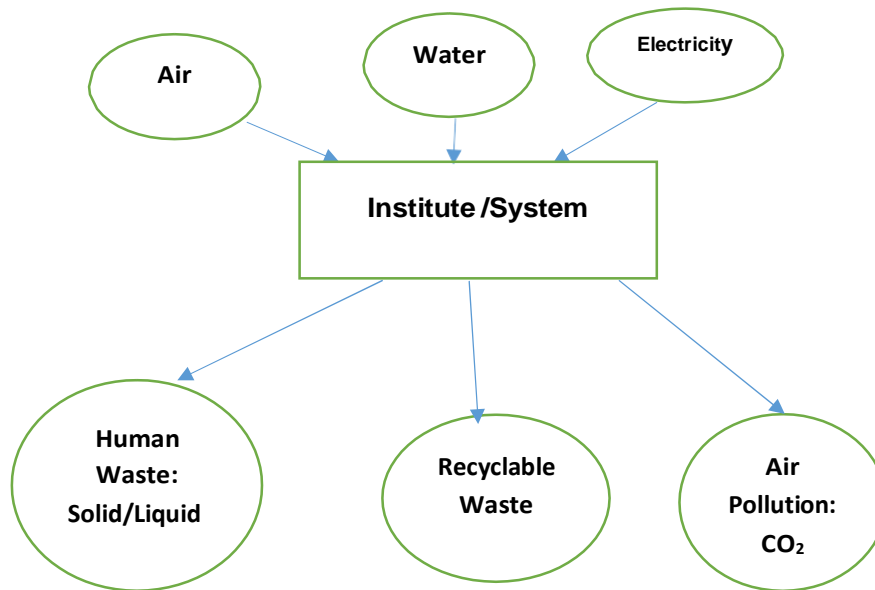
CHAPTER-II STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

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

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



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy.

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

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

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	2111	1.90
2	May-21	1763	1.59
3	Jun-21	1709	1.54
4	Jul-21	2384	2.15
5	Aug-21	2834	2.55
6	Sep-21	3024	2.72

7	Oct-21	3048	2.74
8	Nov-21	2723	2.45
9	Dec-21	3111	2.80
10	Jan-22	3156	2.84
11	Feb-22	3030	2.73
12	Mar-22	3983	3.58
13	Total	32876	30
14	Maximum	3983	3.58
15	Minimum	1709	1.54
16	Average	2740	2.47

Chart No 2: Month wise CO₂Emissions:

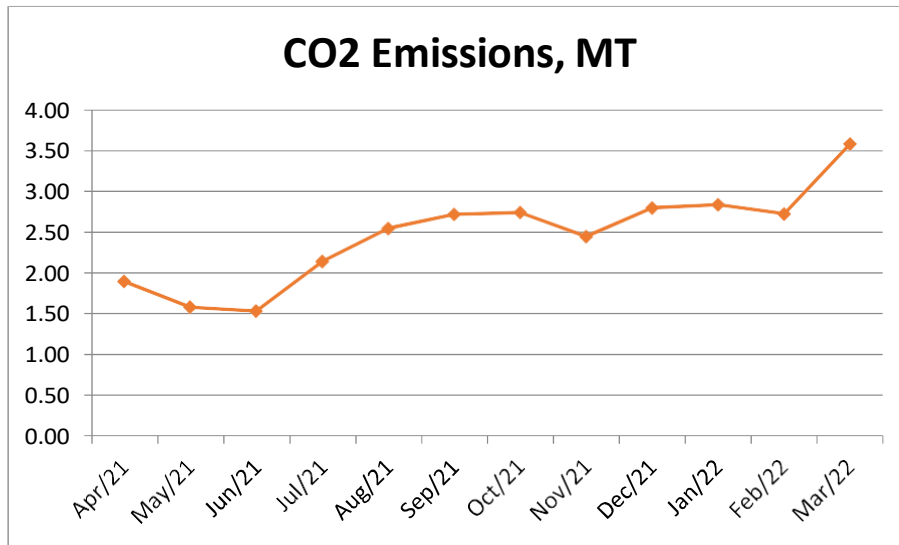


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	32876	30
2	Maximum	3983	3.58
3	Minimum	1709	1.54
4	Average	2740	2.47

CHAPTER III

STUDY OF CO₂ EMISSION REDUCTION

The Institute has installed Roof Top Solar PV Plant of Capacity **10 kWp**.

In the following Table, we compute the Annual Reduction in CO₂ Emissions due to installation of Roof Top Solar PV Plant.

Table No 7: Computation of Annual Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	10	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: 21-22	12000	kWh
5	1 kWh of Electrical Energy saves	0.9	Kg/kWh
6	Qty of CO₂ Saved by Solar PV Plant = (4)*(5) /1000	10.8	MT of CO₂

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 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 10micron

Table No 8: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
	Ground Floor			
1	101 class Room	93	56	72
2	104 Cafeteria	90	54	69

3	108 Director Cabin	85	51	61
4	110 Pantry	110	62	78
5	106 Admin Office	106	61	76
6	109 Board Room	113	63	79
	First Floor			
1	205 IQAC Cell	86	46	59
2	206 Language lab	91	55	70
3	207 Computer Centre	90	54	70
4	210 Class Room	96	58	78
	Second Floor			
1	306 Chanakya Hall	86	57	69
2	311 Faculty Room	85	52	67
3	301 Faculty Room	86	52	68
4	302 Class Room	85	51	63
5	303 Exam control Office	81	49	66
6	304 Faculty Room	90	52	66
	Third Floor			
1	405 Library & Reading Hall	90	54	68
2	401 Faculty Room	83	51	62
3	409 Faculty Room	90	55	70
4	402 Incubation & Entrepreneurship Dev. Centre	76	46	62
5	403 Tutorial Room	85	49	58
6	404 Maintenance Room	81	49	62
7	405 digital Library	100	60	75
8	407 first Aid & Sick Room	90	56	72
	Maximum	113	63	79
	Minimum	76	46	58

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 9: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
Ground Floor					
1	101 class Room	28.9	41	149	49
2	104 Cafeteria	28.9	41	118	62
3	108 Director Cabin	29	41	120	61
4	110 Pantry	29	40	99	63
5	106 Admin Office	29	41	130	41.3
6	109 Board Room	29	40	135	41
First Floor					
1	205 IQAC Cell	29	40	140	41
2	206 Language lab	29	40	150	46
3	207 Computer Centre	29.1	40	146	49
4	210 Class Room	29.1	41	159	58.3
Second Floor					
1	306 Chanakya Hall	29	40	150	56.3
2	311 Faculty Room	29	40	128	54
3	301 Faculty Room	29.1	40	129	59
4	302 Class Room	29.1	40	102	46
5	303 Exam control Office	29.1	41	115	42
6	304 Faculty Room	29	41	112	41
Third Floor					
1	405 Library & Reading Hall	29	41	130	45
2	401 Faculty Room	29	41	135	46.3
3	409 Faculty Room	29	41	138	48
4	402 Incubation & Entrepreneurship Dev. Centre	29.1	41	145	49
5	403 Tutorial Room	28.9	40	102	51.2
6	404 Maintenance Room	28.9	41	101	50

7	405 digital Library	28.9	40	113	52
8	407 first Aid & Sick Room	29	40	110	56
	Maximum	29.1	41	159	63
	Minimum	28.9	40	99	41

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Waste is segregated at Source and the recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

Photograph of Waste Collection Bin:



6.2 Organic Waste Management:

The Institute has installed an Organic Waste Converter unit to converting the Organic Waste into compost.

Photograph of Organic Waste Converter Unit:



6.3 Liquid Waste Management:

The Institute has installed a Sewage Treatment Plant of Capacity 500 m³/Day. The treated water is used for internal gardening purpose.

Photograph of Sewage Treatment Plant:



6.4 E Waste Management:

The E Waste is disposed of through Authorized Agency.

CHAPTER-VII STUDY OF RAIN WATER HARVESTING

The Institute has implemented the Rain Water Harvesting Project. The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to recharge the bore well.

Photograph of Rain water Harvesting Pipe Section:



Rain Water Pipe

CHAPTER-VIII STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The Institute has well maintained landscaped garden in the campus.

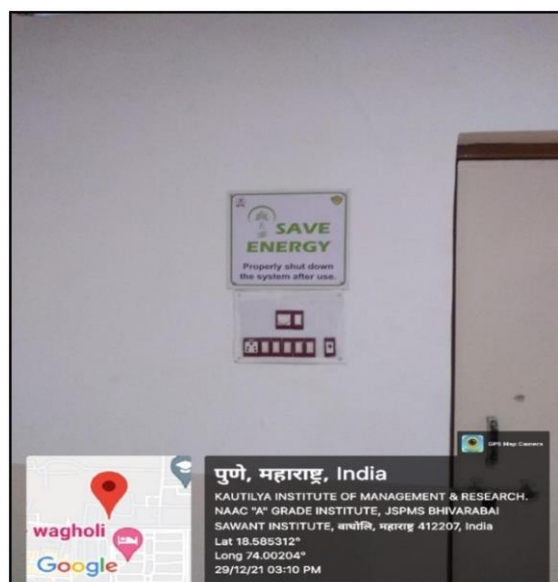
Photograph of Tree plantation:



8.2 Creation of Awareness about Energy & Water Conservation:

The Institute has displayed posters emphasizing on importance of Energy & Water Conservation.

Photograph of Poster on Energy Conservation:



**ANNEXURE-I:
VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR
COMFORT STANDARDS:**

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Water Quality Standards:

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between 6.5 to 8.5 Dissolved Oxygen 6 mg/l or more
2	Drinking water source after conventional treatment and disinfection	pH between 6 to 9 Dissolved Oxygen 4 mg/l or more
3	Outdoor Bathing (Organized)	pH between 6.5 to 8.5 Dissolved Oxygen 5 mg/l or more
4	Controlled Waste Disposal	pH between 6 to 8.5

3. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

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

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


DIRECTOR
JSPM's Kautilya Institute of
Management & Research
Wagholi, Pune - 412 207

