To

The Director

Eshan Collage of Engineering, Mathura

Subject: Submission of Environmental, Green and Energy Audit Report of the Institute for the year 2021-22.

Sir,

The Environmental, Green and Energy Audit of the Institute had been conducted for the year 2021-22. Kindly find attached the Environmental, Green and Energy Audit Report of the Institute for the year 2021-22 for your kind perusal and approval.

Thanking You

Yours Sincerely

Prof. - Incharge

Environmental, Green and Energy Audit Report

(For the Academic Year 2021-22)

1. Preface

Institutional self-inquiry is a natural and necessary outgrowth for quality of higher education. Concern about environmental degradation and realization of values of environment are logical consequences of scholarly research, teaching and learning process. In its pursuit for improving environmental quality and to maintain a pristine environment for the future generation of students. Institute has made a self-inquiry on environmental quality of the campus with the following objectives:

a) To establish a baseline of existing environmental conditions with focus on natural and physical environment.
b) To understand the current practices of sustainability with regard to the use of water and energy, generation of wastes, purchase of goods, transportation, etc.
c) To promote environmental awareness through participatory auditing process.
d) To create a report that document baseline data of good practices and provide future strategies and action plans towards improving environmental quality for future.

This report is compiled by a committee constituted by Eshan College of Engineering. As there was no standard model for such an environment/green audit of campuses in the state, the committee brainstormed and evolved a questionnaire. With the help of student volunteers, the major part of the data was compiled, which the committee analyzed. The remaining part which involved measurement of quality was entrusted with the Department of Civil Engineering & Department of Electrical Engineering, Eshan College of Engineering.

2. Audit Summary

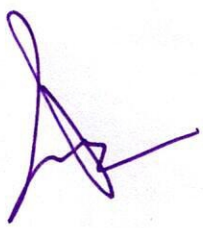
a) Energy Management: The Institution has facilities for alternate sources of energy and energy conservation measures are being practiced. The institute had installed Grid connected rooftop project/ small power plant of 10 KWp capacity in 2021.
b) Water Management: As such, wise use of water is an established practice in Institute. Regular maintenance and repair activities are carried out for prevention of water leakage. The rainwater harvesting system has been established as per the norms of local administrative authorities.
c) Solid Waste management: Priority is being given to eco-friendly brands followed by those that are recyclable or made from recycled material for purchases. Waste segregation is being carried out strictly through different coloured bins kept near every department for proper segregation of waste.
d) E-waste management: The collected e-waste is handed over to a certified agency for the proper disposal as per norms or donated for further use to nearby educational institutes.
e) Landscape/environment: Institute maintains gardens properly and the campus is greener with fair biodiversity around. Long-term Eco restoration programs for

replacing exotic Acacia plantations and land use and development planning should be undertaken.

f) Green Campus Initiatives: Institute facilitates the faculty & staff members with provision of busses to bring them to the campus from a designated point to discourage use of personal vehicles. Faculty and staff members should be motivated to use car pool to commute.

3. Recommendations

a) Environmental and energy auditing should be conducted quarterly every year, under the auspices of the constituted committee.
b) Periodical maintenance of rainwater harvesting facilities should be continued as per the schedule.
c) The public lights within the campus may be run with solar panels and the replacement of existing lights should be done with LED lamps.
d) Further, more green spaces should be established all around the campus around larger trees and shades for the benefit of the students.
e) Vehicle pooling should be promoted both among students and faculty should be promoted as a policy of Institute.
f) Irrespective of the subjects, environmental education is a part of curriculum. Certificates may be given to students participating in environmental conservation/awareness activities.
g) All the purchases in future should be restricted to star rating equipment so that conservation of energy can be done.



Eshan College of Engineering, Mathura

Approved by All India Council for Technical Education, New Delhi (AICTE)
Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh

Energy Audit

(Year 2021)

Executive Summary

Eshan College of Engineering, Mathura acknowledges the importance of Energy as an essential resource for successfully meeting its operational objectives. The Institute also realizes the need to use this resource in a responsible manner that is sustainable and complementary to its Environmental Management Policy.

This document explores how the Institute uses Energy, outlines its approach to managing Energy use and sets targets for Carbon footprint reduction. This strategy is intended to sit alongside the other strategies which together make up the Institute's overall sustainability strategy.

Eshan is committed to improving sustainability. Eshan strives to sustain its local and global environment, organizational health and ability to create a positive, viable future. Eshan endeavors to include environmental sustainability principles and targets in all aspects of its decision-making. Through its research, teaching and learning, operations and community engagement, Eshan aims to:

Minimize the environmental impact of its operations and move towards restoring environmental integrity

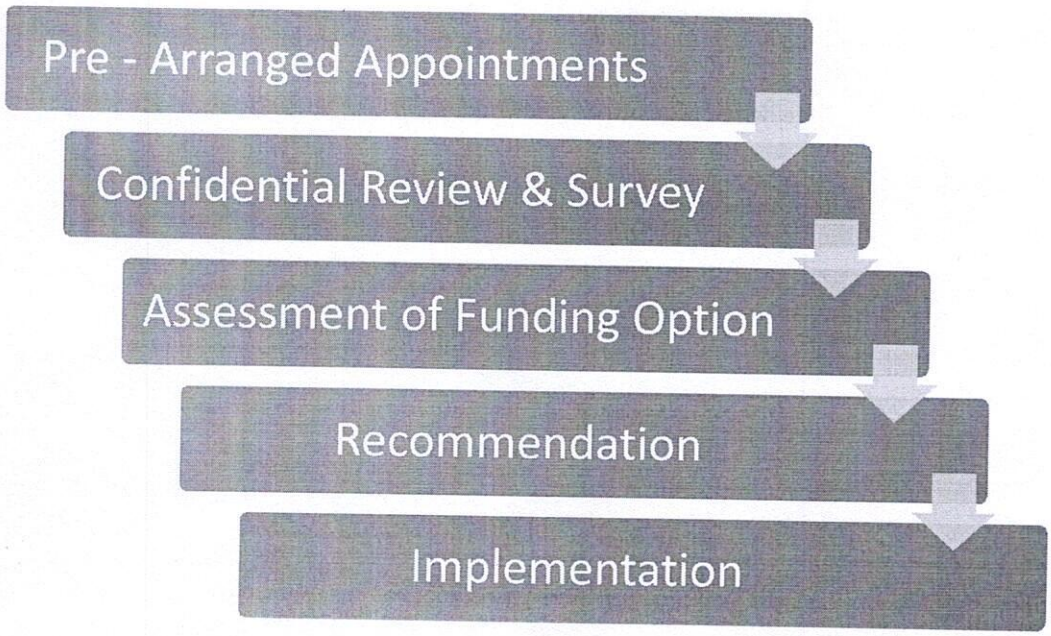
- Promote social justice, equity and diversity
- contribute to human health and well-being
- Maintain its financial viability.

As part of its commitment to sustainability, Eshan developed a Sustainability Policy and Sustainability Strategy. Eshan is now developing a series of Sustainability Action Plans on energy and greenhouse, water, transport and waste to support implementation of the Policy and Strategy. This document deals with Energy Audit.

Introduction

Based on an inspection of the building plans, measurements and documents, energy auditing includes an evaluation and analysis of the existing situation and the various measures that could be implemented to reduce the energy consumption and improve the indoor environment. The results are presented in an energy analysis report describing the recommended measures with corresponding investments, savings and profit.

The energy analysis in a building is a feasibility study, for it not only serves to identify energy use among the various services but also identify opportunities for energy conservation. The study should reveal to the owner, manager, or management team of the building the options available for reducing energy waste, the costs involved, and the benefits achievable from implementing those energy-conserving opportunities (ECOs). It is to reduce waste of energy and money to the minimum, permitted by the climate in which the building is located, its functions, occupancy schedules, and other factors. It establishes and maintains an efficient balance between a building's annual functional energy requirements and its annual actual energy consumption.



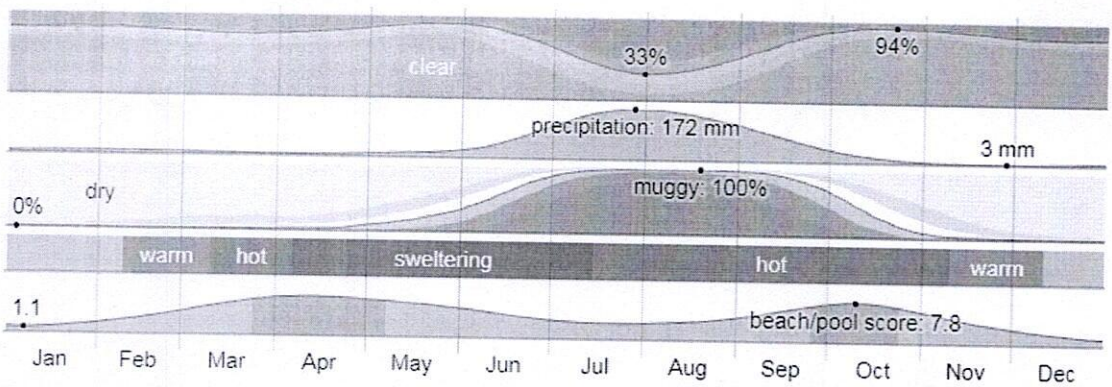
Energy Analysis Process Flow

Occupancy Details

The number of occupants is also important to define the amount of water and energy used in the building; therefore, the following details of the occupants have been considered during the calculation and report preparation. It is observed that the total occupancy of the campus is 600 approx.

Climate

In Mathura, the wet season is sweltering, oppressive, and partly cloudy and the dry season is hot and mostly clear. Over the course of the year, the temperature typically varies from 8°C to 41°C and is rarely below 5°C or above 44°C.



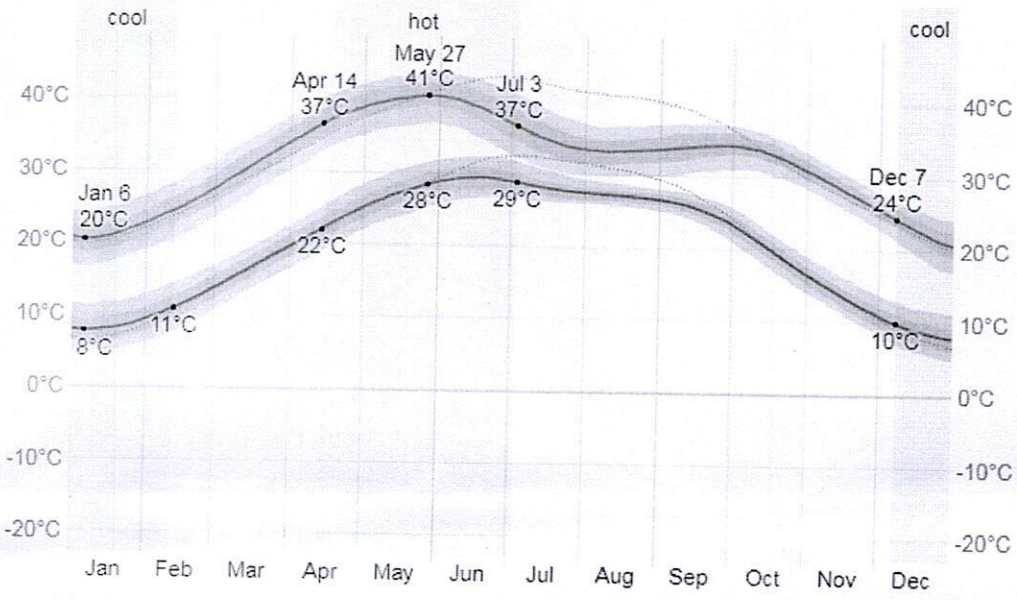
Climate in Mathura

(Data taken from https://weatherspark.com/)

Average Temperature in Mathura

The hot season lasts for 2.7 months, from April 14 to July 3, with an average daily high temperature above 37°C. The hottest month of the year in Mathura is June, with an average high of 39°C and low of 29°C.

The cool season lasts for 2.1 months, from December 7 to February 12, with an average daily high temperature below 24°C. The coldest month of the year in Mathura is January, with an average low of 8°C and high of 21°C.



Average High and Low Temperature in Mathura

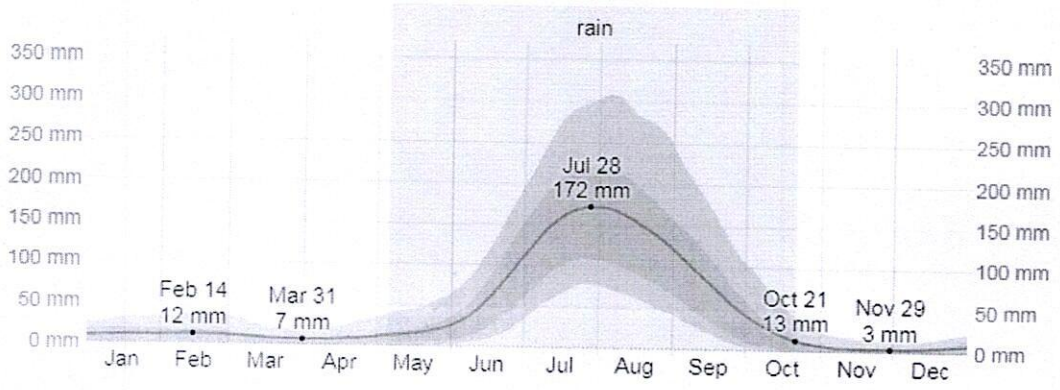
(Data taken from https://weatherspark.com/)

Rainfall

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Mathura experiences extreme seasonal variation in monthly rainfall.

The rainy period of the year lasts for 5.5 months, from May 5 to October 21, with a sliding 31-day rainfall of at least 13 millimeters. The month with the most rain in Mathura is July, with an average rainfall of 159 millimeters.

The rainless period of the year lasts for 6.5 months, from October 21 to May 5. The month with the least rain in Mathura is November, with an average rainfall of 4 millimeters.



Average Monthly Rainfall in Mathura

(Data taken from https://weatherspark.com/)

Energy Analysis Definition & Procedure

Definition

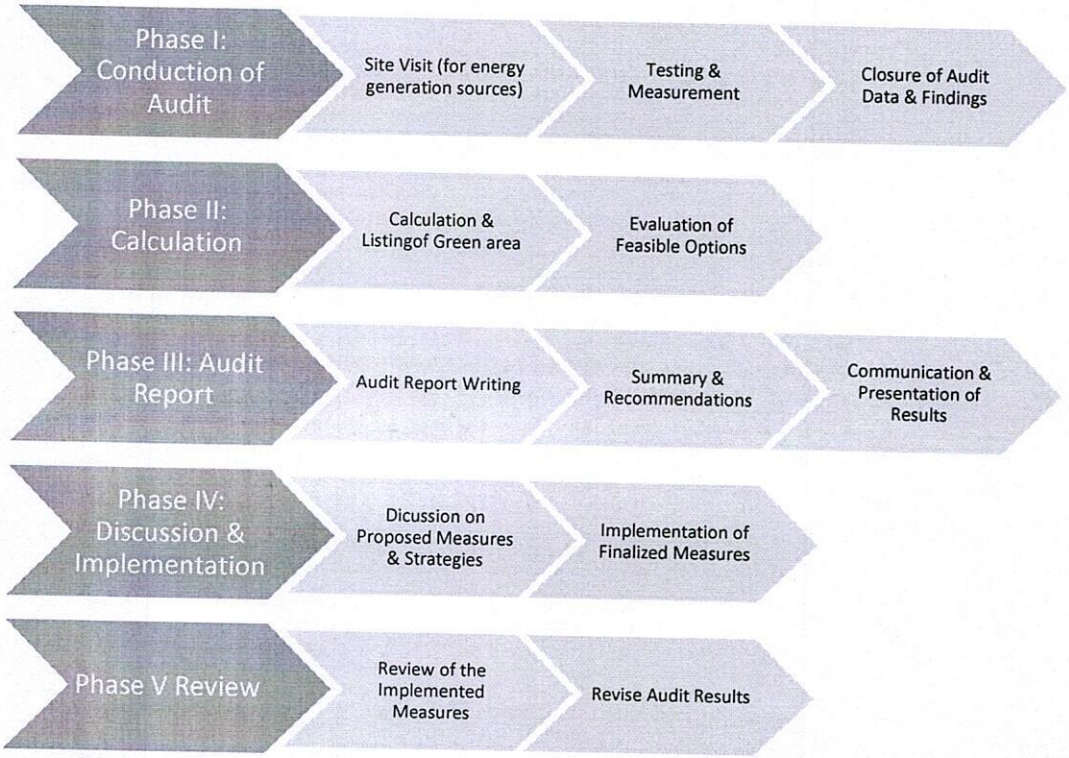
This report elaborates the current actual energy performance of the building and real- time performance of all the energy intensive systems installed in the facility. Detailed survey and testing of the energy intensive systems has been performed in order to arrive at the present performance of each equipment. The test results have been carefully analyzed and presented along with improvement measures and general recommendations for each of the systems. The suggested Energy Efficiency Measures (EEMs) presented in the report are mainly of three types depending on their initial cost implications No Cost, Low Cost and Medium Cost measures. The measures, if implemented, may help the facility team in optimizing the building operations and may result in comprehensive energy and cost savings in the long run.

Objective

The objective of Energy Analysis is to assess the following:

a. Understand the energy consumption scenario.
b. Survey the energy generation systems.
c. Suggest potential energy conservation measures based on end uses.
d. Support with Implementation and maintenance.

Procedure



Energy Consumption Scenario

The electric power for the entire facility is mainly procured from electric connection. In case of loss of grid power, diesel generator sets are installed at the campus for power backup.

Energy Consumption

Year 2021

S. N.	Month	Total Energy Consumption (kWh)
1	January	3218
2	February	3245
3	March	4048
4	April	6447
5	May	7604
6	June	9155
7	July	7321
8	August	5703
9	September	8385
10	October	5407
11	November	4099
12	December	4373

Energy Management

S. N.	Floor	No. of Tubes / Bulbs	No. of A/C	No. of LCD Projector	No. of Photocopier	No. of Computers and Printers	No. of Fans / Exhaust	Non-Conventional Solar
1	Ground	49/25	8	1	6	12/6.	109	1
2	1	76/22	8	6	2	5/2.	133	
3	2	47/17	4	2	3	49/3.	94	
4	3	42/9	0	2	0	18	94	
5	Canteen	5/2.	2	0	0	0	06/1.0	

Energy Performance Index

Energy performance index (EPI) is total energy consumed in a building over a year divided by total built up area in kWh/sq.m/year and is considered as the simplest and most relevant indicator to analyses the energy efficiency of a building.

The total energy kWh consumption by the facility includes the electricity consumption from the grid supply and kWh generated by the DG. The total built-up area doesn't include the parking area and open spaces.

EPI Calculation

Energy Performance	
Total consumption including solar (kWh)	69005
Total Built up Area (m^2)	17994
(kWh/m^2/year)	3.83

The campus consumed 3.83 kWh/m^2 from January 2021 to December 2021.

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Environment Audit

(2021-22)

Executive Summary

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As part of its commitment to sustainability, Eshan developed a Sustainability Strategy. Eshan is now developing a series of Sustainability Action Plans on energy and greenhouse, water, transport and waste to support implementation of the Policy and Strategy. This document deals with Environmental Audit of Eshan.

About the Institute

The Institute is affiliated to Dr. A. P. J. Abdul Kalam Technical University, Lucknow for offering Graduate Courses in Engineering. Located in the religious City of Uttar Pradesh, which is a blend of traditional history and modern outlook, Eshan is putting in efforts for making industry ready engineers and managers through effective Industry -Institute Interface. Apart from Institute curriculum Eshan also pursues activities for research and development in various fields.

The green landscaping, aesthetic elegance of arches and the vibrant pursuit of knowledge by the young aspirants make the environment serene, pleasant and dynamic.

Students joining the institute share the box full of opportunities for professional and personal development through an environment of practical orientation, industrial interaction and student led activities which help the students to develop good communication skills, integrated personality and greater competitive spirit.

Objectives of the Study

The main objective of the green analysis is to promote the Environment Management and Conservation in the Institute Campus. The purpose of the analysis is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out this Analysis are:

1. To introduce and aware students to real concerns of environment and its Sustainability.
2. To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use of the campus.
3. To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requiring high cost.
4. To bring out a status report on environmental compliance.

Audit Inclusions

- Water Audit and Conservation
- Waste Audit and Remediation

Water Audit and Conservation Definition

Water auditing is a method of quantifying water flows and quality in simple or complex systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. It provides the deviation existing in the actual water supply to the minimum required water in the respective premises. Also, water auditing is a mechanism for conserving water, which will grow in significance in the future as demand for water increases.

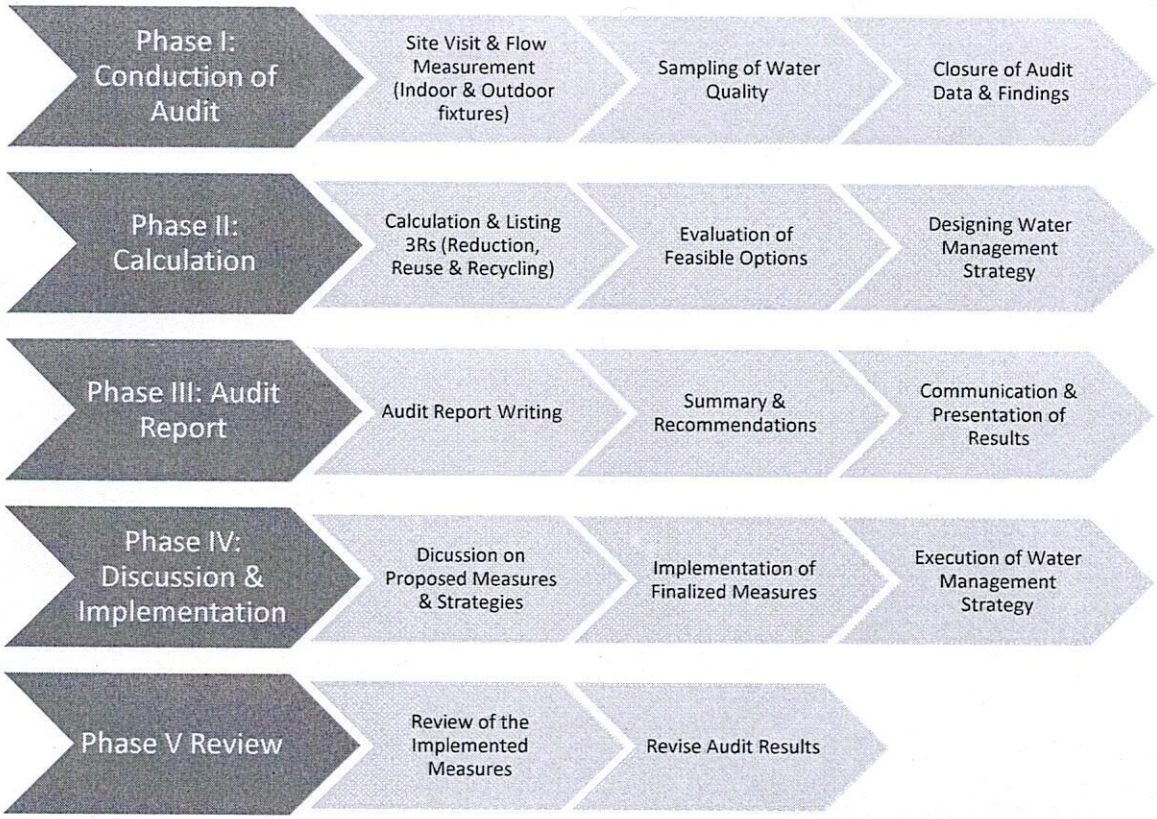
Objective of the Audit

The objective of water audit is to assess the following:

1. Water required (in accordance with National and/or State Bye Laws)
2. Water Used (as per the Existing Fixtures & Equipment)
3. Physical & Non-physical Losses
4. To identify and priorities areas which need immediate attention for control

Procedure

The different stages of the water audit have been depicted in form of below flow chart. The whole procedure is divided into five phase starting from the site inspection to review of the implemented measures.



Phase I: Conduction of Audit

At the beginning of water audit, it is must to observe the supply, storing, & consuming facilities are provided on the site. The water audit team commits to:

- Conduct site visit to locate the water points & Map them
- Locate the water usage areas
- Take samples at various locations to define water quality
- Mark storage tanks
- Compile the findings during visit
- Notice conditions of fixtures (dirty, stuck, leaking etc.)

Phase II: Calculation

After completion of site visit, the audit team performed calculation to analyze the acquired data with reference to local bye laws (in India: NBC 2016) as base line. This enables to determine whether the premise is consuming surplus water or not. The results will help to calculate the amount of water wasted or misused. Following goals are kept in mind during the calculation;

- Estimating water use from different areas and activities of a building.
- Estimate rate of flow of water from different outlets and inlets.
- Determine the rate of flow of water for faucets and shower head.
- Estimating shortage or surplus with reference to NBC 2016.

Based on the calculation, the water management strategies have to be defined and implement in the respective premises.

Phase III: Audit Report

The team prepares detailed report based on procedure mentioned above. The audit report consists:

- Observations done during audit
- All the measurements, calculations
- Overview of the current working of water supply system
- Summary and conclusions based on the calculations

Phase IV: Discussion & Implementation

After formation of audit report, the audit team will hold meeting with the respective project team to discuss the current and future scenario towards the water management. The key discussion points are:

- Possible water conservation measures & their implementation
- Areas where water can be conserved & wastage of water can be minimized

Later, the project team will implement the measures that are finalized in accordance to the discussion and meetings held with audit team.

Phase V

Review After the implementation of measures, the review and maintenance of the same is much needed. Because, the continuous monitoring of the measures can only justify and revise the water savings occurring in the premises.

Water Use

This indicator addresses water consumption, water sources, irrigation, storm water, appliances and fixtures. A water analysis is an on-site survey and assessment to determine the water use and hence improving the efficiency of its use.

No. of Borewells					
S. N.	**Name**	**Quantity (Nos)**	**Capacity (Litres)**	**Location**	**Operating Hours**
1	Borewell 1	1	4000L/HR	Near Temple	4
2	Borewell 2	1	4000L/HR	Behind Workshop	3
3	Borewell 3	1	4000L/HR	Behind Canteen	1

Observations

The study observed that the, Tube well is the major sources of water in college and hostels. Water is used for drinking purpose, toilets and gardening. The waste water from the RO water purifier is used for gardening purpose.

During the survey, no loss of water is observed, neither by any leakages, nor by over flow of water from overhead tanks. On an average the Institute consumes 32000 Liters of Water per day.

No. of Pumps				
S. N.	**Name**	**Quantity (Nos)**	**Capacity (litres)**	**Location**
1	Pump 1	1	4000L/HR	Near Temple
2	Pump 2	1	4000L/HR	Near Workshop
3	Pump 3	1	4000L/HR	Kept it College

No. of Rainwater Harvesting Tanks

S. N.	**Name**	**Quantity (Nos)**	**Location**
1	Rainwater Harvesting Tank 1	1	Near Temple
2	Rainwater Harvesting Tank 2	1	Near Chemistry Lab
3	Rainwater Harvesting Tank 3	1	Behind Washroom
4	Rainwater Harvesting Tank 4	1	Host

No. of Rainwater Recharge

S. N.	Name	Quantity (Nos)	Capacity (litres)	Location
1	Rainwater Recharge 1	1	2540	Near Temple
2	Rainwater Recharge 2	1	1500	Near Chemistry Lab
3	Rainwater Recharge 3	1	on process	Behind Washroom\
4	Rainwater Recharge 4	1	on process	Host

The Total rainfall catchment in the site area of Eshan is $1000m^3$ and by the method of rainwater recharge and harvesting, the Institute campus is able to save $660m^3$ of rainwater. The rest of $340m^3$ of water is used for landscape.

Reverse Osmosis Plant

Reverse osmosis (RO) is a membrane separation process, driven by a pressure gradient, in which the membrane separates the solvent (generally water) from other components of a solution. The membrane configuration is usually cross-flow. The Institute has provided purified R.O. drinking water to all the students and staff residing in the campus by installing the R.O machines in the hostels and academic buildings. In additional to drinking purpose, R.O water is provided to the canteen for cooking foods.

Summary - Water Audit

The water audit was conducted by a team of experts and recommendations have been shared in the report above. The report is an analysis of the water inflows and outflows, and presents opportunities to save water across the facility. Incorporation of the measures suggested in this report shall bring up the water efficiency in the campus and would be a step further in rendering the education campus among the leading institutions in water efficiency. A summary of the identified water conservation measures is given below:

Water Conservation Measures details

WCM	Description	Remarks
1	Install pre-rinse spray valves	66% savings
2	Use of Grease & Oil Interceptor in kitchen	Prevent the blockage of kitchen drain pipe
3	Use of Irrigation System	40% savings in landscaping water usage
4	Prevention of leakages in building taps	100% Savings in leakages

Waste Audit and Conservation

Questionnaire

1	Does your institute generate any waste? If so, what are they?	Yes, Solid Waste, Canteen Waste, Paper, Plastic, Horticulture Waste etc.
2	How the waste generated in the institute is managed? By 1. Composting 2. Recycling 3. Reusing 4. Others (Specify)	• Reuse of one side printed papers for internal communication instead of shredding. • Domestic Waste is given to Municipal Corporation • Two types of Waste Bin are provided in the Campus for biodegradable and non-biodegradable waste
3	Do you use recycled paper in the institute?	No
4	Do you use reused paper in the institute?	Yes
5	Can you achieve zero garbage in your institute? If yes, how?	Not yet achieved, Possible through waste management plan.

Kitchen Waste

The Canteen in Eshan College of Engineering runs for all the students, Staff and supporting Staff and has policy of zero food waste policy. It has created awareness for the same through posters in the canteen. The food waste log is maintained daily and makes sure people produce less food waste and as a community Eshan excels in reduction of food waste.

Eshan is committed to zero food waste policy and reduced significant amount of food through daily logging of wastage and its feeding capacity to needy people, it has resulted in daily update and awareness which triggers mentally in students and staff to reduce food waste.

Existing Green Campus Policy

Eco-friendly practices and educational resources combine in a Green Campus to promote sustainable practices. It allows institutions to re-define their environmental culture and

develop new paradigms for solving the social, economic, and environmental problems of mankind by utilizing a Green Campus concept.

Objectives of the Policy

- To safeguard the environment within and around the campus.
- To keep the campus clean and environment friendly.
- To motivate all stake holders to ensure judicious use of scarce natural resources.
- To increase awareness among staff and students regarding different issue and possiblesolutions related to environment and motivate them to adopt good practices for protection of environment.
- To frame the green policies that will enhance the ecological efficiency in the campus.
- To continually improve the efficient use of all natural resources including water and energy. To make sustainable efforts to make the campus plastic free and tobacco free.
- To improve resource use through reduction in material use by reducing waste and to identify recycling opportunities for west generated such as metal scrap, paper, e-waste etc.
- To conduct in house environmental and energy audits from time to time.
- To make the campus self-reliant in energy using solar energy and to make the campus net zero.
- To recycle west water and utilize it for landscape irrigation.

Scope of the Policy Green Campus develops new extracurricular and co-curricular practices that allow students to take leadership roles in creating positive change. As a result of these initiatives, all infrastructural and administrative activities will be reviewed from the viewpoints of energy, efficiency, sustainability, and environment. The focus areas of the policy are

- Green Campus Initiatives
- Clean Campus Initiatives
- Tobacco free Campus
- Net Zero Campus
- Water Conservation Initiatives
- Waste Management Initiatives

Existing Plastic Ban Policy

The pollution of the environment by plastics has now been identified as a global problem. A quick-term advantage and ease of use have made plastic and plastic goods wildly popular. Plastic has grown more and more popular over the past century, outpacing trash management as a result. Our environment, as well as our health and well-being, suffer from plastic pollution. We have all contributed, consciously or unwittingly, to this issue, and we must work together to minimize and eradicate plastic pollution.

The government has chosen to implement a plastic ban on a nationwide scale in order to address the environmental dangers created by the widespread usage of plastic. Educational institutions must take the lead in this national effort. Educational institutions must take a leadership role in the fight to phase out single-use plastics.

Guidelines

The guideline aims to assist Indian higher education institutions in achieving a plastic-free campus. It is not intended to be comprehensive, but rather to offer basic guidelines and suggestions relevant to all institutions. The recommendations urge institutions to implement policies and practices that promote a more environmentally friendly and plastic- free campus environment.

- The institute will educate stakeholders about the need of reducing, reusing, and recycling plastic.
- All stakeholders are encouraged to reduce their reliance on plastic bags on campus.
- Stakeholders must adhere to rigorous waste segregation guidelines.
- As far as feasible, students should recycle the resources available for creative work at college festivals.
- Conducting events and poster contests, among other things, to promote the creation of ecological and environmentally friendly products in order to reduce the use of single-use plastic.

Water Quality Criteria

Environmental Acts & Rules
Environment Protection
Water Pollution
Air Pollution
Noise Pollution
Waste Management
Hazardous waste
Municipal Solid waste
Biomedical waste
Plastic waste
E-waste
Construction & Demolition waste

Water Quality Criteria

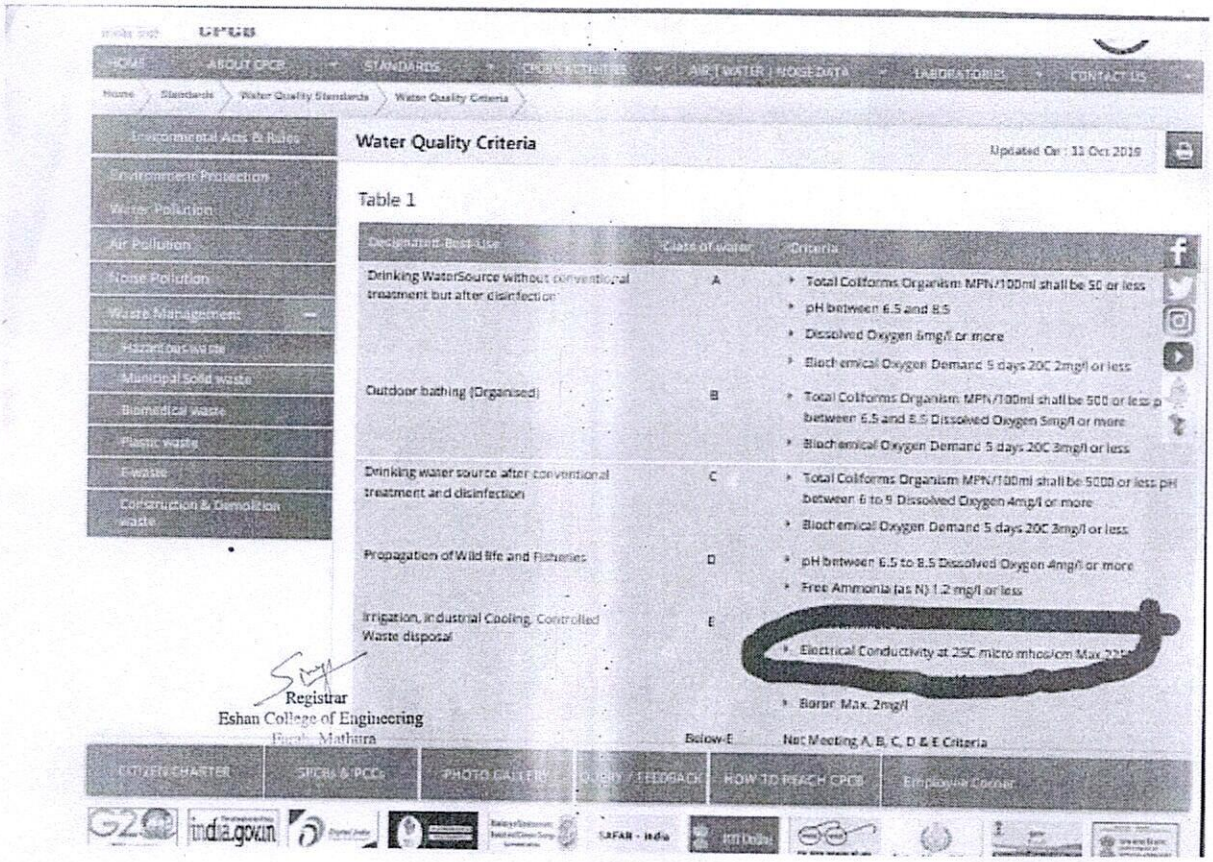
Updated On : 11 Oct 2019

Table 1

Designated-Best-Use	Class of water	Criteria
Drinking WaterSource without conventional treatment but after disinfection	A	• Total Coliforms Organism MPN/100ml shall be 50 or less • pH between 6.5 and 8.5 • Dissolved Oxygen 6mg/l or more • Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	• Total Coliforms Organism MPN/100ml shall be 500 or less p between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more • Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	• Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more • Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	• pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more • Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	• pH betwwn 6.0 to 8.5 • Electrical Conductivity at 25C micro mhos/cm Max.2250 • Sodium absorption Ratio Max. 26 • Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

Last update on website : 20-02-2023

Registrar
Eshan College of Engineering
Farah, Mathura



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- Air Pollution
- Noise Pollution
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  - Municipal Solid waste
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	Below-E	Not Meeting A, B, C, D & E Criteria

CITIZEN CHARTER | SPCBs & PCCs | PHOTO GALLERY | QUERY / FEEDBACK | HOW TO REACH CPCB | Employee Corner

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Registrar
Eshan College of Engineering
Farah, Mathura

TABLE 3.1 CLASSIFICATION OF IRRIGATION WATER BASED ON SALT CONCENTRATION

S.N.	Types of water	Suitability for irrigation
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Sodium Concentration : Irrigation water having

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Approved by All India Council for Technical Education, New Delhi (AICTE)
Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh

Green Audit

(2021-22)

Executive Summary

Eshan College of Engineering acknowledges the importance of Energy as an essential resource for successfully meeting its operational objectives. The Institute also realizes the need to use this resource in a responsible manner that is sustainable and complementary to its Environmental Management Policy.

This document explores how the Institute uses Energy, outlines its approach to managing Energy use and sets targets for Carbon footprint reduction. This strategy is intended to sit alongside the other strategies which together make up the Institute's overall sustainability strategy.

Eshan College of Engineering is committed to improving sustainability. Eshan strives to sustain its local and global environment, organizational health and ability to create a positive, viable future. Eshan endeavors to include environmental sustainability principles and targets in all aspects of its decision-making. Through its research, teaching and learning, operations and community engagement, Eshan aims to:

Minimize the environmental impact of its operations and move towards restoring environmental integrity

- Promote social justice, equity and diversity
- contribute to human health and well-being
- Maintain its financial viability.

As part of its commitment to sustainability, Eshan developed a Sustainability Policy and Sustainability Strategy. Eshan is now developing a series of Sustainability Action Plans on energy and greenhouse, water, transport and waste to support implementation of the Policy and Strategy. This document deals with Green Audit of Eshan.

About the Institute

The Institute is affiliated to Dr. A. P. J. Abdul Kalam Technical University, Lucknow for offering Graduate Courses in Engineering. Located in the religious City of Uttar Pradesh, which is a blend of traditional history and modern outlook, Eshan is putting in efforts for making industry ready engineers and managers through effective Industry -Institute Interface. Apart from Institute curriculum Eshan also pursues activities for research and development in various fields.

The green landscaping, aesthetic elegance of arches and the vibrant pursuit of knowledge by the young aspirants make the environment serene, pleasant and dynamic.

Students joining the institute share the box full of opportunities for professional and personal development through an environment of practical orientation, industrial interaction and student led activities which help the students to develop good communication skills, integrated personality and greater competitive spirit.

Introduction

Green Analysis can be defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity. The 'Green Audit' aims to analyses environmental practices within and outside the college campus, which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Analysis.

Objectives of the Study

The main objective of the green analysis is to promote the Environment Management and Conservation in the Institute Campus. The purpose of the analysis is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out Green Analysis are:

1. To introduce and aware students to real concerns of environment and its Sustainability.
2. To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use of the campus.
3. To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requiring high cost.
4. To bring out a status report on environmental compliance.

Audit Inclusions

- Green Audit and Remediation
- Landscape use and Applicability

Green Audit and Conservation

Definition

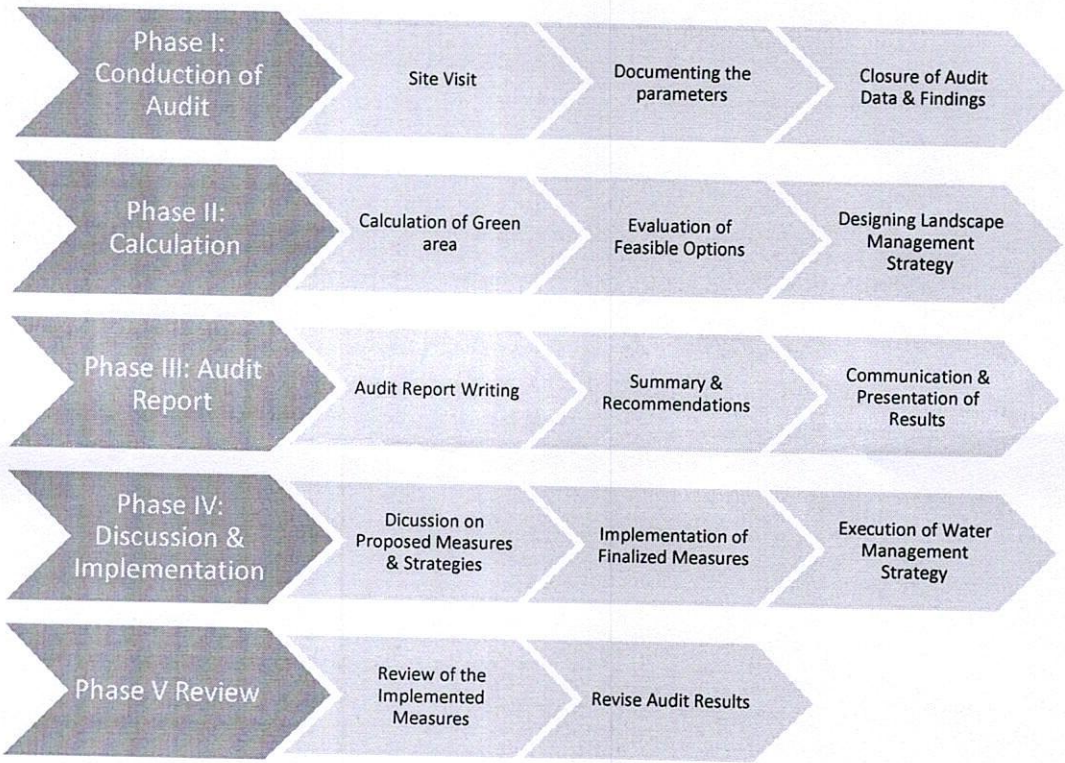
Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of institute. It aims to analyses environmental practices within and outside of the concerned place, which will have an impact on the eco-friendly atmosphere. Green audit is a valuable means for a college to determine how and where they are using the most energy or water or other resources; the college can then consider how to implement changes and make savings. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus it is

imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

Objective of the Audit

The main objectives of carrying out Green Audit are:

1. To map the Geographical Location of the college.
2. To document the floral and faunal diversity of the college.
3. To record the meteorological parameter of Mathura where college is situated.
4. To report the expenditure on green initiatives during the last five years.



Phase I: Conduction of Audit

At the beginning of green audit, it is must to observe the supply, storing & consuming facilities are provided on the site. The Green audit team commits to:

Conduct site visit to locate the water points & Map them

1. Locate the green landscapes
2. Mark Native plants
3. Compile the findings during visit
4. Notice conditions of water fixtures (dirty, stuck, leaking etc.)

Phase II: Calculation

After completion of site visit, the audit team performed calculation to analyses the acquired data with reference to local bye laws (in India: NBC 2016) as base line. This enables to determine whether the premise is covered with green and well shaded.

Based on the calculation, the landscape management strategies have to be define and implement in the respective premises.

Phase III: Audit Report

The team prepares detailed report based on procedure mentioned above. The audit report consists:

1. Observations done during audit
2. All the measurements, calculations
3. Summary and conclusions based on the calculations

Phase IV: Discussion & Implementation

After formation of audit report, the audit team will hold meeting with the respective project team to discuss the current and future scenario towards the landscape management. The key discussion points are:

Possible water conservation measures & their implementation in landscape.

Areas where water can be conserved like rainwater harvesting & wastage of water can be minimized. Later, the project team will implement the measures that are finalized in accordance to the discussion and meetings held with audit team.

Phase V Review

After the implementation of measures, the review and maintenance of the same is much needed. Because, the continuous monitoring of the measures can only justify and revise the water savings occurring in the premises.

The formation of "Sustainable Cell" in the premises will help in proper & continuous execution of the measures. This cell is also responsible to educate the occupants regarding effects of water management along with the finding and installing any new techniques at the project site.

Landscape Use

The baseline landscape consumption is calculated as 4.8 Liters/m^2/day. Whereas, the actual landscape requirement is done as per the plantation species/trees/turf grass. Also, during the actual calculation the annual impending rainwater is also considered.

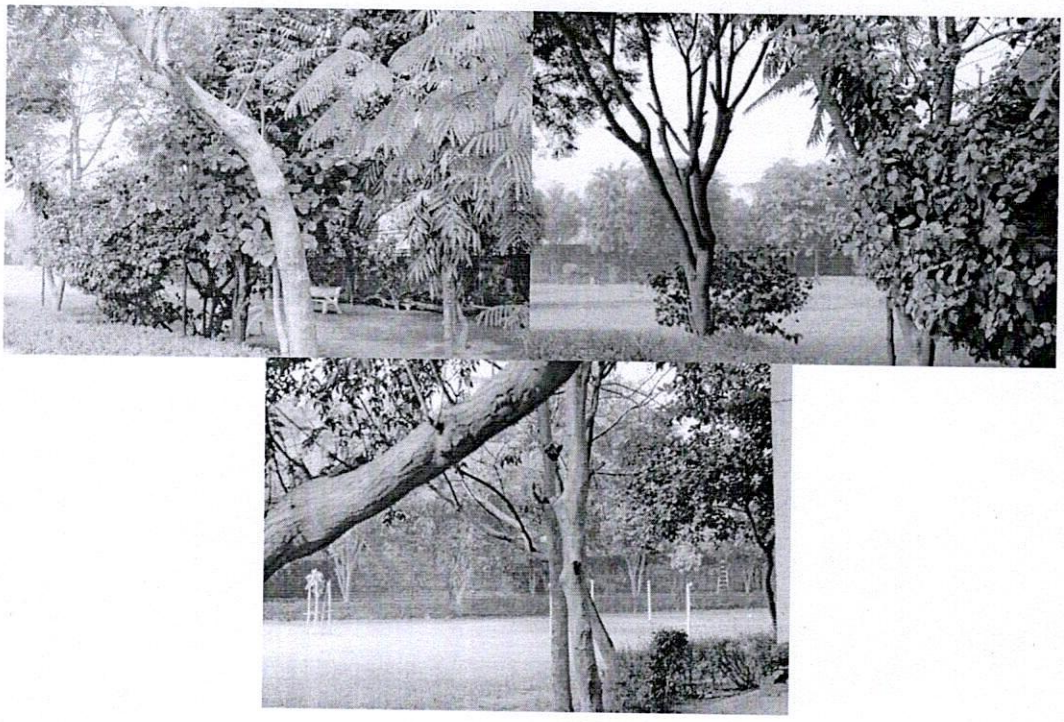
Landscape Area

S.N.	Location	Length(Feet)	Width(Feet)	Area(Sq.Feet)
1	In front of College	78.4	47.5	3724
2	Near Boy's Hostel	77.5	77.5	6006.25
3	In front of Canteen	91	76	6916
4	Left side of College	66.3	41.2	2731.56
5	Back side of College	111.1	73.6	8176.96
6	In-between A & B block	39.6	20.25	801.9
7	In front of E block	57.9	67.6	3914.04
8	Behind of E block	46	19.5	897

The total landscape area in the campus premises utilizes sprinklers and natural ditches to irrigate the green area which is more than of the total site area.

Landscape Watering Schedule

Month	No. of Days	Remarks
Apr-21	15	Alternate Days
May-21	16	
Jun-21	15	
Jul-21	6	Once in a Week
Aug-21	6	
Sep-21	10	Twice a Week
Oct-21	10	
Nov-21	10	
Dec-21	10	
Jan-22	10	
Feb-22	10	
Mar-22	15	Alternate Days



Different types of Plantations

Green Audit - Questionnaire

Which of the following are available in the institute?

1. Garden area	Available
2. Playground	Available
3. Kitchen	Available
4. Toilets	Available
5. Garbage or Waste Store Yard	Available
6. Laboratory	Available
7. Canteen	Available
8. Hostel Facility	Yes
9. Guest House	Not Available

Which of the following are found near your institute?

1. Municipal dump yard	Not in vicinity of institute
2. Garbage heaps	No, Garbage heap
3. Public convenience	Yes, public convenience is available
4. Sewer line	As per Govt. Rule
5. Stagnant water	No stagnant water
6. Open drainage	Yes
7. Industry (Mention the type)	No
8. Bus / Railway station	Faraway from Campus
9. Market/Shopping complex / Public halls	Yes

Greening the Campus

1	Is there a garden in your institute?	Yes, about 70% of Campus area are developed as open spaces
2	Do students spend time in the garden?	2-4 hours during winters
3	Total number of Plants in Campus	Trees (400 Approx.)
4	Suggest plants for your campus. (Trees, vegetables, herbs, etc.)	List attached
5	Number of Tree Plantation Drives organized by Institute per annum. (If Any)	Yes, Two Tree Plantation Drives Are Organized Annually. 500 trees and 250 shrubs planted in this financial year also it has a separate green group
6	Number of Trees Planted in Last FY	200
7	Survival Rate	75%
8	Plant Distribution Program for Students and Community	Yes, Saplings are distributed to Students and visitors at various Occasions
9	Plant Ownership Program	Various Trees are Planted and owned by Visitors as well as students.

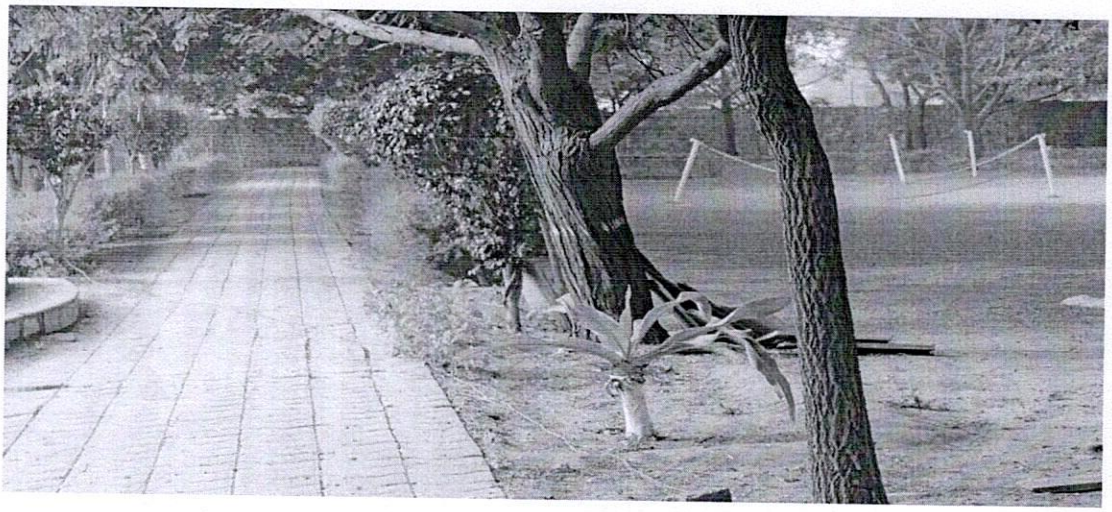
Passive Design Strategies

The physical planning norms addresses human settlements in terms of low rise with high density creating mutual shading, the hierarchy of common open spaces as courtyards used as public areas and also connecting one green space to another green thus creating walk able and cyclable Campus. The passive planning in terms of use of natural terrain and using low profile contoured land as storm water resource management evolving through the natural water resource features such as wells. A tested process through many eras of civilizations to be adopted in modern eras as part of integrated planning.

Existing shading at Campus

Heat Island Effect

An urban heat island is an urban area or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities. The temperature difference is usually larger at night than during the day, and is most apparent when winds are weak. Eshan is quite successful in reducing this effect with the passive design strategies. There are many locations in the Institute that has reduced heat effect and enhanced the livability of the spaces around. The images below show the same.

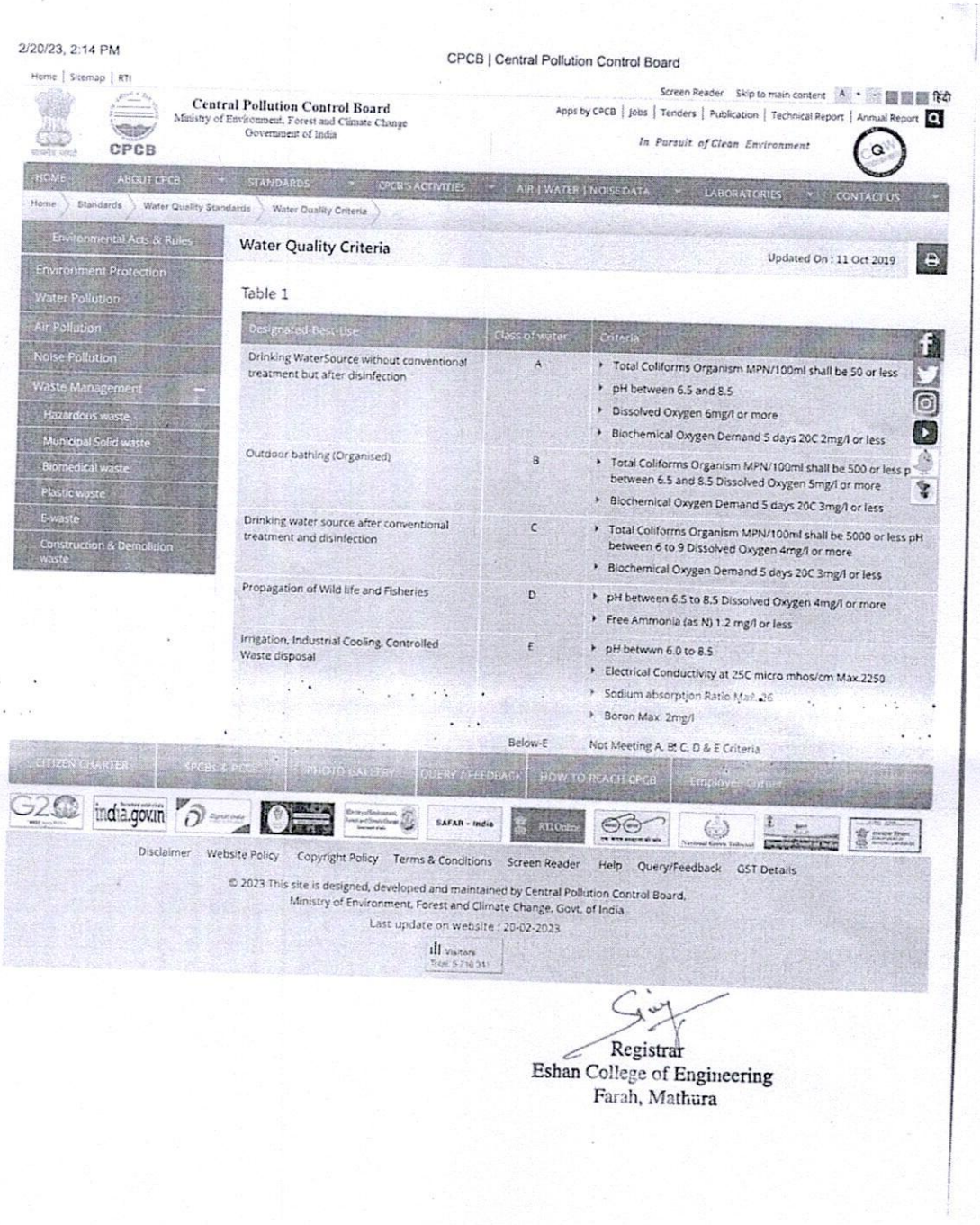


Reduced Head Island effect at Site

Landscape Best Practices

The Campus consists of 522720 sq. ft. of landscape area which is 16% meets the requirement of landscape area requirement of minimum 10% of the total site area. Native plant /adaptive/drought tolerance species are covering around 84% of landscape area and meet the essential requirements.

Water Quality Criteria



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- Water Pollution
- Air Pollution
- Noise Pollution
- Waste Management
  - Hazardous waste
  - Municipal Solid waste
  - Biomedical waste
  - Plastic waste
  - E-waste
  - Construction & Demolition waste

Water Quality Criteria

Updated On : 11 Oct 2019

Table 1

Designated-Best-Use	Class of water	Criteria
Drinking WaterSource without conventional treatment but after disinfection	A	• Total Coliforms Organism MPN/100ml shall be 50 or less • pH between 6.5 and 8.5 • Dissolved Oxygen 6mg/l or more • Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	• Total Coliforms Organism MPN/100ml shall be 500 or less p between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more • Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	• Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more • Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	• pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more • Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	• pH betwwn 6.0 to 8.5 • Electrical Conductivity at 25C micro mhos/cm Max.2250 • Sodium absorption Ratio Max. 26 • Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

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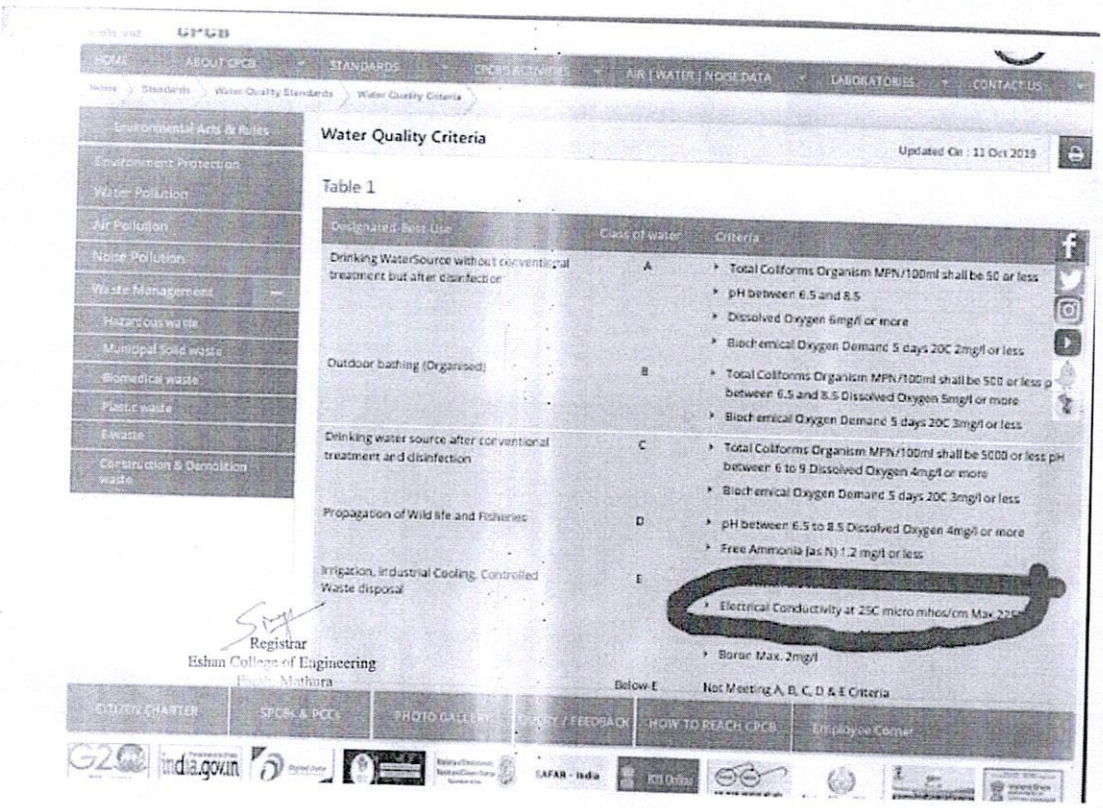

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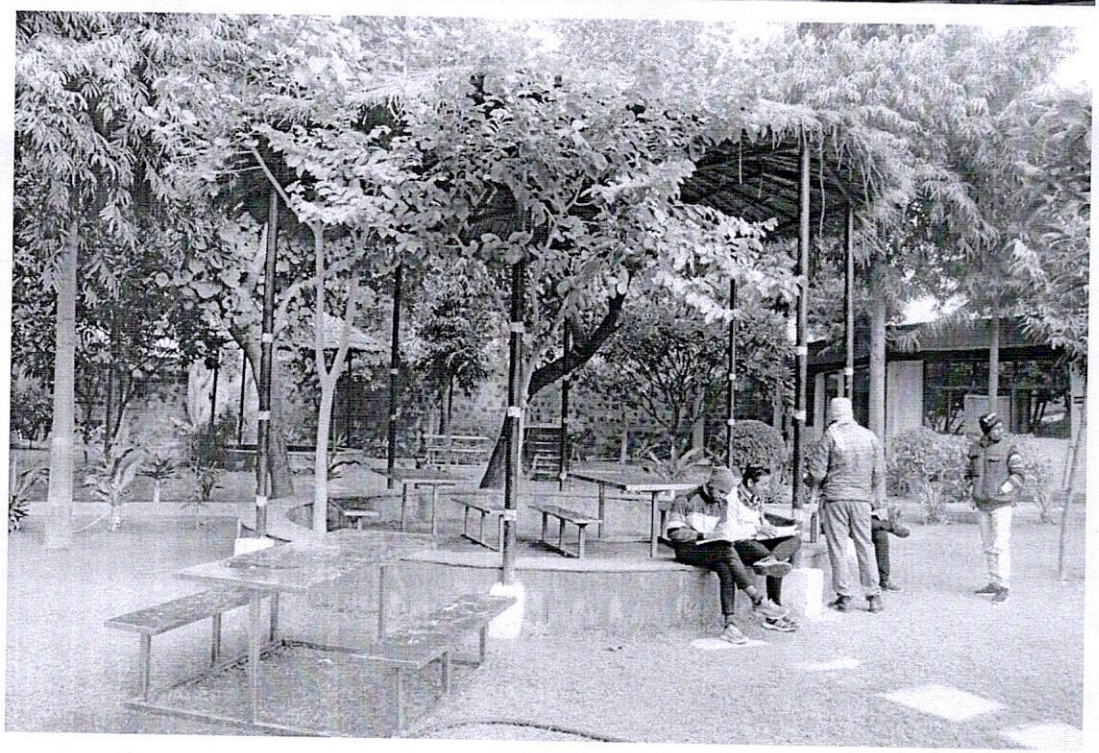
Green Campus



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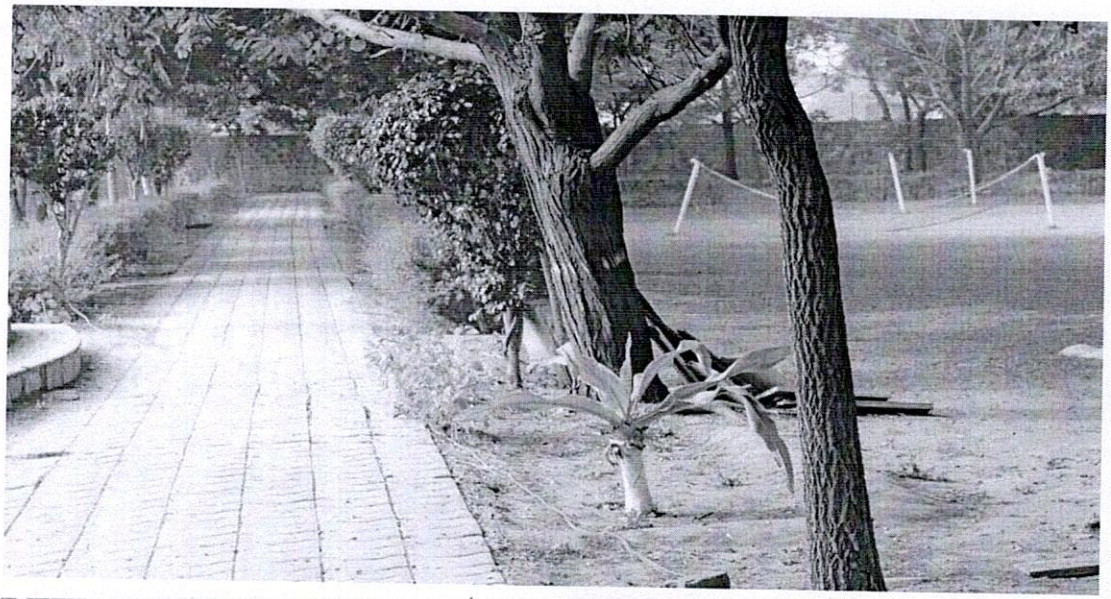

Green Campus

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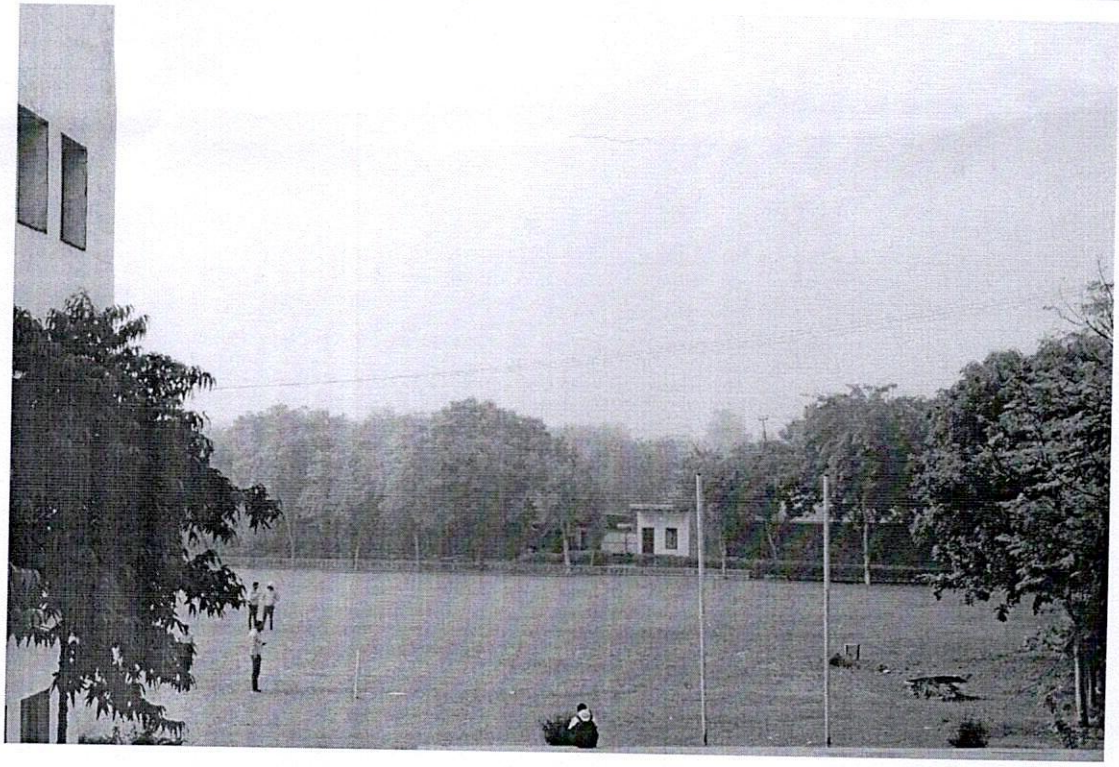


Landscape Water Usage

Irrigation

The present irrigation system is sprinkler which is one of effective way to save water, better yield and possibility of using soluble fertilizers and chemicals less problem of clogging of sprinkler nozzles due to sediment laden water.

Recommendations

Pebbles near the hard cape not only store water and provide to the rainwater harvesting system but also maintain the landscape decorum. The use of such measure in landscape reduces the grass area and its related water demand. Water the plants in early morning or late evening to reduce evaporation loss.

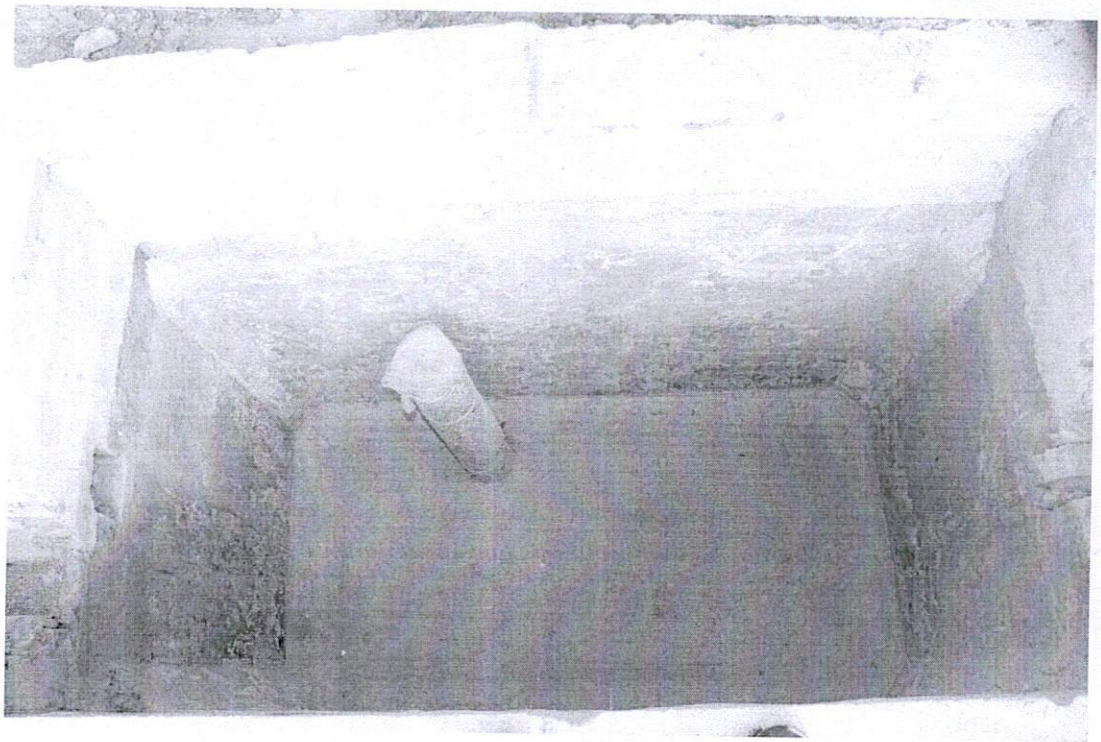
Xeriscaping should be promoted at site. Xeriscaping is a method of garden design that involves choosing of plants that can be maintained with little supplemental watering. With a little common sense and aesthetics, landscape can be organized in harmony with the site by using drought tolerant plant species and mulch material in a way to minimize the water use.

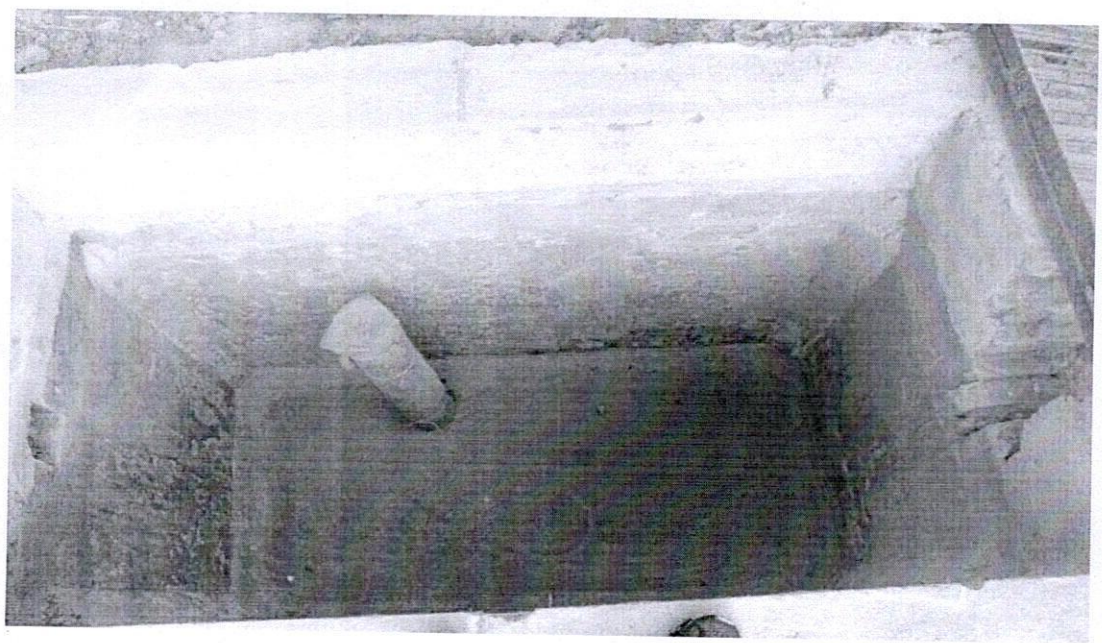
Rainwater Harvesting Pit

One of medium of harvesting rainwater is providing the incoming rainwater directly to the ground. This will increase the ground water table of the location and also helps in achieving the ground water at same or at less level than the existing level, Further the rainwater is reused in the landscape of Eshan campus.

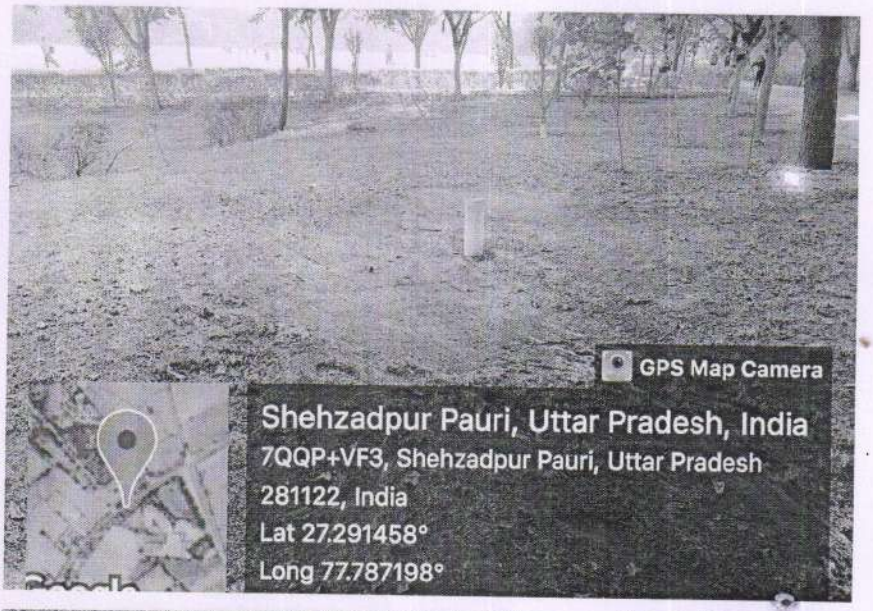
S. N.	Name	Quantity (Nos)	Location
1	Rainwater Harvesting Tank 1	1	Near Temple
2	Rainwater Harvesting Tank 2	1	Near Chemistry Lab
3	Rainwater Harvesting Tank 3	1	Behind Washroom
4	Rainwater Harvesting Tank 4	1	Host

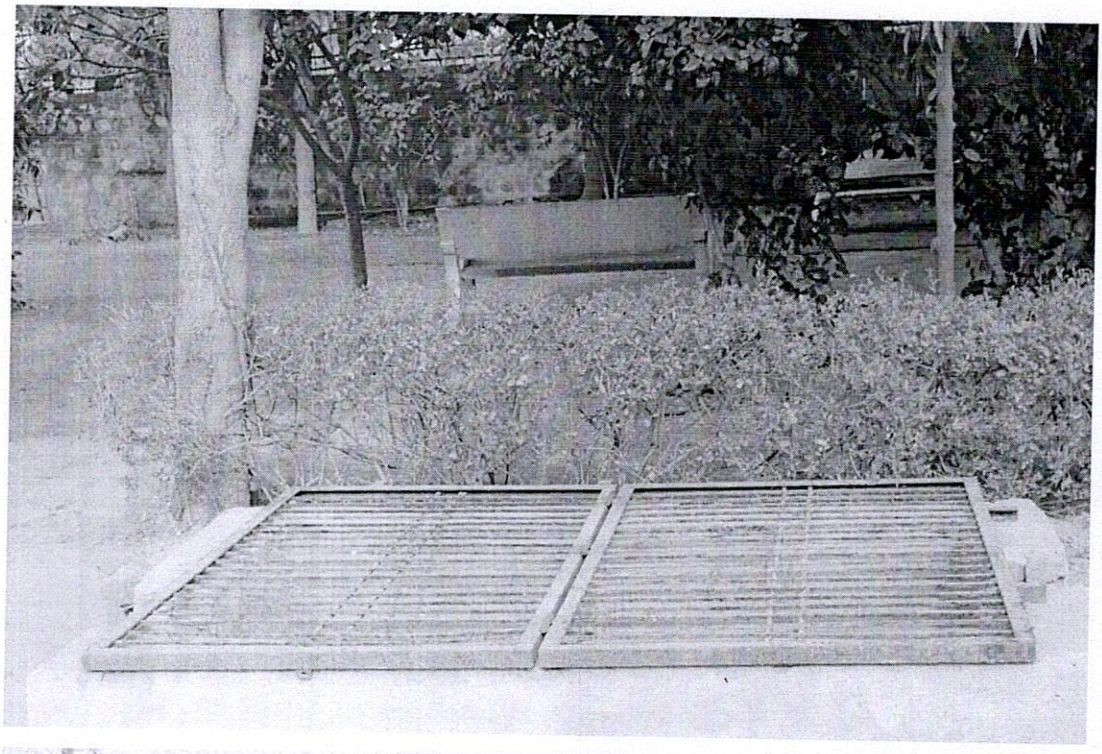
Rain Water Harvesting System during Construction

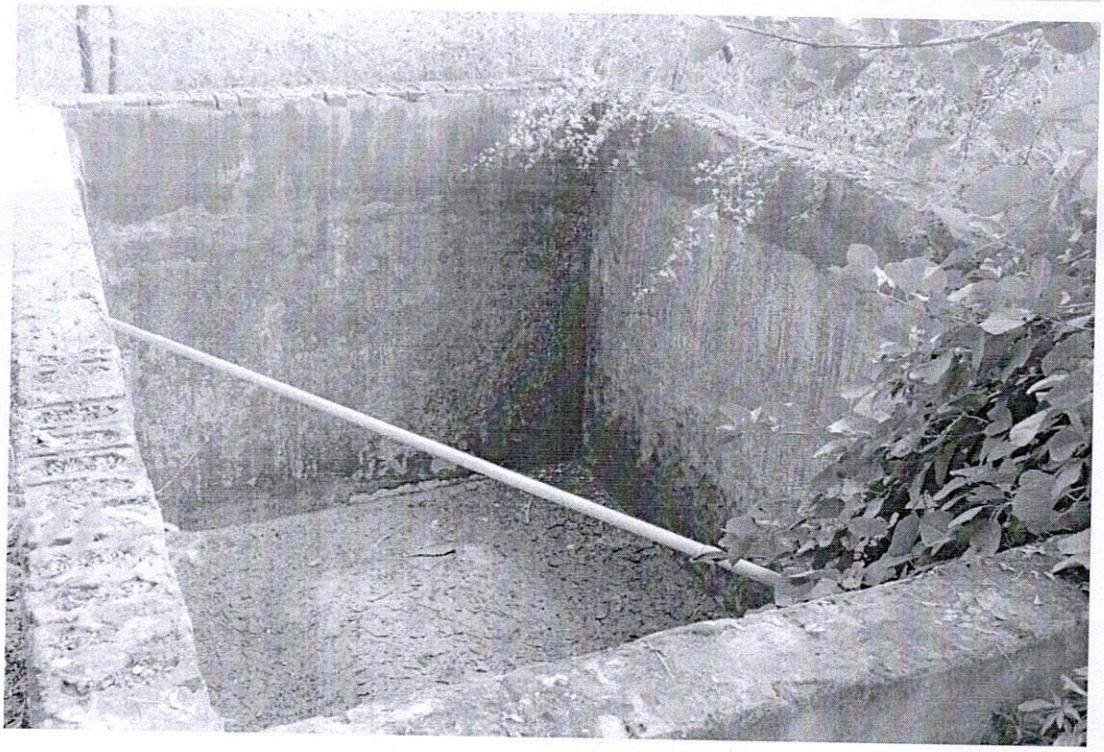




Rain Water Harvesting System after Construction







Observations

Matching with the green and sustainable practices, the Institute campus has facility for RO drinking water points, solid waste management system and separate parking facilities for 2 and 4 wheelers. Around 70 percent of the total campus area is covered with lush green lawns & plantation covering more than 1500 plants & tree species, thus giving pure oxygen to our students and making campus a treat to eyes.

Conclusions

Considering the diversity of Eshan College of Engineering, there is significant environmental research both by faculty and students. The environmental awareness initiatives are substantial. The installation of solar panels and rain water harvesting system are noteworthy. Besides, environmental awareness program initiated by the administration shows how the campus is going green. Few recommendations are added to curb the menace of strategic management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus & thus sustainable environment and community development.

List of Trees with Name and Quantity

Annexure – I

S. N.	Species Name	Quantity
1	PEEPAL	5
2	WAKAD	27
3	GULMOHAR	11
4	KESHIYA	15
5	PAKHAR	20
6	KANJI	22
7	PAPRI	10
8	NEEM	49
9	FAKISH	25
10	KADAM	6
11	ASHOK	23
12	PLASH	3
13	SASAT	4
14	CHAMPA	23
15	ARJUN	13

S. N.	Species Name	Quantity
16	MAHUA	1
17	VOTAL VARUSH	6
18	MOR CHALLI	3
19	BOTIL MAN	2
20	TIKOMA	16
21	DULLE RAJA	4
22	ANWLA	3
23	NIBU	7
24	KARONDA	5
25	JAIWAN	10
26	KACHNAR	9
27	KHINNI	5
28	BARGAD	2
29	SHEESHAM	2
30	PANHA	22