CAUVERY COLLEGE FOR WOMEN
(Autonomous)
TIRUCHIRAPPALLI

ENVIRONMENT AUDIT REPORT

2023 – 2024

CENTRE FOR ENVIRONMENTAL SUSTAINABILITY
DEPARTMENT OF ENVIRONMENTAL SCIENCES
Bishop Heber College (Autonomous)
Tiruchirappalli, Tamilnadu – 620 017

CAMPUS ENVIRONMENT AUDIT CERTIFICATE

Issued under the Green Campus Certification Process

CENTRE FOR ENVIRONMENTAL SUSTAINABILITY

ENVIRONMENTAUDIT

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Annamalai Nagar, Woraiyur,
Tiruchirappalli District Tamilnadu – 620018

Has successfully conducted the **ENVIRONMENT AUDIT** in accordance with the Sustainable Development Goals (SDGs) and standards of regulatory agencies in India.

Based on the Scope of Environment audit we hereby acknowledge and certify that:

The Management, Teaching fraternity, students, and support staff of the **Cauvery College for Women (Autonomous)** have taken efforts to create a strategic change in attaining holistic Environmental Sustainability.

Period of Audit : 2023 – 2024

Date of Certification : 22 March 2024

Prof. A. Alagappa Moses
Ecology and Biodiversity Consultant
Functional Area Expert - NABET

A. Alagappa Moses
Empanelled Expert, FAE
Eco Services India Private Limited
Approved Function Area/s : EB (A)

CAMPUSENVIRONMENT AUDIT
CentreforEnvironmentalSustainabilityDepartmentofEnvironmentalSciencesBishopHeberCollege(Autonomous)Tiruchirappalli,Tamilnadu

TowardsCleanandGreenCampus

CAMPUS GREEN AUDIT

Prof. A. ALAGAPPA MOSES Principal Consultant **Functional Area Expert** **Ecology and Biodiversity (EB)**	**Vice Principal** Associate Professor and Head Department of Environmental Sciences Bishop Heber College (Autonomous)
Accredited by Quality Council of India – NABET **Category A** Projects *(vide AC MOM III, 2010, QCI, NABET, New Delhi)* SA- 270th AC Meeting February 28 ,2020_Rev.01 NABET ACM Dated 6 Jan 2023, RA2, Version 3	

Dr. D. J. S. ANAND KARUNAKARAN Energy Auditor	Associate Dean, IQAC Associate Professor, Department of Physics Bishop Heber College (Autonomous)

Dr. R. TENESON Flora and Fauna|Air|Noise	Assistant Professor Department of Environmental Sciences Bishop Heber College (Autonomous)

Ms. T. AJAYLA KARTHIKA Land, Solid | E-waste	Research Scholar Department of Environmental Sciences Bishop Heber College (Autonomous)

Ms. A. ADELINE NICKIETA Water and Wastewater	Research Scholar Department of Environmental Sciences, Bishop Heber College (Autonomous)

Mr. S. MAHALINGAM Laboratory | Field Assistant	Department of Environmental Sciences, Bishop Heber College

PREFACE

An Environmental Audit is a tool comprising a systematic, documented, periodic and objective evaluation of how well a project, organization or equipment is performing with the aim of helping to safeguard the environment. The audit should facilitate management control of environmental practices and assess compliance with policy objectives and regulatory requirements.

A clean and healthy environment aids effective learning and provides a conducive learning environment.

Green audit is an official examination of the effects a college on the environment. It helps to improve the existing practices with the aim of reducing the adverse effects of these on the environment concerned.

Higher Educational Institutions are committed to preserve the environment within the campus through promotion of energy savings, recycling of waste, water use reduction, water harvesting etc.

Green audit visualizes the documentation of all such activities taking stock of the infrastructure of the college, their academic and managerial policies and future plans in the form of an environmental audit report.

Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of green impact on campus.

Green audit promotes financial savings through reduction of resource use. It gives an opportunity for the development of ownership, personal and social responsibility for the students and teachers. 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 relevant.

The audit process in Cauvery College for Women, Tiruchirappalli involved initial interviews with management to clarify policies, activities, records and the co-operation of staff and students in the implementation of mitigation measures. Staff and students were given training how to collect the data for the green audit process. This was followed by staff and student interviews, collection of data through the questionnaire-based survey, review of records, observation of practices and observable outcomes. In addition, the approach ensured that the management and staff are active participants in the green auditing process in the college.

The baseline data prepared for the College will be a useful tool for campus greening, resource management, planning of future projects, and a document for implementation of sustainable development of the college. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects. The green audit reports assist in the process of attaining an eco-friendly approach to the sustainable development of the college.

The results presented in the green audit report will serve as a guide for educating the college community on the existing environment related practices and resource usage at the college as well as spawn new activities and innovative practices. The Green Audit team expects the management to express their commitment to implement the recommendations.

CONTENTS

CHAPTER I

INTRODUCTION

The Reddy Educational Trust, Tiruchirappalli formed in the year 1984 with 48 members, enlightened and interested citizens of Tiruchirappalli district coming from various walks of life - Educationists, Lawyers, Doctors, Chartered Accountants, Entrepreneurs (representing sectors like Hospitality, Transportation etc), Public representatives, Former Ministers and Legislators felt the need to start one more college for women (at that time there was only two women's college) at Tiruchirappalli.

The Trust sought the permission of the Government of Tamilnadu to start an Arts and Science College for Women at Tiruchirappalli. The Government in its G.O.M.S. No.1298 Higher Education dated 01.10.1984 accorded permission to start one of the first self-financing colleges in Arts and Science in the State of Tamilnadu.

Bharathidasan University the Parent University gave its affiliation in its Lr.No.Aca/188/84 dated 12.10.1984 with 2 Under Graduate Courses, B.Com and B.Sc., Mathematics.

The Cauvery College for Women thus bloomed on 17.10.1984 with 40 students in B.Com., The College as on date (2021-2022) is offering 16 Under Graduate Programmes, 10 Post Graduate Programmes and 8 Research Programmes with a total student strength of 5100.

The college has been recognized by the University Grants Commission under Sec.2(f) and 12(B) of UGC Act 1956 in its Lr.No.F.8-111/2003(CPP-I) dated 11.12.2003. Autonomous status is conferred by UGC on 14.03.2019

The NAAC has awarded "A" Grade to the college consecutively. The college is recognized by NAAC as a Mentor Institution to identify the non-accredited colleges in our vicinity and motivate them for NAAC Accreditation.

The college has a well-equipped fully automated library which has 41,375 volumes of books, 100 Journals and 62 Magazines including 20 International Journals. We have high-tech lab facilities for all science courses and we have 557 computer terminals and 13 servers to meet the needs of our students. Other notable facilities includes KRT Seminar Hall with a seating capacity of 400, Muthu Lakshmi Reddy A/C Seminar Hall, modernized Internet lab and O.P. Ramasamy Reddiar Auditorium which is one of its kind with a seating capacity of 3000. The college has a well-equipped modern hostel for accommodating 1500 students. The main focus of the college is to run an institution not only for academic excellence but also a center which brings out the latent histrionic talents in them.

Fig. 1: The College Emblem

The College coat of arms heralds six symbols of ethnicity and pride.

1. At its heart, the coat of arms bears the image of the Rockfort, which symbolizes the geographical and cultural heritage of the city.

2. A full bloomed lotus with a book on its top symbolizes intellectual blossoming and sustaining the purity of mind in the midst of adversities. The college is christened after the perennial river Cauvery which symbolizes youth, freshness, vigour and fulfillment.

3. The legendary 'Rajagopuram' of the Srirangam Temple is the tallest gopuram in Asia and stands as a representation of lofty thoughts and deeds which the institution presents.

4. The five faced lamp – "Kuthuvilakku" is a metaphoric representation of the light of knowledge dispelling the darkness of ignorance.

5. The college aims to provide academic excellence, employability and self reliance. This aim of the institution is represented by the image of a graduated scholar.

6. The motto of the college is "Karka", "Nirka", which is inscribed in classical Tamil language. It is the essence of the famous Thirukkural couplet 391 written by the classical poet Thiruvalluvar. "Karka" means 'to acquire' (learning / knowledge) "Nirka" means 'to adopt, to apply' (the acquired learning).

Holistically, the coat of arms stands for the empowerment of girls, who bloom and blossom inspite of adversities, graduate and aglow with the power of the acquired knowledge and conduct themselves accordingly, there by bringing glory to the institution, to the society and to the nation at large.

VISION AND MISSION

THE VISION

Our vision is to promote Academic Excellence, inculcate qualities of Competence, Confidence and Excellence for Employability and develop into Self Reliant individuals.

THE MISSION

- To impart higher education to Women Students from local and rural areas.
- To inculcate knowledge of higher order and to instill a scientific approach in the students about information technology.
- To make our wards aware of Entrepreneurial Development.
- To impart skills to the level of excellence and thus present a value system in the youth entrusted to us.

THE OBJECTIVES

- To empower students to participate in social, cultural and economic spheres and contribute positively to the upliftment of the society.
- To promote academic excellence by adopting customized learner focused/centered methodologies.
- To develop to be self-reliant and competent women by tapping and nurturing their potential through curricular and extracurricular activities.
- To provide skilled manpower by imparting on in-depth knowledge and keeping abreast with changing trends in technology.
- To inculcate the spirit of nationalism, uprightness and self confidence enabling them to become responsible members of the society and useful citizens of the nation.

CHAPTER II

CAMPUS ENVIRONMENTAL AUDIT

2.1 Campus Environmental Audit

An Environmental Audit is a tool comprising a systematic, documented, periodic and objective evaluation of how well a project, organization or equipment is performing with the aim of helping to safeguard the environment. The audit should facilitate management control of environmental practices and assess compliance with policy objectives and regulatory requirements. (European Environment Agency, European Commission 1999, Brussels).

Environmental auditing is a systematic, documented, periodic and objective process in assessing an organization's activities and services in relation to:

- Assessing relevant statutory and internal requirements
- Facilitating understanding of good environmental practices
- Promoting good environmental management
- Maintaining credibility with the public/clients
- Raising staff awareness and commitment to departmental environmental policy
- Exploring improvement opportunities
- Establishing the performance baseline for developing good sustainable practices.

2.2 Green Audit towards Sustainable Development

Sustainable Development (SD) is one of the biggest challenges of the twenty-first century and there can be no sustainability where educational institutions (Universities, Institutions of Higher Education, and Schools) promote un-

sustainability. In modern society 'No institutions are better situated and more obliged to facilitate the transition to a sustainable future than schools, Colleges and Universities'.

Sustainable Development Goals (SDGs)

The 17 Sustainable Development Goals and 169 targets which has been proposed demonstrates the scale and ambition of this new universal agenda. They seek to build on the MDGs and complete has not been achieved. They seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and Girls. They are integrated and in and indivisible and balance the three dimensions of Sustainable Development: the economic, social and environmental. The Goals and Targets will stimulate action over the next 15 years in areas of critical importance for humanity and the planet.

Fig. 2: SUSTAINABLE DEVELOPMENT GOALS

In spite of a number of SDGs and an ever increasing number of Universities / Institutions of Higher Educations and Schools becoming engaged with the principles and concepts of SD, especially in the developed world, most of them to be traditional in India.

2.3 Environmental Audit

Environmental auditing has become a valuable tool in the management and monitoring of environmental and sustainable development programmes. The information generated from audit exercise provides important information to many different stakeholders.

Although seen primarily as a tool in commerce and industry, creative application of environmental auditing techniques can improve transparency and communication in many areas of society where there is a need for greater understanding of environmental and ecosystem interactions. The environmental audit is a systematic process that must be carefully planned, structured and organized. As it is part of a long term process of evaluation and checking, it needs to be a repeatable process which can be readily replicated and can reflect change in both a quantitative and qualitative manner.

Universities and Colleges are regarded as “Small Cities” due to their size, population and the multifarious activities, which have some serious direct and indirect impacts on the local environment.

2.4 Campus Green Audit

The campus environmental audit is a common tool that many colleges and universities have employed in recent years. A campus environmental audit is both a summary and a report card for a campus and a way to evaluate where and how resources are being used. An environmental audit is also the first step in being able to quantify whether or not current and/or future environmental efforts are actually making a difference. As such, an environmental audit is the beginning of the sustainability planning process. The results can be used to quantify what kinds of impacts the campus community has on the environment and what steps the college can take to reduce these impacts.

2.5 Green Audit

Green Audit is defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity. The 'Green Audit' aims to analyze environmental practices within and outside the Institute, which will have an impact on the eco-friendly ambience and sustainable ecosystem. It is a useful tool that can be used to understand existing practices and resource use to highlight the prospects of introducing resource efficiency in the ecosystem. Green audit provides cognizance on scope for improvement of environment and ecosystem of the campus. Thus, it is imperative that Cauvery College evaluate its own status on environmental sustainability and contributes towards sustainable future.

2.6 Pre-Audit Stage

The process of Green Audit started with a pre-audit meeting that has provided an opportunity to reinforce the scope and objectives of the audit. The deliberations focused on the procedures to be followed in conducting the audit. This meeting is an important prerequisite for conducting green audit as it provides the first opportunity to meet and interact with the auditee and deal with any matters of concerns. The audit protocol and audit plan were discussed in detail and a Green Audit team was constituted with a staff adviser and student members.

a) Preliminary literature review of concepts and methodologies related to green audit.

b) Discussion with the management staff on various systems installed in the campus.

c) Awareness creation and interaction with the staff and student on the concept of green audit. Walk through the entire campus to understand the nature of water use, energy use and waste management systems in the campus.

2.7 Commitment of the College

The College has shown the commitment and keen interest towards conducting green audit and encourages green practices. The College is committed towards Education for sustainability and implementation of sustainable strategies, reducing carbon foot print and effective utilization of waste into wealth.

2.8 Goals and Objectives

The goal of Green audit is *"Ensuring Environmental Sustainability (EES) through reducing environmental foot print such as carbon, water, food, and land, management and conservation of the natural resource base, and the orientation of Education for Sustainable Development (ESD) by evolving Institutional policies on various environmental attributes in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations".*

2.9 Objectives:

- To evolve institutional policies on various environmental attributes such as water, waste and sanitation and to assess the patterns of consumption of energy and water
- To measure the quantum of generation of wastes and hazardous substances
- To evaluate the level of awareness among the students regarding environmental resources
- To inculcate the concepts of 5 R principle such as Reduce, Refuse, Recover, Recycle and Repurpose among the stakeholders, thus making the organization as a better steward,
- To implement environmental management strategies so as to reduce overall environmental foot print.

2.10 Benefits of the Green Auditing

• More efficient resource management
• To provide basis for improved sustainability
• To create a green campus
• To enable waste management through reduction of waste generation, solid- waste and water recycling
• To create plastic free campus and evolve health consciousness among the stakeholders
• Recognize the cost saving methods through waste minimizing and managing
• Point out the prevailing and forthcoming complications
• Authenticate conformity with the implemented laws
• Empower the organizations to frame a better environmental performance
• Enhance the alertness for environmental guidelines and duties
• Impart environmental education through systematic environmental management approach and Improving environmental standards
• Benchmarking for environmental protection initiatives
• Financial savings through a reduction in resource use
• Development of ownership, personal and social responsibility for the College and its environment
• Enhancement of college profile
• Developing an environmental ethic and value systems in youngsters.
• Green auditing should become a valuable tool in the management and monitoring of environmental and sustainable development programs of the college.

2.11 Modules Campus Green Audit

Campus Green Audit (CGA) is a process of resource management. They are individual modules carried out in a defined interval illustrating an overall improvement or change in the institution over a period of time. The concept of Eco-friendly campus mainly focuses on the efficient use of energy and water; minimize waste generation, economic efficiency and reduction in environmental foot print. All these indicators are assessed in the process of Campus Green Audit. The CGA promotes conservation energy, water and waste management. The audit stages are as follows:

Stages of Audit

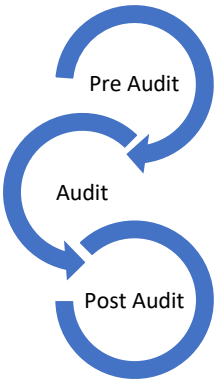


Fig 3: Stages of Audit

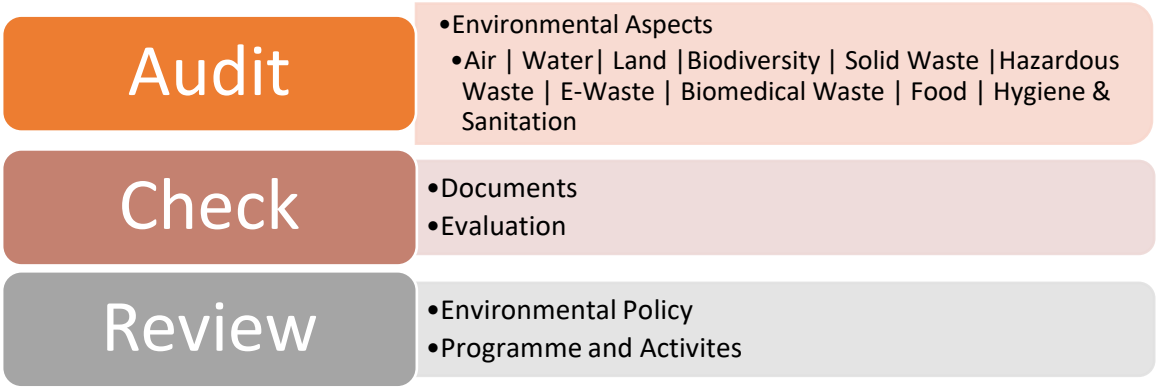


Fig. 4: Audit Stage

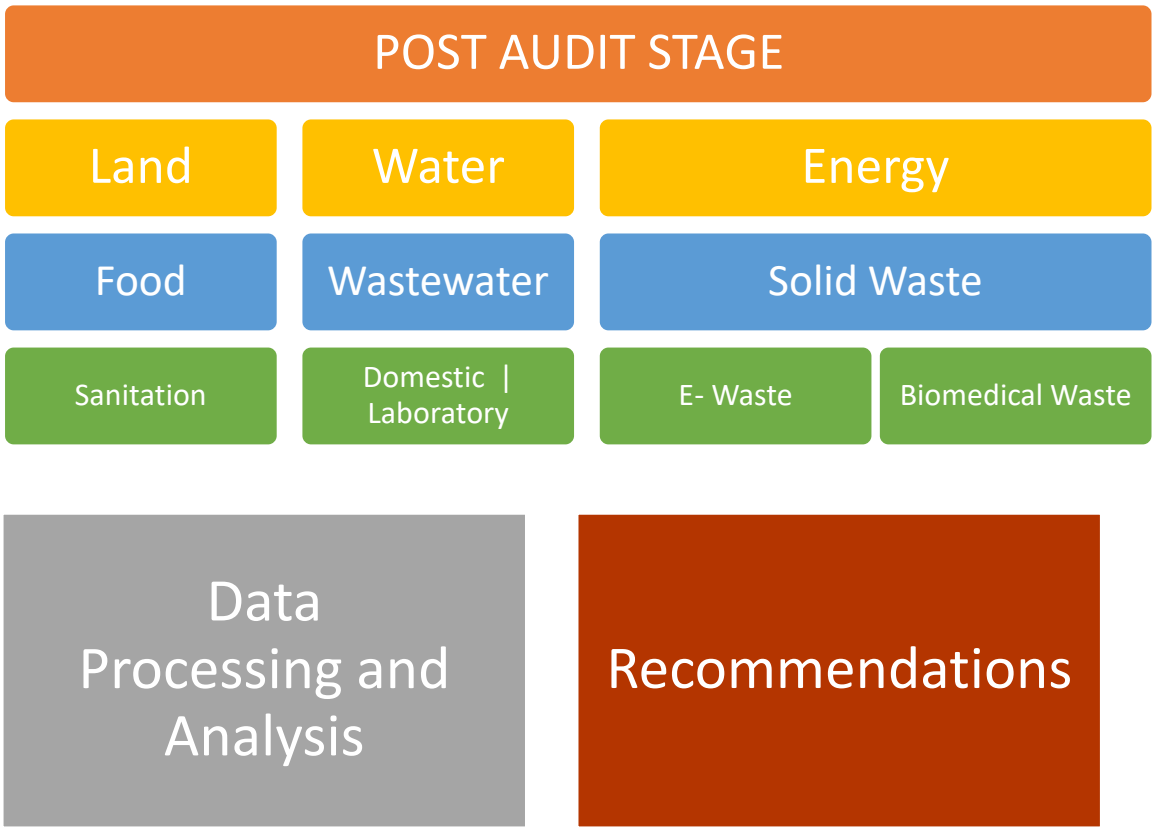


Fig. 5: Post-Audit Stage

CHAPTER 3

METHODOLOGY

3.1 Methods

The data pertaining to various aspects of the environment were collected from primary and secondary sources as per the work sheets. (Annexures – I).

Environmental Aspects

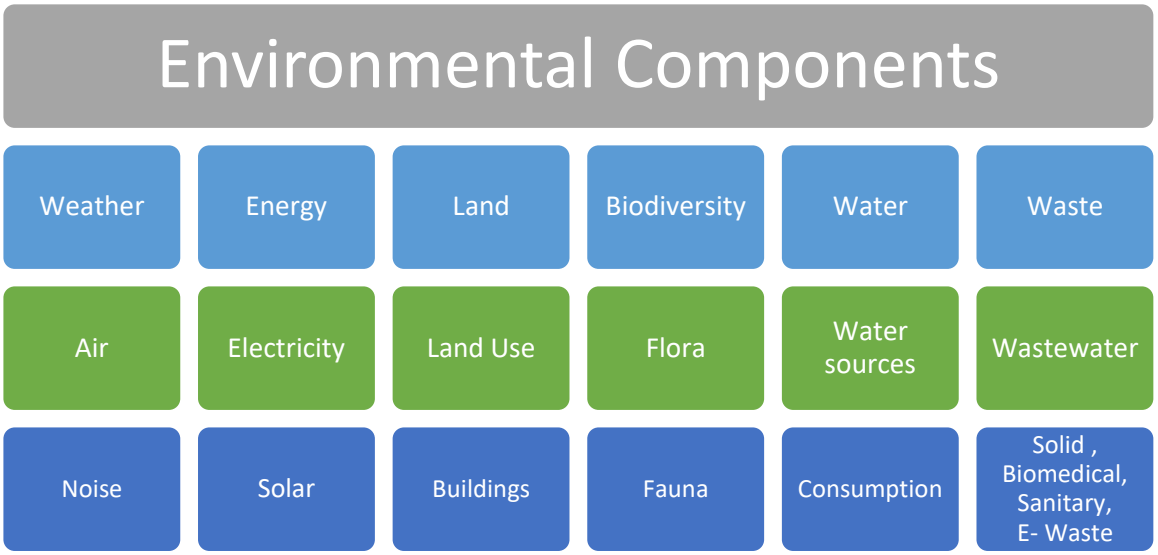


Fig. 6: Environmental Aspects

Work Sheet 1 - WATER AUDIT

Campus Water Profile

Storage Tanks in the College

Number and Location of Bore Wells

Water consumption

WORK SHEET 2: LAND AUDIT

Land at a Glance (Area in Sq. M).

Classification Scheme for Land Use Analysis of Built Up Area

Land Use Data

Total Green Cover

Built-Up Area of the Campus

WORK SHEET 3 : WATEWATER

Wastewater Discharge from the campus

WORK SHEET 4: WASTE

- Waste Audit
- Biodegradable /Wet waste
- Dry / Recyclable waste
- Domestic Hazardous Waste
- Types of E-Waste
- Total Quantity of E-Waste
- Biomedical Waste
- Sanitary Waste
- Construction and Demolition Waste

WORK SHEET 5: WASTE COLLECTION

- Waste Collection Points in your College
- Total Quantity of Waste Treated
- Waste Recycling Practices followed in College

CHAPTER 4

ENVIRONMENT AUDIT

The Campus Environment Audit was carried out by the Post Graduate and Research Department of Environmental Sciences, Bishop Heber College (Autonomous), Tiruchirappalli, Tamilnadu. The audit team constituted by the management during the pre-audit has done extensive data collection covering all the modules of green audit. The Campus Green Audit team comprises of Co-ordinators, Staff in-charge for each module and student volunteers.

4.1 Campus Green Audit Team

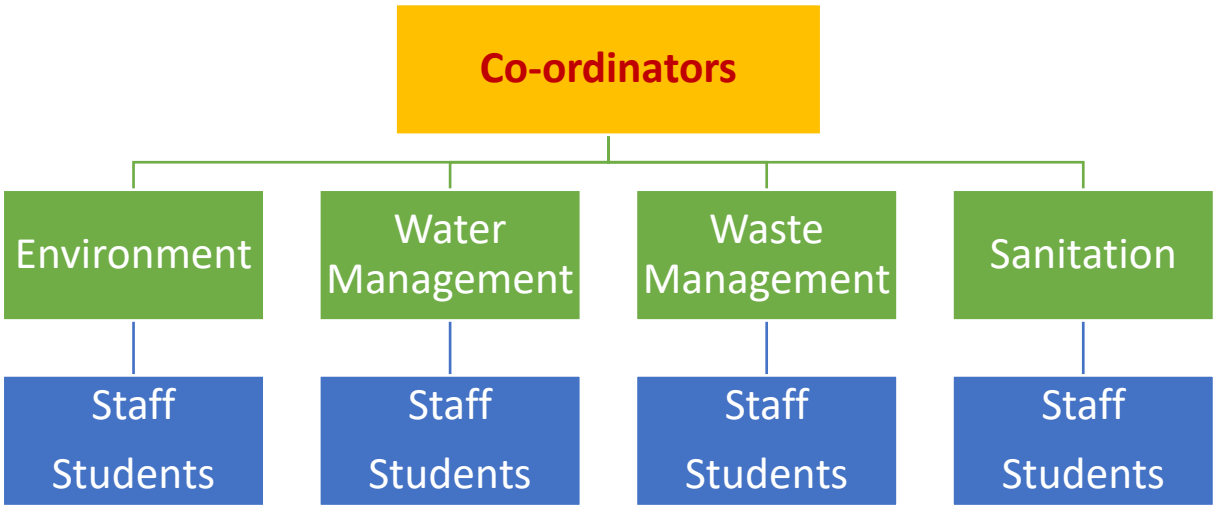


Fig. 7: Campus Environment Audit Team

Assessment Team Coordinators

Table 1: Campus Green Audit Team: 2023 – 2024

S.No.	Name	Designation	Department	Aspect
1.	Dr. R. Merlin Packiam	Professor	Computer Applications	Team Head
I	**Green Audit**			
2.	Dr. S. Sasikala,	Associate Professor	Mathematics	Land
3.	Dr. M. Keerthiga	Assistant Professor	Biotechnology	Flora and Fauna

II	**Environment Audit**			
4.	Ms. P. Thangamani	Assistant Professor	Business Administration	Air & Noise
5.	Ms. P. Thamizhini	Assistant Professor	Chemistry	Water
6.	Ms. P. Thamizhini	Assistant Professor	Chemistry	Waste water
7.	Dr. E. Priya, Dr. J. Prabha and Ms. B. Lavanya	Assistant Professor	Microbiology Commerce Commerce	Solid & E-Waste
8.	Ms. N. Ganga Devi	Assistant Professor	FSM&D	Food
III	**Energy Audit**			
	Ms. D. Devi	Assistant Professor	Physics	Energy
IV	**Campus Hygiene**			
9.	Dr. E. Priya	Assistant Professor	Microbiology	Campus Hygiene

Land Audit Team

Environmental Aspect	**Land**
Name of the Coordinator	Dr. S. Sasikala
Designation and Department	Associate Professor of Mathematics

Audit Team –Students /Scholars

S.No	**Name of The Students**	**Class**	**Department**
1.	K. Saranya	II M. Sc.,	Mathematics
2.	N. Abirami	II M. Sc.,	Mathematics
3.	R.Dhilothama	II M. Sc.,	Mathematics
4.	M.Harini	III B. Sc.,	Mathematics
5.	R.Kaviya Dharsheni	III. B. Sc.,	Mathematics

Flora and Fauna Audit Team

Environmental Aspect	**Flora and Fauna**
Name of the Coordinator	Dr. M. Keerthiga
Designation and Department	Assistant Professor of Biotechnology

Audit Team –Students /Scholars

S. No.	Name of The Students	Class	Department
1.	V. Gowsalya	II B. Sc.,	Biotechnology
2.	S. Hemalatha	II B. Sc.,	Biotechnology
3.	P. Nivekitha	II B. Sc.,	Biotechnology
4.	C. Kanmani	I. B. Sc.,	Biotechnology
5.	N. Karthika	I B. Sc.,	Biotechnology

Air and Noise Team

Environmental **Aspect**	**Air and Noise**
Name of the Coordinator	Ms. P. Thangamani
Designation and Department	Assistant Professor Business Administration

Audit Team –Students /Scholars

S.No	Name of the Students	Class	Department
1.	L.Dhiyasri	III BBA	Business Administration
2.	P.Princy		
3.	K.Kiruthiga		
4.	B.Shobika		
5.	S.Suvetha		

Food Team

Environmental Aspects	Food
Name of the coordinator	MS. N.Ganga Devi
Designation and Department	Assistant Professor FSM&D

Audit Team –Students /Scholars

S.No	Name of The Students	Class	Department
1.	R. Vijayalakshmi	II M.Sc .	FSM&D
2.	M. Abinaya	II M.Sc.	FSM&D
3.	C. Manisha Maheswari	II M.Sc.	FSM&D
4.	S. Sahana	III B.Sc.	FSM&D
5.	S. Lakshmi Shalini	III B. Sc.	N&D

Water & Waste Water Audit Team

Environmental Aspects	**Water**
Name of the Coordinator	Ms. P. Thamizhini
Designation and Department	Assistant Professor of Chemistry

Audit Team –Students /Scholars

S.No	**Name of The Students**	**Class**	**Department**
1.	P.Vinotha	I B. Sc.,	Chemistry
2.	N.Subasree	I B. Sc.,	Chemistry
3.	P.Aruna	II B. Sc.,	Chemistry
4.	S.Harin	II B. Sc.,,	Chemistry
5.	R.Kalpanai	II B. Sc.,.,	Chemistry

Solid and E Waste Audit Team

Environmental Aspects	**Solid Waste and E Waste**
Name of the Coordinator	Dr. E. Priya, Dr. J. Prabha and Ms. B. Lavanya
Designation and Department	Assistant Professor of Physics and Commerce

Audit Team –Students /Scholars

S.No	**Name of The Students**	**Class**	**Department**
1.	G. Dharanilakshmi	II B. Com.	Commerce
2.	A. Yazhini	II B. Com.	Commerce
3.	S.Ranjani	III B. Com.	Commerce
4.	R.Prabhavathi	III B. Com.	Commerce
5.	S.Ajitha	III B. Com.	Commerce

Energy Audit Team

Environmental Aspects	**Energy Audit**
Name of the coordinator	Dr. D. Devi
Designation and Department	Assistant Professor of Physics

Audit Team –Students /Scholars

S.No	Name of The Students	Class	Department
1.	R.Janani Sri	II M.Sc.,	Physics
2.	D.Saveedhana	II M.Sc.,	Physics
3.	V.Santhiya	III B.Sc.,	Physics
4.	R.Shurudhika	III B.Sc.,	Physics
5.	R.Bhuvanika	III B.Sc.	Physics

Campus Hygiene Audit Team

Environmental Aspects	Hygiene
Name of the coordinator	Dr. E. Priya
Designation and Department	Assistant Professor of Microbiology

Audit Team –Students /Scholars

S.No	Name of The Students	Class	Department
1.	S.Abinaya	III B. Sc.	Microbiology
2.	R.Keerthana	III B. Sc.	Microbiology
3.	M.Nagajothi	III B. Sc.	Microbiology
4.	R.Nithya	III B. Sc.	Microbiology
5.	R.Harshini	III B. Sc.	Microbiology

CHAPTER 5

AUDIT STAGE

5.1 Audit

The Campus Environment Audit relies upon findings supported by documents and information. The essence of green audit is to express the environmental policy, environmental organization, environmental management and environmental sustainability. The individual functioning of these components ensure a holistic environmental sustainability.

The Campus Green Audit comprises of the following environmental components, its baseline information, identification of impacts and strategies for environmental management:

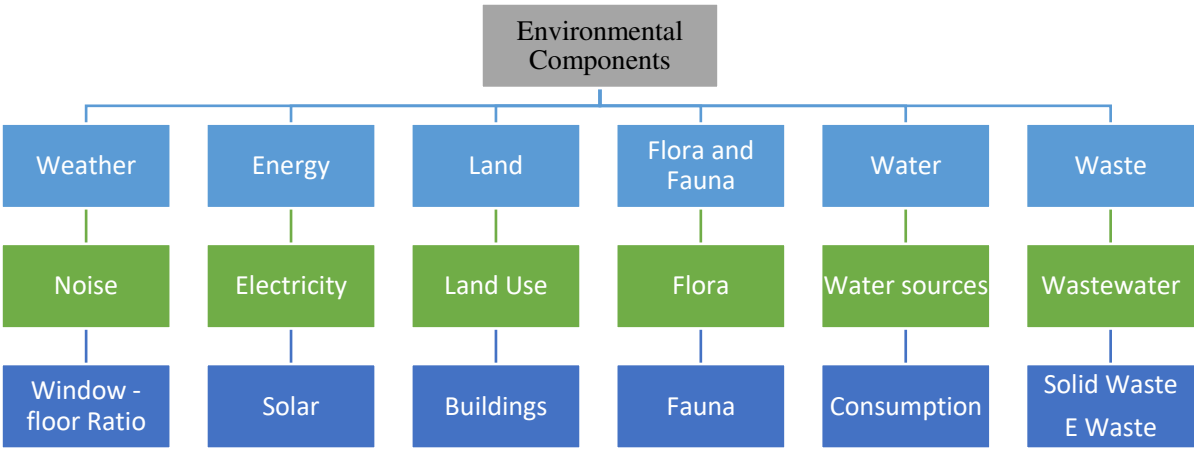


Fig. 8: Environmental Components

5.2 **Climate**

The climate of Tiruchirappalli can be termed as a fairly healthy one. The hot season lasts for 3.5 months, from March 24 to July 6, with an average daily high temperature above 97°F. The hottest month of the year in Tiruchirappalli is May, with an average high of 100°F and low of 81°F.

The cool season lasts for 2.9 months, from November 1 to January 28, with an average daily high temperature below 88°F. The coldest month of the year in Tiruchirappalli is December, with an average low of 71°F and high of 85°F.

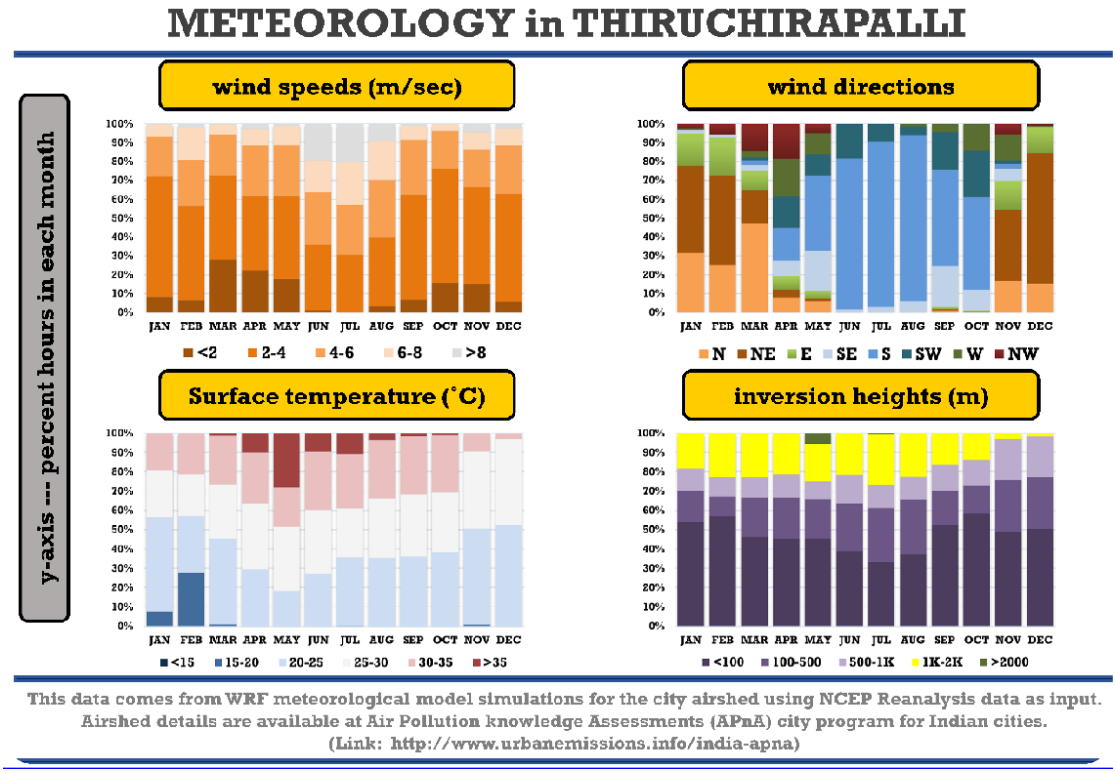


Fig. 7: Meteorology in Tiruchirappalli

Temperature

Tiruchirappalli has a tropical climate. The summers are much rainier than the winters in Tiruchirappalli. This climate is considered to be Aw according to the Köppen-Geiger climate classification. The average temperature in Tiruchirappalli is 28.6 °C | 83.4 °F. The rainfall here is around 823 mm | 32.4 inch per year.

The warmest month of the year is May, with an average temperature of 31.9 °C | 89.4 °F. The lowest average temperatures in the year occur in December, when it is around 24.8 °C | 76.6 °F.

The hot season lasts for 3.5 months, from March 24 to July 6, with an average daily high temperature above 97°F. The hottest month of the year in Tiruchirappalli is May, with an average high of 100°F and low of 81°F.

Table 23: Average Climate Data

Parameters	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Avg. Temperature °C	24.9	26.6	29.2	31.2	31.9	30.9	30.3	29.9	29.8	27.7	25.7	24.8
Min. Temperature °C	20	20.9	23.2	26	27.2	26.6	26.1	25.7	25.5	24.2	22.4	20.9
Max. Temperature °C	30.2	33.1	36.2	37.8	38.2	36.8	36.1	35.6	35.5	32.5	29.7	29
Rainfall, mm	16	12	20	40	57	46	42	67	95	172	182	74
Rainfall, inches	0.6	0.5	0.8	1.6	2.2	1.8	1.7	2.6	3.7	6.8	7.2	2.9
Humidity (%)	67%	59%	54%	56%	53%	53%	53%	55%	57%	70%	75%	72%
Rainy days (d)	3	2	2	5	8	7	7	8	10	14	12	6
Avg. Sun hours(hr.)	7.1	8.1	9.1	10	10.9	11.1	11	10.7	10.2	8.8	6.9	6.3

https://en.climate-data.org/asia/india/tamil-nadu/tiruchirappalli-4207/

The cool season lasts for 2.9 months, from November 1 to January 28, with an average daily high temperature below 88°F. The coldest month of the year in Tiruchirappalli is December, with an average low of 71°F and high of 85°F.

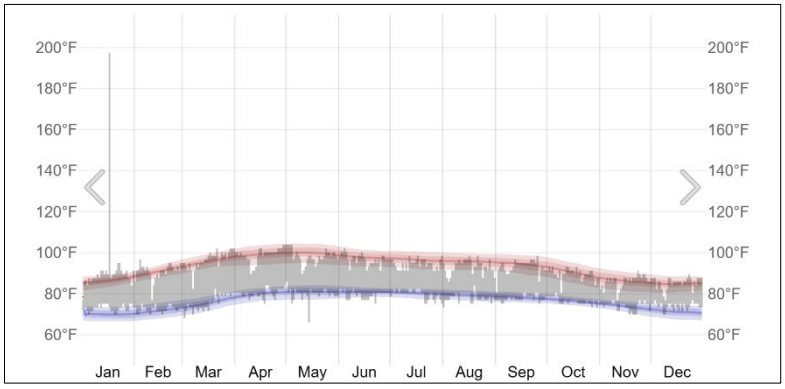


Fig. 20: Average High and Low Temperature in 2023

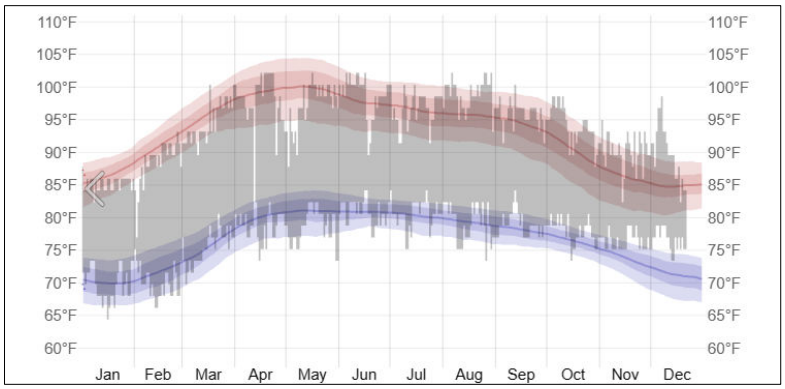


Fig. 21: Average High and Low Temperature in 2024

https://weatherspark.com/y/109340/Average-Weather-in-Tiruchirappalli-India-Year-Round#Figures-Temperature

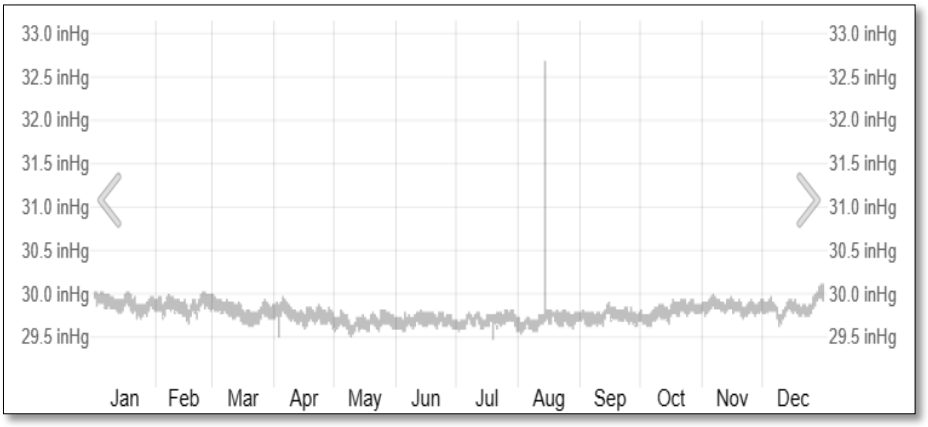


Fig. 22: Atmospheric Pressure in 2023

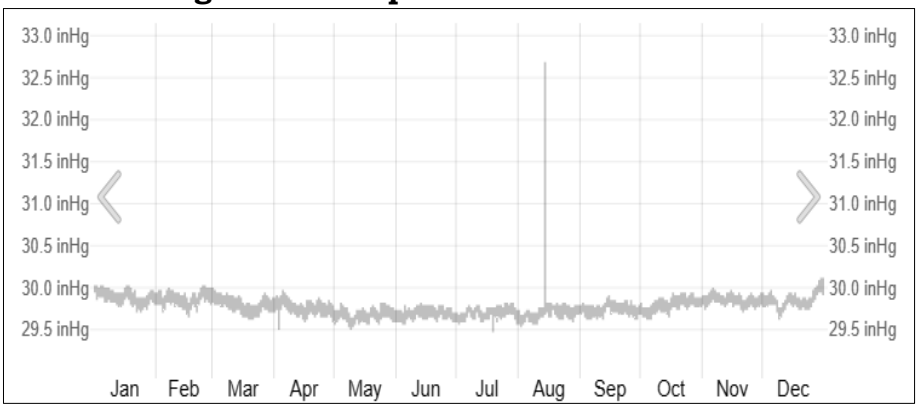


Fig. 23: Atmospheric Pressure in 2024

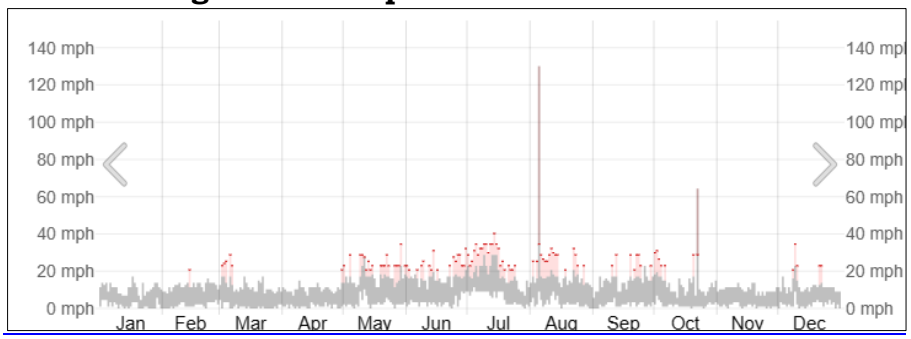


Fig. 24: Wind Speed in 2023

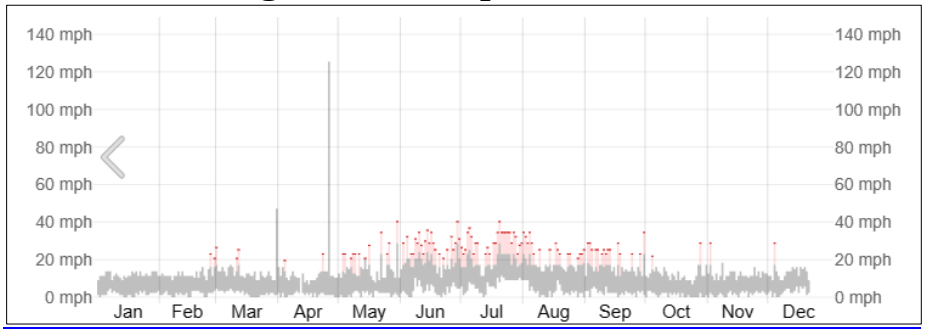


Fig. 25: Wind Speed in 2024

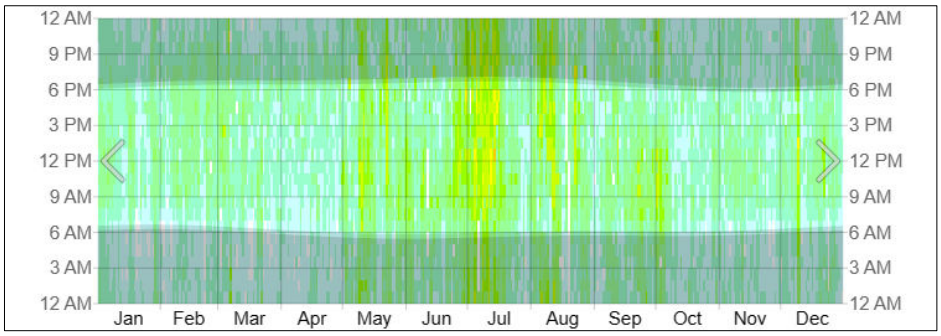


Fig. 26: Hourly Wind Speed in 2023

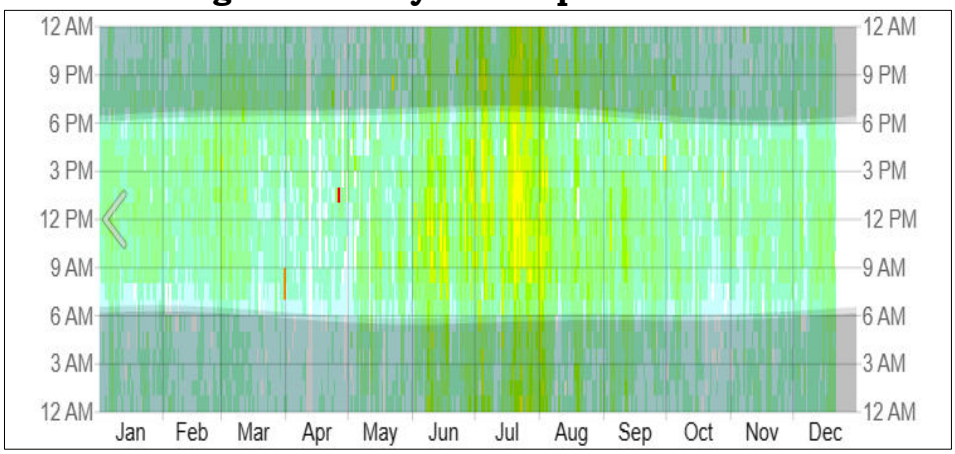


Fig. 27: Hourly Wind Speed in 2024

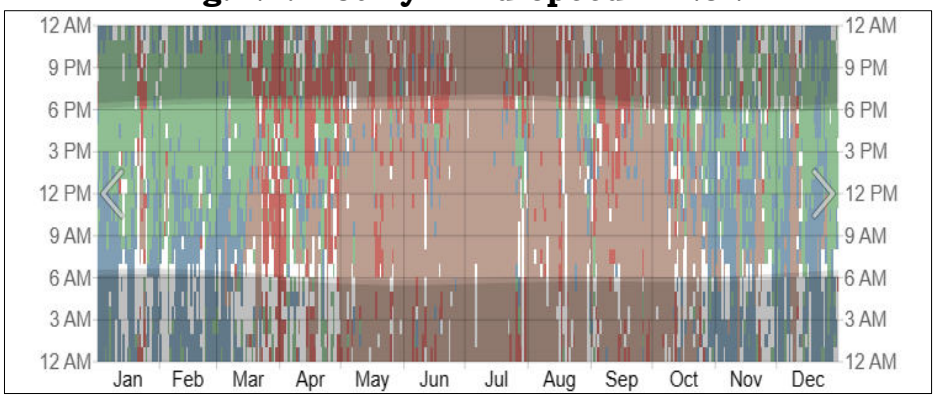


Fig. 28: Hourly Wind Direction in 2023

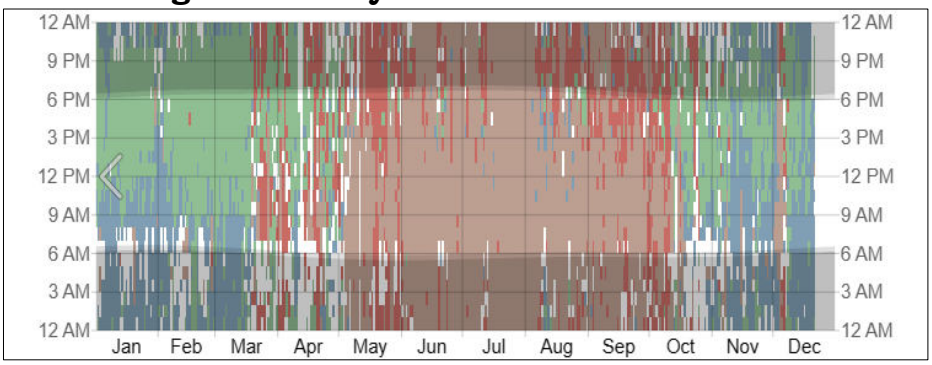


Fig. 29: Hourly Wind Direction in 2024

5.3 Air Quality Assessment

Tiruchirappalli city has developed fast in the recent years and simultaneously the vehicle population in Trichy has exponentially grown over the years. Occupying an area of 170 sq.km, the city is home to a million people (2011 census). To assess Tiruchirappalli air quality, the Urban Emission info *(UE info founded in 2007 as a repository of information, research, and analysis related to air pollution, https://urbanemissions.info/)* has selected an air shed covering 30km x 30km. This domain is further segregated into 1km grids, to study the spatial variations in the emission and the pollution loads.

The ambient air quality is being monitored in the city by the Tamil Nadu pollution control board (TNPCB) in terms of the concentration levels of the pollutants (RSPM, SO_2 and NO_2). The air quality monitoring using the IND-AQI procedure. IND – AQI proposed by Sharma et al (2003) has been used for computing the AQI. The AQI is computed from the following function.

$$I = \frac{I_{high} - I_{low}}{C_{high} - C_{low}} (C - C_{low}) + I_{low}$$

where, I is the air quality index, C is the pollutant concentration, C_{low} is the concentration breakpoint that is ≤ C, C_{high} is the concentration breakpoint that is ≥ C, I_{low} is the index breakpoint corresponding to C_{low} and I_{high} is the index breakpoint corresponding to C_{high}. Table 3.1 shows the linear segmented relationship for sub-index values and the corresponding pollutant concentrations that are calibrated to Indian conditions (Sharma et al 2001, 2003). These values are used to compute AQI using Equation. AQI is computed using three pollutants; Irrespirable suspended particulate matter (RSPM), sulphur-dioxide (SO_2) and nitrogen-oxides (NO_X). Analysis of variance and pair-wise comparison of means by Tukey's test are used to know if there is any significant difference in AQI values in the different areas.

AQI Category	AQI	Concentration Range*							
		PM_{10}	$PM_{2.5}$	NO_2	O_3	CO	SO_2	NH_3	Pb
Good	0-50	0-50	0-30	0–40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory	51 - 100	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.5-1.0
Moderately Polluted	101-200	101-250	61-90	81-180	101-168	2.1-10	81-380	401-800	1.1-2.0
Poor	201-300	251-350	91-120	181-280	169-208	10-17	381-800	801-1200	2.1-3.0
Very Poor	301–400	351-430	121-250	281-400	209-748*	17-34	801-1600	1200-1800	3.1-3.5
Severe	401-500	430+	250+	400+	748+*	34+	1600+	1800+	3.5+

* CO in mg/m^3 and other pollutants in $\mu g/m^3$; 24-hourly average values for PM_{10}, $PM_{2.5}$, NO_2, SO_2, NH_3, and Pb, and 8-hourly values for CO and O_3.

Fig. 30: Air Quality Index

There are six AQI categories, namely Good, Satisfactory, moderately polluted, Poor, Very Poor, and Severe. The proposed AQI will consider eight pollutants (PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, O_3, NH_3, and Pb) for which short-term (up to 24-hourly averaging period) National Ambient Air Quality Standards are prescribed. Based on the measured ambient concentrations, corresponding standards and likely health impact, a sub-index is calculated for each of these pollutants. The worst sub-index reflects overall AQI. The AQI values and corresponding ambient concentrations (health breakpoints) as well as associated likely health impacts for the identified eight pollutants are as follows:

Table 10: AQI Category, Pollutants and Health Breakpoints

AQI	Score	Associated Health Impacts
Good	(0-50)	Minimal impact
Satisfactory	(51-100)	May cause minor breathing discomfort to sensitive people.
Moderately polluted	(101–200)	May cause breathing discomfort to people with lung disease such as asthma, and discomfort to people with heart disease, children and older adults.
Poor	(201-300)	May cause breathing discomfort to people on prolonged exposure, and discomfort to people with heart disease.
Very poor	(301-400)	May cause respiratory illness to the people on prolonged exposure. Effect may be more pronounced in people with lung and heart diseases.
Severe	(401-500)	May cause respiratory impact even on healthy people, and serious health impacts on people with lung/heart disease. The health impacts may be experienced even during light physical activity.

https://airpollutionapi.com/aqi/india/tamil-nadu/tiruchirappalli-city

AQI in Tiruchirappalli: 2023 – 2024

Table 11: Air Quality Index – 2023

TIRUCHIRAPPALLI CITY

MAIN GUARD GATE – 770

JUNE 2023		
01.06.2022	77	Satisfactory
06.06.2022	74	Satisfactory
08.06.2022	90	Satisfactory
13.06.2022	81	Satisfactory
15.06.2022	72	Satisfactory
20.06.2022	90	Satisfactory
22.06.2022	84	Satisfactory
27.06.2022	96	Satisfactory
AUGUST 2023		
01.08.2022	41	Good
03.08.2022	72	Satisfactory
08.08.2022	64	Satisfactory
10.08.2022	70	Satisfactory
15.08.2022	74	Satisfactory
17.08.2022	48	Good
22.08.2022	71	Satisfactory
24.08.2022	58	Satisfactory
OCTOBER 2023		
03.10.2022	68	Satisfactory
05.10.2022	55	Satisfactory
10.10.2022	42	Good
12.10.2022	64	Satisfactory
17.10.2022	46	Good
19.10.2022	62	Satisfactory
26.10.2022	79	Satisfactory
31.10.2022	65	Good

TRAFFIC INTERSECTION

JULY 2023		
04.07.2022	75	Satisfactory
06.07.2022	70	Satisfactory
11.07.2022	66	Satisfactory
13.07.2022	74	Satisfactory
18.07.2022	59	Satisfactory
20.07.2022	76	Satisfactory
25.07.2022	65	Satisfactory
27.07.2022	73	Satisfactory
SEPTEMBER 2023		
05.09.2022	53	Satisfactory
07.09.2022	72	Satisfactory
12.09.2022	63	Satisfactory
14.09.2022	74	Satisfactory
19.09.2022	65	Satisfactory
21.09.2022	70	Satisfactory
26.09.2022	63	Satisfactory
28.09.2022	39	Good
NOVEMBER 2023		
02.11.2022	57	Satisfactory
07.11.2022	66	Satisfactory
09.11.2022	59	Satisfactory
14.11.2022	54	Satisfactory
16.11.2022	56	Satisfactory
21.11.2022	71	Satisfactory
23.11.2022	55	Satisfactory
28.11.2022	59	Satisfactory

DECEMBER 2023		
05.12.2022	61	Satisfactory
07.12.2022	54	Satisfactory
12.12.2022	56	Satisfactory
14.12.2022	62	Satisfactory
19.12.2022	58	Satisfactory
21.12.2022	64	Satisfactory
26.12.2022	60	Satisfactory
28.12.2022	57	Satisfactory

Department of Environmental Sciences,
Bishop Heber College, Tiruchirappalli and TNPCB, Tiruchirappalli

Table 12: Air Quality Index – 2024

TIRUCHIRAPPALLI CITY

MAIN GUARD GATE – 770 TRAFFIC INTERSECTION

JANUARY 2024		
02.01.2023	72	Satisfactory
04.01.2023	65	Satisfactory
09.01.2023	68	Satisfactory
11.01.2023	58	Satisfactory
16.01.2023	66	Satisfactory
18.01.2023	69	Satisfactory
23.01.2023	71	Satisfactory
24.01.2023	61	Satisfactory

FEBRUARY 2024		
01.02.2023	65	Satisfactory
06.02.2023	63	Satisfactory
08.02.2023	62	Satisfactory
13.02.2023	57	Satisfactory
15.02.2023	67	Satisfactory
20.02.2023	72	Satisfactory
22.02.2023	66	Satisfactory
27.02.2023	63	Satisfactory

MARCH 2024		
01.03.2023	62	Satisfactory
06.03.2023	66	Satisfactory
08.03.2023	70	Satisfactory
13.03.2023	67	Satisfactory
15.03.2023	64	Satisfactory
20.0320.23	62	Satisfactory

Department of Environmental Sciences,
Bishop Heber College, Tiruchirappalli and TNPCB, Tiruchirappalli

Air Quality Monitoring Results

CO (mg/m^3)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	AQI	Noise in dB(A)
					$L_{eq.}$
2.15	6.37	175.23	0.83	150	83.10

AQI Category	AQI	Concentration Range*						
		PM_{10}	$PM_{2.5}$	NO_2	O_3	CO	SO_2	NH_3
Good	0-50	0-50	0-30	0–40	0-50	0-1.0	0-40	0-200
Satisfactory	51 - 100	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400

5.4 Ambient Noise Quality Monitoring

The word noise is defined as unwanted sound that creates annoyance and interferes in conversation disturbs sleep and teaching-learning process, reduce work efficiency, causing stress and challenge to public health and it is a silent killer problem growing day-by-day. Almost all the educational

institutes are located near the busy places such as bus-stand, market area, highways/busy roads etc. Therefore, these educational institutes suffer from noises and hence disturbing in school activities like teaching, learning and discussion session.

Table 5.1 Noise Levels around the College

S. No.	Directions of the college	Noise Level in dB (A)		Leq
		L_{max}	L_{min}	
1	**North**	**71.52**	**40.61**	63.99
2	**East**	**70.68**	**38.65**	**66.24**
3	**West**	**69.25**	**60.11**	**66.53**
4	**South**	**70.45**	**42.68**	**65.09**

Permissible Noise level:
The Noise Pollution (Regulation And Control) Rules, 2000 MoEF
Notification S.O. 123(E) dated 14.2.2000 (Source: Environment & Pollution Laws -Justice M. R. Mallick - Professional Book Publishers 2017)SCHEDULE [See rule 3(1) and 4(1)]

Outdoor	Below 55 dB (A)
Classroom	35 - 45 dB (A)

dB (A)	Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing
Decibel	A "decibel" is a unit in which noise is measured
“A”	"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise andcorresponds to frequency response characteristics of the human ear.
Leq	It is an energy mean of the noise level over a specified period

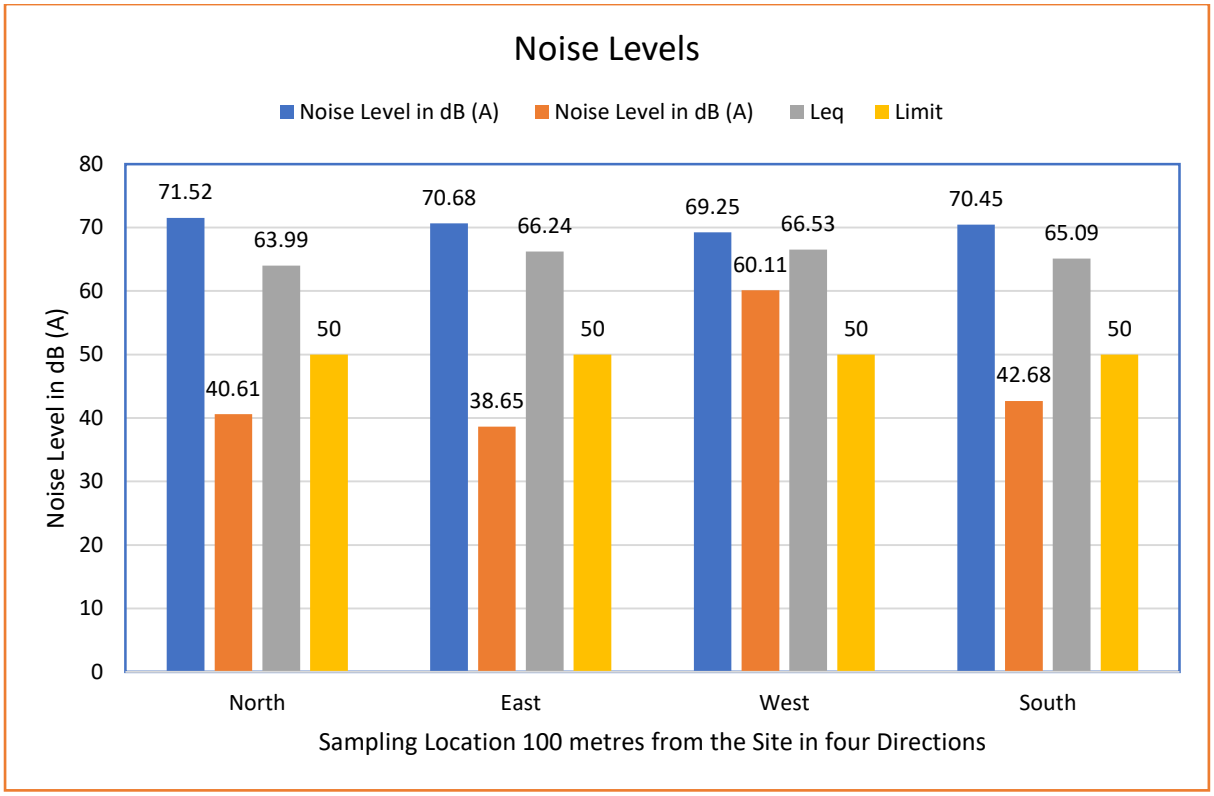


Fig. 13: Ambient Noise Levels

As per **Indian standards** the desirable **noise** pollution for **educational institutions** and hospitals during daytime is 50 dbA. **Noise levels** were measured with a **sound** level meter at 10 points 2 each in north, East, West and South (8– 10 am, 12–2 pm, and 3–5 pm) over two cycles of measurements. The noise levels around the College shows a minimum value of 26 dB (A) and maximum of 66 dB (A).

5.5 Window – Floor Ratio

Building occupants can enjoy an aesthetically pleasing indoor environment with less lighting energy required if sufficient daylight is available. Effective use of daylight is essential in achieving a sustainable building design (Al-Tamimi *et al*, 2016).

The openings for natural light may range from 10%–100% of the floor area. A study by Al-Tamimi and Syed Fadzil, (2012) suggested an upper limit because in the tropical context, too much light may not be desirable because it can introduce heat and glare problems.

Windows and doors are an important aspect of any house design. They are required for physical and visual connections, but their interaction with heat gain/loss and natural ventilation make them and their design critical to a home's good passive design.

A window-to-floor ratio provides a rough rule of thumb for determining optimum areas of window in relation to the floor area of a room or house. As with all rules of thumb it should only be used as a starting point for a design and firmed up by a skilled designer and computer modeling. This helps in accounting for the complexity of the thermal interactions in a building.

In any house, window type, area, orientation and shading should be jointly considered in order to effectively control the heat gain and heat loss of a building. They will be dependent on the opportunities of the site and the climate it is located in, and should be shaped further by the construction method employed. In temperate climates, higher levels of exposed thermal mass will enable greater areas of windows.

As a general guide, the total **window** area should be less than 25 per cent of the total **floor** area of the house. Most of the **windows** should be located to the north where good solar access is easiest to manage, with minimal amounts on the east and west façade.

Internal environment quality (IEQ) research has understandably focused on the readily measurable aspects of: heat, light, sound and air quality, and although impressive individual sense impacts have been identified, Kim and de Dear, (2012) argue strongly that there is currently no consensus as to the relative importance of IEQ factors. (Fadzi, Tamimi, 2009; Carmody*et al*, 2004, Philips, 2013).

Window – to – Floor ratio of the Class rooms and other rooms have been calculated and are within the norms.

Table 5: Window – Floor Ratio

Class Room	Room No.	Percentage of floor area Ventilated
III B.Sc. Chemistry	7	46.44
I BCA 'B'	23	
I BCA 'A'	22	
II BCA	21	
III BCA 'A'	20	
II M. Sc. Maths	36	
I M. Sc. Maths	35	
II B.Sc. Maths	34	
III B.ScMaths	33	
I B.Sc. Maths	32	

5.5 Observation and Comments

1 Ventilation in rooms of different buildings is good and complies with the standards.

2 All the rooms receive optimum lighting with prescribed window-floor ratio.

3 The noise levels in all the locations are slightly above the desirable limits.

CHAPTER 6

WATER

Water use by individuals and institutions is not generally regulated, even though many parts of the country are experiencing droughts or water shortages. Regardless of the region's climate, it is important to conserve water, as groundwater supplies are increasingly depleted and polluted. By cutting back the volume of wastewater and runoff generated by the campus the pollutants entering the local waterways and regional body of water can be cut down.

6.1 Campus Population

A college campus contains administrative offices, libraries, class rooms, research rooms, laboratories, food services or cafeteria, guest rooms, recreational and sport facilities, halls, hostels, parking lots pavements, roads, wilderness areas. These are the units of the college campus that constitutes a college community. The units of a campus have been broadly grouped under academic facilities and accommodation facilities. The hostels and the guestrooms come under accommodation facilities, whereas the remaining units will form the academic facilities. The academic and accommodative facilities become functional only in the presence of the students and faculty. They are the backbones of a functional educational institution. All facts of the campus community are critical in facing environmental challenges.

Table 6: Campus Population – Students, Research scholars and Staff

Year	Students	Teaching	Non-Teaching	Hostel	Others	Total
2023 – 24	3704	203	70	74	109	4160

6.2 Sources

The water source of the campus could be classified as local panchayat water supply and Ground water. The panchayat water is being used for potable purposes whereas the ground water is used for all other purposes.

Table 7: Water Storage Tanks and its Capacity

Table Storage Tanks (Over Head) in the College

S.NO	Location of the Tank	Dimension of the Tanks(M)	Capacity in m^3	No Of tanks in each Location	Total Capacity in Litres
1.	Auditorium Top -1 (PVC)	1.41 x 1.31	2	2	2,000
2.	Auditorium Top – 2 (Concrete)	2.1 x 4.9 x 1.8	5		5,000
3.	A- Block Top (Concrete)	2.1 x 4.9 x 1.8	5	1	5,000
4.	B- Block Top (PVC)	1.41 x 1.31	2	1	2,000
5.	C- Block Top -1 (PVC)	1.5 x 4.6	4	4	4,000
6.	C- Block Top -2 (PVC)	1.5 x 4.6	4		4,000
7.	C- Block Top -3 (PVC)	4.5 x 2.1	6		6,000
8.	C- Block Top -4 (Concrete)	2.1 x 4.9 x 1.8	5		5,000
9.	D- Block Top -1 (PVC)	1.41 x 1.31	2	2	2,000
10.	D- Block Top -2 (Concrete)	2.1 x 4.9 x 1.8	5		5,000
11.	E- Block Top (Concrete)	2.1 x 4.9 x 1.8	0.005	1	5,000

Table 8: Sump in the College

S. No.	Location of the Sump	Dimension of the Sump (M)	Capacity in m^3	No. of sump	Total Capacity in Litres
1.	Auditorium Left Side	7.1 x 2.4 x 1.75	25	1	25,000
Sump in the Hostel					
1.	A- Block Front Side	6.4 x 3.28 x 1.82	21	1	21,000
2.	Kitchen Front Side		68	1	68,000
3.	Kitchen Back Side	15.24 x 5.79 x 2.59	50	1	50,000

Table 9: Bore wells in Academic Unit

Sl. No.	Location of the Bore well	Type of Pump Used & hp	Depth of the Bore well
1.	Auditorium Back Side	Techmo Pump & 3 hp	300
2.	A-Block		250
3.	D- Block		200
4.	E - Block		200
5.	F -Block		250

Number and Location of Bore Wells in Hostel Unit

Sl. No.	Location of the Bore well	Type of Pump Used & hp	Depth of the Bore well
1.	A- Block Front	Texmo & 1 hp	100 ft
2.	Hostel office front side	Texmo & 5 hp	160 ft
3.	Hostel office back side	Texmo & 5 hp	200 ft
4.	PG block front side-1	Texmo & 5 hp	200 ft
5.	PG block front side-2	Texmo & 1.5 hp	160 ft
6.	Kitchen front side	Texmo & 1.5 hp	220 ft

6.3 Consumption of Water

The average percapita water consumption of water in academic unit during 2023_2024 is 40.79 lpcd and 20 lpcd in hostels. The details are given in Table 10-11.

Table10: Total Water Demand and Consumption: 2023–2024

	Description	Population	Domestic Litres/ Head/Day		Flushing Litres/Head/Day		Total Water Consumption LPCD	Total Water Requirement (KLD)	WW Generation (KLD)
			Demand/Head/Day	Total	Demand/Head/Day	Total			
1	Staff	382	25	9550	20	7640	17190	17.19	14.6115
2	Students	3704	25	92600	20	74080	166680	166.68	150.012
3	Non-Teaching	74	25	1850	20	1480	3330	3.33	2.997
		4160		**104000**		**83200**	**187200**	**187.2**	**167.6205**

Table11: Per capita Water Consumption in *lpcd*

S. No.	Unit	Population	Water Consumption	Per capita Consumption
1	Academic	4086	166680	40.79
2	Hostel	74	6290	85.00

6.4 Water Supply

- The sources of water supply for the campus are from 5 bore wells and collected in one sump
- Water is stored in 11 tanks and distributed throughout the campus and used for drinking purpose, toilets and gardening.
- The average depth of water table is 150 feet.
- The average per capita water consumption of water in academic unit during 2023 – 20243 is 40.79 *lpcd* and 85 *lpcd* in hostels.

6.5 Water Quality Assessment

Safe drinking water is supplied to the students both in the academic buildings and hostels using water purifiers. In order to test the quality of the water samples potable water and ground water samples were collected and tested for selected parameters. The results show that all the parameters are within the permissible limits prescribed by BIS, IS 10500:2021 drinking water quality.

Table 12: Physico-Chemical Characteristics of Water

S. No.	Parameters	1	2	3	4	5	6	BIS- Std (mg/L)
1.	pH	7.58	6.91	7.91	7.78	8	8.19	**6.5-8.5**
2.	EC (µ Mho)	1954.5	10.87	1997.5	2536.5	1615.5	870.9	
3.	TDS (mg/L)	1163.42	1.02	1183.42	1513.42	963.42	513.42	**500-2000**
4.	Alkalinity (mg/L)	50.1	4.1	60.1	63.1	53.1	31.1	**250**
5.	TH (mg/L)	389.5	74.5	459.5	494.5	269.5	199.5	**600**
6.	Ca (mg/L)	106.53	14.34	110.53	124.56	72.46	58.46	**200**
7.	Mg (mg/L)	43.57	5.9	36.28	41.14	16.84	9.55	**100**
8.	Cl (mg/L)	130.73	27.92	113	169.72	84.64	70.64	**250-1000**
9.	Fl (mg/L)	0.225	0.065	0.195	0.165	0.175	0.095	**1-1.5**
10.	Phosphate (mg/L)	**0.03**	**0.03**	**0.08**	**0.11**	**0.1**	**0.1**	**0.1**
11.	Nitrate (mg/L)	**2.25**	**0.1**	**0.12**	**0.22**	**0.16**	**0.18**	**200**
12.	BOD (mg/L)	3.51	3.65	3.38	3.66	2.25	2.24	**30**
13.	COD (mg/L)	14.2	10.2	22.2	30.2	18.2	14.2	**250**
14.	DO (mg/L)	7.62	8.03	7.21	8.04	6.81	6.8	

15.	Sodium	216.9	2.15	201.1	247.7	130.1	15.79	
16.	Potassium	4.3	0.56	15.89	24.25	99.74	1.75	

6.6 Water Conservation and Rain Water Harvesting

Rainwater harvesting is a technology used to collect, convey and store rain water for later use from relatively clean surfaces such as a roof, land surface or rock catchment. RWH is the technique of collecting water from roof, Filtering and storing for further uses. Rainwater Harvesting is a simple technique of catching and holding rainwater where its falls. Either, we can store it in tanks for further use or we can use it to recharge groundwater depending upon the situation. RWH system provides sources of soft, high quality water reduces dependence on well and other sources and in many contexts are cost effective. RWH system is economically cheaper in construction compared to other sources, i.e. well, canal, dam, diversion, etc.

Rainwater harvesting is an important environment friendly approach. It is a Green Practice having double benefit of keeping the groundwater level undisturbed and charging the aquifer. Rainwater and run-off water, stored in a planned way, can save the earth from soil erosion and flood and recharge the aquifers to increase the groundwater level.

Objectives of Rain Water Harvesting

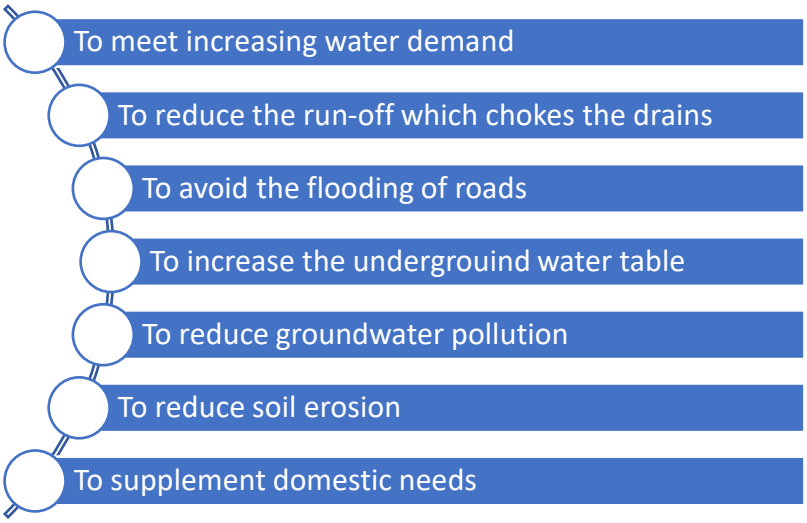


Fig. 14: Objectives of Rain Water Harvesting

Methods of Rain Water Harvesting

There are mainly two methods of rainwater harvesting,

Surface runoff harvesting
Rooftop rainwater harvesting

1. Surface Runoff Harvesting

The rainwater flowing along the ground during the rains will be collected in low lying area.

2. Roof top Rainwater Harvesting

Roof Top Rainwater Harvesting Method is adopted in all the buildings where the rainwater is captured from the roof catchments of various buildings and drains into sand gravel filter pits of 1.27 m^3 volume capacity. Totally 6 pits are available in the campus.

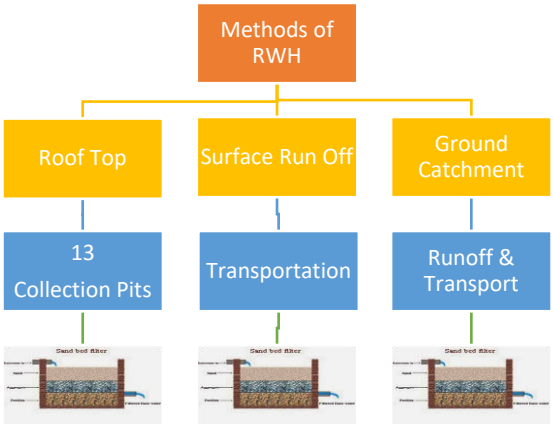


Fig.15: Methods of Rain Water Harvesting

Sand Gravel Filter

In the solid granular media category, three materials have been used – sand, gravel, and pebbles. Media less than 2mm in diameter is sand and anything larger is referred to as gravel.

The rainwater flows relatively slowly through sand and is used for single-pass filters. However, gravel is used for recirculation filters which can accept larger amounts of runoff than single-pass sand filters. Each layer is separated by wire mesh.

Rain Water Harvesting Potential

Table13: Rain Water Harvesting Potential Calculation

Rain Water Harvesting Potential	:	Mean annual rainfall in mm x area in m^2 x runoff factor
Roof top area	:	8802.00 m^2
Rain Water Collection Pit	:	06 Pits
Volume of each collection Pit	:	1.27 m^3
Type of Filter in collection Pit	:	Sand Gravel Filter
Ground catchment area	:	3840.00 m^2
Mean Annual rainfall	:	95.00 mm (3.74 inch)
Runoff Coefficient	:	0.8

Co-efficient Chart		
1.	Roof catchment • Tiles • Corrugated metal sheets	 0.8 – 0.9 0.7 – 0.9
2.	Ground surface covering • Concrete • Brick pavement	 0.6 – 0.8 0.5 – 0.6
3.	Untreated Ground catchment • Soil on slopes less than 10% • Rocky natural catchment	 0.0 – 0.3 0.2 – 0.5
Harvesting Potential = Rainfall (mm) x Area of Catchment x Runoff coefficient		
A Guide to Techniques of Water conservation and Management, UNDPIndia2008		

Table14: Status of Rainwater harvesting by Roof top and Catchment Method

1	2	3	4	5	6	7
S. No.	**Area**	**Mean Annual Rainfall (mm)**	**Roof Top Area (Sq.M)**	**Runoff factor**	**Rain water in Litres (3x4x5)**	**Rainwater In m^3**
1	Roof Top	95.11	8802.00	0.8	669726.58	669.73
2.	Ground Catchment	95.11	3840.00	0.8	292177.92	292.17
	Quantity of Rain water harvested					961.9

Table 15: Status of Rainwater harvesting by Pit Method

Type of Collection Pit	No. of Pits	Volume of each pit in m^3	Total Volume of Rain water Harvested in Pit method	
			m^3	Litres
Sand Gravel Pits	06	1.27	7.62	7620.00

Table 16: Summary of Rain Water Harvested in the Campus

S.No.	Area	In litres	m^3
1.	Roof Top	669726.58	669.73
2.	Catchment	292177.92	292.17
3.	Pits	7620.00	7.62
		969524.5	969.52

Rain water collected from the roof top and ground catchment is 969524.50 litres

6.7 Observation and Comments

1. Per capita consumption of water during 2023 – 2024 is 40.79 *lpcd* in the academic unit and 85 *lpcd* in hostels. This is well below the Indian average prescribed for both rural area and urban area (Rural:70–80 lpcd and urban:135 lpcd).
2. The per capita consumption is well within the Indian average prescribed for rural area. The campus has one Ground level storage tank and an overhead tank which are spatially distributed in the campus and is adequate for the students in the campus.
3. The water quality parameters are within the standard limits prescribed by Bureau of Indian Standards (BIS) except Total hardness and calcium.
4. Rain water harvesting structures are well laid in the campus. Roof top, collection pits with sand gravel filter, and surface runoff/ground catchment methods are implemented Total quantity of rainwater harvested is **969524.50 litres**

CHAPTER 7

WASTE AUDIT

7.1 Waste

The sustainable development requires that the generation of waste is avoided, or where it cannot be avoided, that it is reduced, re-used, recycled or recovered and only as a last resort treated and safely disposed.

7.2 Wastewater

Water is an important element for all living organisms. Water is so essential that without water human cannot survive. Most of the reactions which occur in the living cells and the non-living environment involve the medium of water. Man uses water for various purposes; it includes drinking, cooking, bathing, washing, heating, air-conditioning, industrial processing, power generation and other recreational purposes. (Nandakumar, 1988).

Once the water is used, it becomes a waste because of the various impurities mixed with the water which changes the quality of water. In other words, water becomes waste water which may be defined as "combination of the liquid-or water-carried waste removed from residences, institutions, commercial and industrial establishments, together with such groundwater, surface water, and storm water as may be present" (Metcalf & Eddy, 1991). The components of the waste water depend on the community which may include the following:

1. **Domestic (also called sanitary) wastewater:** Waste water discharged from residences and from commercial, institutional, and similar facilities.

2. **Industrial waste water:** Waste water in which industrial wastes predominate.

3. **Infiltration /inflow:** Water that enters the sewer system through indirect and direct means. Infiltration is extraneous water that enters

the sewer through leaking joints, cracks and breaks, or porous walls. Inflow is the storm water that enters the sewer system from storm drain connections (catch basins), roof leaders, foundation and basement drains, or through manhole covers.

4. **Storm water:** Runoff resulting from rainfall.

The untreated waste water, if allowed to accumulate, leads to the production of large qualities of malodorous gases, and also cause diseases through the pathogenic microorganisms. It can stimulate the growth of aquatic plants and also contains toxic compounds. For these reasons, the immediate and nuisance-free removal of waste water from its sources of generation, followed by treatment and disposal is not desirable but also necessary.

7.3 Wastewater Generated from the Campus

The total quantum of wastewater generated from the campus is depicted in the Figure 16.

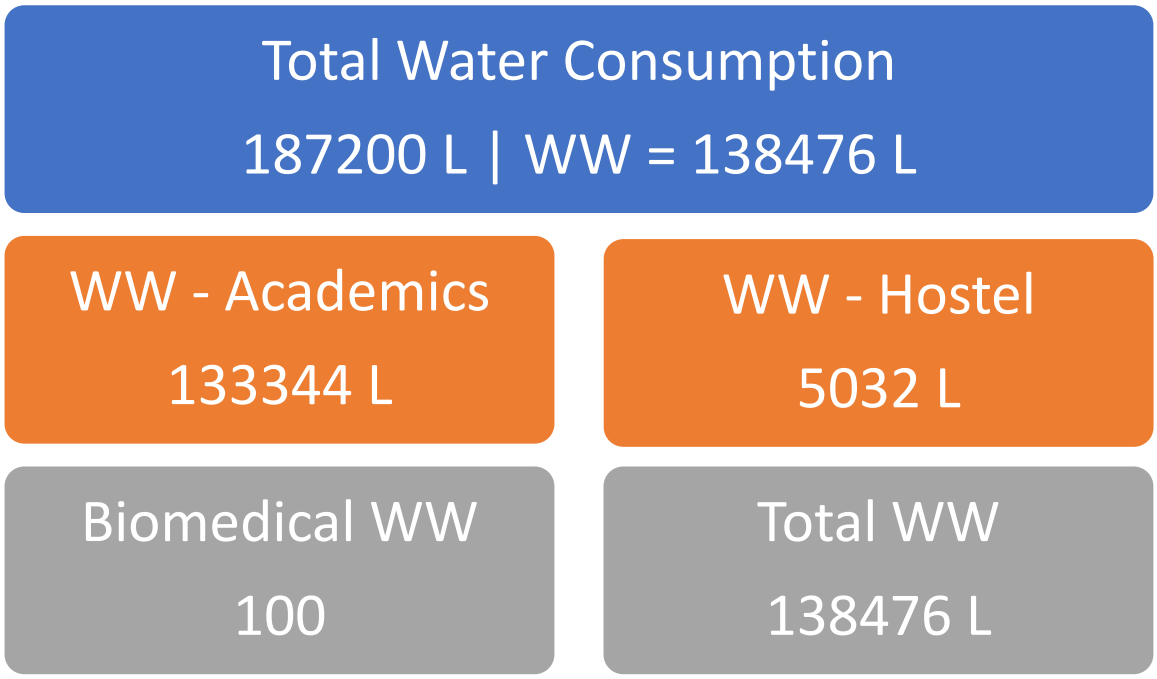


Fig. 16: Quantity of Wastewater

Waste water generated in the campus is reused for gardening purposes.

7.4 Solid Waste

Solid waste substances are those materials which become waste after short period of their use as newspapers packing wrappers etc., different types of cans, bottles, broken glass wares plastic containers, polythene bags, ashes and domestic garbage. These discarded solid substances after their uses are variously called as Refuse, Garbage, Rubbish solid waste etc.

Solid waste, often called the third pollution after air and water pollution is that material which arises from various human activities and which is normally discarded materials from the urban community as well as the more homogenous accumulation of other wastes.

aste is the raw material located at a wrong place. It can be converted into useful products by making use of appropriate processing technologies. Many of the waste are at presently reused in uneconomic manner or left completely unutilized causing great hazards to the human environment.

Table 17: Biodegradable Waste

S. No.	Waste generated in the College	Quantity (monthly average in kg)
1.	Garden / horticulture waste	600
2.	Kitchen waste ---- Raw	150
3.	Kitchen waste ---- Cooked	500
4.	Wet waste from classroom etc.	-
5.	Total amount of waste	1250

Table 18: Dry / Recyclable waste

S. No.	Waste generated in the College	Quantity (monthly average in kg)
1.	Plastic	1.5
2.	Paper	20
3.	Wood or classroom furniture	15
4.	Glass	1
5.	Metal	-
6.	Thermocol	0.5
7.	Tetra packs	2
8.	Total amount of waste	40

Table 19: Domestic Hazardous Waste

S. No.	Waste generated in the College	Quantity (monthly average in kg)
1	Hazardous and toxic waste (Paints, Lab waste, etc.)	-
2	Oil from diesel generator sets	0.2
3	Total amount of waste	0.2

Table 20: Biomedical Waste

S. No.	Waste generated in the College	Quantity (monthly average in kg)
1	Biomedical waste such as Syringes, band aids, expired medicines etc.	0.1
2	Per capita waste generation	1.2

Table 21: Sanitary Waste

S. No.	Waste generated in the College	Quantity (monthly average in kg)
1	Sanitary waste	120
2	Per capita waste generation	1440

Table 22: Construction and Demolition Waste

S. No.	Waste generated in the College	Quantity (monthly average in kg)
1	Construction and Demolition waste	-

WASTE COLLECTION

Table 23: Waste Collection Points in your College

Area	Total No. of Waste collection points	No. of waste collection points with no bin	No. of waste collection points with one bin (mixed waste)	No. of waste collection points with one bin (for only dry waste)	No. of waste collection points with two bins (wet &dry)	No. of waste collection points with three bins or more)
Classrooms	98	-	98	-	-	-
Playgrounds	3	-	3	-	-	-
Common area (e.g. reception, corridors)	2	-	2	-	-	-
Staff room	14	-	14	-	-	-
Laboratory	19	-	19	-	-	-
Canteen	4	-	1	2	1	-
Clinic/sick room	1	-	1	-	-	-
Library	3	-	3	-	-	-
Toilets	73	-	-	-	-	-
Others(EDC, COE, Placement Cell)	12		1	7	4	-
Total	232		145	9	5	

Table 24: Waste Recycling Practices followed in College

S. No.	Category Waste	Local Scrap collector	Authorized dealer	Dumped at a designated community site	Internal Procedure
1	Paper (e.g. Used notebooks, used examination papers, subscription newspaper and magazines)	Scrap			
2	Plastic (e.g. Broken, unusable)	Scrap			
3	Horticultural waste				
4	E-Waste (e.g. broken, unusable computers)				
5	Hazardous waste				
6	Wood, glass, metal				
7	Biomedical Waste (e.g. waste from nurse room in College such as Band-Aids, syringes.)				

TABLE 25: E-Waste Disposal

S. No.	Waste generated in the College	Quantity (monthly average in kg)
1	E-Waste	-

TABLE 26: List of Electronic Gadgets/Instruments

S. No.	Item	Total no. of Items	BEE Star Rating	Working condition	Non-Working condition
1.	TVs	2		Yes	
2.	Monitor	3		Yes	
3.	Refrigerators and freezers	7		Yes	
4.	Washing machines	-			
5.	Air conditioners	68		Yes	
6.	Heaters	1		Yes	
7.	Microwave Ovens	5		Yes	
8.	Toasters	1		Yes	
9.	Electric kettles	-			
10.	Personal computers (CPU, Mouse, Screen, and key board included)	571		Yes	
11.	Laptop computer (CPU, mouse, Screen, and key board included)	85		Yes	
12.	Notebook computes	-			
13.	Notepad computers	-			
14.	Printers	53		Yes	
15.	Copying equipment (Xerox)	1		Yes	
16.	Projectors	83		Yes	
17.	Whiteboards (Interactive Board + Smart board)	8		Yes	
18.	Electric/Electronic computers	-			
19.	Pocket and desk calculators	-			
20.	Fax machines	1		Yes	
21.	Telex	-			
22.	Telephones	5		Yes	
23.	Pay Telephones	-			
24.	Mobiles	3		Yes	

25.	Mobile batteries	-			
26.	Induction cookers	-			
27.	Geysers/water heaters	-			
28.	Batteries condemned	-			
29.	Bulbs – tube lights and others	2,347		Yes	

List of Electronic Gadgets/Instruments In Hostel

S. No.	Item	Total no. of Items	BEE Star Rating	Working condition	Non-Working condition
1	TVs	4		Yes	
2	Monitor	1		Yes	
3	Refrigerators and freezers	2		Yes	
4	Washing machines + Driers	8 +10		Yes	
5	Air conditioners	2		Yes	
6	Heaters	11		Yes	
7	Microwave Ovens	1		Yes	
8	Toasters	-			
9	Electric kettles	-			
10	Personal computers (CPU, Mouse, Screen, and key board included)	2		Yes	
11	Laptop computer (CPU, mouse, Screen, and key board included)	2		Yes	
12	Notebook computes	-			
13	Notepad computers	-			
14	Printers	3		Yes	
15	Copying equipment (Xerox)	-			
16	Projectors	1		Yes	
17	Whiteboards (Interactive Board + Smart board)	-		Yes	
18	Electric/Electronic computers	-			
19	Pocket and desk calculators	-			
20	Fax machines	-			
21	Telex	-			
22	Telephones	3		Yes	
23	Pay Telephones	-			
24	Mobiles	1		Yes	
25	Mobile batteries	-			
26	Induction cookers	-			
27	Geysers/water heaters	-			
28	Batteries condemned	-			
29	Bulbs – tube lights and others	27,417		Yes	

Observation and Comments

1. The wastewater generated in the campus is 138476 L which is below the normal range.

2. Biodegradable waste generated per month is negligible, dry waste 150.00Kg/Mon. Sanitary waste generation is 1kg/month. The campus does not produce hazardous waste. Total waste generation is 1610 Kg.
3. The quantity of solid wastes generation is within the limits as per the MSWM Rules, 2000.

CHAPTER 8

FOOD AUDIT

8.1 Eat good Food for good Health

Good food is all around us. For generations, Indians have incorporated biodiversity in their daily food-using millets instead of wheat or rice, eating vegetables sourced from forests rather than farms, eating local food, and changing their diet with changing seasons.

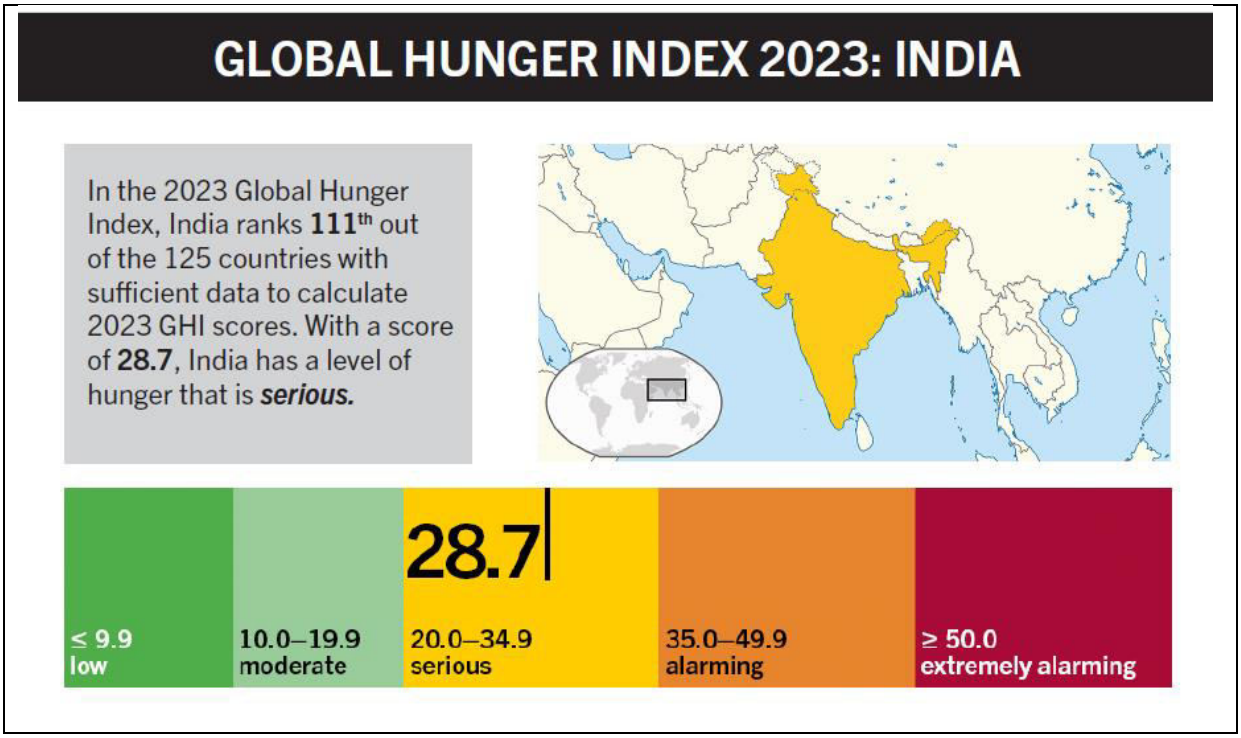
- India is one of the biodiversity-rich countries and home to nearly 12 per cent of the world's plant species. People in the biodiversity-rich areas have an immense understanding of the plants that grow around them. Each region of the country has its special cuisine based on the plants available in the area.

- Many bio-diverse foods have medicinal properties. They are rich in micronutrients, help people fight disease and keep them healthy in changing seasons. It was for food that people protected their environment. When crops were cultivated, they were grown naturally, without the use of agrochemicals. In rural areas, people often do not have to buy food and this provides nutrition security. There is some evidence that people living in places where food is available in traditional sources are healthier.

- Access to good food has decreased drastically. Most traditional food cannot be stored and it is difficult to market them. People no longer have access to forests and kitchen gardens are fast disappearing, particularly in urban areas. In many places, environmental damage has decimated the biodiversity.

8.2 Child Health and Food Policy

The Global Hunger Index is a peer-reviewed annual report, jointly published by Concern Worldwide and Welthungerhilfe, designed to comprehensively measure and track hunger at the global, regional, and country levels. GHI scores are calculated each year to assess progress and setbacks in combating hunger. The GHI is designed to raise awareness and understanding of the struggle against hunger, provide a way to compare levels of hunger between countries and regions, and call attention to those areas of the world where hunger levels are highest and where the need for additional e orts to eliminate hunger is greatest. This country profile is based on data and information from the 2023 Global Hunger Index.



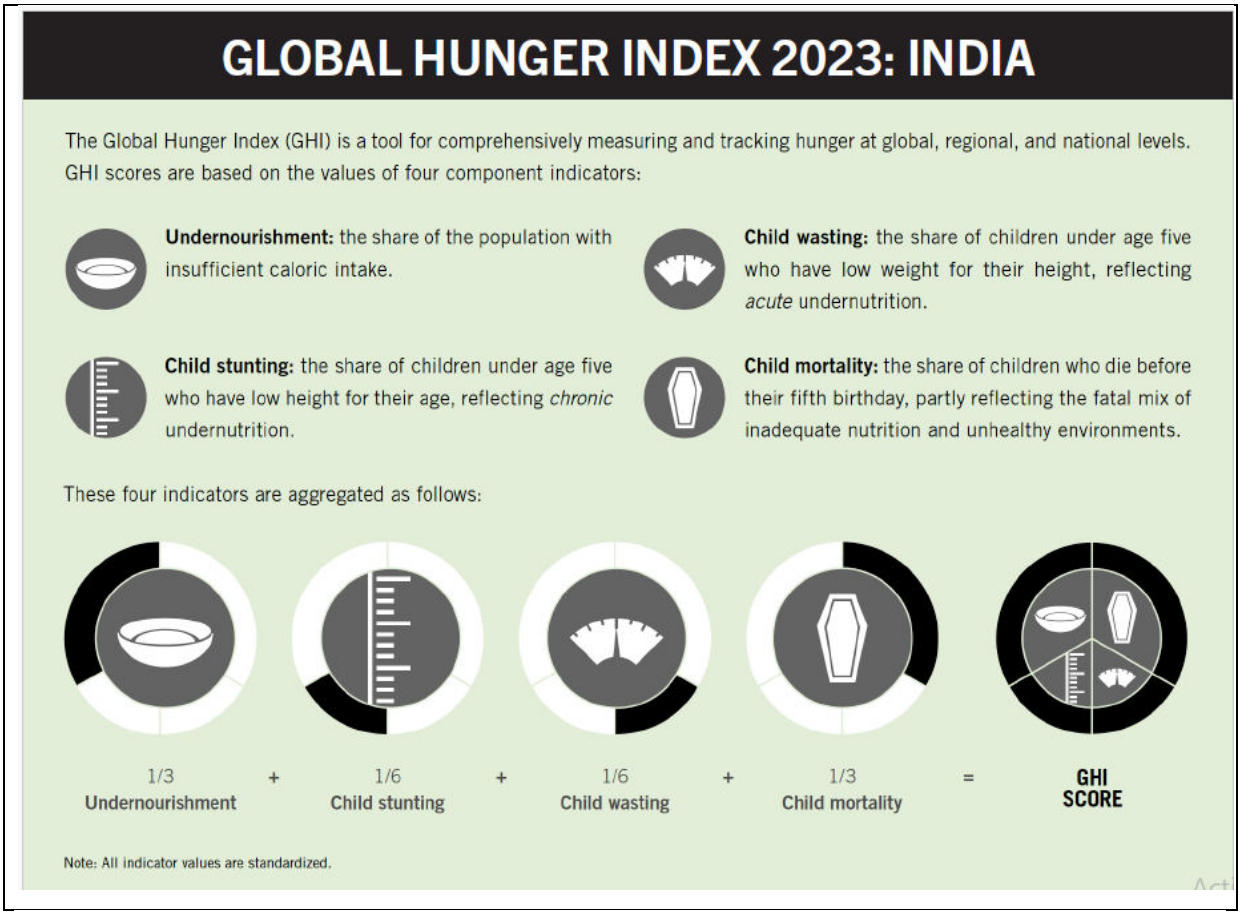
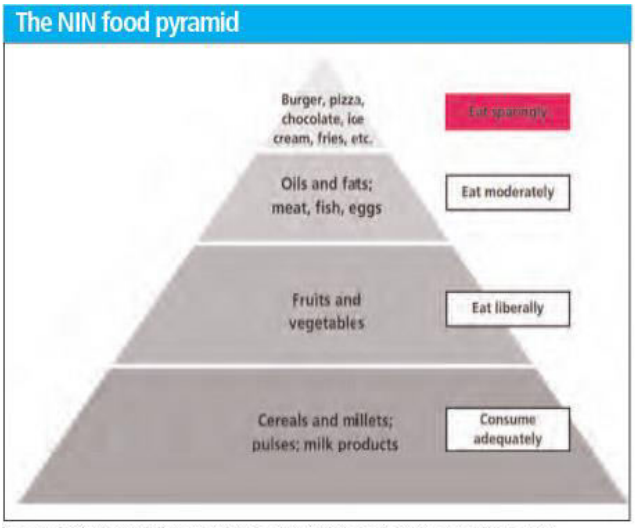


Fig. 17 Global Hunger Index

https://www.globalhungerindex.org/results.html



Source: Dietary Guidelines for Indians, 2011, National Institute of Nutrition (NIN)

Recommended Daily Allowance (RDA) for a 10- to 12-year-old moderately active child

Nutrient/energy	RDA
Energy (E)	2,100 kilocalorie*
Sugar	Up to 30 g
Total visible fat	35 g [~15%E]
Saturated fatty acids (SFA)	Up to 8% E
Trans-fatty acids (TFA)	< 1% E
Salt	5 g
Protein	34g/day
Carbohydrates	130g/day

kote: *Average for calculation purpose [2,190 kcal for a boy weighing 34.3 kg and 2,010 kcal for a girl weighing 35 kg]; calorie calculation; 1 g of fat=9 kcal; 1g of protein = 4 kcal

Source: Dietary Guidelines for Indians, 2011, National Institute of Nutrition

Fig. 18: Food Pyramid and Recommended Daily Allowance

Table 27: Food Categorization for College Canteen Policy

GREEN	**Always on menu**	Vegetables and legumes, fruits, grain (cereal) foods; mostly whole grain and/or high in fibre, learn meat, egg, fish etc.
YELLOW	**Select carefully** Approach should be greening, small portion size and reduced frequency.	Baked vegetable-based snacks, Ice creams, milk-based ices and dairy desserts etc.
RED	**Not on menu** Banned from Colleges as they are high in fat, salt and sugar.	Energy drinks, carbonated and other sweetened beverages, fried packaged foods, chocolates, potato fries

8.3 The fat of the matter:

The highest level of total fat was found in an Indian snack (Haldiram's aaloo bhujia): 37.8 gm/100 gm of the sample (Centre for Science and Environment)

- Trans-fat content was the highest in French fries (8.1 per cent of the total fat), followed by instant noodles (4.6 percent of the total fat) and potato chips (4.5 per cent of the total fat).
- Salt content was the highest in instant noodles (3.7 gm/100 gm of sample). Eating a packet of instant noodles, therefore, will cover about half of the daily salt quota. The salt content is not declared by the companies on the label
- The highest level of carbohydrates was detected in Top Ramen noodles at 73.3 gm per 100 gm.

FOOD SERVICE IN THE COLLEGE

Table 28: Varieties of packaged food items sold in the school

S. No.	Packaged Food Items	Please count all flavours / variants available in the school separately	Total No. of items sold on an average in a Day	Day the food items were sold in
1	Savoury snacks and similar packaged food like chips, and Haldirams.	Murukku-10 Potato Chips – 150 Wheel Chips - 25		185
2	Instant noodles like knorr, Cup-a-Noodles, Top ramen, Wai-wai, Yippee, Foodles, Maggi Etc.	70	-	70
3	Potato fries and burgers	-	-	-
4	Confectionery (Chocolates, Candies, gums)	Candies Rs.1 – 100 Nos Rs. 2 –50 Nos Choclates Rs.5 – 50 Nos Rs.10 – 30 Nos Rs.100 – 10 Nos Rs.20 – 30 Nos Rs.40 – 20 Nos Rs. 80- 10 Nos		150
5	Ice cream	Rs.10 – 70 Nos Rs.20 – 25 Nos Rs. 35 – 25 Nos	-	
6	Carbonated beverages	-	-	-
7	Sugar sweetened non-carbonated beverages	Rs.10 – 50		50
8	Packages / bottles Maza/lassi/flavoured milk	Rs. 35 - 15		15
9	Packaged / bottled energy drinks	-	-	-

Table 29: Varieties of Traditional Indian Food Items

S. No.	Traditional Indian Snacks (non-packaged) Samosas, idli/dosa, sambhar, pavbhaji, moms etc.	Number of servings sold when on the menu
1	Samosas	100
2	Idli/Dosa and Sambhar	60
3	Pavbhaji	-
4	Momos	-
5	Chapathi	-

Table 30: Varieties of Traditional Indian Beverage Items (Especially Non-Packaged) Served in the college Canteen

S. No.	Traditional Indian beverages (non-packaged)Nimboopani, salted butter milk, sweet, lassi etc.	Number of plates sold when on the menu
1	Lemon Juice	-
2	Sweet lassi	-
3	Salted buttermilk	-

Fig. 19: Food Items Served in the College

Table 31: Traditional Indian Beverage Items

S. No.	Traditional Indian beverages	Number of cups
1	Tea	40
2	Coffee	20
3	Milk	10

8.4 Balanced Diet

According to the 'Dietary Guidelines for Indians, 2011' of the National Institute of Nutrition (NIN), a balanced diet is one that provides all nutrients in required amounts and proper proportions. It should provide around 50-60 per cent of the total calories from carbohydrates, about 10-15 per cent from proteins and 20-30 per cent from both visible and invisible fat. In addition, it should provide other non-nutrients such as dietary fibre and antioxidants that bestow positive health benefits.

8.5 Observations and comments:

1. Food and beverage items served in the college canteen are traditional and prepared and served in hygienic manner.

CHAPTER 9

CAMPUS HYGIENE

BACKGROUND

Lack of access to clean water, sanitary facilities, and hygiene education is among the most serious problems facing the globe. The achievement of development objectives and a sustained improvement in health depend on improvements in water and sanitation. The attainment of universal and equal access to clean, inexpensive drinking water as well as appropriate and equitable sanitation and hygiene for everyone has been emphasised by the United Nations' Sustainable Development Goals.

Campus hygiene is a complete strategy for safeguarding people's health in all of its aspects. On college campuses, where students often live in close quarters and travel from one building or classroom to another every day, putting such practices into practice is especially crucial. One of the most crucial parts of maintaining a college facility is cleaning. The health and wellness of everyone who uses a building might suffer from failing to maintain its cleanliness. Maintaining the college in good condition promotes productivity and raises the possibility of drawing in additional students. According to the World Green Building Council, well-designed, clean workplaces are more likely to foster a positive work environment. Setting excellent examples for pupils by keeping the campus environment clean system. It motivates students to take pride in their school, which decreases their likelihood of littering and may lead them to put more effort into maintaining their surroundings.

The cleanliness of the institution is crucial for reducing the spread of infections there and ensuring that staff and students have a relaxing atmosphere in which to study. Additionally, it raises standards of cleanliness and may lessen the transmission of disease. Campus Cleaning has a "Cleaning for Health" campaign as part of their commitment to efficiency and sustainability. Utilizing a chemical management system, green chemicals are administered; low-VOC floor care solutions are

employed; and all accessories are environmentally friendly. Campus Cleaning is committed to doing what is best for building occupants and the environment, and we are always researching and evaluating market trends, goods, and fresh concepts.

TOILETS AND URINAL REQUIREMENTS

Indian Standard

CODE OF BASIC REQUIREMENTS FOR WATER SUPPLY, DRAINAGE AND SANITATION

(Fourth Revision)

Fourth Reprint DECEMBER 2010

UDC 628.1/.3 : 006.76

IS 1172 : 1993
(Reaffirmed 2007)

IS 1172 : 1993

Table 10 Schools and Educational Institutions

(Clause 5.3)

Sl No.	Fitments*	Nursery Schools	Educational Institutions (Non-Residential)		Educational Institutions (Residential)	
			For Boys	For Girls	For Boys	For Girls
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Water-closets†	1 per 15 pupils or part thereof	1 per 40 pupils or part thereof	1 per 25 pupils or part thereof	1 for every 8 pupils or part thereof	1 for every 6 pupils or part thereof
ii)	Ablution taps	1 in each water closet	1 in each water-closet	1 in each water-closet	1 in each water-closet	1 in each water-closet
	1 water tap with draining arrangements shall be provided for every 50 pupils or part thereof in the vicinity of water-closets and urinals					
iii)	Urinals	—	1 per 20 pupils or part thereof	—	1 for every 25 pupils or part thereof	—
iv)	Wash basins	1 per 15 pupils or part thereof	1 per 60, *Min* 2	1 per 40, *Min* 2	1 for every 8 pupils or part thereof	1 for every 6 pupils or part thereof
v)	Baths	1 bath-sink per 40 pupils or part thereof	—	—	1 for every 8 pupils or part thereof	1 for every 6 pupils or part thereof
vi)	Drinking water fountains or taps	1 for every 50 pupils or part thereof	1 for every 50 pupils or part thereof	1 for every 50 pupils or part thereof	1 for every 50 pupils or part thereof	1 for every 50 pupils or part thereof
vii)	Cleaner's sinks	← 1 per floor, *Min* →				

*For teaching staff, the schedules of fitments to be provided shall be the same as in the case of office buildings (*see* Table 2).

†Some of the water-closets may be of European style, if desired.

TOILETS / SANITATION REQUIREMENTS for Schools and Educational Institutions as per Indian Standards IS 1172 : 1993

S. No.	Institution	Sex	Ratio	AVASC
1.	Educational institutions (Non Residential)	Girls	1 per 25 pupils(students) or part thereof	1 per 14 students
2.	Educational institutions (Residential)	Girls	1 per 6 pupils (students) or part thereof	

S. NO.	Building	No. of Floors	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of Students/Staff using the Toilet	No. of times cleaned per day
			Western	Indian	Urinal	Bath	Wash Basin		
1.	Block – A	3	11	5	3	-	26	824	2
2.	Block – B	3	10	53	-	-	21	642	1
3.	Block – C	3	10	53	-	-	21	638	1
4.	Block – D	3	6	21	-	-	13	851	1
5.	Block - E	2	21	-	-	-	09	910	2
6.	Block -F	1	1	1	1	-	4	292	1

Maintenance of Campus Facilities

The institution has hired a Campus Manager/Supervisor to keep an eye on campus upkeep. 14 support personnel work as part of Campus Cleaning. The institution has made steps to preserve the healthy ambiance of the campus by posting signs that promote environmental awareness, such as "Plastic Free Campus" and "Litter-Free Zone." The institution employs a Campus Engineer who, with the aid of competent supporting personnel, oversees the upkeep of the infrastructure.

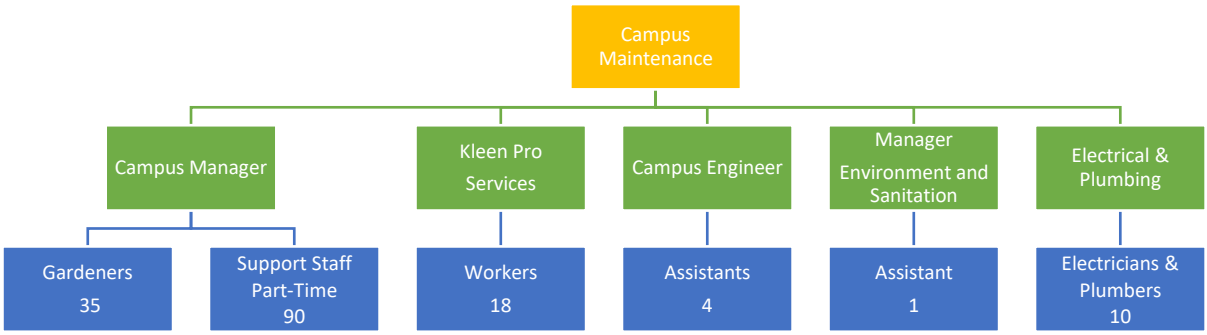


Fig. 20: Campus Maintenance Team

The administration creates a pleasant environment for the students and instructors by routinely replacing worn-out furniture with new pieces. The key components of campus upkeep are listed below.

- Every five years, the whole campus is painted.
- Floor cleaning is done on Saturdays.
- Desks and seats in classrooms are inspected and repaired annually.
- The whole campus is cleaned with water twice a month.
- Every two hours, bathrooms and toilets are cleaned using "Green" cleaning products.
- The garden is watered twice daily (6:30 am and 4:30 pm).
- Plumbing and electrical connections are serviced every 15 days.

Toilets in the campus

ADMIN BLOCK - GROUND FLOOR

S. NO.	Details of Room	Usage of Toilet	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of Students/ Staff using the Toilet	No. of times cleaned per day
			W	I	U	B	WB		
1	Reception	-	-	-	-	-	-	-	-
2	Placement cell	Staff	1	-	-	-	1	5	1
3	Canteen	-	-	-	-	-	-	-	-
4	Wash Room	Staff	-	-	1	-	-	-	1
5	Wash Room	Staff	-	1	-	-	-	-	1

ADMIN BLOCK - FIRST FLOOR

S. NO.	Details of Room	Usage of Toilet	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of Staff using the Toilet	No. of times cleaned per day
			W	I	U	B	WB		
1	Principal Room	Personal	1	-	-	-	1	1	2
2	College Office	Staff	1	-	-	-	2	2	2
3	Secretary of College Governing Council	Personal	1	-	-	-	1	1	2
4	President/Treasurer of College Governing Council	-	-	-	-	-	-	-	-

ADMIN BLOCK - SECOND FLOOR

S. NO.	Details of Room	Usage of Toilet	Types and No/ Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of Students/Staff using the Toilet	No. of times cleaned per day
			W	I	U	B	WB		
1	Rameswari Nallusamy Hall	-	-	-	-	-	-	-	-
2	Stationery and dining Hall	-	-	-	-	-	-	-	-
3	Trust Secretary	-	-	-	-	-	-	-	-
4	Trust President/Treasurer	-	-	-	-	-	-	-	-
5	Internal Quality Assurance Cell	-	-	-	-	-	-	-	-
6	Trust Office	-	-	-	-	-	-	-	-
7	Research Center	-	-	-	-	-	-	-	-
8	Wash Room	Staff - Male	2	-	1	-	2	**16**	**1**
9	Wash Room	Staff - Female	2	2	-	-	3	**20**	**1**

ADMIN BLOCK – THIRD FLOOR

S. NO.	Details of Room	Usage of Toilet	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of Students/Staff using the Toilet	No. of times cleaned per day
			W	I	U	B	WB		
1	Cauvery Hall	-	-	-	-	-	-	-	-
2	Trust Meeting Hall	-	-	-	-	-	-	-	-
3	Wash Room	Staff -Male	1	-	1	-	1	-	1
4	Wash Room	Staff -Female	1	2	-	-	3	-	-

A group of qualified and trained electricians is responsible for maintaining the electrical infrastructure. Through the yearly renewal of the insurance coverage for the college buildings, lab equipment, and computers, the college has an efficient process in place to safeguard its infrastructure.

Toilet Signage

Fig 21: Signage Boards

Operation and Maintenance (O & M) to Ensure Campus Hygiene

To guarantee that the desired effects are attained and that capital expenditures made in building these systems are not lost, all water, sanitation, and hand washing facilities must be clean, functioning, and well-maintained. Annual Maintenance Contracts (AMCs) have been given to Ms. Chithra Pro Services, and they include the annual upkeep of a few facilities as well as the regular provision of consumables including soap, disinfectants, brooms, brushes, and buckets for cleaning. The AMC also makes arrangements for repair facilities and the identification of repair activities.

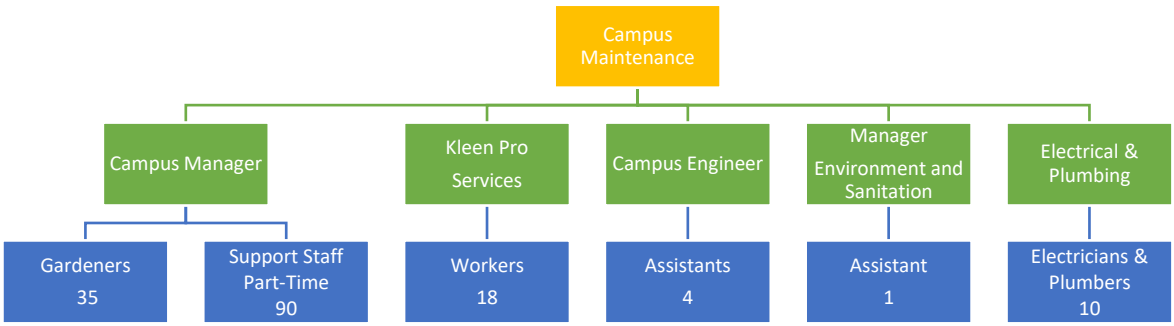


Fig. 23: Campus Maintenance Team
O & M Team

O & M Sequence

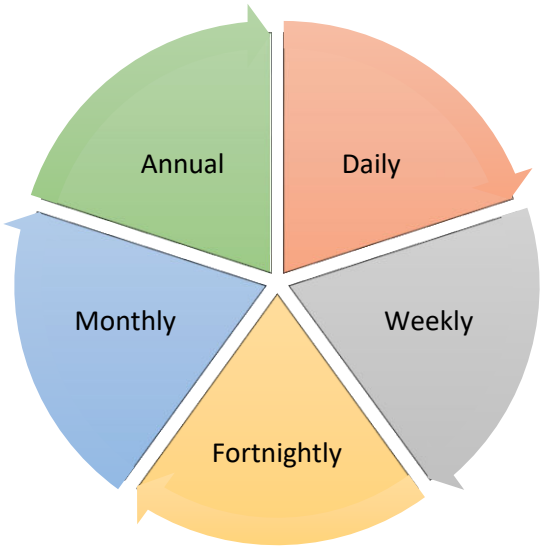


Fig. 24: Operation and Maintenance

Daily Maintenance

- Dusting of general storage, tables and benches
- General cleaning of indoor flooring across the whole campus, including the lavatory and kitchen
- Cleaning of any water logging throughout the entire college site

Weekly Maintenance

- Check for any obstruction in the drains, sewage pipelines and waste water pipes.
- Check for any loose locks, sliding doors, windows, steel tables and almirahs.
- Perform fortnightly maintenance on any leaking taps, valves, flushing cisterns, etc.
- Check for water logging in open spaces
- Clean up dust from all appliances, walls, etc.
- Remove discarded rubble, trash, and construction waste from the property
- Check for blocked drains on the ground, portico, and water outlets from buildings

- Eliminating stains from areas of the walls that were enamel painted, including the corners and edges as well as the door, window, almirah, sliding doors, etc.

Monthly Maintenance

- Check for termites in the building, termite damage to the walls, ceilings and floor, and ensure that all doors, windows and almirahs are operating properly.
- Inspect the walls, roofing, sun shades, etc. for any cracks.
- Verify that the primary water storage tank's outlets and lid aren't leaking and that the water being stored is clean.
- Verify that all manhole covers and inspection chamber coverings are securely fastened and undamaged.
- Check the condition of the fire extinguishers.
- Verify that the first aid kit is current and that the medications are still effective.
- Seasonal and yearly upkeep
- Seasonal/quarterly maintenance (prior to the monsoon)
- Thoroughly inspect water tanks for leaks and other issues before sealing them with sealant
- Regular cleaning of the sump and overhead water tanks (once every three months)
- Thorough cleaning of the roof, water outlets, crack inspection, and repair work.
- The levelling and cleaning of open land
- The inspection of rainwater collection pits; the testing of electrical cables and earthing
- The thorough cleaning of fans, light fixtures, and bulbs
- The interior and exterior cleaning of coolers.

Annual Maintenance

- General repair and maintenance work during the vacation
- Structural repair and plaster work

- Associated painting work
- Thorough cleaning of open drain/ditch and all underground drains
- Through cleaning of septic tanks and leach pits
- Repair/paining Black boards

Sanitation: Student – Toilet Ratio

- Separate toilet for men and women, with one unit generally having one toilet (WC) plus 3 urinals.
- The ration to be maintained is preferably one unit for every 40 students.
- Disposal of menstrual waste as per Biomedical Waste
- Pedal type Yellow colour bins are provided in all Women Toilets with chlorine free yellow colour bags.

Fig. 25: Garbage Bin and Bags

Table 37: Campus Maintenance Crew of Annai Vailankanni Arts and Science College

S. No.	Name of the Gardeners and Campus Cleaning	Timing and Work Allocation
1.	V.KANNAGI	• Maintenance of greenery • Leaf litter collection • Collection of garbage kept in common places • Pruning • Grass cutting • Nursery maintenance • Watering plants • Assisting in over all maintenance work
2.	V.MALAR	
3.	S.PARAMESWARI	
4.	S.SELVI	
5.	SOLAI AMMAL	
6.	R.CHITHRA	

7.	MAHARASI	• Meeting Hall arrangement o Seating arrangement o Flower pot arrangement o Floor cleaning • Examinations o Seating arrangement in Multi-Purpose auditorium o Auditorium o Other halls as per requirement • Functions o Garbage Bin arrangement o Collection of trash and other wastes • Ensuring over all maintenance of the College campus along with the Campus Manager.
8.	R.JANAKI	
9.	J.CHANDRAVALLI	
10.	A.ARAVAYEE	
11.	S.KALIDEVI	
12.	C.REVATHI	
13.	P.VIGNESWARI	
14.	ABIBA	
15.	AYYAMAL	
16.	P.THANGAM	

Campus Maintenance Crew of Cauvery College For Women (Autonomous)

Toilet Cleaning and Moping

Timing: 9:00 am -03:00 am

S. No.	Name of the workers	Block/Floor Allotted	Nature of work
1.	LAKSHMI	I Floor	• Toilet cleaning 5times / day; • Mopping frequently; • Veranda cleaning 3 times/week; • Windows cleaning daily; • Placing Phenolphthalein balls frequently; • Deep Cleaning using acid 2times/ week; • Phenyl application 5times /day • Cob web Removal /
2.	M.GANDHA	I Block	
3.	M.SARASWATHI	Auditorium	
4.	P.SIVAKUMARI	D Block – II ,III Floor	
5.	M.THILAGAVATHI	B Block – Ground Floor	
6.	A.USHA	A Block	
7.	P.MARIYAMMAL	D Block – Ground ,I Floor	
8.	D.KALIDEVI	B Block – II Floor	
9.	M.NAGAVALLI	E Block	
10.	K.SOOMALAI	B Block – II,III Floor	

11.	K.PANCHAVARNAM	Gents Toilet	Cleaning using Cob web stick / Brush
12.	V.JANAKI	Hostel – A Block	
13.	V.USHA	Hostel – B Block	
14.	G.NAGAVALLI	Hostel – B Block	
15.	J.KALAVATHI	Hostel – PG Block	
16.	R.DEVI	Hostel – PG Block	
17.	R.TAMILARASI	Hostel – PG Block	
18.	G.THANGAMANI	Hostel – Common Toilet	
19.	S.DEEPA	Hostel – Common Toilet	
20.	P.JAYASUDHA	Hostel – Pad Dispose	
21.	P.RAJAMMAL	Garbage Collector	
22.	A.KRISHNAN	Drainage Cleaner	

CLEANING AND HYGIENE SOLUTIONS USED BY CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Cleannol – Mubin Lab

Certified by

1. White Scented Phenyl : Toilet and bath room
2. Detergent Liquid Soap : Wash basin, Toilet Bowl
3. Room Spray : AC Rooms
4. Stain Remover : Toilets and deep cleaning areas
5. Floor perfume :
6. Bleaching Powder :
7. Liquid Hand wash :
8. HARPIC

Scented White Phenyl

Liquid Hand Wash

Floor Perfume

Room Spray

Liquid Detergent

Deep Stain Remover

Bleaching Powder

Deep Toilet Cleaner

Naphthalene Balls

PART - TIME - MORNING CLEANING WORKERS

Time Schedule : 06.30 am – 07.30 am

S. No	Name of the worker	Work Allotment
1.	R.JANAKI	
2.	J.CHANDRAVALLI	
3.	S.MALINI	
4.	R.SASIKALA	
5.	K.SELVI	
6.	T.J.INDRANI	
7.	D.MALLIKA	
8.	J.VASANTHI	
9.	R.KRISHNAVENI	

10.	V.SUJATHA	
11.	R.ELANGIAM	
12.	R.PUNITHA	
13.	S.ANUJA	
14.	T.SUSEELA	
15.	S.DEEPA	
16.	T.CHITHRA	
17.	S.SAROJA	
18.	V.LAKSHMI	
19.	S.BHUVANESWARI	
20.	A.RANI	

CLEANING AND HYGIENE SOLUTIONS USED BY KLEEN PRO SERVICES
FORBES PRO Clean Technology Solutions complies with International Standards

- ISO 9001 and ISO 13485 certified products for Quality
- ISO 14001 certified products for to reduce the environment impact of their products

pH<11.4 pH 9.5±0.5

All Purpose Cleaner

Room Spray pH 9.0±0.5

Glass Cleaner

Toilet Bowl Cleaner

Floor Mop

Cleaning Material Used in Cauvery College for Women (Autonomous)

Fan-shaped bunched Filament Broom

Coconut Broom

Dust Pan

Free Broom

CHAPTER 10

CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion

Environment Audit is the most efficient way to identify the strength and weakness of environmentally sustainable practices and to find a way to solve problem. Green Audit is one kind of professional approach towards a responsible way in utilizing economic, financial, social and environmental resources. Green audits can “add value” to the management approaches being taken by the college and is a way of identifying, evaluating and managing environmental risks (known and unknown).

There is scope for further improvement, particularly in relation to waste, energy and water management. The college in recent years considers the environmental impacts of most of its actions and makes a concerted effort to act in an environmentally responsible manner. Even though the college does perform fairly well, the recommendations in this report highlight many ways in which the college can work to improve its actions and become a more sustainable institution.

10.2 Observations

Campus Green audit is a guide to assess environmental quality and creating strategies for change. Some of the very salient observations and important strategic changes to be implemented in the college are as follows:

1 Ventilation in rooms of different buildings is good and complies with the standards.
2 All the rooms receive optimum lighting with prescribed window-floor ratio.
3 The noise levels in all the locations are above the desirable limits which are due to the vehicular movement.
4 As per **Indian standards** the desirable **noise** pollution for **educational institutions** and hospitals during daytime is 50 dbA. Noise levels ranges

from 40.61 dB during non-peak hours and 71.58 dB during peak hours which is well above the limits.

5 Per capita consumption of water is 40.79 *lpcd* in the academic unit and 85 *lpcd* in hostels. This is well below the Indian average prescribed for both rural area and urban area (Rural: 70–80 lpcd and urban:135 *lpcd*).

6 The per capita consumption is well within the Indian average prescribed for rural area. The campus has overhead tank which are spatially distributed in the campus and is adequate for the students in the campus.

7 The water quality parameters are within the standard limits prescribed by Bureau of Indian Standards (BIS) except Total hardness and calcium.

8 Rain water harvesting structures are well laid in the campus. Roof top, collection pits with sand gravel filter, and surface runoff/ground catchment methods are implemented Total quantity of rainwater harvested is **969524.50 litres**

9 The wastewater generated in the campus is 138476 L. The wastewater generation is below the normal range.

10 Biodegradable waste generated per month is negligible, dry waste 150.00Kg/Mon. Sanitary waste generation is 1kg/month. The campus does not produce hazardous waste. Total waste generation is 1610 Kg.

11 The quantity of solid wastes generation is within the limits as per the MSWM Rules, 2000.

12 Food and beverage items served in the college canteen are traditional and prepared and served in hygienic manner.

13 Campus hygiene and sanitation is well organized meeting the standards 1 per 14 students.

10.3 Recommendations

1) The principles of Reduce, Reuse and Recycle can be encouraged among the students, teachers, non-teaching staff, support staff and all the stakeholders of the College.

2) Segregation of waste should be done as per the MSWM Rules, 2000 with twin bin system.

3) A paper recycling unit may be established in the campus.

4) E waste and laboratory waste management plan should be developed and implemented.

5) Maintenance of water tanks and RO plants should be done regularly.

6) Butterfly garden may be developed to arouse appreciation towards floral and faunal diversity.

7) Trees and plants can be named with its common name and scientific name wherever possible. QR Code can be introduced *(Avoid nailing name tags).*

8) Total Replacement of CFL with LED. Donate used Tube lights and CFL to educational institutions in need.

9) Conduct quarterly Campus Environmental Audit for water, energy and waste.

10) Display of Policies related to Campus Environmental Audit in the campus.

CHAPTER 11
Annexure

Work Sheet 1 - WATER AUDIT

Table 1: Campus Water Profile

No. of Municipal water connections	:	
No. of Sumps	:	
No. of Storage tanks	:	
No. of Bore wells	:	
Average annual rainfall	:	
No. of Rainwater Harvesting Structures	:	

Table 2: Storage Tanks in the College

S.No.	Location of the Tank	Dimension of the Tanks(M)			Capacity in m^3	No Of tanks In each Location	Total Capacity in Litres
		L	B	H			
1.							
2.							

Table 3: Number and Location of Bore Wells

Sl. No.	Location of the Bore well (Geo-coordinates)	Type of Pump Used (Hp)	Depth of the Borewell	Average depth of the water table
1				
2				

Table 4: Water consumption

Sl. No.	Unit	Population	Water Consumption (L)	Percapita consumption
1	Academics			
2	Hostels			

WORK SHEET 2: LAND AUDIT

Table 5: Land at a Glance (Area in Sq. M).

1.	Total Land area of your College	:	
2.	Open space	:	
3.	Plantation / Green area	:	
4.	Built-up / Constructed Area	:	
5.	No. of Buildings in the campus	:	
6.	Total No. of floors in buildings	:	
7.	Roof Top area	:	
8.	Terrain of the Campus	:	**Plain / Rocky / Undulating**
9.	Ground area	:	
10.	Parking Area	:	

Table 6: Classification Scheme for Land Use Analysis of Built Up Area

Level I	Level II
1. Built-up Area	1.1 Dense 1.2 Moderate 1.3 Sparse

Table 7: Land Use Data

Categories of Land Use	Area in Sq. Metres
Open space and Plantation	
Build up area	
Total	

Table 8: Total Green Cover

S. No.	Block	Place	m^2
1	A	Ground coverage area	m^2
2	B1	Green landscaped area on ground	m^2
3	B2	Play area that has grass on ground	m^2
4	B	Green area on ground (B1 + B2)	m^2
5	C	Play area that is paved/concrete on ground	m^2
6	D	surface parking area	m^2
7	E	Service area on Ground	m^2

Table 9: Built-Up Area of the Campus

S. No.	Block	Place	Area unit
1	A	Roof and terrace area	m^2
2	B	Green cover on exposed roof and terrace	m^2
3	C	Total built-up / constructed area	m^2
4	D	total number of floors (excluding ground floor)	m^2

WORK SHEET 3 – WASTE WATER

Table 10: Wastewater Discharge from the campus

S. No.	Buildings	Quantity of Water Consumption	Quantity of Wastewater generated in Litres (80%) of water consumption
1.	**Academic**		
	A		
	B		
	C		
2.	**Hostels**		
	A		
	B		
	C		

WORK SHEET 4 – Waste Audit

Table 11: Waste Audit

S. No.	Does your College segregate solid waste?		**Yes**		**No**
	If yes, who segregates the waste at source?	✓	**x**	**No. of staff**	
1.	Students, Teachers and all the staff				
2.	Housekeeping staff (Sweeper)				
3.	Gardner				
4.	Rag Pickers				
5.	Other				
6.	How many categories does your college segregate waste into?	**1**	**2**	**3**	> 3

Table 12: Biodegradable /Wet waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
6.	Garden / horticulture waste	
7.	Kitchen waste ---- Raw	
8.	Kitchen waste ---- Cooked	
9.	Wet waste from classroom etc.	
10.	Total amount of waste	
11.	Per capita waste generation	

Table 13: Dry / Recyclable waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (Monthly average in kg)
9.	Plastic	
10.	Paper	
11.	Wood or classroom furniture	
12.	Glass	
13.	Metal	
14.	Thermocol	
15.	Tetra packs	
16.	Total amount of waste	
17.	Per capita waste generation	

Table 14: Domestic Hazardous Waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
4	Hazardous and toxic waste (Paints, Lab waste, etc.)	
5	Oil from diesel generator sets	
6	Total amount of waste	
7	Per capita waste generation	

Table 15: Types of E-Waste

S. No.	Item	Total no. of Items	BEE Star Rating	Working condition	Non-Working condition
30.	TVs				
31.	VCR or DVD players				
32.	Refrigerators and freezers				
33.	Washing machines				
34.	Air conditioners				
35.	Water/Room heaters				
36.	Microwaves /Ovens				
37.	Toasters				
38.	Electric kettles				
39.	Personal computers				
40.	Laptop computer				
41.	Notebook / Pad computes				
42.	Printers				

43.	Copying equipment (Xerox)				
44.	Projectors				
45.	Digital Whiteboards				
46.	Calculators/Fax/Telex				
47.	Telephones				
48.	Mobiles / Mobile Batteries				
49.	Induction cookers				
50.	Batteries condemned				
51.	Bulbs – tube lights and others				

Table 16: Total Quantity of E-Waste

S. No.	How much waste does your College generate?	Quantity generated (monthly average in kg)
1	E-Waste	

Please submit the following supporting documents:

- Certificate of disposing e-waste from authorized dealer/dismantler.

  Who collects your e-waste, when not in working condition?
- Scrap dealer
- Taken back by manufacturer / vendor
- Authorized dealer
- Authorized dismantler

How Does Your College Dispose of Waste?

What is the final destination for waste that is disposed of externally from your college? (No points should be given here as dumping waste in landfills are not sustainable practices.)

- Open dumping
- Designated dumping site
- Landfill site

Please upload the following supporting documents on GSP audit portal:

- Picture of housekeeping staff disposing different types of solid wastes.
- Does your college burn waste? □ Yes □ No
- If yes,

a) Where does your College burn waste?
   - Inside the College / Outside the College

b) What kind of waste is burnt / incinerated?
   - Horticultural / Plastic / Tyre / Paper

Table 17: Biomedical Waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
3	Biomedical waste such as Syringes, band aids, expired medicines etc.	
4	Per capita waste generation	

Table 18: Sanitary Waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
3	Sanitary waste	
4	Per capita waste generation	

Table 19: C & D Waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
2	Construction and Demolition waste	
3	Per capita waste generation	

WASTE COLLECTION

Table 20: Waste Collection Points in your College

	No. of waste collection points					
Area	**Total No.**	**With no bin**	**with one bin (mixed waste)**	**with one bin (for only dry waste)**	**with two bins (wet &dry)**	**with three bins or more)**
Classrooms						
Playgrounds						
Common area (e.g. reception, corridors)						
Staff room						
Laboratory						
Canteen						
Clinic/sick room						
Library						
Toilets						
Others						
Total						

Tool tip: collection points are the areas where dusting have been placed.

Table 21: Total Quantity of Waste Treated

S. NO.	Type of Waste	Quantity of waste recycled per month (in Kg, frequency may differ)
1	Garden waste/horticulture waste	
2	Kitchen waste – Raw	
3	Kitchen waste – Cooked	
4	Wet waste from classrooms etc.	
5	Plastic	
6	Paper	
7	Wood, class room furniture	
8	Glass	
9	Metal	
10	Thermocol	
11	Tetra packs	
12	Hazardous and toxic waste (paints, lab waste etc.	
13	Oil from diesel generator sets.	
14	E – waste	
15	Biomedical waste such as syringes, Band-Aids, expired medicines etc.	
16	Sanitary waste	
17	Construction and demolition (C&D) Waste	
18	Total (in Kilograms)	

Table 22: Waste Recycling Practices followed in College

S. No.	Category Waste	Local Scrap collector	Authorized dealer	Dumped at a designated community site	Internal Procedure
8	**Paper** (e.g. used notebooks, used examination papers, subscription newspaper and magazines)				
9	Plastic (e.g. Broken, unusable)				
10	Horticultural waste				
11	E-Waste (e.g. broken, unusable computers)				
12	Hazardous waste				
13	Wood, glass, metal				
14	Biomedical Waste (e.g. waste from nurse room in College such as Band-Aids, syringes..)				

CHAPTER 12

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