PATRICIAN COLLEGE OF ARTS AND SCIENCE

ADYAR, CHENNAI

CAMPUS GREEN AUDIT REPORT

2018 – 2019

PREPARED BY

DEPARTMENT OF ENVIRONMENTAL SCIENCES
Bishop Heber College (Autonomous)
Tiruchirappalli, Tamilnadu - 620 017

CERTIFICATE

This is to certify that **Patrician College of Arts and Science, Adyar, Chennai, Tamilnadu** has conducted detailed CAMPUS GREEN AUDIT and has submitted necessary data and credentials for scrutiny. The activities and measures carried out by the College have been verified based on the reports submitted and was found to be satisfactory. The College has evolved policies on Environment, Water, Waste and Sanitation in line with the Sustainable Development Goals. The efforts taken by the members of the faculty, students, support staff and the Management towards creating a strategic change in attaining holistic environmental sustainability is highly appreciated andcommended.

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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.

Green audit is defined as an official examination of the effects a college has 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. A green auditor will study an organization's environmental effects in a systematic and documented manner and will produce an environmental audit report.

A clean and healthy environment aids effective learning and provides a conducive learning environment. 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 auditing 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 Patrician College of Arts and Science, Adyar, Chennai 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 Patrician College of Arts and Science, Adyar, Chennai 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.

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CAMPUS GREEN AUDIT PERSONNEL

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PATRICIAN COLLEGE OF ARTS AND SCIENCE

CAMPUS GREEN AUDIT TEAM

Co-ordinators

1	Dr. Ravita Bhatia	Head, Green audit	Noise
2	Mrs. Christy. T	Co ordinator Enviro Club	Flora and Fauna
3	Dr. Martina Jency.J	Enviro Club	Land
4	Dr. Arivarasan. N	Dept. of Tamil	Air
5	Dr. Baby.M	Dept. of Tamil	Energy
6	Mr. Pandiyan	Dept. of Computer Science	Water

AIR

Faculty: Dr. N. ARIVARASAN- DEPARTMENT OF TAMIL

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1.	Lavanya. M	II BSC (CS)
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4	Jaaziel. D	II B.COM (G)

FLORA AND FAUNA

Faculty: Mrs. T. Christy, co ordinator and Dr. Martina Jency .J – Enviro-club

S. No.	Name of the Student	Department
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2.	Jayendran.B	II B.COM (G)
3.	Prasath.R	II B.COM (G)
4.	Praveenraj.R	II B.COM (G)
5.	Manoj.J.R	II B.COM (G)
6.	Lokesh.R	II B.COM (G)

CAMPUS HYGIENE

1.	Dr. Ravita Bhatia	Associate Professor	Hindi
2.	Mrs. Christy .T	Assistant Professor-Member	Mathematics
3.	Dr. Baby. M	Associate Professor- Member	Tamil
4.	Dr. Arivarasan .N	Assistant Professor- Member	Tamil
5.	Dr. Martina Jency. J	Assistant Professor- Member	Mathematics-Shift-II
6.	Mr. Pandiyan	Assistant Professor- Member	Computer Science-Shift-II

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CHAPTER I
INTRODUCTION

Patrician College is a Christian Minority Institution founded by the Brothers of St. Patrick situated in the heart of Chennai, in Adyar. The college works with the vision to uplift the less privileged ones. Hence utmost importance is given to students from marginalized group and the one who excels in sports. Students irrespective of their caste and creed are given opportunity to shape their life and turn it into a success story with dedication and perseverance. Affiliated to the University of Madras with each course eligibility criteria prescribed by the Directorate of Education, the college offers 13 UG, 3 PG programs and 2 M.Phil programs. It also offers Scholarships from the management and channelizes the process for students to obtain Government scholarships as well. The college is ranked one amongst top 100 colleges by India Today. Despite Commerce stream being its forte with subjects as Corporate Secretaryship, Accounting & Finance wherein 1045 students are currently enrolled, Patrician's true mix of subjects can be seen in the Arts and Science streams with a combination of a number of interesting subjects such as Psychology, Social Work, Visual Communication, English, Computer Science, Computer Application, Mathematics, the Art & Science stream ranging into a variant palette. These subjects at present are witnessing a number of infrastructural developments and opportunities in the college. Among the latest developments in the college, the recently renamed Centre for Media studies offers Visual Communication, Electronics Media, Journalism for the top position in Chennai with state-of-the-art 80 seater Preview theatre, Sound & Editing room equipped with latest technologies, and Multi media lab.

The Internal Quality Assurance System, through the Internal Quality Assurance Cell(IQAC) frames and implements quality parameters, organizes faculty development programs, and regularly reviews academic and non academic student development programs. In the quest to become a Centre of Excellence, the college is working towards upgrading the Research departments with the introduction of M. Phil courses, while planning to increase number of academic courses which is scheduled to be inducted in the next academic year. Pertaining to the vision of making Patrician College a Centre of Excellence in Higher Education, the management team works to build human resources with values to make a significant contribution to society. The management team of the College works to build human resources with values to make a significant contribution to society in adherence to the vision of making Patrician College a Centre of Excellence in Higher Education. The college continuously upgrades itself in terms of faculty development, providing the ideal teaching-

learning support, infrastructural facilities, organizing campus placement drives with reputed companies, and providing counselling support wherever needed. Believing that the success of an educational institution lies on the shoulder of its faculties, Patrician College has a highly committed, qualified faculty providing an ideal teaching–learning environment.

The faculty members continuously update themselves by attending workshops and seminars apart from helping arrear students, slow learners, and bridge courses in English grammar for first year Tamil medium students. Extended Facilities the College within a span of 18 years has earned a name as a leading City College accredited as 'A' Grade Institution by NAAC and its 'No Ragging' policy further seals its commitment towards safety and security of girl students. The institute takes pride in its excellent infrastructure with fully air conditioned, well equipped Daniel Delany Library which houses 16,700 books in various subjects, reference books and 25 international and national journals.

The college also has Green Mat room, 100 seater computer lab, Multi media lab, Psychology lab, conference halls and auditorium with the latest audio equipments. Students at Patrician are encouraged to participate in sports, cultural events, and extension activities organized by the clubs, helping them grow holistically. Sports ground, Basket ball court with electronic scoreboard built to International standards, and Cricket pitch adds that extra niche to its pool of offerings. Very often the institute has taken up community development through extension activities.

The NSS organizes rural camp, Swachh Bharath campaigns; its Rotaract club involved in social welfare activities; the Enviro club takes up recycling waste and cleaning in and outside of the college; and Literacy club adopts a slum and conducts literacy drives. Similarly, the Department of Social work has an outreach program wherein they adopt a village and conducts a rural camp. With such believes and extraordinary efforts, Patrician College of Arts and Science aims at making a difference in the life of students through assisting value based education. Further in coming years the college will induct more number of academic courses and even anvil autonomous state for itself. Key Management: Courses Offered: Shift I UG B.A English, B.S.W., B.B.A, B.Com (Gen), B.Com (Corporate Secretary ship), B.Com (Accounting and Finance) B.C.A, B. Sc Computer Science, B. Sc Visual Communication,B.ScMathematics,B.ScPsychology,PGM.S.W.,M.AEnglish,M.Com
M. Phil Commerce, Social Work Shift II B.Com (Gen), B.Com (Corporate Secretary ship), B.Com (Accounting and Finance), B.C.A, B. Sc Electronic Media, B.A. (Journalism), B. Sc (Computer Science).

1.1VISION

Patrician College will continue to emerge as the centre for excellence in Higher Education and build human resources with values to make a significant contribution to society.

1.2MISSION

To provide a holistic education for intellectual and physical development, social and cultural sensitivity and economic opportunities that will empower every student to live in harmony.

1.3Campus Environmental Audit or 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 /IHEs/Schools) promote un-sustainability. In modern society no institutions is better situated and more obliged to facilitate the transition to a sustainable future than schools, Colleges and Universities'.

1.4 Sustainable Development Goals(SDG_S)

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.

1.5 Sustainable Development Goals (SDGs)

Plate 1 Sustainable Development Goals

In spite of a number of SDGs and an ever increasing number of Universities / Institutions of Higher Education and Schools. They are becoming engaged with the principles and concepts of SD.

1.6 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.

1.7 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.

1.8 Green Audit

Green Audit is defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity. The 'Green Audit' aims to analyse 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 Patrician College of Arts and Science, Adyar, Chennai evaluate its own status on environmental sustainability and contribute towards sustainable future.

CHAPTER II

CAMPUS INFRA STRUCTURE

The Campus includes a main building wherein the administrative office, faculty offices, classrooms, library and conference halls are housed. Apart from the main building, the Institute also has an auditorium.

Table 1: Total Campus Area and Buildings

Area	Acre	Sq. M
Total campus Area	3.00	12140.57
Built-up Area	1.043	4222.143
Open space and Garden	1.957	7919.698

Table 2: Campus Infrastructure

S. No.	Building / Block	Area in Sq. M
1	A Block	636.3858
2	B Block	1060.9530
3	C block	1277.0450
4	D Block	1246.7590
		4221.1428

PCAS Campus Lay out

Plate 2 Building Plan of PCAS

Plate 3 View of PCAS

2.1 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 meeting was held at PCAS, Chennai during March 2019. The audit protocol and audit plan was discussed in detail and a Green Audit team was constituted with a staff adviser and student members.

2.2 Commitment of the Management

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

2.3 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".*

Objectives:

- To evolve institutional policies on various environmental attributes such as water, waste and sanitation
- 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 footprint.

2.4 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.

2.4.1 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.

CHAPTER III

METHODOLOGY

The Campus Green Audit is an exercise that ensure the extent of implementation Green policies adopted by the institution. The methodologies for the green audit are as follows:

1. Preparation of Campus Green Audit questionnaire based on the objectives
2. Constitution of Campus Green Audit Team with staff and students for each module
3. Data Collection:
    a. Primary Data collection for each module by respective teams
    b. Secondary Data collection by the team members
    c. Collection of samples, observation, interviews and discussion with various staff members
    d. Steps in primary and secondary data collection
        i. Visits to each department, classrooms
        ii. Laboratories, Library, Cafeteria
        iii. Inventory of electrical fittings, scientific instruments and other appliances along with their power consumption
        iv. Electricity bill

Campus Green Audit
Work Sheet 1
Table 3: Institutional Profile

1.	**Name of the Institution**	**:**				
2.	**Address of the College**	**:**				
	City / District	**:**				
	State	**:**				
	Pincode	**:**				
	Phone - Landline	**:**				
	E mail	**:**				
	Web site	**:**				
3.	**Name of the Principal**	**:**				
	Mobile Number	**:**				
4.	**Green Audit Coordinator's Name**	**:**				
	Mobile number	**:**				
5.	**How many shifts does your College have? Please Tick ✔**	**:**	**Shift**	**✔ / ×**	**Time**	**Hours**
			Morning			
			Evening			

			Both				
6.	**Is your College single gender?**	**:**	Only Boys				
			Only Girls				
			Co-Education				
7.	**What is the total population of the College?**	**:**	**Total**	**:**			
			Male	**No.**		**Female**	**No.**
	Students	**:**					
	Teachers	**:**					
	Non-Teaching Staff (housekeeping, support & Management Staff)	**:**					
	Total	**:**					
8.	**How many visitors visit your College?** (Visitors are Students & Teachers from other Colleges, Technicians, contractors, labourers, guests and others (Please provide an average number).	**:**					
9.	**How many students / wardens / support staff stay in your school?**	**:**					
10.	**Brief History of the Campus**	**:**	**Annexure**				
11.	Lay out of the Campus showing all the buildings, play grounds and other features	**:**	**Annexure**				
12.	**Total Area of the campus**	**:**	Acres			Sq. M	
13.	**Age of the Buildings**						

	Name of the Building	**Opened on**
14	**Built up area (All Floors)**	
	Name of the Building	**Area in Sq. M**
15	**Student's Strength (For the past Five years)**	

S. No.	**Year**	**UG**	**PG**	**M. Phil**	**Ph. D**	**Total**
1.	**2014 – 2015**					
2.	**2015 – 2016**					
3.	**2016 – 2017**					
4.	**2017 – 2018**					
5.	**2018 – 2019**					
	Total					

WORK SHEET 2 - WATERAUDIT

Table 4: Key Facts about the institution

No. of staff (Teaching and Non-teaching)	:	
No. of students	:	
No. of Metro water connections	:	
No. of Sumps for storing Metro water	:	
No. of Storage tanks for storing Metro water	:	
No. of Bore wells	:	
Total Rooftop Surface area (Sq. M)	:	
Average annual rainfall	:	
No. of Rainwater Harvesting Structures	:	
Average Visitors per day	:	

Table 5: Storage Tanks in the College – Academic Buildings

Table Storage Tanks (Over Head) in the College

S.No.	Location of the Tank	Dimension of the Tanks(M)	Capacity in m3	No Of tanks In each Location	Total Capacity inLitres
1					
2					
3					

Table 6: Number and Location of Bore Wells

Number & Location of Bore Wells In Academics Unit

Sl. No.	Location of the Bore well	Type of Pump Used &hp	Depth of the Borewell	Average depth of the water table
1				
2				
3				

Table 7: Water consumption

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

WORK SHEET 3

Table 8: ELECTRICAL ENERGY AUDIT

1.	Power : Maximum Demand (MD)	**:**	**KVA**
2.	Transformer	**:**	**KVA**
3.	No. of Diesel Generator sets & Capacity	**:**	
4.	Solar energy utilization (Yes / No)	**:**	
5.	Fuel used for cooking in hostels	**:**	

Table 9: Electricity Consumption

Billing Cycle : Monthly / Bimonthly
Tariff :

Service No.	Units consumed	Amount Paid	EB Load (kw)
Total			

Table 10: Total Electricity consumption

Year	Units consumed	Amount Paid	
2014 – 2015			
2015 – 2016			
2016 – 2017			
2017 – 2018			
2018 2019			

Table 11: Electrical Audit
(Prepare the details for each building – Model is given in the next table)

S. No	Name of the Article	Quantity	Power in Watt	Duration of usage/day	Total power consumed/day (W)	Total power consumed/ day (Unit)
1	Incandescent bulb		**60**			
2	Tube Light		40			
3	LED light		7			
4	CFL light		16			
5	Ceiling fan		75			

6	Table Fan		75			
7	Grinder		750			
8	Mixer grinder		550			
9	Iron box		1000			
10	Refrigerator		200			
11	Air conditioner		1800			
12	Water heater		1400			
14	Washing machine		1000			
15	Any other specify here under (findout the power inwatts)					

- **voltage X ampere = Power (V X I =P)**
- **Unit: (volt X ampere =watt)**
- **Tariff Structure and Power cost**
- **One electrical Unit =1000W/hour**
- ***(1000 watt bulb glows for an hour or 100 watt bulb glows for 10hours)***
- **Power factor(pf)= Actual power/ apparent power**
-

Table 12: Model Table to be prepared for each Department

S.NO.	Name of the Article	Quantity	Power in Watt	Duration in hours /Day	Total Power Consumed	Total Electrical Unit/Day	Total Electrical/Two months	Total
1	Tube Light							
2	Ceiling Fan							
3	LED							
4	Air Conditioner							

Table 13: Details of UPS and BATTERY (Model)

UPS And Battery Details										
Place	Date Of Installation	Capacity	Type	Brand	Battery Brand	Battery Nos.	Battery Capacity	Battery Repalced	UPS Life in Year	Batt Life in Year
Computer .Lab										

Table 14: Fuel Usage
(Prepare monthly details for five years) Year wise table and a consolidated table

DATE	FUEL		LPG (Commercial / Domestic)	
	WOOD in Kg	Amount	No. of Cylinders	Amount
				5

WORK SHEET 4: LAND AUDIT

Table 15: Land at a Glance (Area in Sq. M).

6.	Total Land area of your College	**:**	
7.	Open space	**:**	
8.	Plantation / Green area	**:**	
9.	Built-up / Constructed Area	**:**	
10.	No. of Buildings in the campus	**:**	
11.	Total No. of floors in buildings	**:**	
12.	Roof Top area	**:**	
13.	Is there any rocky structure present	**:**	
14.	Ground area	**:**	
15.	Parking Area	**:**	

Table 16: Classification Scheme for Land Use Analysis of Built Up Area

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

Table 17: Land Use Data

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

Table 18: 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

Ideally the green area on the ground should be 35% of the total site area,, out of which 15 % should be from green landscape area on ground.

Table 19: Built-Up Area of the Campus

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

WORK SHEET 6: FLORA

Table 20: FLORA

S.No.	Family	Species	Habit
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Table 21: Stratification

	Stratum	Plant species
1	Grasses	
2	Herbs	
3	Shrubs	
4	Climbers	
5	Trees	

Table 22: Habitat Forms

a.	**Xerophytes**	
b.	**Medophytes**	
c.	**Hydrophytes**	

FAUNA

Table 23: Butterflies

	Common Name	Scientific Name	Status/Schedule
1.			
2.			
3.			

Table 24: Insects

S.No	Common name	Scientific Name	Status/Schedule
1			
2			
3			

Table 25: Molluscans

S No	Common English Name	Scientific Name	Status
1			
2			

Table 26: Crustaceans

S No	Common English Name	Scientific Name	Status
1			

Table 27: Fishes

S. No.	Common English Name	Scientific Name	Status
1.			

Table 28: Reptiles

S. No.	Common English Name	Scientific Name	Status
1.			

Table 29: Birds

Sl.No.	Common Name	Scientific name	IUCN	WPA 1972 Schedule
1				
2				
3				

Table 30: Mammals

S No	Common English Name	Scientific Name	Status
1			
2			

WORK SHEET 7
Table 31: Waste Audit

Does your College segregate solid waste?
• □Yes□No
If yes, who segregates the waste a source?
• Students, teachers and all the staff
• Housekeeping(sweeper)
• Gardener
• Rag pickers
• Other
How many categories does your College segregate waste into?
• Two
• Three
• More than three

If your College segregates waste into more than three categories, mention the categories_____
_____
_____

HOW MUCH WASTE DOES YOUR COLLEGE GENERATE?

Determine the quantity of waste generated in your College (in Kilogram) and complete the table. Please note that some categories of waste may happen daily, weekly, monthly, biannually. Please convert these to monthly averages before filling the table below:
Tooltip: Please note that some categories of waste may happen daily, weekly, monthly, biannually or annually. Please convert these to monthly average before entering.

Table 32: Biodegradable /wet waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
1	Garden / horticulture waste	
2	Kitchen waste----- Raw	
3	Kitchen waste----- Cooked	
4	Wet waste from classroom etc.	
5	Total amount of waste	
6	Per capita waste generation	

Table 33: Dry / Recyclable waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
1.	Plastic	
2.	Paper	
3.	Wood or classroom furniture	
4.	Glass	
5.	Metal	
6.	Thermocol	
7.	Tetra packs	
8.	Total amount of waste	
9.	Per capita waste generation	

Table 34: Domestic Hazardous Waste

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

Table 35:E-Waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
1	E-Waste	
2	Per capita waste generation	

Table 36: Biomedical Waste

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

Table 37: Sanitary Waste

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

Table 38: G. C & D Waste

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

WORK SHEET 7A
WASTE COLLECTION

Table 39: Waste Collection Points in your College

Tooltip: Students will have to count the number of waste disposal points in the College as, for instance, one dustbin, two dust bins or more, if there are no dustbins, please say Zero (0).

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						
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.

WORK SHEET 7B
HOW MUCH WASTE DOES YOUR COLLEGE TREAT/RECYCLE

To collect data: Find out whether your College had any waste recycling facility such as compost pit, paper recycling machine, etc. if you have a paper recycling unit, the person in charge will definitely be recording the input and output from the unit. If the College is selling newspapers or bottles or metal scrap to the local waste dealer, that can be included in the quantity recycled.

Does your College recycle any generated waste?

- □Yes□No

Tool tip: on Kg/day or Kg/month you can check daily waste generation and then find out how much of it goes for recycling or treatment.

If the answer is yes, please provide quantity of what is applicable in Table 3.

In the answer is no, please move to the next question.

Table 40: 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)	

Does your College have a composting facility?

- □**yes**□**no**

Please upload the following supporting documents on the GSP Audit Portal.

- Composting pit
- Manure from composting

a) If yes, what is the methodology used?
    - Natural composting with/without added microbes
    - Vermi composting

- Mechanical composting (with electricity /machines)
- Other: _____

b) If yes, what is the quantity of compost that is generated per month in Kilograms?
_____

c) What is the purpose of the compost that is generated per month?
- For horticultural purposes
- For College garden
- For dale
- For charity

Does your College encourage students and teachers to reuse textbooks?

- □Yes□No

Please fill Table 4: waste recycling practices followed in College to understand whether waste recycling procedures are applied to waste.

Table 41: 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)				
2	Plastic (e.g. Broken, unusable)				
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..)				

Please upload the following supporting documents on GSP Audit Portal:

- Pictures of recycling units – paper recycling machines, selling paper to scrap men, recyclers etc.

Does your College have the following? If yes, please give the numbers of items in working condition and those that are not.

WORK SHEET 7C

E-Waste

Tooltip: Please give the numbers of items in working condition and those that are not. Check the store room of the College and find our equipment that are lying unused because of maintenance and operation issues. Also count the number of equipment in working condition. This will help to inventorize electronic waste.

Table 42: E-Waste Disposal

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

Do you know that your e-waste can be collected by an authorized dealer or dismantler?

Yes No

Please upload the following supporting documents on GSP audit portal:

- 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
- Other _____

HOW DOES YOUR COLLEGE DISPOSE OFF 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
- Don't know

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

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

COLLEGE'S INITIATIVES

It is important to appreciate the initiatives taken by the management on issues related to waste. The management's approach to these issues can be assessed in the following way: seek an appointment with the Chairperson, manager and Principal of your College and ask them the following questions:

Does the College have a policy on waste?

□ Yes□ No

Please upload the following supporting documents

- Waste policy

Are there awareness drives with regard to reduce, recycle and reuse

□ Yes□No

Please upload the following supporting documents

Photographs of various initiatives of the College e.g. rally, debates, street play, art competition etc.

What form of these awareness drives take?

- As part of the curriculum
- As part of extra-curricular activities, such as guest lectures
- By showcasing posters and stickers

Is the study of the environment integrated in to the curriculum?

□Yes □No

CHAPTER IV

AUDIT STAGE

The Campus Green Audit (CGA) was carried out by the Post Graduate and Research Department of Environmental Sciences, Bishop Heber College (Autonomous), Tiruchirappalli, Tamilnadu. The CGA 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

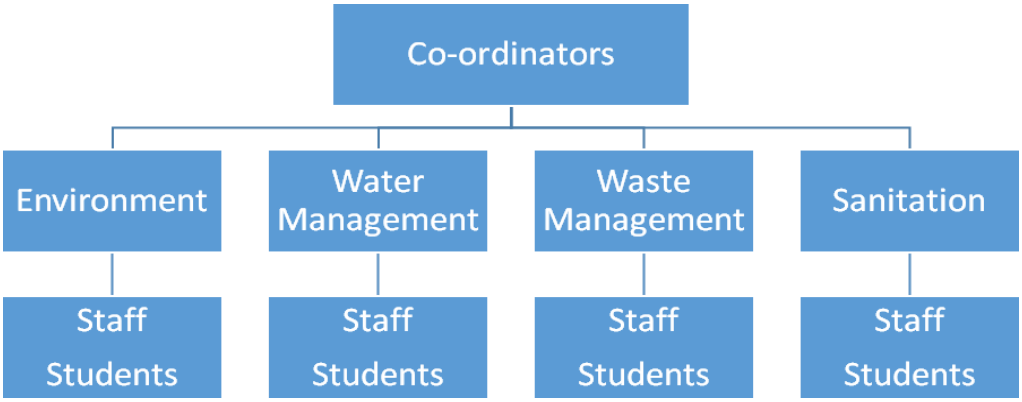


Fig. 1 Campus Green Audit Team

4.2 Co-ordinators:

Table 43: Campus Green Audit Coordinators

1	Dr. Ravita Bhatia	Head, Green audit	Noise
2	Mrs. Christy. T	Enviro Club	Flora and Fauna
3	Dr. Martina Jency.J	Enviro Club	Land
4	Dr. Arivarasan. N	Dept. of Tamil	Air
5	Dr. Baby.M	Dept. of Tamil	Energy
6	Mr.Pandiyan	Dept. of Computer Science	Water

4.3 AIR

Table: 44 Air Quality Monitoring Team

Faculty: Dr. N. ARIVARASAN-Department of Tamil

S. No.	Name of the Student	Department
1.	Lavanya. M	II BSC (CS)
2.	Sandra Kathrin. T	II BSC (CS)
3.	Shalini. S	II BSC (CS)
4.	Aswin kumar. G	IIB.COM(A/F)

4.4NOISE

Table 45: Noise Monitoring Team
Faculty: Dr. RAVITA BHATIA - Green Audit –Head

S. No.	Name of the student	Department
1.	BARANI DHARAN B	II B.com(A/F)
2.	SOWMITHRA P	II B.com(A/F)
3.	PAVITHRA K	II B.com(A/F)

4.5 ENEGRY:

Table 46: Energy Audit Team
Faculty : Dr. BABY.M- DEPARTMENT OF TAMIL

S.No	Name of the Student	Department
1	S.ARAVIND	II B.COM A/F
2	R.YOGA LAKSHMI	II B.COM A/F
3	R.SRIKUMARESAN	II B.COM A/F
4	D.JAAZIEL	II B.COM (G)

4.6 FLORA AND FAUNA

Table 47: Flora and Fauna Team
Faculty: T. Christy and Dr. Martina Jency.J – Enviro-club Members

S. No.	Name of the Student	Department
1.	JOHN BOSCO Y	II B.COM (G)
2.	JAYENDRAN.B	II B.COM (G)
3.	PRASATH.R	II B.COM (G)
4.	PRAVEENRAJ.R	II B.COM (G)
5.	MANOJ.J.R	II B.COM (G)
6.	LOKESH.R	II B.COM (G)

4.7 CAMPUS HYGIENE

Table 48: Campus Hygiene Team

S. No.	Name	Designation		Department
1.	Dr. Ravita Bhatia	Associate Professor	Head- Green Audit Team	Hindi
2.	Mrs. Christy T	Assistant Professor	Co-ordinator-Enviro Club	Mathematics
3.	Dr. Baby M	Associate Professor	Member	Tamil
4.	Dr. Arivarasan N	Assistant Professor	Member	Tamil
5.	Dr. Martina Jency J	Assistant Professor	Member	Mathematics-Shift:II
6.	Mr. Pandiyan	Assistant Professor	Member	Computer Science-Shift:II

4.8 PCAS Environmental Policy

PATRICIAN COLLEGE OF ARTS AND SCIENCE,
ADYAR, CHENNAI – 600020.

Environmental Policy

The Patrician College always aims to eliminate or reduce all forms of environmental pollution and encourages all faculty members, staff, students and others to practice the same.

The College always raises awareness of environmental issues among its staff/students/visitors and encourages initiatives leading towards a clean and green environment.

The College promote the 5 R's for waste management in the order of Reduce, Reuse, Recycle, Refuse, Recover and provide convenient waste segregation, collection and guidance for the disposal of paper, cardboard, glass, plastic, electrical and white goods, hazardous waste and e-waste.

The College minimizes the consumption of water and enhances groundwater level by establishing campus catchment area and rainwater harvesting schemes in all buildings of the campus, encouraging to report leaks and rectifying them promptly, progressively replacing faulty taps and fittings, exploring options for using waste roof run off water wherever possible.

The College minimizes the consumption of electricity where opportunity arises by progressive replacement of light bulbs with energy efficient ones. Inculcating the practice among staff and residents to turn off electrical appliances when not in use. Installation of a Hybrid solar power system in the campus.

The College adapts health, safety and environmental codes of practice. The College is completely free from plastics and discourages burning of waste materials in any form.

Plate 4 Environmental Policy

4.9 PCAS Water Policy

PATRICIAN COLLEGE OF ARTS AND SCIENCE,
ADYAR, CHENNAI – 600020.

WATER POLICY

The Patrician College recognizes and endorses water as a prime natural resource, a basic human need and a precious institutional asset.

The College emphasizes water as a significant commodity and strives to promote its conservation and efficient use through the implementation of the 6th Sustainable Development Goal 'Clean Water and Sanitation'.

The College minimizes the consumption of water and enhances groundwater level by establishing Campus Catchment Area and rainwater harvesting schemes in C and D buildings of the campus. Students and Staff are encouraged to report leaks and faulty taps and take measures to rectify them promptly by progressively replacing faulty taps and fittings.

The College utilizes rainfall directly with a Campus Catchment Area by gravity method through well laid conduits. The Campus Rainwater Harvesting facility is considered in a holistic manner. Recycle and reuse water as a much as possible.

Plate 5 Water Policy

4.10 PCAS Waste Policy

PATRICIAN COLLEGE OF ARTS AND SCIENCE,
ADYAR, CHENNAI – 600020.

WASTE POLICY

The Patrician College promotes sustainable consumption pattern among staff, students and visitors. Waste is considered as a misplaced resource and is managed responsibly.

The College endorses that careless waste disposal leads to Environmental hazards and Responsible disposal leads to a healthier living.

The College stimulates 5 R principles in the order of **Reduce, Reuse, Recycle, Refuse and Recover** and provide convenient waste segregation, collection and guidance for the disposal of paper, cardboard, glass, plastic, electrical and white goods, and e-waste.

The College inculcates a culture of avoiding purchase of products with excessive or unnecessary packaging and encourages to purchase products that can be used multiple times and are long lived rather than single-use or poor quality items that are thrown away quickly.

The College encourages all the stakeholders to improve the habit of recycling materials by appropriate segregation of waste and recycling paper waste through an authorized dealer.

Plate 6 Waste Policy

4.11 PCAS Sanitation Policy

PATRICIAN COLLEGE OF ARTS AND SCIENCE,
ADYAR, CHENNAI – 600020

CAMPUS HYGIENE

One of the world's most urgent issues is lack of safe water, sanitation and hygiene. Water and sanitation related improvements are crucial to meet the development goals and improve health in a sustainable way. The United Nations' Sustainable Development Goals have emphasized on the achievement of universal and equitable access to safe and affordable drinking water and adequate and equitable sanitation and hygiene for all.

Campus hygiene is defined as a comprehensive plan for preserving individual and community health in all its dimensions. Implementing such practices are particularly important on college campuses where students often live in close quarters and move from one building or class room to another every day.

Cleaning is one of the most important aspects of running a college building. Failing to ensure the cleanliness of a building can have a detrimental impact on the health and wellbeing of all of those who use it.

Ensuring that the college is well maintained is not only conducive to productivity; it also increases the likelihood of attracting more students. The World Green Building Council revealed that clean offices that are well-designed are more likely to produce a good working atmosphere.

Maintaining a clean college environment sets a **good example** to students. It encourages learners to take pride in their university or college, which makes them less likely to drop litter and as such they will potentially make a bigger effort to maintain their environment.

The **cleanliness is incredibly important when it comes to cutting down on the spread of diseases in the college** and means that staff and students are able to enjoy a comfortable learning environment. It also improves hygiene levels and can help to reduce the spread of sickness.

Campus Cleaning is committed to sustainability and efficiency through a "Cleaning for Health" initiative. Green chemicals are dispensed using a chemical management system; floor care products are used that contain minimal Volatile Organic Chemicals and all accessories used are eco-friendly.

The goal of Campus Cleaning continues to focus on what's best for both building occupants and the environment as we continually research and review industry trends, products and new ideas. Each of the Patrician is committed to professional excellence and pride in the service provided to Patrician College.

Plate 7 Campus Hygiene Policy

CHAPTER V

POST AUDIT STAGE

The Campus Green 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.

5.1 AIR

5.1.1 Ambient Air Quality in Adyar, Chennai

Chennai city has developed fast in the recent years and simultaneously the vehicle population in Chennai has exponentially grown over the years. To ease congestion, several flyovers have been constructed. Now the metro rail project is in an advanced stage of completion. Because of all this, air quality suffers. 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). In this study an attempt has been made to assess the air quality in selected areas of the Chennai city, using the IND-AQI procedure. IND-AQI proposed by Sharma et al (2003) has been used for computing the AQI in this study. 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.

Table 49: AQI Proposed for India (Sharma et al, 2003)

S. No.	Sub Index	Category	SO_2	NO_2	SPM	PM_{10}
			24 hr average µg/m^3			
1	0 – 100	Good	0 – 80	0 – 80	0 - 200	0 – 100
2	101 – 200	Moderate	81 - 367	81 - 180	201 – 260	101 - 150
3	201 – 300	Poor	368 – 786	181 – 564	261 - 400	151 – 350
4	301 – 400	Very Poor	787 - 1572	565 – 1272	401 - 800	351 – 420
5	401 - 500	Severe	> 1572	> 1272	> 800	> 420

Tamil Nadu Pollution Control Board is operating eight ambient air quality monitoring stations in Chennai under National Air Quality Monitoring Programme (NAMP) funded by Central Pollution Control Board.https://www.tnpcb.gov.in/air-quality.php

The eight ambient air quality monitoring stations in Chennai are:

Table 50: Ambient Air Quality Monitoring Stations

S. No.	Station location	Land Use Zone / Area
(i)	Kathivakkam	Industrial area
(ii)	Manali	Industrial area
(iii)	Thiruvottiyur	Industrial area
(iv)	Kilpauk	Commercial (traffic inter-section)
(v)	Thiyagaraya Nagar	Commercial (traffic inter-section)
(vi)	Nungambakkam	Commercial (traffic inter-section)
(vii)	Anna Nagar	Residential area
(viii)	Adyar	Residential area

https://www.tnpcb.gov.in/air-quality.php

All the above stations are functioning on 24 hours basis, twice a week. The samples collected from NAMP stations are analysed for the Respirable Suspended Particulate Matter (RSPM) (RSPM is particulate matter less than 10 microns) and gaseous pollutants such as Sulphur di oxide (SO_2) and Nitrogen di Oxides (NO_2).The ambient air quality data for Adyar, Chennai is given in Table 49 – 51 and figure 2 – 4.

Table 51: Ambient Air Quality in Adyar, Chennai

S. No.	From	To	microgram / cubic metre			
			PM_{10}	$PM_{2.5}$	SO_2	NO_2
1	06/11/18	07/11/18	**212**	**95**	8	13
2	08/11/18	09/11/18	**184**	**88**	9	15
3	13/11/18	14/11/18	74	32	7	13
4	15/11/18	16/11/18	67	29	8	14
	Permissible Limit		100	60	80	80
6th to 8th November 2018 : Deepavali Festival						

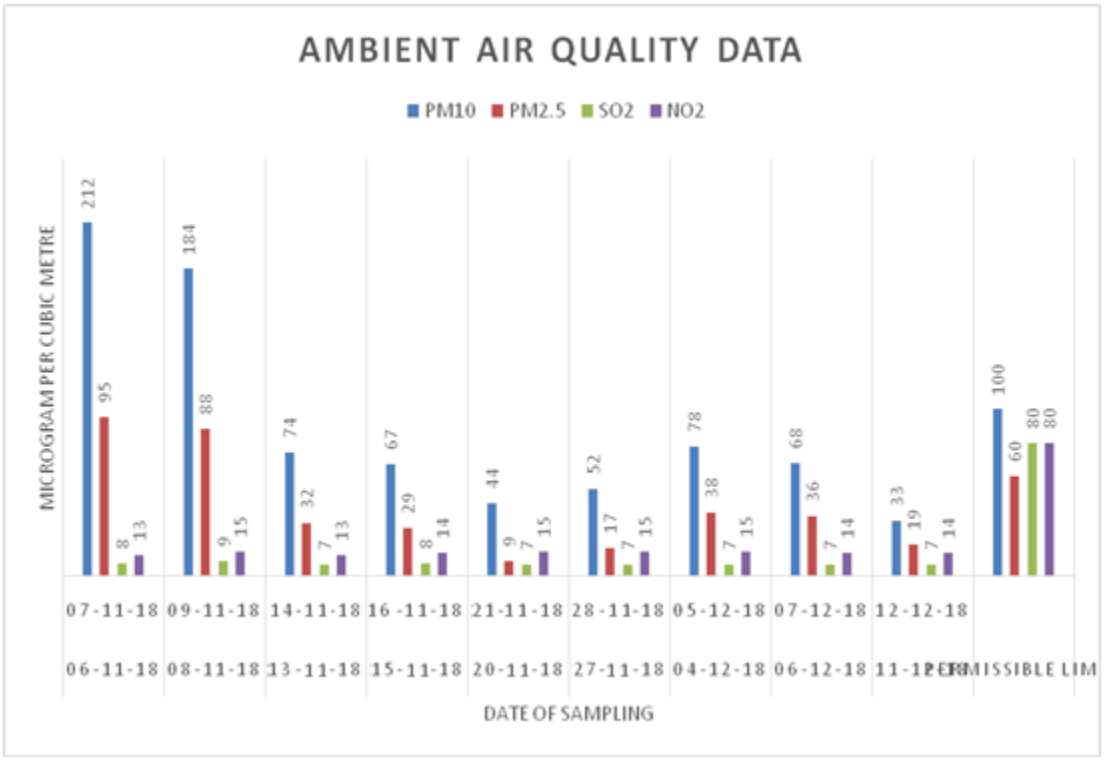


Fig: 2 Ambient Air Quality Data without AQI

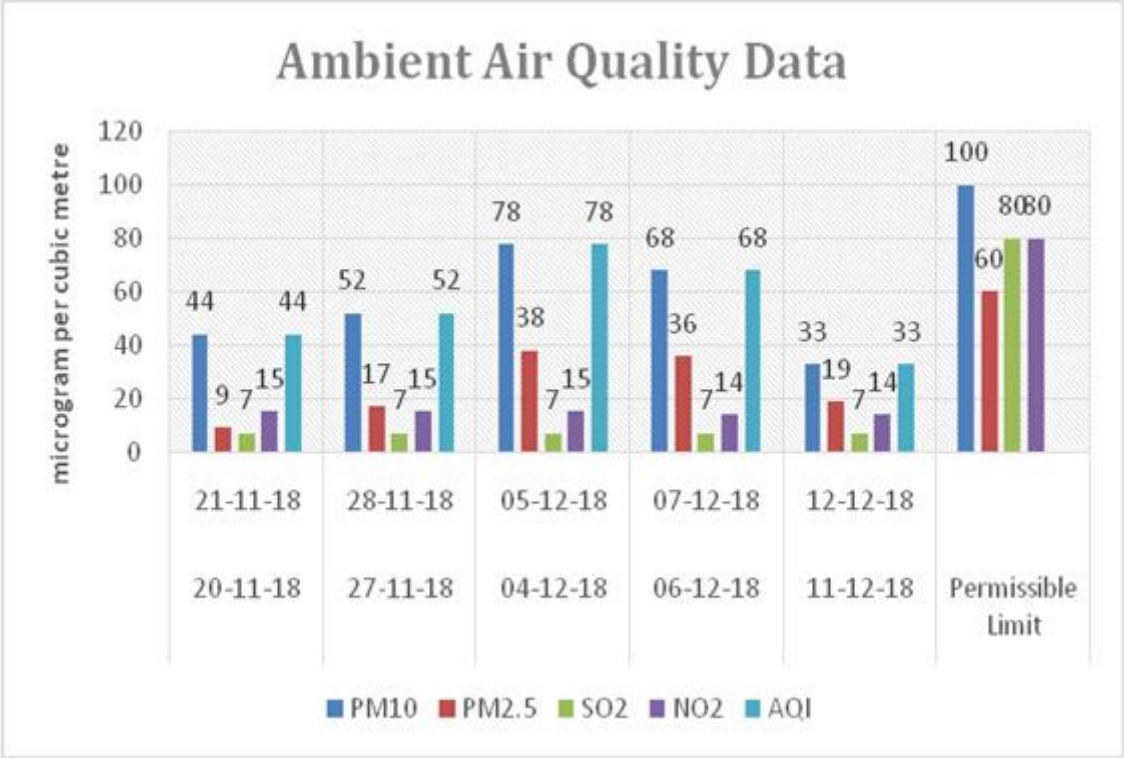


Fig: 3 Ambient Air Quality Data with AQI

Table 52: Ambient Air Quality in Adyar with AQI

S. No.	From	To	microgram / cubic metre				AQI		
			PM_{10}	$PM_{2.5}$	SO_2	NO_2		Air Quality Index	
1	20/11/18	21/11/18	44	9	7	15	44	0-50	Good
2	27/11/18	28/11/18	52	17	7	15	52	51-100	Satisfactory
3	04/12/18	05/12/18	78	38	7	15	78	101-200	Moderate
4	06/12/18	07/12/18	68	36	7	14	68	201-300	Poor
5	11/12/18	12/12/18	33	19	7	14	33	301-400	Very Poor
	Permissible Limit		100	60	80	80		>401	Severe

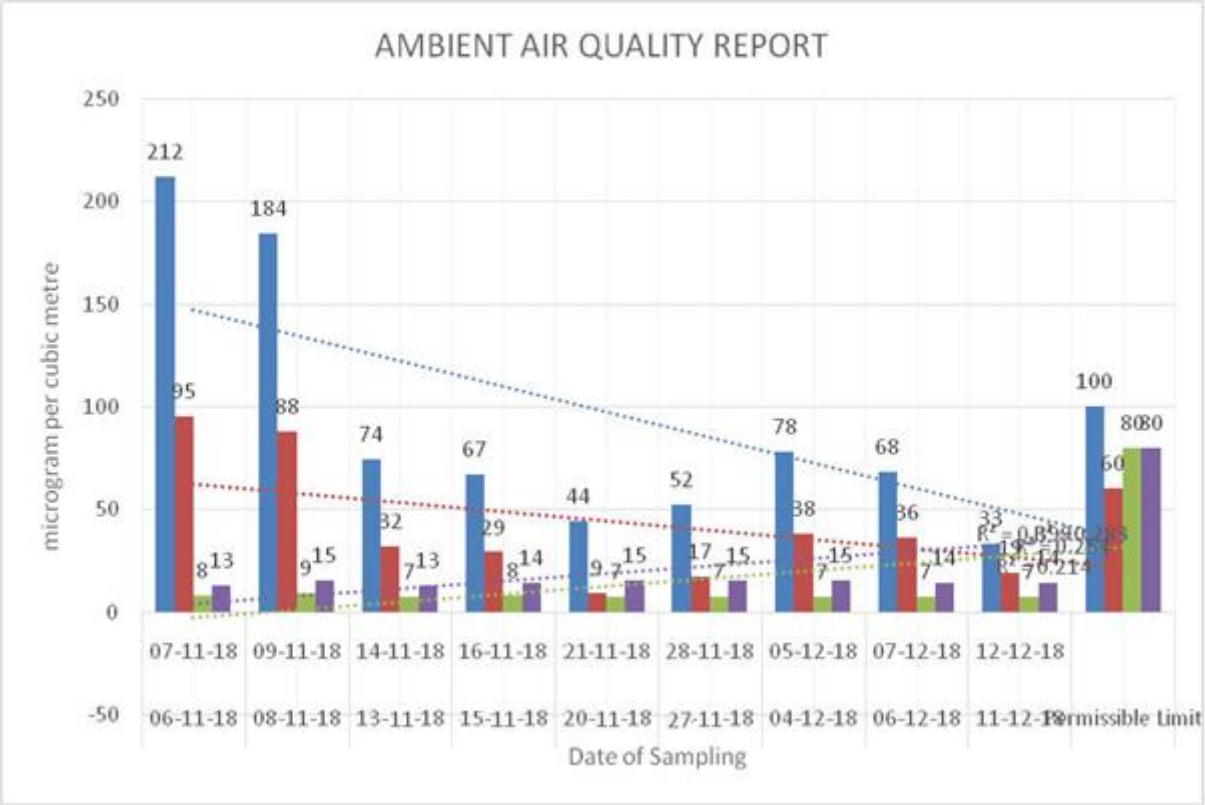


Fig: 4 Ambient Air Quality Report

During the monitoring period from November to December 2018 high concentration of PM_{10} was recorded from 6^{th} to 8^{th} November 2018 which is due to Deepavali festival.

5.2 Monitoring of Micro-meteorological Parameters

Table 53: Micro-meteorological Parameters

Location	Wind Velocity M/s	%	^{0}C	LUX	CO PPM	mg/m^3
Entrance	1.30	59.60	32.6	18,200	0.004	0.00493
Block - A	1.00	55.50	35.2	15,520	0.008	0.00987
Block - B	1.40	61.10	32.2	12,220	0.007	0.00863
Block - C	3.40	16.70	32.6	10,920	0.007	0.00863
Block - D	1.30	59.80	32.8	16,430	0.005	0.00617
Entrance	1.60	60.70	32.1	15,120	0.006	0.0074
Block - A	1.10	63.40	31.6	16,150	0.006	0.0074
Block - B	1.80	64.70	31.7	7,050	0.008	0.00987
Block - C	1.40	64.30	31.3	9,130	0.007	0.00863
Block - D	0.70	64.20	30.8	3,700	0.007	0.00863
Entrance	2.40	62.70	31.4	14,320	0.006	0.0074
Block - A	0.20	65.60	31.4	5,350	0.008	0.00987
Block - B	1.60	66.70	30.2	17,250	0.007	0.00863
Block - C	0.60	67.10	31.4	7,170	0.008	0.00987
Block - D	1.00	64.60	31.4	8,080	0.005	0.00617
Entrance	2.50	66.90	31	8,870	0.004	0.00493
Block -A	0.60	66.50	30.8	1,360	0.005	0.00617
Block -B	1.00	65.70	30.5	12,488	0.006	0.0074
Block-C	0.30	69.00	30.5	4720	0.006	0.0074
Block-D	0.30	68.90	30.5	8470	0.006	0.0074
Max	3.40	69.00	35.2	18,200	0.008	0.00987
Min	0.20	16.70	30.2	1,360	0.004	0.00493
Average	1.28	61.685	31.6	10,626	0.0063	0.00777

5.3 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 percent 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 four blocks viz. A, B, C, & D has been and calculated and the results are given in Table 54 to 57 and Figure 5 to 8.

5.3.1 Block wise Window-to-Floor Ratio

Table 54: Window to floor ratio - A Block

S. No.	X (Sq. M)	Y (Sq. M)	(Y/X*100) Percentage
	Class Room Area	Window	Floor Area ventilated
1.	49.05	18.62	37.95
2.	49.05	18.62	37.95
3.	49.05	18.62	37.95
4.	18.12	10.78	59.49
5.	49.05	10.03	20.45
6.	49.05	4.83	9.85
7.	49.05	5.95	12.12
8.	14.88	5.95	39.95
9.	196.20	49.79	25.38
10.	66.89	18.62	27.83
11.	66.89	18.62	27.83
12.	66.89	18.62	27.83
13.	66.89	18.62	27.83
14.	28.98	26.05	89.87
15.	66.89	18.62	27.83

16.	66.89	18.62	27.83
17.	66.89	18.62	27.83
18.	66.89	18.62	27.83
19.	66.89	18.62	27.83
20.	66.89	18.62	27.83
21.	28.98	17.47	60.26

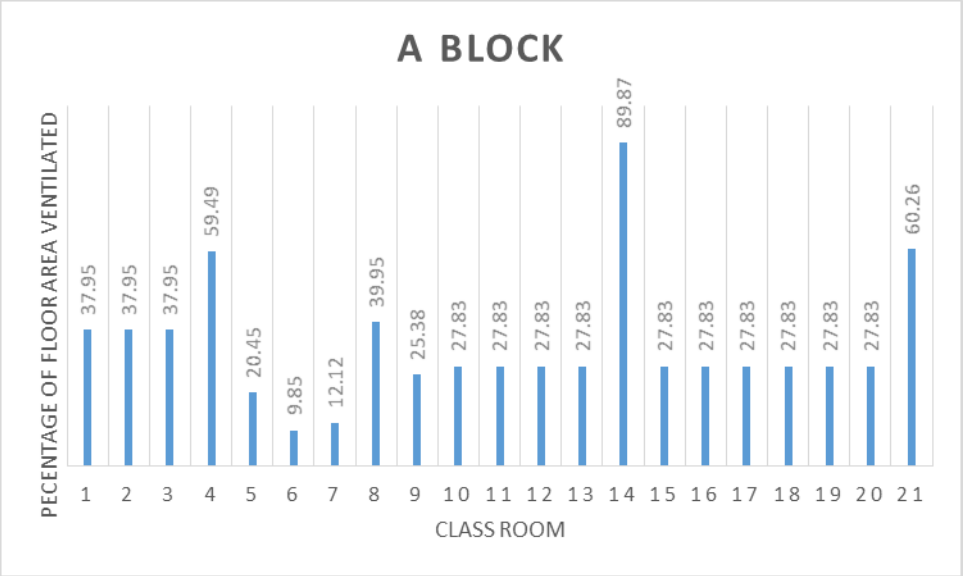


Fig: 5 Percentage of floor area ventilated - A Block

Table 55: Window to floor ratio - B Block

S. No.	X (Sq. M)	Y (Sq. M)	(Y/X*100) Percentage
	Class Room Area	Window	Floor Area ventilated
1.	64.66	20.44	2043.80
2.	64.66	20.44	2043.80
3.	64.66	20.44	2043.80
4.	31.21	15.98	1597.88
5.	18.86	11.52	1151.96
6.	407.46	87.70	8769.76
7.	64.66	20.44	2043.80
8.	64.66	20.44	2043.80
9.	64.66	20.44	2043.80
10.	64.66	20.44	2043.80
11.	64.66	20.44	2043.80
12.	64.66	20.44	2043.80
13.	64.66	20.44	2043.80
14.	64.66	20.44	2043.80
15.	64.66	24.90	2489.72
16.	64.66	15.98	1597.88
17.	64.66	11.89	1189.12
18.	64.66	20.44	2043.80
19.	64.66	20.44	2043.80
20.	64.66	20.44	2043.80

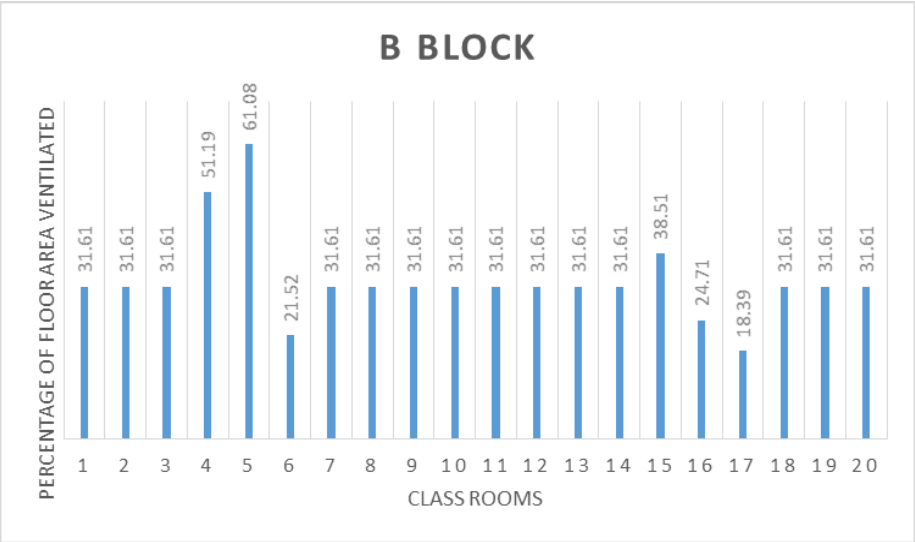


Fig: 6 Percentage of floor area ventilated - B Block

Table 56: Widow to floor ratio - C Block

S. No.	X (Sq. M)	Y (Sq. M)	(Y/X*100) Percentage
	Class Room Area	Window	Floor Area ventilated
1.	75.90	11.46	15.10
2.	75.90	11.46	15.10
3.	75.90	11.46	15.10
4.	21.09	9.23	43.79
5.	21.09	12.55	59.52
6.	21.09	12.63	59.91
7.	21.09	9.23	43.79
8.	77.57	9.23	11.90
9.	23.41	8.15	34.80
10.	44.59	13.67	30.65
11.	42.08	10.35	24.59
12.	42.08	10.35	24.59
13.	42.08	11.46	27.24
14.	42.08	11.46	27.24
15.	42.08	11.46	27.24
16.	21.46	5.20	24.24
17.	75.90	11.46	15.10
18.	75.90	11.46	15.10
19.	75.90	11.46	15.10
20.	75.90	11.46	15.10
21	75.90	11.46	15.10
22	75.90	11.46	15.10
23	153.01	11.46	7.49

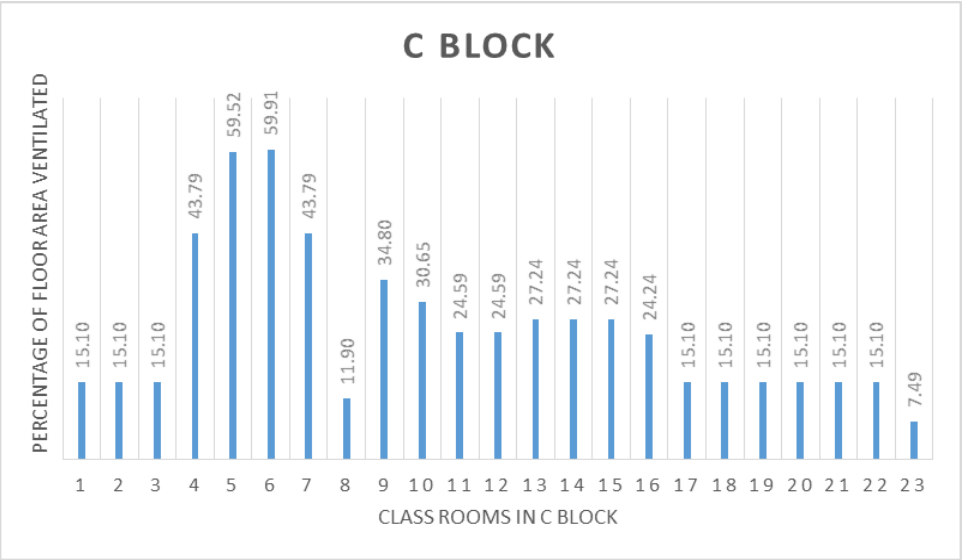


Fig: 7 Percentage of floor area ventilated - C Block

The WFR in C block shows that, all the other rooms are above 10%.

Table 57: Widow to floor ratio - D Block

S.No.	X (Sq.M)	Y (Sq.M)	Y/X*100 (Percentage)
	Class Room Area	Window	Floor Area ventilated
1.	60.20	14.49	24.07
2.	60.20	14.49	24.07
3.	60.20	14.49	24.07
4.	60.20	14.49	24.07
5.	60.20	14.49	24.07
6.	67.35	14.49	21.52
7.	133.78	17.09	12.78
8.	111.48	17.09	15.33
9.	60.20	14.49	24.07
10.	60.20	14.49	24.07
11.	60.20	14.49	24.07
12.	60.20	14.49	24.07
13.	60.20	14.49	24.07
14.	55.74	14.49	26.00
15.	321.54	27.50	8.55
16.	60.20	14.49	24.07
17.	60.20	14.49	24.07
18.	60.20	14.49	24.07
19.	60.20	14.49	24.07
20.	60.20	14.49	24.07
21	60.20	14.49	24.07
22	60.20	14.49	24.07
23	60.20	14.49	24.07
24	60.20	14.49	24.07
25	100.33	14.49	14.44
26	86.07	14.49	16.84

27	60.20	14.49	24.07
28	60.20	14.49	24.07
29	115.71	14.49	12.53
30	60.20	14.49	24.07
31	60.20	14.49	24.07
32	60.20	14.49	24.07
33	60.20	14.49	24.07
34	37.44	11.89	31.76
35	27.87	14.49	52.00
36	13.47	14.49	107.59
37	13.94	14.49	104.00
38	13.94	14.49	104.00
39	8.18	14.49	177.27
40	100.80	14.49	14.38
41	90.30	14.49	16.05
42	29.26	14.49	49.52
43	18.21	14.49	79.59

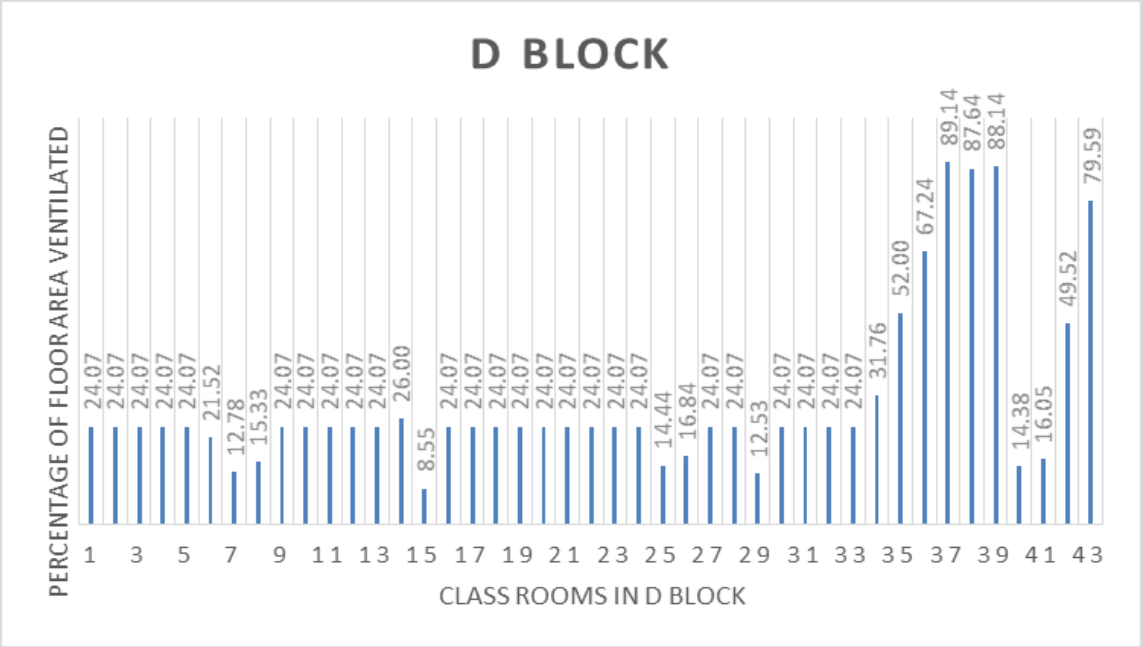


Fig: 8 Percentage of floor area ventilated - D Block

In D Block, all the rooms except 15 are well above 10% WFR. The overall WFR of all the blocks are above the norms recommended by UNESCO set for Educational institutions. (UNESCO,1985).

5.4 AMBIENT NOISE QUALITYMONITORING

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, busy roads etc. Therefore these educational institutes suffer from noises and hence disturbing in college activities like teaching, learning and discussion session.

Patrician College of Arts and Science is located in a residential area with a close proximity to busy road and commercial area. The ambient noise levels were measured in Block A, B, C, and D and the results are given in Table 58 and Figure 9. The noise standards prescribed by **TNPCB** is also given in Table 58.

Table 58: Noise Levels in Patrician College

S. No.	Block	Noise Level in dB (A)		Leq
		L_{max}	L_{min}	
1	**A**	62.50	55.30	59.59
2	**B**	69.80	61.10	65.95
3	**C**	70.10	65.60	67.79
4	**D**	71.50	62.80	67.53

(Permissible noise level: Outdoor-Below 55 dB (A) & Classroom-35-45 dB (A))

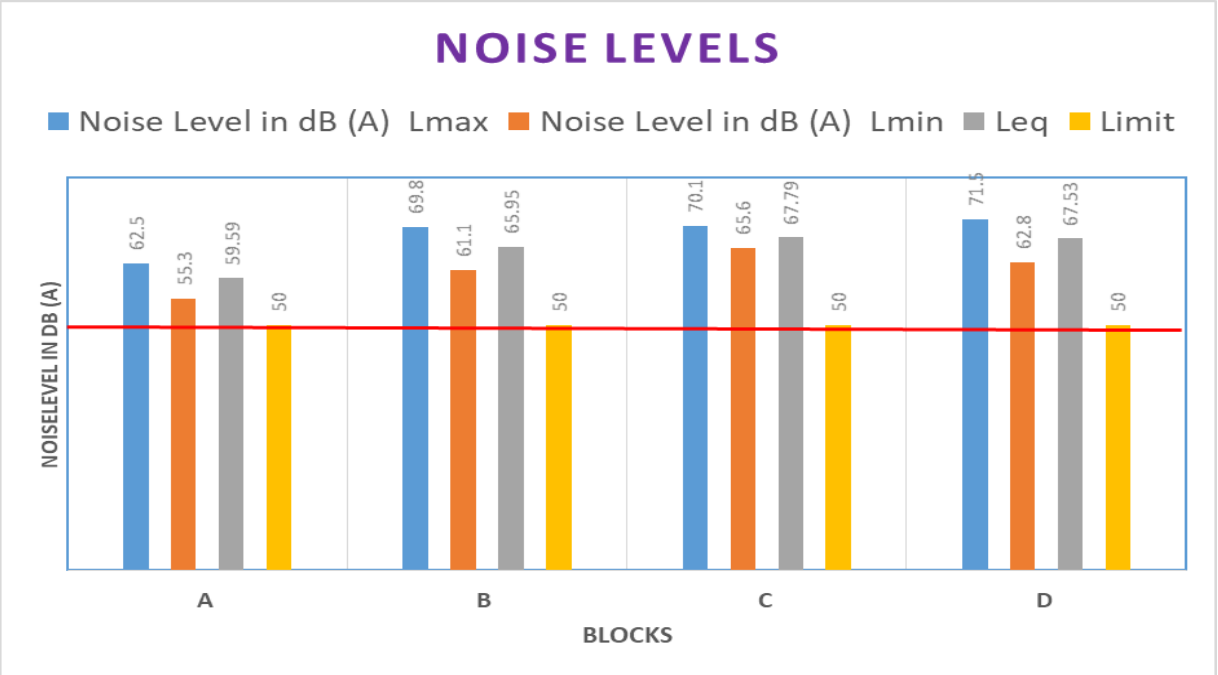


Fig: 9 Ambient noise levels

As per **Indian standards** the desirable **noise** pollution for **educational institutions** and hospitals in daytime is 50 dbA. **Noise levels** were measured with a **sound** level meter at 19 points within the campus at three different timings (8– 10 am, 12–2 pm, and 3–5 pm) over two cycles of measurements.

5.4.1 Status of Micro-Meteorological Parameters

The micro-meteorological parameters such as Wind velocity, Relative Humidity, Temperature, illumination and lighting as lux are well within the prescribed standards placed at comfort zone. (Table 59)

Table 59: Status of Micro-Meteorological Parameters at PCAS

Location		Wind	RH%	T^0C	Lux
Entrance	Max	2.5	66.9	32.6	11500
	Min	1.3	59.6	31.1	8870
	Ave	1.95	62.475	31.8	10167
A	Max	1.1	66.5	35.2	9,200
	Min	0.2	55.5	30.8	6,500
	Ave	0.725	62.75	32.3	8,303
B	Max	1.8	66.7	32.2	8,465
	Min	1	61.1	30.2	6,500
	Ave	1.45	64.55	31.5	7,394
C	Max	3.4	69	32.6	10920
	Min	0.3	16.7	30.5	4720
	Ave	1.425	54.275	31.5	7985
D	Max	1.30	68.90	32.8	9,680
	Min	0.30	59.80	30.5	3,700
	Ave	0.83	64.38	31.4	7,483

The parameters given in table 59 provide a very good learning atmosphere for the students. The temperature is slightly on the higher side in almost all the rooms as the readings were taken during the noon time. However the overall ambience and aesthetic value of the campus is highly appreciated.

5.5 ENERGY

5.5.1 Energy-saving measures and Carbon Footprint Reduction

The Energy Audit Report of the College during the period 2018-19 revealed that the total consumption of electricity was 2, 22, 265.00 units. This includes air conditioners which consume about 20% of electricity.

One unit equals 1000 watts (1kWh). It requires 0.538 kg or approximately ½ kg of coal to produce 1 unit of electricity.

The total quantity of coal required to produce 2, 22, 265.00 units of electricity (2, 22, 265.00 × 0.538 kg coal) = 1, 19,578.57 kg or 119.57 tons.

CO_2 emission by coal One kilogram of coal emits 2.86 kg of CO_2, thereby increasing the carbon footprint which in turn contributes to global warming.

Therefore, 155.86 tons of coal consumed indirectly by the Institution through consumption of 2, 22, 265.00 units of electricity led to the emission of (1, 19,578.57 kg of coal × 2.86 kg CO_2) **3, 41,994.71 kg or 342 tons of CO_2**into the atmosphere. (Table 61).

From the accumulators for UPS 3490 units of electrical energy is required for a full capacity of charging which requires (3490 x 0.538) = 1877.62 Kg of Coal or 1.88 Ton of coal which in turn emits carbon dioxide (1877.62 x 2.86) = **5369.99 Kg. or 5.37 tons.** (Table 64)

One Kg of L-gas consists 61.4% of carbon or 614 grams and requires 1638 grams of Oxygen in order to combust. Hence, 1 Kg of L-gas emits 2252 gram of CO_2 or 2.252 CO_2 / Kg. The net capacity of cylinders (67 x 19) = 1273kg which emits **(1273 x 2.252) = 2866.80 Kg of CO_2 or 2.87 tons of CO_2**(Table 65).

The campus emission of CO_2 per annum is about **3,50,231.50 Kg or 350.2 tons** .

The management of **Patrician Arts and Science College** is conscious of this damage to the environment and has been implementing various programs/activities to reduce energy consumption on the one hand and increase green energy sources on the other.

They are

a) Replacing high energy-consuming lighting system with energy-efficient lighting systems.

b) Installing a 15 KVA pilot solar PV power system through which analysis of CO_2reduction is succeeded.

c) Installing energy-efficient lighting system Based on the recommendations of the Energy Audit conducted this year, the Institution has reduced CO_2 emissions indirectly by replacing high energy-consuming electric bulbs with energy-efficient LED lighting systems. (Table60).

d) Average energy consumption by an incandescent lamp 60 W, and LED 12W max and energy consumed by LED 12,400 KWh per Annam or12,400 electrical units. (Table 62-63).

5.5.2 **CO_2 Reduction measures adopted in the Institution**.

5.5.2.1 LED Lamps in the Campus

The Institution has installed LED tube lights in the College campus. The power consumption and carbon footprint reduction are discussed below.

Total units of electricity consumed by LED lamps = 12,400 units Coal equivalent of 12,400 units (12,400 × 0.538 kg coal) = 6,671.2 kg or 6.67 tons. 1 kg coal emits 2.86 kg CO_2 into the atmosphere. At this rate, 6,564 kg coal emits (6,671.2 × 2.86) = **19,079.63 kg or 19.1 tons of CO_2.**

5.5.2.2 Solar Energy Available in the Campus

Solar energy is the most feasible and viable green energy available around the globe. Its viability is very high in tropical countries like India. Ten solar panels, each measuring 4 × 3 ft., were installed on the terrace of the college building where light intensity is very high. Each panel produces 180 W of electricity. However, the panels will function effectively only for about 10 months per year (300 days). Monsoon and clouds prevent sun's rays for more than 2 months. At this rate net power generated by renewable energy resources. (Table66).

Table 60: Power Sources in the Campus

• Available solar powersources:	= 15 KVA
• 15 KVA X 80% X 10 hrs (per-day) X 280days	= 33,600 KWh

Annual local power generated by renewable energy = **33,600 KWh**

The segment 15 KVA array is grid tied will export

15 KVA X 80% X 10 hrs (per-day) X (280-180) =12,000 KWh at any instant if local consumption is zero. (Export energy local power generation is calculated for non-working days only) (Plate 8).

The total quantity of coal required to produce 12,000 units of electricity (12,000 × 0.538 kg coal) = 6,456 kg or 6.46tons.

The **CO_2**equivalent is 6,456 × 2.86 = **18,464.16 kg. or 18.5 ton is reduced per Annam**

A total of **37.6 ton** (19.1 ton LED lamps replacement and 18.5 ton by solarisation) of **CO_2 reduction** of carbon measured to be eliminated per Annam and the campus is eco concerned and adapts all possible resources. (Plate 9).

5.5.3 Average Monthly Consumption

Table 61: Average Monthly Consumption

Service No : 0920100510	
Tariff : LM51	
Billing Cycle: Monthly	
Month & Year	**Units Consumed**
Jan-18	9173
Feb-18	8264
Mar-18	10765
Apr-18	13612
May-18	12671
Jun-18	12671
Jul-18	12671
Aug-18	16359
Sep-18	16204
Oct-18	16233
Nov-18	14508
Dec-18	11680
Average	**12,900.92**

Table 62: Power consumed per month as per service connection

Service No. : 092010057	
Tariff : LM51	
Billing Cycle : Bimonthly	
Month & Year	Units Consumed
Feb-18	3939
Apr-18	7270
Jun-18	4982
Aug-18	7043
Oct-18	5699
Dec-18	4794
Average	**5,621.17**

Table 63: Monthly Net Consumption

Monthly net consumption	18,522.08
Annual consumption	2,22,265.00

Table 64: Details of UPS and Batteries

Location	UPS Details		Total Storage Capacity in KVA
	Capacity	Quantity	
A-BLOCK - COMPUTER LAB	20 KVA	32	640
A-BLOCK - COMPUTER LAB	30 KVA	30	900
A-BLOCK - DIGITAL LAB	8 KVA	16	120
B-BLOCK - SERVER ROOM	5 KVA	16	80
B-BLOCK - AUDITORIUM	10 KVA	16	160
D-BLOCK - LIBRARY	15 KVA	30	450
D-BLOCK - THEATER	8 KVA	15	120
D-BLOCK - MULTIMEDIA LAB	30 KVA	30	900
D-BLOCK - RECORDING ROOM	8 KVA	15	120
		Total KVA	3490

Table 65: Fuel Usage in Canteen and Office

YEAR	NO. OF CYLINDERS	
	CANTEEN	OFFICE
2014 – 2015 (JUNE- MAY)	60	06
2015 – 2016 (JUNE- MAY)	60	06
2016 – 2017 (JUNE- MAY)	60	06
2017 –2018 (JUNE- MAY)	60	06
2018 – 2019 (JUNE- MAY)	60	06
Other Usage	-	05

Total consumption of Cylinder per year is 67

5.5.4 Additional information and Images

Site : Patrician College of Arts and Science
Capacity : Solar panel – 15Kw (Total Modules: 60)
Module Wattage : 254.77 wp
Azimuth : South
Module tilt : 12degrees

Table 66: Solar Panel Modules

S. No	Location	No. of Modules	Module Wattage(w)	Capacity (KVA)	Comments
1	B - Block	60	254.77	15	Ok

Solar Panels – B Block

Bird's Eye View – Solar panels

AC Units

Plate 8: Solar Panels, Power Room, Control Panel and Diesel Generator Sets

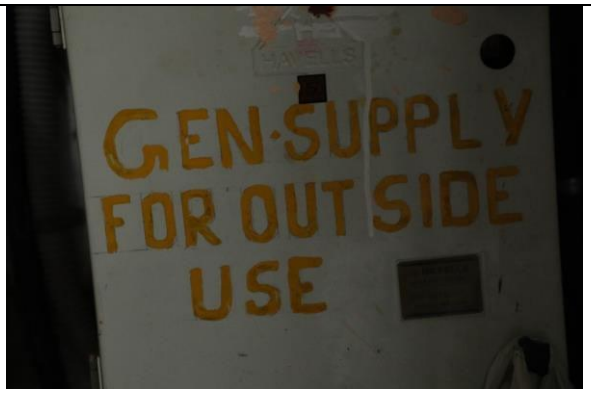
Power Room

Diesel GeneratorSet

DG Set Control Unit

Power Room control

Power control Board



Power control Board

Plate 9: Power Room

5.6 LAND

Patrician College of Arts and Science has a total land holding of 3.00 acres, of which approximately 50 % of the total area is under green cover. The College is located in a partially hilly terrain with green cover augmenting the aesthetic value of the college.

5.6.1 Land Use pattern

The Land Use attributes were identified as Built-up area, Ground area, cultivated area dump yard, barren land / drainage, Pond and storm water drains and green cover.

Table 67: Land Use / Land Cover Details of PCAS

Particulars	Acre	Square meter	Square feet
Total land Area	3.000	12140.600	130680.331
Built-up Area	1.043	4222.114	45446.457
Open space and Garden	1.957	7919.698	85246.920

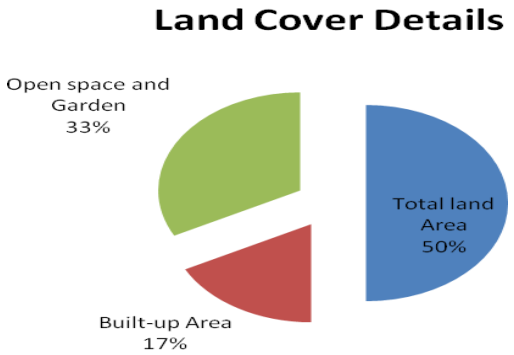


Fig: 10 Land Cover Details

5.6.2 Built-up Environment

The total built-up area is 1.043 acre out of the total 3 acre of the campus. The campus has a good road network, garden area and well maintained green cover. The details of various buildings/block are given in the following table:

Table 68: Built-up Environment

S. No.	Building / Block	Area in Sq. M
1	A Block	636.3858
2	B Block	1060.9530
3	C Block	1277.0450
4	D Block	1246.7590
		4221.1428

Grass Cutting using Mover Unit	
	
Mover unit	**Pest Control by Biopesticide**
	
Pest Control and Pruning	

Plate 10 Land Management

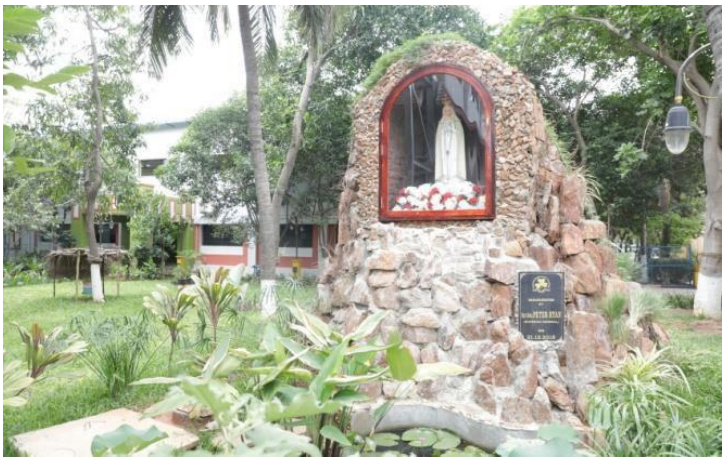


Plate 11: Mary Statue Near the Garden with a beautiful pond below it

Plate 12: Digital Board Showing various Blocks and Amenities

Plate 13: Display Board Showing various Blocks and Amenities

Plate 14: Display Board specifying the Green Initiatives on Campus

Plate 15: Display board near the canteen enforcing the seven life principles

Plate 16: Lotus Pond near the Main entrance

5.7 CAMPUSBIODIVERSITY

The natural landscape of the College campus includes green vegetation, tree canopy cover, small lentic system and artificial rain water harvesting pond provides a unique environmental setting conducive for a wide range of floral and faunal diversity. Totally 62 species of plants are present in the College campus. The particulars of floral diversity are given in the following Table 69 – 70. Figure11.

5.7.1 Assessment of Flora

Table 69: Campus Biodiversity

S. No.	Habit	Number
1	Herbs	05
2	Shrubs	21
3	Grass	02
4	Trees	34
	Total	62

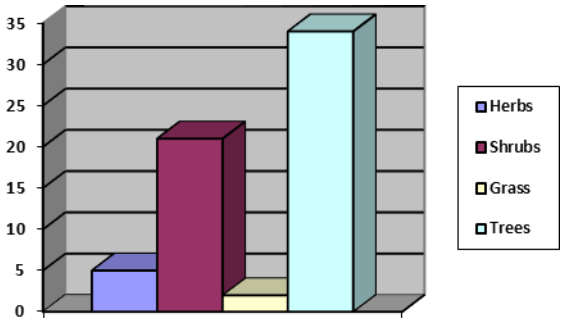


Fig:11 Floral diversity of theCampus

Table 70: Campus Flora2018-2029

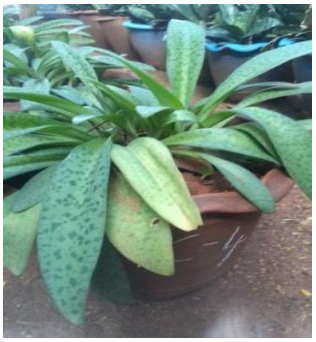
SL. No.	**COMMON NAME**	**Botanical name**
	TREE	
5.	COCONUT TREE	*Cocos nucifera*
6.	MANGO TREE	*Mangifera indica*
7.	SLIVER OAK	*Silver oak*
8.	MAGHIZAM TREE	*Mimusops elengi*
9.	NAVAL	*Jamoon tree (syzygium cumini)*
10.	PUNGAN TREE	*Pongamia glabra*
11.	BADAM TREE	*Terminalia catappa*
12.	FIG TREE	*Ficus benjamina*
13.	NEEM TREE	*Azadirachta indica*
14.	GULMOHAR	*Delonix regia*
15.	TAMARIND TREE	*Tamarindus indica*
16.	POOVARASU TREE	*Thespesia populnea*

17.	CHRISTMS TREE	*Araucaria cookii*
18.	ASOKA TREE	*Ashoka pendula*
19.	TEAK	*Tectona grandis*
20.	TECOMA (GOLDEN ARALI)	*Tecoma gaudichaudi*
21.	MUSSANDA	*Mussanda*
22.	PAPAYA	*Carica papaya*
23.	PRITCHARDIA PALM	*Pritchardia palm*
24.	PISONIA ALBA	*Pisonia alba*
25.	STERCULIA	*Sterculia foetida*
26.	RAIN TREE	*Samanea saman*
27.	PCASK FRUIT	*Artocarpus heterophyllus*
28.	SANDAL WOOD	*Santalum album*
29.	MAHAGANI TREE	*Mahagani*
30.	ACACIA	*Acacia auriculiformis*
31.	PELTOPHORUM	*Peltophorum pterocarpum*
32.	TABEBUIA ROSEA	*Tabebuia rosea*
33.	KENTIA PALM	*Howea forsteriana*
34.	ROYAL PALM	*Roystonea regia*
	SHRUBS	
35.	SAPOTA	*Manilkara zapota*
36.	GOOSEBERRY	*Ribes uva-crispa*
37.	GAUVA	*Psidium guajava*
38.	PIUMERIA	*Plumeria rubra*
39.	BOTTLE BRUSH	*Callistemon*
40.	IRUVATCHI	*Jasminum*
41.	FOXTAIL PALM	*Wodyetia bifurcata*
42.	SIVANKUNDALAM	*Kigelia africana*
43.	CUSTARD APPLE	*Annona reticulata*
44.	UDIYA TREE	*Udiya*
45.	SPATHODEA	*Spathodea campanulata*
46.	CURRY LEAVES	*Murraya koenigii*
47.	ADENIUM OBESSUM	*Dogbanes*
48.	BANANA	*Musa*
49.	NYMPHAEA	*Nymphaea alba*
50.	COCKSCOMB	*Amaranthaceae*
51.	VINCA ROSEA	*Apocynaceae*
52.	LANTANA CAMARA	*Lantana aculeata*
53.	CELOSIA	*Celosia argentea*
54.	REINWARDTIA INDICA	*Yellow flax*
55.	HIBISCUS	*Hibiscus rosa-sinensis*
	HERBS	
56.	TULSI	*Ocimum tenuiflorum*
57.	KARPOORAVALLI	*Plectranthus amboinicus*
58.	KEELANELLI	*Phyllanthus niruri*
59.	ALOE VERA	*Aloe barbadensis*
60.	VETHALAI OR BETAL LEAVES	*Piper betle*
	GRASS	
61.	COMMON GRASS	*Aristida hysteris*
62.	GOLDEN BAMBOO	*Phyllostachys aurea*

Plates 17: Flora of the campus

Adeniumobessum

Philodendron dwarf green



Dracena

ScheffeleroOrbaricola

Coleus

Aloevera

Ferns Asplenium

Pentanus

MoneyPlantsyndapsis

Aralia

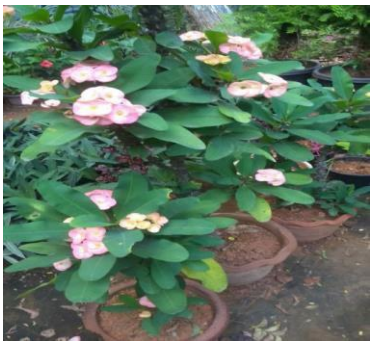
Heliconia

Lemongrass

Betal

ThumbergiaGrandiflora

RheoCompacta



Euphorbiamilli

Podacorpus

Jectroba

ArecaLutesensePalms

Thuja

Dracena Marginata

HibiscusLafference

Hydrilla

Dracena

Dust Miller

Cordyline Mahatma

Adenium

Agloenima

Dieffenbachia

Dracena

Aralia

PichardiaPalm

Adenium

Portulaca

Portulaca

Ferns

RheoCompacta

Syngonium

RusseliaJunicia

Eranthemum

Algonema

ferns

Crinumlilli

Agloenima

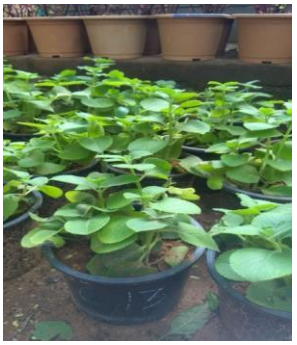
Aglonema

Pedilanthus

Alternanthra

Dracenatricolor

Amaranthus



Karpooravalli

5.7.2 Assessment of Fauna

The animal life of an area is dependent upon the vegetation and there are countless relationships between the species composing an animal community. Fauna assessment involves more problems than flora assessment by virtue of the greater variety of animal types, their mobility and behavior. Faunal assessment provides a basis for determining relative abundance and evaluating commonness or rarity of each species encountered.

In the college campus, the animal survey was conducted along with the plants. The study includes surveys of the animal communities such as aquatic organisms, insects, molluscs, reptiles, fishes, amphibians, birds and mammals. The details of fauna found in campus are given in the **Table: 71 to 79.**

5.7.2.1ThePlankton

The term plankton refers to unattached organisms that are dispersed individually or in colonies in water. Phytoplanktons are plant plankton, and zooplanktons are animal plankton. Water samples were collected using standard methods and analyzed for plankton diversity.

5.7.2.1.1 Shannon Weaver Index(SWI)

The SWI is a measure of diversity, it may be considered as an overall index of diversity as it concedes a true picture of the information theory. The species diversity of such a community may be computed by employing the SWI of diversity by applying the Index.

$$H = - \Sigma n/N \log n/N$$

Or

$$H = -\Sigma pi \log pi$$

Where,
n = Number of individual species
N = Total number of individual species
Pi = Importance value for each species n/N

The SWI can be interpreted based on the SWI-H values obtained by computing the values of quantitative plankton analysis. Based on the H-values of SWI, the quality of water can be classified into the following three categories.

Table 71: SWI – Standard Table

SWI – H VALUE	QUALITY OF WATER
X > 3	Clear
1 to 3	Moderately polluted
X < 1	Heavily polluted

The list of plankton present in the water body is given in Table56 along with its SWI values.

Table 72: List of Plankton

S. No.	Plankton	Pool 1	Pool 2
1	Calamus	✔	✔
2	Cyclops	✔	✔
3	Daphnia	✔	✔
4	Moina	✔	✔
5	Nauplius	✔	
6	Rotifer	✔	✔
7	Notonecta	✔	✔
8	Streptocephalus	✔	✔
9	Conocostrachan	✔	✔
10	Dragonfly nymph	✔	✔
11	Chironomous	✔	✔
	H - Value	2.781	3.335
	Status	Clear	Clear

5.7.3 Butterflies

Table 73: List of Butterflies

S. No.	Common Name	Scientific Name	Status/ Schedule
1.	**SKIPPERS**		
2.	Ceylon swift/African straight swift	*Parnara bada*	*Common/Na*
3.	Rice swift	*Borbo cinnara*	*Common/Na*
4.	Bevan' s Swift	*Pseudoborbo bevani*	*Common/Na*
5.	Indian palm bob	*Suastus gremius*	*Common/Na*
	SWALLOWTAILS:		
6.	Common jay	*Graphium doson*	*Common/Na*
7.	Tailed jay	*Graphium agamemnon*	*Common/Na*
8.	Common rose	*Atrophaneura aristolochiae*	*Common/Na*
9.	Crimson rose	*Atrophaneura hector*	*Common/Na*
	YELLOWS AND WHITES		
10.	Common grass yellow	*Eurema hecabe*	*Common/Na*
11.	Common emigrant	*Catopsilia pomona*	*Common/Na*
12.	Crimson tip	*Colotis danae*	*Common/Na*
13.	Common gull	*Cepora nerissa*	*Common/Na*
14.	Common jezebel	*Delias eucharis*	*Common/Na*
	BLUES		
15.	Forget-me-not	*Catochrysops strabo*	*Common/Na*
16.	Pale grass blue	*Pseudozizeeria maha*	*Common/Na*
17.	Lesser grass blue	*Zizina otis*	*Common/Na*
18.	Tiny grass blue	*Zizula hylax*	*Common/Na*
19.	Indian cupid	*Everes lacturnus*	*Common/Na*
20.	Lime blue	*Chilades lajus*	*Common/Na*
	BRUSH FOOTED		
21.	Plain tiger	*Danaus chrysippus*	*Common/Na*
22.	Blue tiger	*Tirumala limniace*	*Common/Na*
23.	Tawny coster	*Acraea violae*	*Common/Na*
24.	Common leopard	*Phalanta phalantha*	*Common/Na*
25.	Common castor	*Ariadne merione*	*Common/Na*
26.	Angled castor	*Ariadne ariadne*	*Common/Na*

Na: Native

5.7.4. Insects

Table 74: List of Insects

S.No	Common name	Scientific Name	Status/Schedule
1	House fly	*Musca domestica*	Common/ NA
2	Common grasshopper	*Gastrimargus marmoratus*	Common/ NA
4	Red cotton bug	*Dysdercus cingulatus*	Common/ NA
5	White spotted cockroach	*Coridia petivariana*	Common/ NA
6	House cockroach	*Periplanata americana*	Common/ NA
7	Honey bee	*Apis indica*	Common/ NA
8	Small honey bee	*Apis florea*	Common/ NA
9	Anopheles mosquito	*Anopheles meigen*	Common/ NA
10	Water scorpion	*Nepa cinerea*	Common/ NA
11	Praying mantis	*Gongylus gongiloides*	Common/ NA
12	Water strider	*Gerris gracilicornis*	Common/ NA

5.7.5 Molluscans

Table 75: Molluscans

S.No	Common name	Scientific name	Status / Schedule
1.	Apple snail	*Pila globosa*	Common / NA
2.	Wheel snail	*Planorvis gyrautus*	Common / NA
3.	Tower snail	*Limnaea peregra*	Common / NA
4.	Cone snail	*Limnaea truncatula*	Common / NA

5.7.6 Amphibians

Table 76: List of Amphibians

S. No	Common Name	Scientific Name	Status/Schedule
1.	Skittering frog	*Rana cyanophlyctis*	Common/ NA
2.	Indian Bull frog	*Hoplobatrachus tigerinus*	Common/ NA
3.	Common Indian toad	*Bufo melanostictus*	Common/ NA
4.	Indian Pond frog	*Rana hexadactylus*	Common/ NA

5.7.7 Reptiles

Table 77: List of Reptiles

S. No	Common Name	Scientific Name	Status /Schedule
1.	common skink	*Mabuya carinata*	Common / NA
2.	Indian rat snake	*Ptyas mucosus*	Common / NA
3.	Common vine snake	A*haetulla nasurta*	Common / NA
4.	Indian chameleon	*Chamaleo zeylanicus*	Common / NA

5.7.8 Birds

Table 78: List of Birds

S.No	Common Name	*Scientific Name*	Remarks	Status
1.	**KINGFISHERS**			
2.	Common Kingfisher	*Alcedo atthis*		C,R
3.	**BEE-EATERS AND FLYCATCHER**			
4.	Green Bee-Eater	*Merops orientalis*		C,R
5.	**CUCKOOS AND COUCALS**			
6.	Common Hawk Cuckoo	*Hierococcyx varius*		C,R
7.	Asian Koel	*Eudynamys scolopacea*		C,R,Br
8.	Greater Coucal	*Centropus sinensis*		C,R
9.	**PARAKEETS**			
10.	Rose-Ringed Parakeet	*Psittacula krameri*		C,R, Br
11.	**SWIFTS AND SPARROWS**			
12.	House Swift	*Apus affinis*		C,R
13.	House sparrow	*Passer domesticus*		C, R
14.	**OWLS**			
15.	Spotted Owl	*Athene brama*		C,R
16.	**PIGEONS**			
17.	Rock Pigeon	*Columba livia*		C,R
18.	**DOVES**			
19.	Laughing Dove	*Streptopelia senegalensis*		C,R,Br
20.	Spotted Dove	*Streptopelia chinensis*		C,R,Br
21.	**SHRIKES**			
22.	Rufous Treepie	*Dendrocitta vagabunda*		C,R
23.	House Crow	*Corvus splendens*		C,R
24.	Large-Billed Crow	*Corvus macrorhynchos*		C,R
25.	Large wood shrike	*Tephrodornis gularis*		C, R
26.	**ORIOLES AND CUCKOOSHRIKES**			
27.	Ashy Woodswallow	*Artamus fuscus*		O,SM
28.	Black-Headed Cuckooshrike	*Coracina melanoptera*		O,SM
29.	**DRONGOS**			
30.	Black Drongo	*Dicrurus macrocercus*		C,R,Br
31.	Ashy Drongo	*Dicrurus leucophaeus*		O,M
32.	Common Iora	*Aegithina tiphia*		C,R
33.	Common Wood shrike	*Tephrodornis pondicerianus*		C,R
34.	**MYNAS**			
35.	Common Myna	*Acridotheres tristis*		C,R,Br
36.	**HERONS**			
37.	Indian pond heron	*Ardeola grayi*		C, R
38.	Grey heron	*Aredea cinerea*		C, LM
39.	**EGRETS**			
40.	Little egret	*Egretta garzetta*		C, R
41.	Cattle egret	*Bubulcus ibis*		C, LM
42.	**BABLER ,WARBLER AND WOODPECKERS**			
43.	Jungle babbler	*Argya striata*		C, R
44.	*White-headed babbler*	*Turdoides leucocephala*		C, R
45.	Leaf warblers	*Phylloscopus*		C, R

46.	Lesser golden-backed woodpecker	*Dinopium benghalense*		C, R
47.	**TAILOR BIRDAND SUN BIRD**			
48.	Common Tailer bird	*Orthotomus sutorius*		C, R
49.	Purple rumped sunbird	*Leptocoma zeylonica*		C, R
50.	**ROLLER, BULBUL, PATRIDGE, WAGTAIL**			
51.	Indian roller or blue joy	*Coracias benghalensis*		C, R
52.	Grey Partridge	*Perdix perdix*		C, R
53.	Red vented bulbul	*Pycnontus cafer*		C, R
NT –Nearthreatened C – Common R – Resident , LM - LocalMigrant M– Migratory Br – Breeding Sm – SeasonalMigrant				

5.7.9 Mammals

Table 79: List of Mammals

Sl. No.	Common Name	Scientific Name	IUCN status / Schedule
1	Indian palm squirrel	*Fumambulus palmarum*	*Lower risk/III*
2	Grey mongoose	*Herpestes edwardsii*	*Lower risk/II*
3	Short nosed fruit bat	*Synopterus sphinx*	*Lower risk/III*
4	Indian gerbils	*Tatera indica*	*Lower risk/III*
5	Large bandicoot – rat	*Bandicota indica*	*Lower risk/III*
6	House rat	*Rattus rattus*	*Lower risk/III*

Based on the above tables, the following observations were made:

5.7.10 Invertebrates

The insects in the study area are interrelated with each other and other organisms. Invertebrates recorded in the study site include 26 species butterflies, 12 species of insects and 4 species of molluscans.

5.7.11 Amphibians

The toads and frogs were the amphibians recorded in the study area. Many of them were seen along the Lentic water system and other areas. Totally 3 species of amphibians were recorded in the study sites.

5.7.12 Reptiles

The reptiles recorded in the study area include lizards, and snakes. Totally 4 species of reptiles were recorded in the study sites.

5.7.13 Birds

Birds play an important role in understanding the ecological balance and its interrelationships. Totally 43 species of birds were recorded in the campus.

5.7.14 Mammals

The mammals present in the study area include Mongoose, Indian palm Squirrel, etc. These mammals are spread over the study area.

5.8 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 we can cut back the amount of pollutants entering the local waterways and regional body of water.

5.8.1 Campus Population

A college campus contain administrative offices, libraries, class rooms, research rooms, laboratories, food services or cafeteria, recreational and sport facilities, halls, parking lots pavements, roads and wilderness areas. These are the units of the college campus that constitutes a college community. The academic 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 80: Campus Population – Students, Research Scholars and Staff

S. No.	Year	UG	PG	M. Phil	Ph. D	Total
1.	2014 – 2015	1598	59	0	0	1657
2.	2015 – 2016	1856	102	0	0	1958
3.	2016 – 2017	2045	130	0	0	2175
4.	2017 – 2018	2489	121	0	0	2610
5.	2018 – 2019	2846	153	5	0	3004
	Total	**10834**	**565**	**5**	**0**	**11404**

Thus the students and faculty including non-teaching staff constitute the campus population. The average population in PCAS campus is 2280 inclusive of students and staff. All the students and staff are day scholars.

5.8.2 Sources

The water source of the campus is mainly from tanker lorry supply. The water transported by tanker lorry is stored in sump wells and pumped to various storage facilities in the campus. The campus has installed Rain Water Harvesting (RWH) structures in all the buildings. These RWH structures facilitate adequate ground water recharge of the campus.

Table 81: Water Sources and consumption – Key Facts

No. of staff (Teaching and Non-teaching)	:	147
No. of students	:	3004
No. of well water connections	:	3
No. of Sumps for storing well water	:	3
No. of Storage tanks for storing well water	:	4
No. of Bore wells	:	nil
No. of Rainwater Harvesting Structures	:	1-24000L Remaining water goes to well
Average Visitors per day	:	10

5.8.3 Consumption of Water

The average per capita water consumption of water in the college is 119 lpcd with a total consumption of 273451litres.

Table 82: Water Consumption – Academics

S. No.	**Year**	**Students**	**Staff**	**Total**	Total Water consumption in Litres	**Total**
1.	2014 – 2015	1657	85	1742	240396	138
2.	2015 – 2016	1958	85	2043	245160	120
3.	2016 – 2017	2175	87	2262	262392	116
4.	2017 – 2018	2501	88	2589	289968	112
5.	2018 – 2019	2904	90	2994	329340	110
	Average				**273451**	**119**

Table 83: Water Consumption in the College

S. No.	Year	Academic
1.	2014 – 15	138
2.	2015 – 16	120
3.	2016 – 17	116
4.	2017 – 18	112
5.	2018 – 19	110
	Average	119

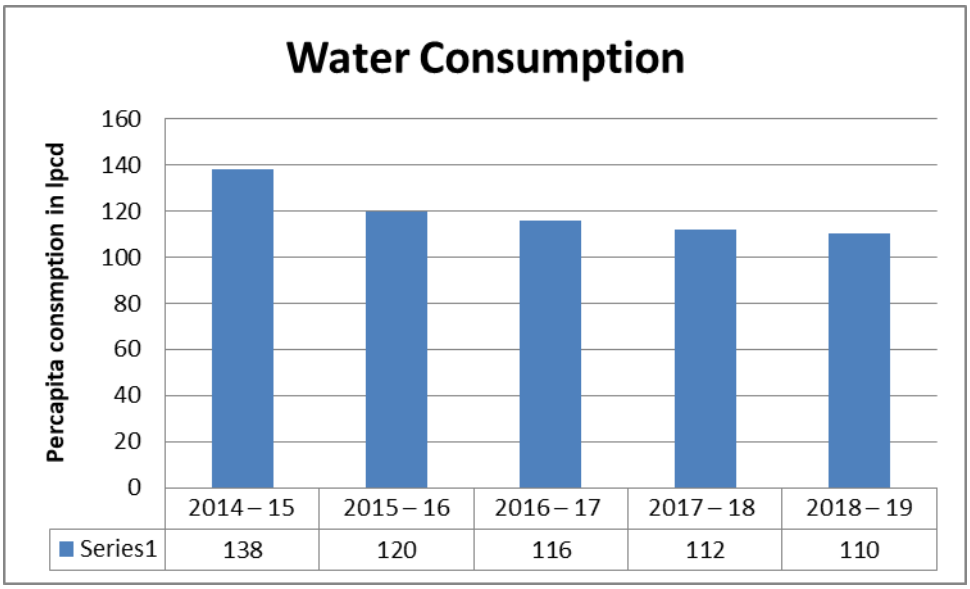


Fig: 12 Water Consumption Details

Table 84: Location of Wells in Academics Unit

Sl. No.	Location of the well	Type of Pump Used & hp	Depth of the well	Average depth of the water table
1	A Block	5hp	35x8ft	20
2	C Block(backside)	2hp	30x12ft 24x4ft	20
3	D Block (backside)	2hp	37x12ft	20

Table 85: Storage Tanks (Over Head) in the College

S.NO	Location of the Tank	Shape of the Tank	Capacity in m3	No Of tanks In each Location	Total Capacity in Litres
1	A block	Circular	5000L(2) 3000L(2)	Over head tank	16000L
2	B Block	Circular	3000L(2) 1500L 1000L	Over head tank	8500L
3	C Block	Circular	3000L(2)	Over head tank	6000L
4	D Block	Circular	5000L(4)	Over head tank	20000L

Table 86: Block wise details of Pumps and Tank Capacity

Sl No	Location of the sumps	HP	Litre
1	A Block	5hp	22000
2	Canteen	5hp(2) Submarine	11000
3	C Block	2hp(MomBlock)	1Lakh5000L

5.8.4 Water management

Rain water Harvesting is a technology used to collect, convey and store rain water for later use from relatively clean surfaces such as roof, filtering and storing for further uses. The Patrician College has a well laid structure that can store upto 28,000 litres of water .

5.8.5 Rain Water Harvesting Structures and Utilization in the Campus

Plate 18: Rain Water Segregation Chamber – D Block

Plate 19: Rain Water Harvesting Structure - B Block

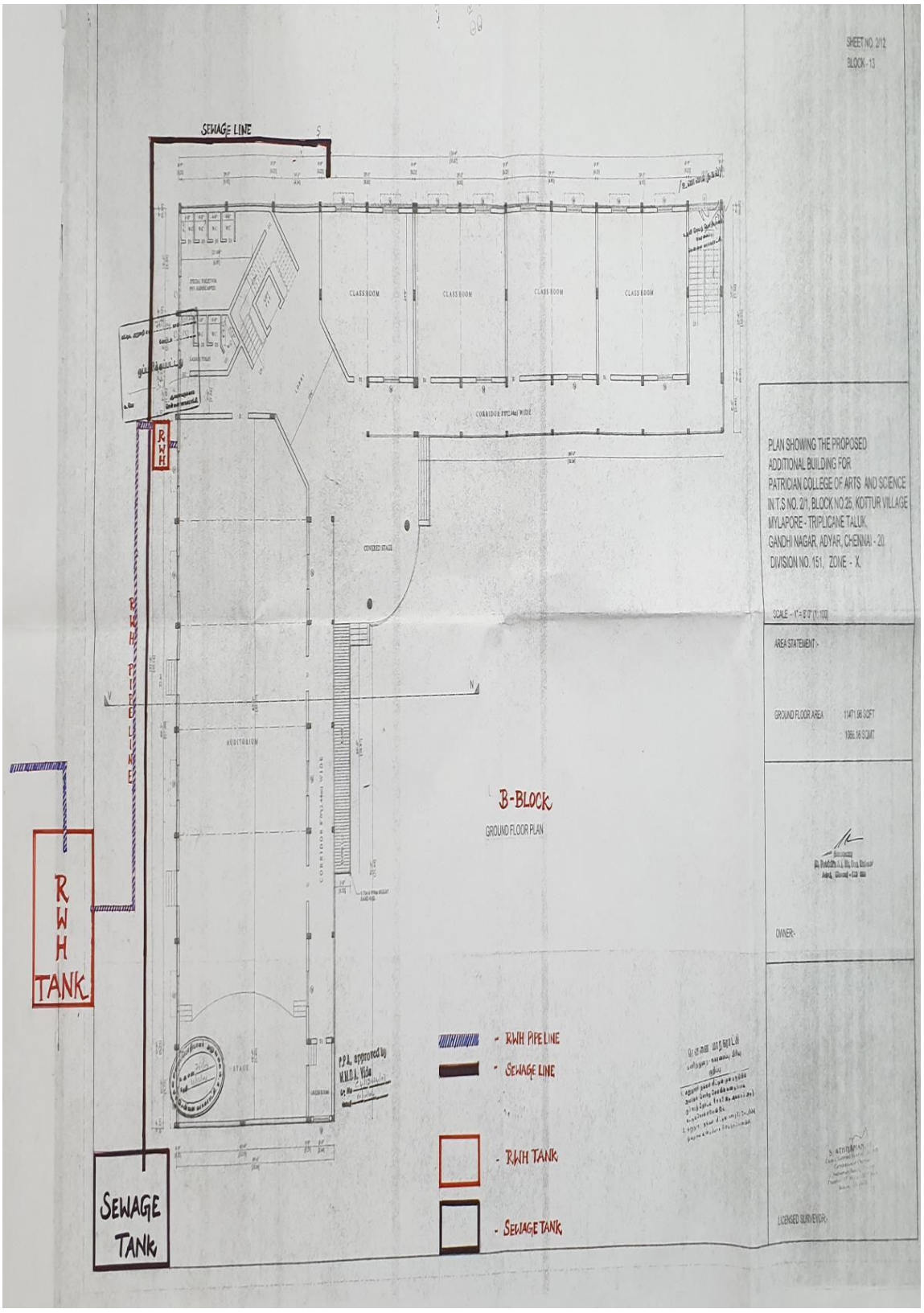


Plate 20: Rain Water Harvesting Structure - C Block Ground Floor

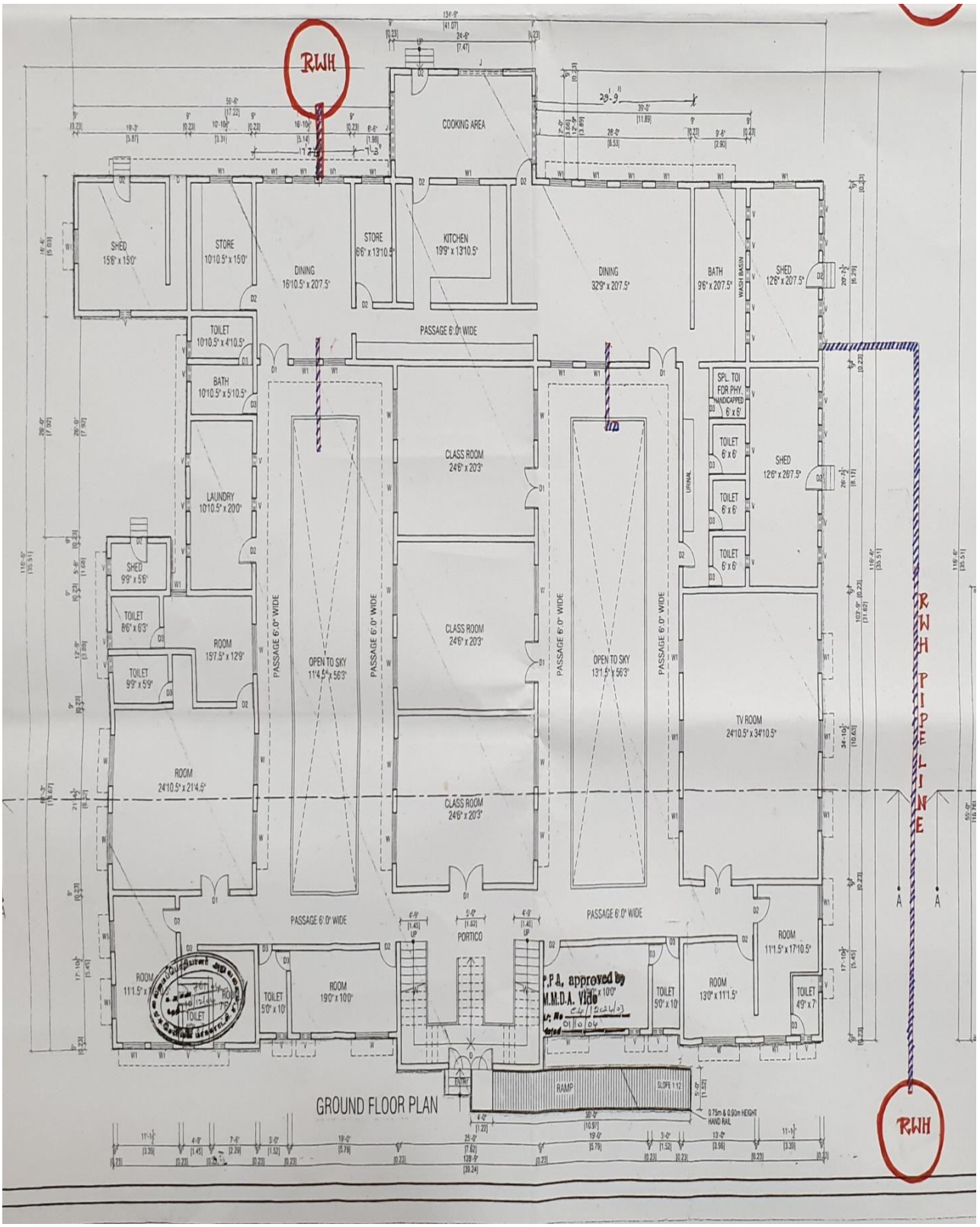


Plate 21: Rain Water Harvesting Structure - C Block Terrace

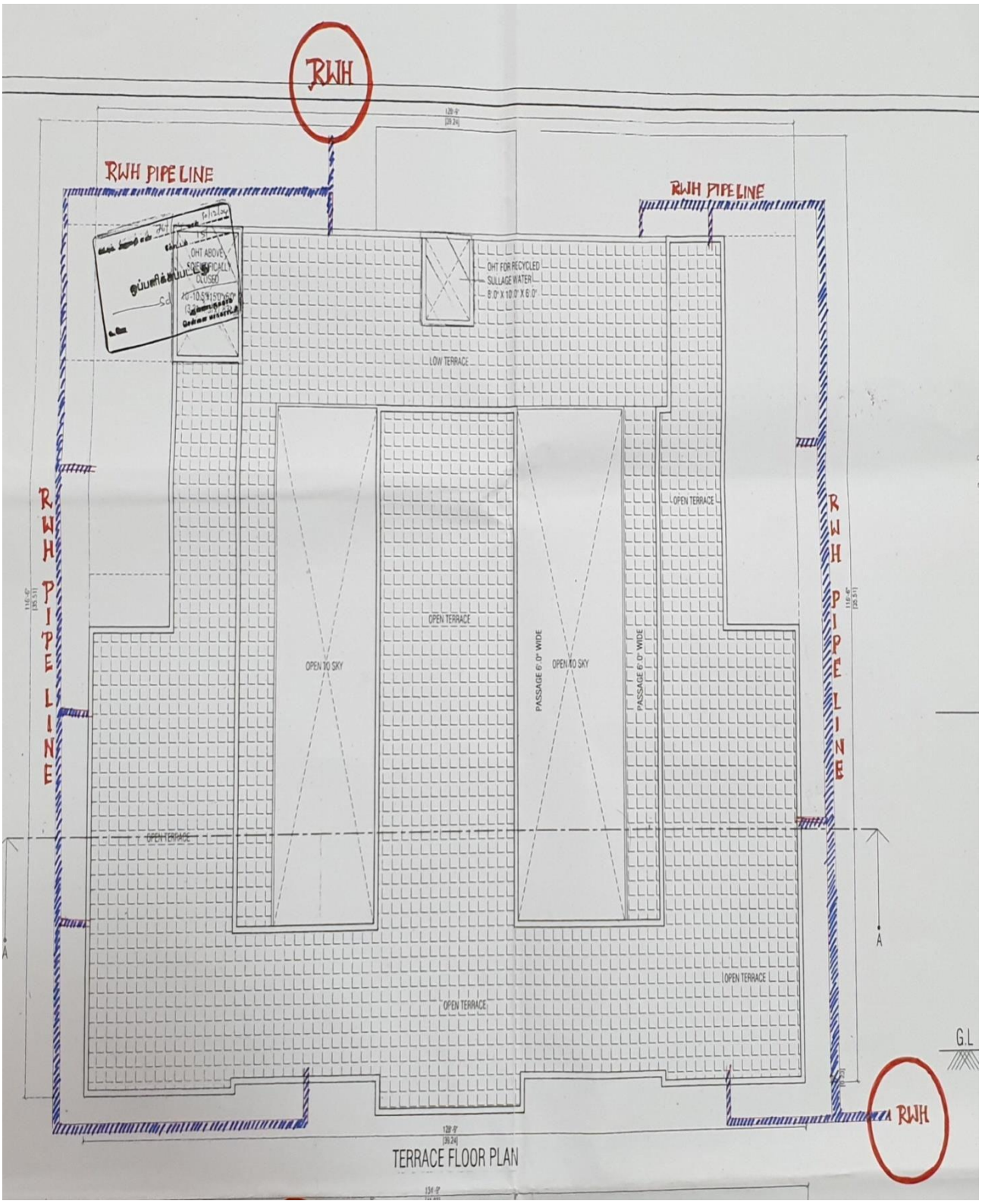


Plate 22: Rain Water Harvesting Structure – D Block

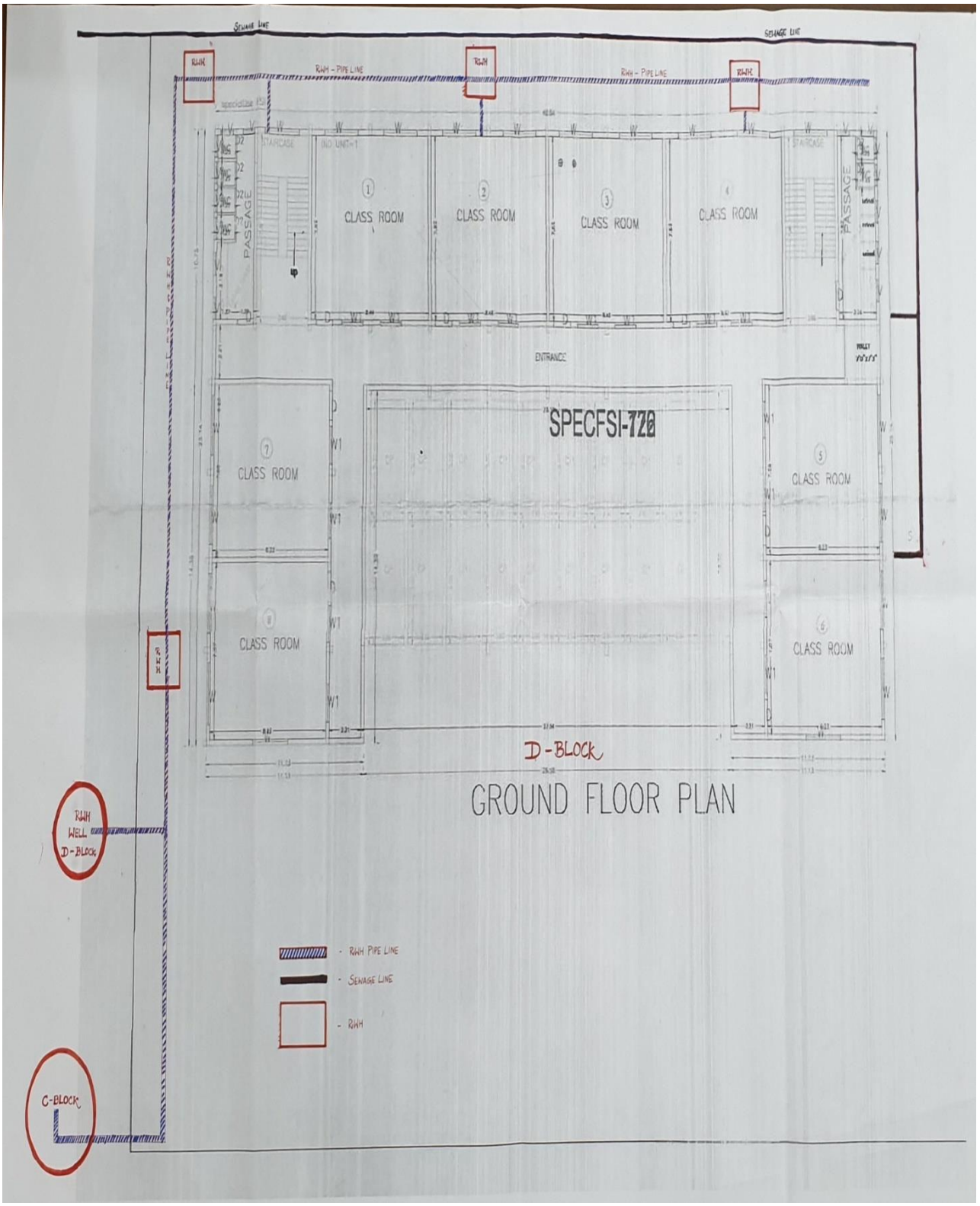


Plate 23: Water management systems

5.8.6 Potable Water Supply

The campus receives water supply through a College owned Tanker lorry with a capacity of 12,000 litres drawn from a bore well.

5.8.7 Water Storage and Distribution

The water is stored in sump wells and pumped to storage tanks for further distribution. The bore well water is pumped, stored in tanks and distributed throughout the campus.

5.8.8Water Quality Assessment

Safe drinking water is supplied to the students in the academic buildings 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 are given in the following Table.

Table 87: Physico-Chemical characteristics of Water Samples

S. No	Parameter	Sample							Indian Standard
		1	2	3	4	5	6	7	
		Well	Sump	RO Water 'A' Block	RO Water Canteen	Tanker Lorry	Sewage A	Sewage B	
1.	pH	6.50	6.53	6.85	6.87	6.42	8.27	8.22	6.5-8.5
2.	Turbidity (NTU)	1.8	1.4	1.2	1.0	1.3	3.8	3.6	1.0
3.	EC (micromho /cm)	4457	4797	1303	3475	4200	5200	5270	--
4.	TS (mg/l)	3000	3000	2000	2000	3000	4000	4000	--
5.	TDS (mg/l)	2457	2797	1651	1787	2200	3000	3050	500
6.	TSS (mg/l)	2000	2100	1650	1738	1100	1400	1500	--
7.	BOD (mg/l)	6.08	3.28	3.20	2.88	6.56	6.40	6.32	--
8.	COD (mg/l)	32.00	40.00	12.00	8.00	32.00	80.00	84.00	--
9.	DO (mg/l)	7.67	7.31	6.10	6.10	5.70	6.51	4.88	--
10.	Temperature ^{0}C	28.6	26.7	26.5	28.0	28.0	27.5	27.8	--
11.	Total Hardness (mg/l)	230	160	90	80	210	350	360	200
12.	Calcium (mg/l)	36.07	26.05	12.02	8.01	34.06	46.09	46.34	75.00
13.	Magnesium (mg/l)	29.16	15.79	8.22	4.58	20.37	34.08	34.12	30.00
14.	Fluoride(mg/l)	0.48	0.39	0.32	0.30	0.49	0.98	0.97	1.00
15.	Nitrate(mg/l)	0.16	0.17	0.009	0.08	0.17	0.43	0.43	45.00
16.	Nitrite (mg/l)	Nil	Nil	Nil	Nil	Nil	0.22	0.24	--
17.	Silicate(mg/l)	0.52	0.54	0.32	0.33	0.45	0.39	0.35	--
18.	Phosphate(mg/l)	0.10	0.09	0.06	0.06	0.09	0.54	0.55	--
19.	Chloride (mg/l)	127.62	88.62	53.17	42.54	131.16	276.51	283.60	250.00
20	Total Alkalinity (mg/l)	30.00	41.00	23.00	18.00	44.00	195.00	189.00	200.00

5.9 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.

5.9.1 Waste water

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 causes 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.

5.9.1.1 Wastewater Generated from the Campus

The total quantum of wastewater generated from the campus is depicted in the **Fig: 10**

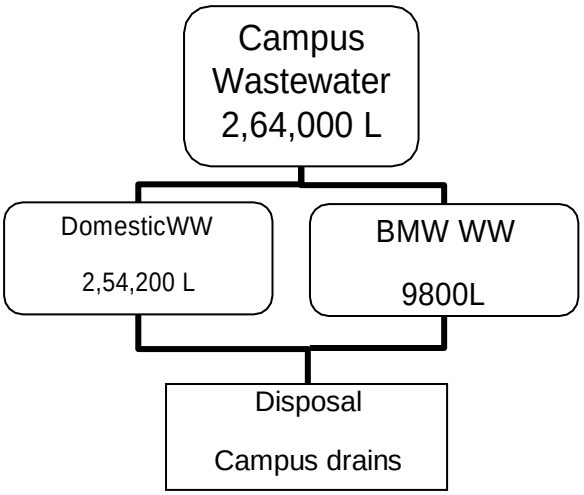


Fig: 13 Quantity of Wastewater

Wastewater samples were collected from laboratories and cafeteria. The results are given in Table 6.17 and 6.18. The demand parameters, solids hardness and chlorides are above the standards limits in all the samples.

5.9.2 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.

Waste 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. Solid waste produced from the College Campus given below

The Patrician College has a waste policy and strictly follows segregation. The students and housekeeping staff are responsible for segregation

5.9.2.1 Quantity of Solid Wise Generated

The details of solid waste generated by the campus are given in the following tables.

Table 88. Biodegradable /wet waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
1	Garden / horticulture waste	300kg/ month
2	Kitchen waste -----Raw	9kg/annum 0.75kg/month
3	Kitchen waste -----Cooked	Nil
4	Wet waste from classroom etc.	Nil
5	Total amount of waste	300.75
6	Per capita waste generation	Used as manure

Table 89: Dry / Recyclable waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
1.	Plastic	Disposed properly
2.	Paper	1137kg
3.	Wood or classroom furniture	Disposed properly
4.	Glass	Disposed properly
5.	Metal	Reused
6.	Thermocol	Disposed properly
7.	Tetra packs	Disposed properly
8.	Total amount of waste	Rs. 11,370 (cheque)
9.	Per capita waste generation	Rs. 11,370 (cheque)

Table 90: Domestic Hazardous Waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
1	Hazardous and toxic waste (Paints, Lab Waste, etc.)	NA
2	Oil from diesel generator sets	2 Liters
3	Total amount of waste	Reuse (applying on tools)
4	Per capita waste generation	Nil

Table 91: E-Waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
1	E-Waste	940kg
2	Per capita waste generation	Nil

Table 92: Biomedical Waste

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

Table 93: Sanitary Waste

S. No.	How much waste does your College generate?	Quantity of solid waste generated (monthly average in kg)
1	Sanitary waste	Disposal machine
2	Per capita waste generation	Nil

Table 94 G. C & D Waste

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

5.9.2.2 WASTE COLLECTION

Table 95: Waste Collection Points in the 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	50	-	50	-	-	-
Playgrounds	10	-	-	1	-	-
Common area (e.g. reception, corridors)	12	-	-	06	06	-
Staff room	20	-	20	-	-	-
Laboratory	07	-	-	07	-	-
Canteen	04	-	01	02	01	-
Clinic/sick room	02	-	-	02	-	-
Library	04	-	-	04	-	-
Toilets	23	-	-	-	02	-
Others	04	-	-	-	04	-
Total	136	-	71	22	13	-

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

5.9.2.3 WASTE TREATED / RECYCLED BY THECOLLEGE

The college does not recycle the waste generated by the campus community. However, the details of waste generated and the methods of disposal are given in the following table:

TABLE 96: 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	300kg/ month
2	Kitchen waste – Raw	9kg/annum 0.75kg/month
3	Kitchen waste – Cooked	Nil
4	Wet waste from classrooms etc.	Nil
5	Plastic	Disposed properly
6	Paper	1137kg
7	Wood, class room furniture	Disposed properly

8	Glass	Disposed properly
9	Metal	Disposed properly
10	Thermocol	Disposed properly
11	Tetra packs	Disposed properly
12	Hazardous and toxic waste (paints, lab waste etc.	NA
13	Oil from diesel generator sets.	2 Litre
14	E – waste	**940 kg**
15	Biomedical waste such as syringes, Band-Aids, expired medicines etc.	Disposed properly
16	Sanitary waste	**Disposal Machine**
17	Construction and demolition (C&D) Waste	**Reused**
18	Total (in Kilograms)	**1,446**

Table 97: 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, usedexamination papers, subscription newspaper andmagazines)		✓		
2	Plastic (e.g. Broken, unusable)			✓	
3	Horticultural waste				✓
4	E-Waste (e.g. broken, unusable computers)		✓		

Plate 24 Well Being out of Waste - Certificate of Appreciation 2016 – 2017

Plate 25 Well Being out of Waste - Certificate of Appreciation 2017 – 2018

Table 98: List of E Waste

S. No.	Item	Non-Working condition
1.	AC	✓
2.	Cables	✓
3.	UPS	✓
4.	FAN	✓

The electronic wastes are disposed off through dismantlers/authorized person

5.9.2.4 WASTEPOLICY

The College promotes sustainable consumption pattern among staff, students and visitors. Waste is considered as a misplaced resource and is managed responsibly.

The College endorses that careless waste disposal leads to Environmental hazards and Responsible disposal leads to a healthier living.

The College stimulates 5 R principles in the order of **Reduce, Reuse, Recycle, Refuse and Recover** and provide convenient waste segregation, collection and guidance for the disposal of paper, cardboard, glass, plastic, electrical and white goods, and e-waste.

The College inculcates a culture of avoiding purchase of products with excessive or unnecessary packaging and encourages to purchase products that can be used multiple times and are long lived rather than single-use or poor quality items that are thrown away quickly.

The College encourages all the stakeholders to improve the habit of recycling materials by appropriate segregation of waste and recycling paper waste through an authorized dealer.

5.9.3 E-Waste

Electronic wastes generated in the campus are sent to recyclers @940 kg per year.

5.10 FOOD

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 percent 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 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.

5.10.1 Child Health and Food Policy

Food has been at the centre of policy debate in India for many years, as more than 20 per cent of the country's population suffers from undernourishment. India ranks 97thout of 118 countries in the 2016 Global Hunger Index and has further pushed to 102ndout of 117 qualifying countries in 2019 with a score of 30.3. India suffers from a level of hunger that is serious. https://www.globalhungerindex.org/results.html

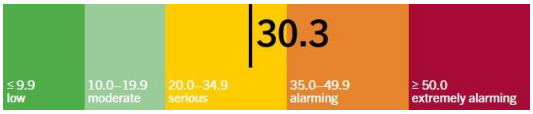


Plate 26: Global Hunger Index - India

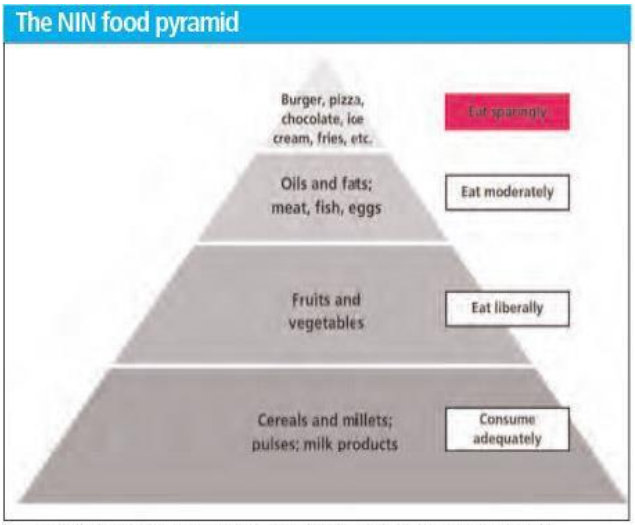
Itranks120thamong128countrieswithdataonundernutritionduring2009-13; 30.7 percent of the country's children are underweight (an improvement from 43.5 percent in 2005-06. Data from targeted studies show an alarming trend. The HUNGaMA (Hunger and Malnutrition) report covering112 worst-performing districts in nine states

tells us that 42 percent children are underweight, 58 percent are stunted and 11.4 are 'wasted' by the age of 24 months.

Meanwhile, childhood obesity is also alarmingly on the rise globally as well as in India. The International Obesity Task Force (IOTF) of WHO estimates that 10 percent of children aged 5-17 years worldwide are overweight.

India therefore faces a peculiar crisis that spans both ends of the spectrum of nutritional disorders—while 30.7 percent of the country's children are underweight, according to the International Association for the Study of Obesity's world map of obesity, overfeeding is evident as overweight and obesity has been recently on the riseandispresentin20.6percentboysand18.3percentgirlsinIndia.

Given India's dubious distinction of carrying the twin burden of under nutrition and overfeeding, we need to be extra cautious. In a bid to beat hunger, we are losing out to the deadly parasite of ultra-processed food, without realizing how harmful it actually is. Yes, craving for ultra-processed food is a global epidemic.



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

Plate 27: Food Pyramid and Recommended Daily Allowance

Table 99: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

5.10.2 **The fat of the matter:** Centre for Science and Environment study findings:

- ThehighestleveloftotalfatwasfoundinanIndiansnack(Haldiram'saaloobhujia): 37.8 gm/100 gm of the sample
- 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 100gm.

Table 100: Packaged food items sold in the College Canteen

S.No	Packaged Food Items	Flavours / variants	Total No. of items sold on an average in a Day
1	Savoury snacks and similarpackaged food like chips, and Haldirams.	9	50
2	Instant noodles like Cup-a-Noodles, Top Ramen, Wai-wai, Yippee, Foodles, Maggi Etc.	Nil	Nil
3	Potato fries and burgers	Nil	Nil
4	Confectionery (Chocolates, Candies, gums)	8	100
5	Ice cream	5	30
6	Carbonated beverages	Nil	
7	Sugar sweetened non-carbonated beverages	2	50
8	Packages /Bottles Maza/lassi/flavoured milk	5	50
9	Packaged / bottled energy drinks	Nil	

Table 101: 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	20
3	Pavbhaji	Nil
4	Momos	20
5	Others/Chapathi	20

		
Soft Drinks	Idly	*Dosa*
		
Vadai	Momos	Pea nut Cake

Plate 28: Snacks and Food Served in the Canteen

5.10.3 Diet. Disease. Death.

● Diets low on nutrients and high on salt and fat are directly blamed for ill-health. According to who, approximately 3 percent of deaths worldwide are attributed to low fruit and vegetable consumption.

● High consumption of saturated fats and trans-fatty acids is linked to heart disease.

● High salt consumption causes high blood pressure and hikes up the risk of cardiovascular disease.

5.10.4 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 percent of the total calories from carbohydrates, about 10-15 percent from proteins and 20-30 percent from both visible and invisible fat. In addition, it should provide other non-nutrients such as dietary fiber and antioxidants that bestow positive health benefits.

Table 102:Traditional Indian Beverage Items

S. No.	Traditional Indian beverages (non-packaged)Nimboopani, salted butter milk, sweet, lassi etc.	Number of plates sold when on the menu
1	Nimboopani	15
2	Sweet lassi	Nil
3	Salted buttermilk	15
4	Others	-

5.11CAMPUSHYGIENE

5.11.1 Background

One of the world's most urgent issues is lack of safe water, sanitation and hygiene. Water and sanitation related improvements are crucial to meet the development goals and improve health in a sustainable way. The United Nations' Sustainable Development Goals have emphasized on the achievement of universal and equitable access to safe and affordable drinking water and adequate and equitable sanitation and hygiene for all.

5.11.2 Campus Hygiene and Cleanliness

Campus hygiene is defined as a comprehensive plan for preserving individual and community health in all its dimensions. Implementing such practices are particularly important on college campuses where students often live in close quarters and move from one building or class room to another every day.

Cleaning is one of the most important aspects of running a college building. Failing to ensure the cleanliness of a building can have a detrimental impact on the health and well-being of all of those who useit.

Ensuring that the college is well maintained is not only conducive to productivity; it also increases the likelihood of attracting more students. The World Green Building Council revealed that clean offices that are well-designed are more likely to produce a good working atmosphere.

Maintaining a clean college environment sets a **good example** to students. It encourages learners to take pride in their university or college, which makes them less likely to drop litter and as such they will potentially make a bigger effort to maintain their environment.

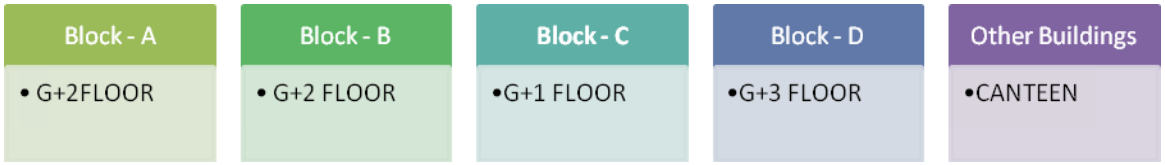
The cleanliness is incredibly important when it comes to cutting down on the spread of diseases in the college and means that staff and students are able to enjoy a comfortable learning environment. It also improves hygiene levels and can help to reduce the spread of sickness.

Campus Cleaning is committed to sustainability and efficiency through a "Cleaning for Health" initiative. Green chemicals are dispensed using a chemical management system; floor care products that are used contain minimal Volatile Organic Chemicals and all accessories used are eco-friendly.

5.11.2.1 Goal of Campus Cleaning

The goal of Campus Cleaning continues to focus on what's best for both building occupants and the environment as we continually research and review industry trends, products and new ideas. Each of the Patrician is committed to professional excellence and pride in the service provided to Patrician College.

5.11.3 Buildings in the Campus



5.11.4 Campus Population

The campus has a total population of 3151 with 147 teaching and non-teaching staff and 3004 students. Among the staff 61 are male and 86 are female, and among the students 2113 are male and 892 are female.

Table 103: Teaching Non-Teaching Staff and Student's Strength for the year 2018-19

S. No.	Particulars	Course	Male	Female	Total
01	Teaching Staff	-	44	69	113
02	Non Teaching Staff	-	17	17	34
	Total	-	**61**	**86**	**147**
03	Student's Strength	UG	2042	804	2846
		PG	**68**	85	153
		M. Phil	**03**	02	05
	Total		**2113**	**891**	**3004**

5.11.5 Block-wise Details of Toilets in Patrician College campus

Table 104 : 'A' BLOCK - GROUND FLOOR

S. No.	Details of Rest Rooms	User Group	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
			W	I	U	B	WB		
1	Men	Students	1	3	5	3	3	150	3
2	Administrative Office	Staff	2	-	-	2	2	4	2
3	Principal's Office	Staff	1	-	-	1	1	2	2
4	Canteen	Staff	1	-	2	1	1	10	2
5	Men	Students	1	3	5	3	3	150	3

Table 105 : 'A' BLOCK - FIRST FLOOR

S. No.	Rest Rooms	User Group	Types and No / Western /Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
			W	I	U	B	WB		
1	Men	Students	1	3	5	3	3	150	3
2	Exam room	Staff	1	1	-	1	1	10	3
3	Girl	Students	1	3	-	-	3	70	3

Table 106 : 'A' BLOCK - SECOND FLOOR

S. No.	Details of Rest Rooms	Types and No / Western /Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Men	1	3	5	3	3	150	3
2	Girls	1	5	-	-	3	150	3

Table 107: 'B' BLOCK – GROUND FLOOR

S. NO.	Details of Room	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Men' s Rest Room	1	2	5	1	1	150	3
2	Girls Rest Room	1	2	-	1	1	150	3
3	Vice Principal's Room	1	1	-	1	1	2	3
4	Server Room	1	1	-	1	1	2	1

Table 108 : 'B' BLOCK – FIRST FLOOR

S. NO.	Details of Room	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Men' s Rest Room	1	2	5	1	1	150	3
2	Girls Rest Room	1	2	-	1	1	150	3
3	Staff Rest Room	1	1	-	-	1	20	3

Table 109 : 'C' BLOCK – GROUND FLOOR

S. NO.	Details of Rest Rooms	Types and No / Western / Indian / Urinals/Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Men	1	3	19	5	2	250	3
2	Girls	1	2	-	-	1	150	3
3	Girls Sick Room	-	1	-	1	1	Occasional	1
4	Physical Director's Room	-	1		1	1	1	1
5	Physical Directress Room	-	1		1	1	1	1

Table 110: 'C' BLOCK – FIRST FLOOR

S. No.	Details of Rest Rooms	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Staff -Men	1	-	-	1	1	10	3
2	Staff -Women	1	-	-	1	1	10	3

Table 111: 'D' BLOCK – GROUND FLOOR

S. No.	Details of Rest Rooms	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Director's Office	2	-	-	2	3	7	3
2	Girls	2	2	-	2	2	75	3
3	Men	1	1	5	1	2	150	3

Table 112: 'D' BLOCK – FIRST FLOOR

S. No.	Rest Rooms	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Girls	2	2	-	2	2	100	3
2	Men	1	1	5	1	2	180	3

Table 113: 'D' BLOCK – SECOND FLOOR

S. No.	Rest Rooms	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Girls	2	2	-	2	2	120	3
2	Men	1	1	5	1	2	180	3

Table 114: 'D' BLOCK – THIRD FLOOR

S. NO.	Rest Rooms	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of users	Cleaning Frequency per day
		W	I	U	B	WB		
1	Girls	2	2	-	2	2	25	3
2	Men	1	3	7	1	3	100	3

5.11.6 Types of Toilet Fittings

Table 115: Toilets in Patrician College Campus

S. No.	Building	No. of Floors	Types and No / Western / Indian / Urinals/ Bathroom/ Wash Basin					Average No. of Students using the Toilet	No. of times cleaned per day
			Western (W)	Indian (I)	Urinal (U)	Bath (B)	Wash Basin (WB)		
1.	Block – A	G+2	10	18	17	14	3	670	3
2.	Block – B	G+2	7	11	10	6	7	600	3
3.	Block – C	G+1	4	8	19	10	8	400	3
4.	Block – D	G+3	14	14	22	14	20	930	3
	Total		35	51	68	44	55	2600	

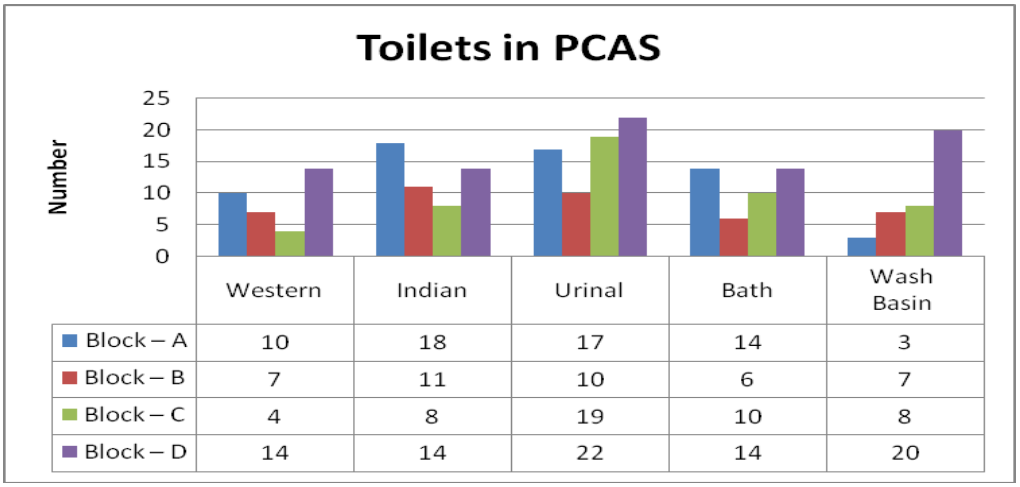


Fig. 14 Types of Toilet Fittings

Table 116: Summary of Types of Toilet

S. No.	Fittings	No.
1.	Western Closet	35
2.	Indian Closet	51
3.	Urinals	68
4.	Bath Room	44
5.	Wash Basin	55

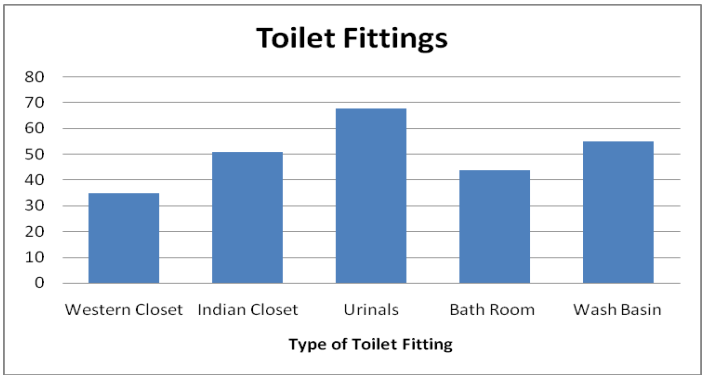


Fig. 15 Summary of Toilet Fittings

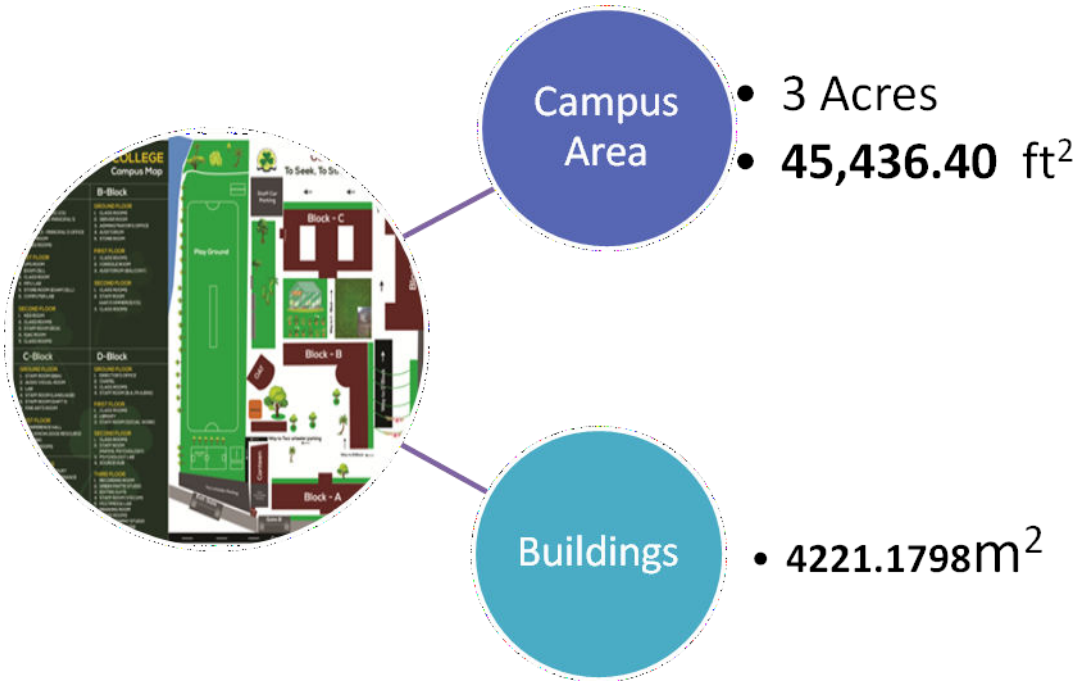


Plate 29 Extent of College Campus Area

5.11.7 Commitment of the College Towards Cleanliness

The Patrician College of Arts and Science is committed to a continuous effort to instill sustainability into the many aspects of life on our campuses, in our institutions, and in the larger community of which we are part. In alignment with its values, vision and mission, the College takes an integrated approach to sustainability that incorporates teaching and learning, research, outreach, and the operations that support them, as it builds one of the great Colleges for the public good.

Plate 30. Campus Building Plan.

5.11.8 Maintenance of Campus Facilities

The college has appointed a Campus Manager/Supervisor who monitors the maintenance of the campus. Campus Cleaning is made up of 35 dedicated custodians and 25 support staff servicing 3 acres (**45,436.40**ft^2) of the campus and **4221.1798**m^2 of learning, office and research space. Through eco-awareness signage like 'Plastic Free Campus' and 'Litter-Free Zone', the college has taken initiatives to maintain the healthy ambience of the campus. The college has a Campus Engineer who supervises the maintenance of the infrastructure, with the assistance of quality supporting staff members.

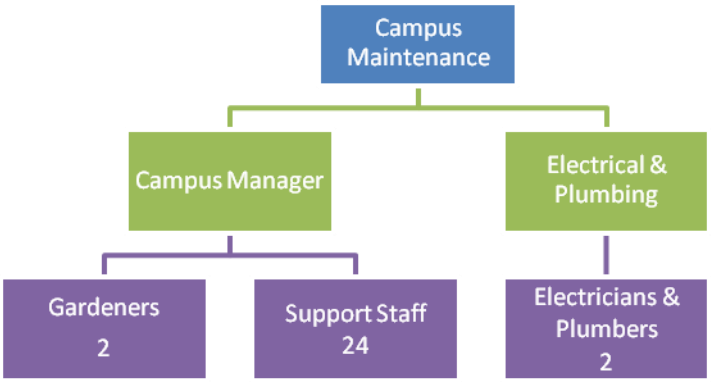


Fig. 16 Campus Maintenance Team

The management periodically replaces the damaged furniture with new ones and thus ensures a good ambience for the learners and the teachers. The following are the salient features of campus maintenance.

- Painting of the entire campus is done every 5years.
- Sweep and spot mop academic and administrative classrooms, entrances, corridor and lobbies on a daily basis (Monday through Sunday).
- Empty trash in academic and administrative areas on a daily basis.
- Every Saturday, floor cleaning is done.
- Every year, class room benches and desks are checked and repaired.
- Monthly twice cleaning of the entire campus is done using water.
- Toilets and Bath rooms are cleaned every 2 hours using "Green" Cleaning agents.
- Watering the garden is done 2 times a day (6.30 am and 4.30pm)
- Electrical and plumbing connections are maintained once in 15day.

The electrical facilities are maintained by a team of well-trained and certified electricians. The College has an effective mechanism to protect the infrastructure of the College by renewing the insurance policies of the college buildings, the lab equipments and the computers annually.

5.11.9 Rest Room Signage

Restroom signs make it easier for people to navigate your facility. After all, finding the restroom shouldn't be difficult. Rest rooms and wash facilities in the College are properly guided by the rest room signs.

Fig. 17 Rest Room sign for Gents and Ladies

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

All water, sanitation and hand washing facilities need to be clean, functional and well maintained to ensure that the intended results are achieved and capital investments made in installing these systems are not lost. The College Campus Hygiene is ensured by dedicated support staff ably guided by a Campus Manager assisted by electricians and Plumbers.

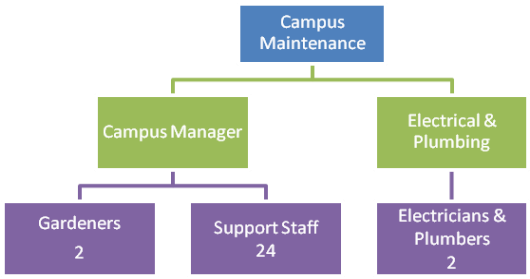


Fig. 18 Operation and Maintenance Team

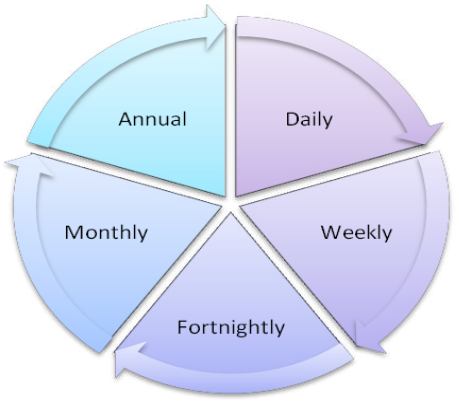


Fig. 19 Frequency of O & M

5.11.10,1 Daily Maintenance

- General cleaning of indoor floors of the entire campus including toilet and kitchen
- Cleaning of any water-logging in the entire College campus
- Sweeping and mopping in all .
- Dusting of general storage, Tables, Chair, desks and benches and all furniture in Office, Staff room, Class room, Administrator's room, Director and Principal's room.

5.11.10.2 Weekly Maintenance

- Check for all leaky taps, valves, flushing cisterns etc.,
- Check for any blockage in the drains, sewage pipes and waste water pipes,
- Check for any loose locks, sliding doors, windows, Steel tables and almirah

5.11.10.3Fortnightly Maintenance

- Cleaning of dust from all appliances and walls etc,
- Remove dumped rubble/debris/building waste from the premises
- Observe any water logging in open areas
- Check for clogged drains on the ground, portico and water outlets from buildings
- Stain removal on the enamel painted portions of the walls (especially corner sand edges) door, window, almirah, sliding doors etc.

5.11.10.4 Monthly Maintenance

- Check for any damp marks on the walls, ceilings and floor
- Check for any termites in the building
- Check for proper hardware operation of all doors, windows and almirahs
- Check for any cracks on the walls, roofs, sun shades etc.
- Check if main water storage tank cover and outlets are leaking and the stored water is clean.
- Check if all the manhole covers/inspection chamber covers are properly in place and not damaged.
- Check the status of fire extinguishers
- Check if the first aid kit is up-to-date and the medicines are within their expiry date.
- Seasonal / quarterly maintenance
- Seasonal/quarterly maintenance(before monsoon)
- Check water tank thoroughly for leak age etc. and sealing with sealant
- Cleaning Sump and Over Head Water Tanks at regular intervals (once in three months)

- Thorough cleaning of the roof, water outlets, checking for cracks and carrying out repair work.
- Leveling and cleaning of open ground
- Checking Rain water harvesting pits
- Through checking of electrical lines and earthling
- Cleaning all dust from fans, light fittings and bulbs
- Cleaning coolers, internal and external

5.11.10.5 Annual Maintenance

- General repair and maintenance work during the vacation
- Structural repair and plasterwork
- Associated painting work
- Thorough cleaning of open drain/ditch and all underground drains
- Through cleaning of septic tanks and leach pits
- Repair/paining Blackboards

5.11.11 Sanitation: Student – Toilet Ratio

- Separate toilet for men and women, with one unit generally having one toilet (WC) plus 3 urinals. The ratio to be maintained is preferably one unit for every 40students.
- Disposal of menstrual waste as per Biomedical Waste (Management and Handling) Rules, 2016.

Plate 31 Colour Bins for the Disposal of Biomedical / Sanitary Waste

Table 117: Campus Maintenance Crew of Patrician College Of Arts And Science

Garden Maintenance and Campus Cleaning

Timing	**Morning**	**:**	**06.30 am to 10.30am**
	Afternoon	**:**	**03.00 pm to 06.30pm**

S. No.	Name of the Supporting Staff	Work Allocation
1.	Mrs. Gowri. M	• Maintenance of greenery • Leaf litter collection • Collection of garbage kept in commonplaces • Pruning • Grass cutting • Nursery maintenance • Watering plants • Assisting in over all maintenance work • Meeting Hall arrangement o Seating arrangement o Flower pot arrangement o Floor cleaning • Examinations o Seating arrangement in Multi-Purpose auditorium o Auditorium • 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.
2.	Mrs. Bhuvaneshwari. G	
3.	Mr. Somasundraram. K	
4.	Mr. Karthik. G.K	
5.	Mrs. Janaki. R	
6.	Mrs. Amutha. P	
7.	Mrs. Jayamala. K	
8.	Mrs. Premavathi. P	
9.	Mr. JaiKumar. A	
10.	Mr. Senthilkumar	
11.	Mr. Johnpaul	
12.	Mr. Karuppannan. P.K	
13.	Mr. Sathish. E	
14.	Mrs. Lakshmi. R	
15.	Mr. Bharathy. T	
16.	Mrs. Kumari.V	
17.	Mrs. FlowraMary. C	
18.	Mr. Yesu Kalaiarasan. J	
19.	Mr. Tamilarasan. D	
20.	Mrs. Anburani. P	
21.	Mr.Kumar	

Table 118: Campus Maintenance Crew of Patrician College of Arts and Science
Toilet Cleaning and Moping

Timing **Morning : 07.30 am to 11.30am**
Afternoon : 01.30 pm to 05.30pm

S.No.	Name of the workers	Block/Floor Allotted	Nature of work
1.	Mr. Sathish. E	A Block	• Toilet cleaning 5times /day; • Mopping frequently; • Veranda cleaning 3times/week; • Windows cleaning daily; • Placing Phenolphthalein balls frequently; • Deep Cleaning using acid 2times/week; • Phenyl application 5times/day • Cob web Removal / Cleaning using Cob web stick /Brush 
2.	Mrs. Janaki. R	A Block	
3.	Mrs. Kumari.V	A Block	
4.	Mrs.Flowra Mary. C	B Block	
5.	Mrs. Amutha.P	B Block	
6.	Mrs. Jayamala.K	C Block	
7.	Mr.Tamil	C Block	
8.	Mrs.Bhuvaneshwari.G	D Block	
9.	Mrs. Anburani. P	D BLock	
10.	Mrs. Lakshmi. R	D BLock	
11.	Mrs. Gowri. M	D Block	
12.	Mr. Karuppannan P.K	D BLock	
13.	Mr. Kumar	Gardener	
14.	Mr. Johnpaul	Masion	
15.	Mr. Yoganathan	Gate Security	
16.	Mr. Senthil Kumar	Gate Security	
17.	Mr. Yesu Kalaiarasan.J	Driver	
18.	Mr. Somasundraram.K	Lorry Driver/Car	
19.	Mr. Karthik. G.K	Cleaner/Lorry/ Car	
20.	Mr.Tamilarasan D	Electrician	

5.11.12 Cleaning and Hygiene Solutions

Cleannol – Mubin Lab

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/Cleaner	:	For all floors
6.	Bleaching Powder	:	Cleaning soiled surface and disinfection
7.	Liquid Hand wash	:	General use
8.	HARPIC	:	Deep cleaning

Scented White Phenyl

Liquid Hand Wash

Floor Perfume

Room Spray

Liquid Detergent

Deep Stain Remover

Bleaching Powder

Deep Toilet Cleaner

Naphthalene Balls

Plate 32: Cleaning Solutions

CLEANING AND HYGIENE SOLUTIONS USED BY PATRICIAN COLLEGE

TetraClean

Green Cleaning Solution

Tetra Clean Green Cleaning Solutions Complies with Indian Standards

	
All Purpose Cleaner RC-2	**Multipurpose Cleaner B300**
All Purpose Cleaner	
	
Room Spray	**Glass Cleaner**
	
Toilet Bowl Cleaner	**Floor Mop**

Plate 33: Cleaning Materials

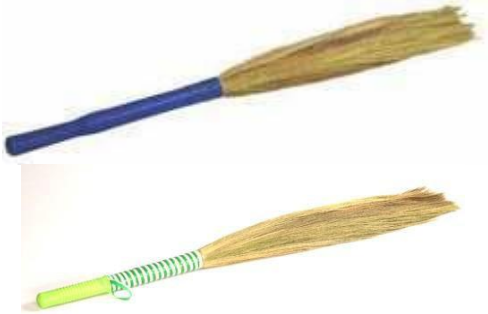
	
Cob Stick	**Fan-shaped bunched Filament Broom**
	
Coconut Broom	
	
Dust Pan	**Free Broom**

Plate 34 Cleaning and Sweeping Materials

	
D Block- Thrid Floor	**D Block- Second Floor**
	
D Block- Ground Floor	**B Block- Second Floor**
	
College Entries	**D Block- First Floor-Library**

Plate 35 Cleaning Work in Progress

	
D Block - Second Floor-Source club	**College Garden**
	
College-Puppy	**D Block – Men's Rest Room**
	
College –Fishes	**A Block –Computer Lab**

Plate 36 Cleaning and Mopping Work

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

Green Audit is the most efficient way to identify the strength and weakness of environmental sustainable practices and to find a way to solve problem. Green Audit is one kind of professional approach towards a responsible way in utilising 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.

Recommendations

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

1) Adopt Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.
2) Inculcate the concepts of Sustainable Development Goals. Increase Awareness on Economic, Social and Environmentally Sustainable Development - Use every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future.
3) Educate Environmentally Responsible Citizenship - Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and have the awareness and understanding to be ecologically responsible citizens.
4) Practice Institutional Ecology by making the students, staff and management to adopt resource conservation, recycling, waste reduction, and environmentally sound operations.
5) Involve All Stakeholders - Encourage involvement of government, foundations, and Industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development. Expand work with community and nongovernmental organizations to assist in finding solutions to environmental problems.

6) Collaborate and establish partnership for Interdisciplinary Approaches with University, Environmental practitioners and NGOs and Industries.
7) Disseminate the 5 R principles among the students, teachers, non-teaching staff, support staff and all the stakeholders of the College practice the principles of **Reduce, Reuse, Recycle, Reform and Refuse** education on campus.
8) Set up water recycling unit where the recycled water can be used for gardening.
9) Set up paper recycling unit
10) Develop a butterfly garden that arouse appreciation towards floral and faunal diversity.
11) Name all the trees and plants with its common name and scientific name wherever possible. (Avoid nailing nametags)
12) Conduct exhibitions for parents and public on environment and sustainable practices.
13) Arrange training programmes on environmental management system and nature conservation.
14) Declare the campus plastic free and implement it thoroughly. Discourage of use of PET bottle water during functions.
15) Avoid plastic/thermocol plates and cups in the college level or department level functions.
16) Establish a Material Recovery Facility (MRF) and provide adequate space for glass. Plastics, stryroform, thermocoal, wood etc.
17) Ensure participation of students and teachers in local environmental issues.
18) Total Replacement of CFL with LED. Donate used Tube lights and CFL to educational institutions in need.
19) Conduct quarterly Campus Environmental Audit for water, energy and waste
20) Maintain Campus Environmental Register.

Commitments after Green Auditing

In the light of Green Audit the College should, adopt the above recommendations in planned manner. The institution should also comply with environmental laws and regulations incorporating Sustainable Development Goals towards sustainable existence of the college.

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