

Green Audit Report

Seth Anandram Jaipuria College

10, Raja Nabakrishna St, Raja Nabakrishna Street, Sovabazar, Kolkata 700005



Prepared by

RSP Green Development & laboratories Pvt. Ltd.

(ISO Certified and QCI - NABET Accredited Environmental Consultant Organization)

Acknowledgment

RSP Green Development & Laboratory Pvt. Ltd. sincerely extends gratitude to the authority and administration of Seth Anandram Jaipuria College, Kolkata for assigning us the responsibility of Green Audit in their college campus. We appreciate the cooperation extended to our team during the entire process. We convey our thanks to the Principal Prof. Dr. Asok Mukhopadhyay and all faculty members of the college for giving us necessary inputs to carry out this very vital exercise of Green Audit. We are also thankful to Prof. Jaydip Datta, Bursar and Associate Professor, Department of Economics, Dr. Arpita Rakshit, Assistant Professor, Department of Zoology, Dr. Arabinda Chowdhury, Associate Professor, Department of Physics, Dr. Dinesh Chandra Ghosh, Assistant Professor, Department of Chemistry, Dr. Kalipada Das, Assistant Professor, Department of Physics, members of the IQAC and other staff members who were actively involved while collecting the data and conducting field measurements.

We look forward to many more fruitful associations with this eminent academic Institute.

Pinaki Roy

Managing Director

RSP Green Development & Laboratory Pvt. Ltd.

SL. NO.	CHAPTERS	PAGE NO.
1.	INTRODUCTION	1 – 8
1.1	Need for Green Audit	2 - 3
1.2	Objectives of Green Audit	3
1.3	About the Institution	4 – 6
1.3.1	Vision of the Institution	5
1.3.2	Mission of the Institution	5 – 6
1.3.3	Physical Structure of the College	6 - 8
2.	METHODOLOGY	9 –14
2.1	Target Areas of Green Audit	9
2.1.1	Water Management Auditing	10
2.1.2	Energy Management Auditing	10 - 11
2.1.3	Waste Management Auditing	9 – 10
2.1.4	Biodiversity/ Green Campus Management Auditing	11
2.1.5	Carbon Footprint Auditing	11
2.2	Methods Adopted	11 - 12
2.2.1	Onsite Data Collection	11
2.2.2	Focus Group Discussion	12
2.2.3	Water, Energy, Waste, Biodiversity and Carbon Foot Print Analysis Survey	12
2.3	Audit Team	12 - 13
2.4	Audit Stages	14
3.	OBSERVATIONS & FINDINGS	15 –32
3.1.	Water Management	15 – 16
3.1.1	Source of water and its uses	15
3.1.2	Water Quality Analysis	15 – 16
3.2	Energy Audit	17 – 21
3.2.1	Electrical Bill Analysis	17
3.2.2	Electrical Appliances	18 – 20
3.2.3	Efficient Energy Management Practices	21
3.2.4	Alternative Energy Resource	21 – 22
3.3	Waste Management	22 - 23
3.3.1	Types of waste generated in the campus	23
3.3.2	Waste Disposal Practices Adopted by the College	23 – 25
3.3.3	Reduce, Reuse, Recycle	25 – 27
3.4	Green Campus	27 –31
3.4.1	Campus Biodiversity	27 - 28
3.4.2	Green Campus Initiatives	28
3.4.3	Sustainable Practices	28 – 31
3.5	Carbon Foot Print Analysis	32
4.	SUGGESTIONS AND RECOMMENDATIONS	33 – 35
4.1	Water Management	33
4.2	Energy Management	33 - 34
4.3	Waste Management	34
4.4	Green Campus	34 - 35

SL. NO.	LIST OF TABLES	PAGE NO.
Table 1	College Infrastructure	7
Table 2	Total Strength of Students, Teachers & Non-teaching Staff	7
Table 3	Electrical Appliances in the College	18
Table 4	Distribution of Electrical appliances	19
Table 5	Air Conditioning System in the Campus	19
Table 6	Approximate quantity of waste generated per day (in kg)	23
Table 7	Carbon Foot Print Analysis	32

SL. NO.	LIST OF FIGURES	PAGE NO.
Figure 1	PDCA Cycle of Green Audit	2
Figure 2	Location Map	4
Figure 3	Target Areas of Green Audit	9
Figure 4	Electricity Consumption in Last 12 Months	17



1. Introduction

Green Audit is a stage wise review process of systematic identification, quantification, recording, reporting, analysis and documentation of components of environmental diversity of the institute or organization. It is a systematic assessment of day-to-day activity with reference to the utilization of resources as well as waste management. It aims to analyze environmental practices within and outside of the concerned place; leading to an eco-friendly atmosphere. It helps to determine how and where the energy, water or other resources are being used, based on which the institution can design effective management policies and implement changes towards sustainable use of resources. It can create health consciousness and promote environmental awareness, values and ethics. It also helps to enlighten staff and students of the institution for better understanding of Green impact on campus. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for environmental sustainability. Especially in colleges and universities where young minds dwell, ensuring an ecosystem with endurable qualities is the need of the hour. The green influence on the campus is vital to guarantee the best learning environment and healthy ecosystem for everyone associated with the site. The green audit report determines the greenery quotient on the campus and covers other influential environmental aspects. It includes the consumption and management of energy resources and environmental components.

National Assessment and Accreditation Council (NAAC) was introduced by the University Grants Commission or UGC in September 1994. NAAC was established for reviewing the performance and operational quality of Indian universities and colleges. The National Assessment and Accreditation Council have made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the mitigation of global warming through enforcement of carbon footprint reduction measures and improved management steps.

- **Self-assessment** – It allows the universities and colleges to review the ideal steps and implement them for the campus. The audit assists in self-assessment and the decision-making process.
- **Awareness** – It develops awareness among everyone associated with the campus with conscious and consistent efforts.

- **Improved scopes** – By complying with the norms, universities can ensure higher scopes of getting the best grade from NAAC. It is vital to follow the systematic way and implement the best steps for green audits on the campus under professional guidance.

The PDCA cycle audit is a systematic way of checking and improving the quality and performance and it involves four phases: planning the improvement, implementing the change, measuring the results, and acting on the feedback.

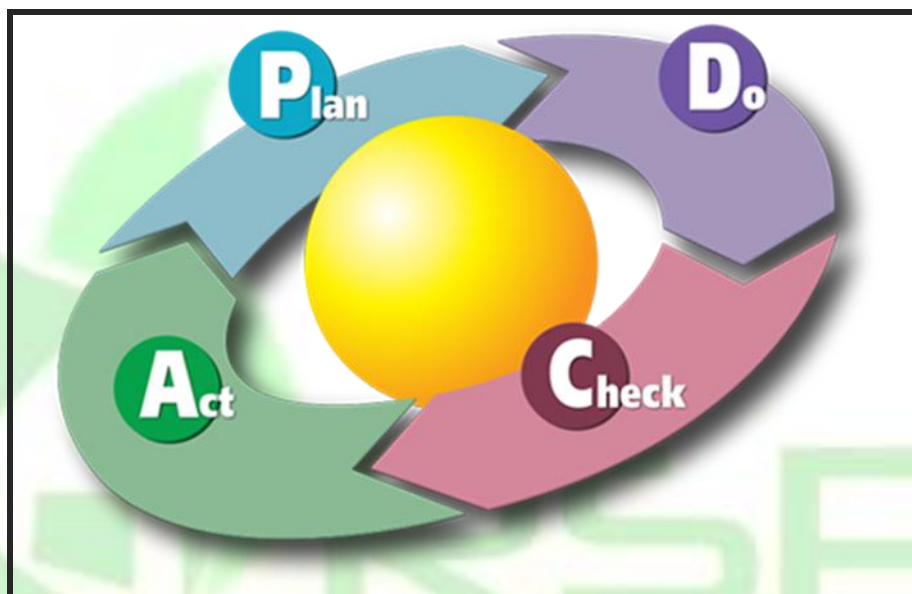


Figure 1: PDCA Cycle of Green Audit

1.1 Need for Green Audit

Green Audit is assigned to the Criteria 7 of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India that accredits the institution according to the scores assigned at the time of accreditation.

The Audit report helps to understand the current practices of sustainability with regard to the use of water and energy, generation of wastes, transportation, purchase of goods, etc; establishing a baseline of existing environmental conditions with focus on natural and physical environment and create awareness among students and staff concerning real issues of environment and its sustainability. Based on the audit report, the college can make the best strategies to make the campus ideal for students, teachers, and

anyone associated. It also helps the college acknowledge the wastage volume and consider different recycling projects for developing a sustainable ecosystem for the learners. Simply put, it is a way to minimize wastage and create a more suitable place for learning with improved NAAC grades.

1.2 Objectives of Green Audit

The main aim of this green audit is to assess the environmental quality and the sustainable management strategies being implemented in Seth Anandram Jaipuria College.

The objectives of Green Audit include:

- Documentation of baseline data of good practices, strategies and action plans towards improving environmental quality for future along with corrective actions and future plans.
- Maintain conformity with the norms and standards in the environmental management system and to design ideal protocols that develop a sustainable ecosystem on the campus.
- Assessment of water use, waste management, energy consumption, health and environmental quality in the campus.
- Identification of the gap areas and suggest recommendations to improve the Green Campus status of the College.

1.3 About the Institution

Seth Anandram Jaipuria College affiliated to the University of Calcutta was inaugurated by Pt. Jawaharlal Nehru in 1945. The college is situated at 10, Raja Nabakrishna Street, Sovabazar, Kolkata, West Bengal 700005. Currently the college runs in three shifts: Morning, Day, and Evening. The college is serving society and the nation since its inception. Padmabhushan Seth Mangturamji Jaipuria (1901-1978), who founded the College in his father's name, Seth Anandram Jaipuria, wished the institution to grow into centre of unbound academic excellence by fostering a spirit of multiculturalism reflective of India's diversity in unity

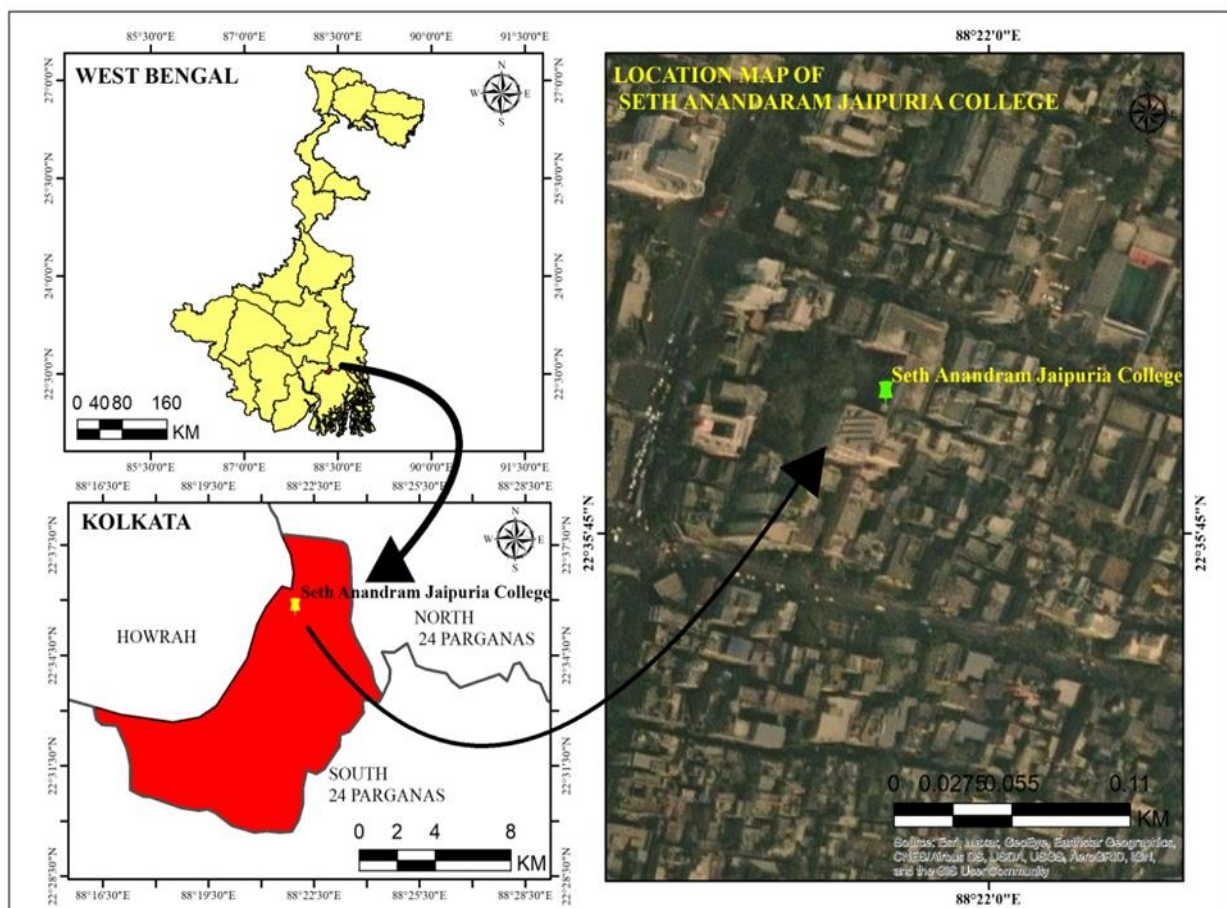


Figure 2: Location Map

1.3.1 Vision of the College

The college logo proudly displays the phrase "Vidya Amritam Bhava", reflecting the belief that knowledge fuels humanity's progress beyond life: Engaging in academics is an enjoyable journey that inspires and unleashes the potential hidden within every individual. The College seeks to cultivate an atmosphere that celebrates India's rich cultural diversity and embodies the spirit of unity amidst this diversity. The college aims to provide a comprehensive education that caters to a wide range of students, equipping them with essential skills and knowledge for the modern world. To achieve this, the institution focuses on the integration of new technologies into its teaching, learning, and management processes. The college is committed to creating an eco-friendly campus, promoting environmental awareness and sustainable practices among students, faculty, and staff. The College emphasizes on building collaboration with other educational institutions and organizations, ensure gender equality to promote improved and equal opportunities for learning, growth, and achievement, as well as fostering a culture of respect and understanding among all members of the college community. The college aims to provide a holistic education that nurtures the intellectual, emotional, social, and physical development of its students. By offering a supportive and stimulating learning environment, the institution empowers its students to reach their full potential, preparing them to become responsible, compassionate, and successful leaders in an ever-changing world.

1.3.2 Mission of the College

Seth Anandram Jaipuria College aspires to be a leading institution in higher education, fostering intellectual growth, critical thinking, creativity, and lifelong learning for our diverse student population. The primary educational aims and objectives of the College is to focus on nurturing well-rounded, responsible, and enlightened global citizens who contribute positively to society. To achieve these aims, we provide a comprehensive range of academic programs that emphasize interdisciplinary learning, innovation, and research. Our faculty is dedicated to delivering a rigorous, cutting-edge curriculum that equips students with the knowledge and skills necessary for success in their chosen fields. We also recognize

the importance of extracurricular activities in promoting personal growth, leadership, and teamwork. Therefore, we offer a wide array of clubs, sports, and cultural events that cater to the diverse interests and talents of our students.

We are committed to creating a safe, inclusive, and supportive learning environment that respects and values the uniqueness of each individual. Our college embraces diversity, equity, and inclusion initiatives, ensuring that all students, staff, and faculty have equal opportunities to thrive academically and professionally. Our policies and practices foster a culture of respect, empathy, and collaboration, enabling everyone to reach their full potential. Access to high-quality education for all, regardless of financial or social backgrounds, is at the core of our mission. We strive to provide affordable education while maintaining excellence in teaching and learning. Our financial aid programs, scholarships, and flexible payment options ensure that a diverse range of students can benefit from our offerings. In addition, we actively engage with local communities, schools, and businesses to promote access to higher education and facilitate seamless transitions for students. Through these endeavours, Seth Anandram Jaipuria College remains dedicated to empowering our students to become responsible, compassionate, and innovative leaders who make a positive impact on the world.

1.3.3 Physical Structure of the College

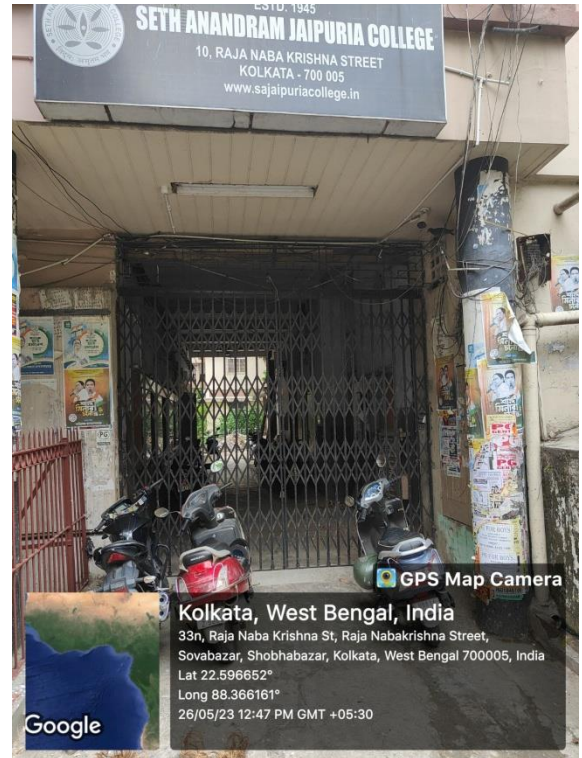
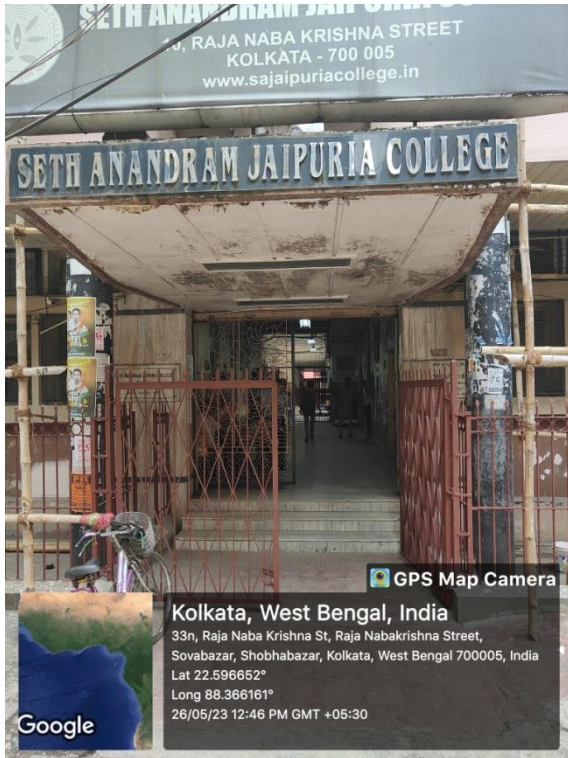
Seth Anandram Jaipuria College in North Kolkata is famed for its immensity. With around 5000 students and more than 200 teachers and non-teaching staff, it is one of the few colleges in West Bengal running in three shifts and catering to all three streams of Science, Arts and Commerce. Housed in one of the spacious buildings of erstwhile Shovabazar Rajbari, it claims 18 Laboratories, a free WI-FI zone, a Gymnasium, an Audio-visual Room, Smart Classrooms, Library and Reading Room, Board Room, Hostel and Staff quarter. The greenery is not in plenty but a curated lawn and small stretches of garden are well in place. With RUSA (Rashtriya Uchchattar Shiksha Abhiyan) grant, process is on to install two lifts of 10 and 16 passenger capacity, promote vertical expansion of the building and harness alternative energy resource through solar panels on roof top.

Table 1: College Infrastructure

Campus Area	0.525 Acre
Built Up Area	8491.34 sq m
No. of Buildings	
No. of Departments	
Teachers' Room	
Principal's Room	
Class Rooms	
Smart Class Rooms	
Dry Laboratories	
Wet Laboratories	
Library	
Auditorium	
Seminar Hall	
Canteen	
Common Room	
Gymnasium	
Common Room	
Office Room	
Hostel	
Staff Quarter	

Table 2: Total Strength of Students, Teachers & Non-teaching Staff:

No. of Teachers			No. of Students			No. of Non Teaching Staffs		
Male	Female	Others	Male	Female	Others	Male	Female	Others
74	96	0			0	40	11	0



College Gate



College Campus

2. Methodology

In order to perform green audit, the methodology that included different tools such as preparation of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations was adapted.

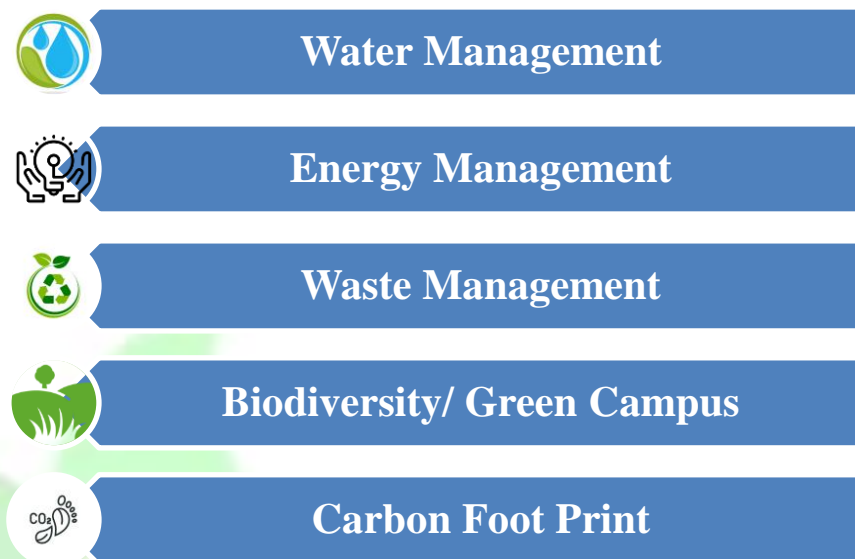


Figure 2: Target Areas of Green Audit

2.1 Target Areas of Green Audit

Green audit aims to evaluate the efficient use of energy and water; minimize waste generation or pollution, biodiversity status and also efficiency in resource utilization. These indicators are assessed focusing on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, promotes personal action, reduce the institute's energy and water consumption, reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, biodiversity and carbon footprint.

2.1.1 Water Management Auditing

Water is a natural resource which is required for sustenance of all living creatures. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. Groundwater depletion and water contamination are taking place at an alarming rate. Hence it is essential to examine the quality and usage of water in the Institutions or organizations. Water auditing is conducted for the evaluation of facilities of water intake, water usage and facilities for water treatment &/or reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water.

2.1.2 Energy Management Auditing

Energy conservation is an important aspect of campus sustainability which is also linked with carbon foot print of the campus. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices and incorporate alternative energy resources wherever possible.

2.1.3 Waste Management Auditing

Human activities create waste; and unsustainable ways of waste handling, storage, collection, transport and disposal may pose risks to the environment and public health. Solid waste generated in the campus can be divided into three categories: bio-degradable, non-biodegradable and hazardous waste.

1. Bio-degradable wastes include food wastes, canteen waste, wastes from toilets etc.
2. Non-biodegradable wastes include plastic, tins and glass bottles etc.
3. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals, acids and petrol.

Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated in the college.

Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of

solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

2.1.4 Biodiversity/ Green Campus Management Auditing

Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen released by the trees of the campus is good for the people in the campus. Campus biodiversity is reflection of the ecological health of the campus. A sustainable strategy is required for adopting environment friendly viable way outs for a green campus.

2.1.5 Carbon Footprint Auditing

Burning of fossil fuels (such as petrol) has an impact on the environment through the emission of greenhouse gases into the atmosphere. The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions. Vehicular emission is the main source of carbon emission in the campus, hence to assess the method of transportation that is practiced in the college is important.

2.2 Methods Adopted

The methodology adopted to conduct the Green Audit of the Institution had the following components.

2.2.1 Onsite Data Collection

Both Physical and virtual tour of the college campus was organized by the Green Audit Team. The data samples and relevant photographs were collected through geo-tagged photographs. The key focus of the audit was on assessing the status of the green cover of the Institution, their waste management practices and energy conservation strategies etc.

2.2.2 Focus Group Discussion

The Focus Group discussions were held with the staff members and the management focusing various aspects of Green Audit. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional and local level.

2.2.3 Water, Energy, Waste, Biodiversity and Carbon Foot Print Analysis Survey

With the help of teachers and staff, the audit team has assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college. The monitoring was conducted with a detailed questionnaire survey method.

2.3 Audit Team

A Team comprised of the faculty members of the College and representatives from the RSP Green Development & Laboratories Pvt. Ltd. (ISO Certified and QCI - NABET Accredited Environmental Consultant Organization) conducted the Green Audit.

Members from Seth Anandram Jaipuria College

1. Prof. Jaydip Datta, Bursar and Associate Professor, Department of Economics
2. Dr. Arpita Rakshit, Assistant Professor, Department of Zoology
3. Dr. Arabinda Chowdhury, Associate Professor, Department of Physics
4. Dr. Dinesh Chandra Ghosh, Assistant Professor, Department of Chemistry
5. Dr. Kalipada Das, Assistant Professor, Department of Physics

Members from RSP Green Development & Laboratories Pvt. Ltd.

1. Ms. Manisha Bhowmick
2. Mr. Ashish Chatterjee



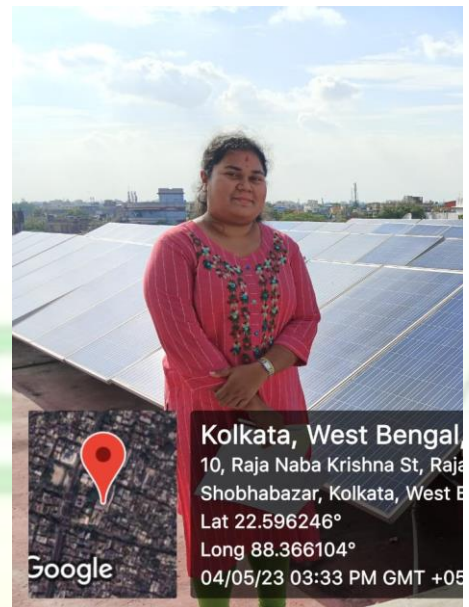
Part of Audit Team with Principal of the College



Audit Process



Audit Process



2.4 Audit Stages

Green auditing in Jaipuria College, Kolkata began with the assessment of the status of the green cover of the Institution followed by waste management practices and energy conservation strategies etc. The team monitored different facilities at the college, determined different types of appliances and utilities (lights, taps, toilets, air conditioners, etc.) as well as measuring the usage per item (Watts indicated on the appliance, etc.) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain appliances. Data collection was done in the sectors such as Energy, Waste, Greening, Carbon footprint and Water use. College records and documents were verified several times to clarify the data received through survey and discussions.

3. Observations & Findings

The findings and observations after campus visit, group interactions, survey and review have been analyzed and represented below.

3.1. Water Management

3.1.1 Source of water and its uses

The major source of water used in the College comes from municipality water supply and ground aquifer. The Municipal Corporation provides water to the College at free of cost. The amount of water supplied is sufficient for the daily college activities and hence no additional tanker water is needed to meet its demand. Total 8 numbers of water tanks are available in the campus with capacity of 6000 L each. A total of 15000 L of water is pumped every day using 2 motors. Water consumption meter is not installed and hence no record is maintained for daily water consumption. An average of 3,90,000 L of water is used by the College per month. Water is used for drinking purpose, toilets, canteen, laboratories and gardening. Water purifier units have been installed in the campus to treat the water for drinking purpose. Distilled water requirement in laboratories are by the distillation unit set in the college itself. College has displayed signboards for spreading awareness regarding water conservation. There was no leaking taps or water wastage reported during the audit phase. There is no formal water management plan available with the institute. There is ample scope in the campus to establish Rain Water Harvesting System to ensure efficient water management and contribute in water conservation. There is no Sewage Water Treatment plant in the campus to recycle the waste water for the use of flushing and gardening. The waste water is being drained to main drainage system of the city. Details of water consumption in hostel and staff quarter could not be procured during audit process.

3.1.2 Water Quality Analysis

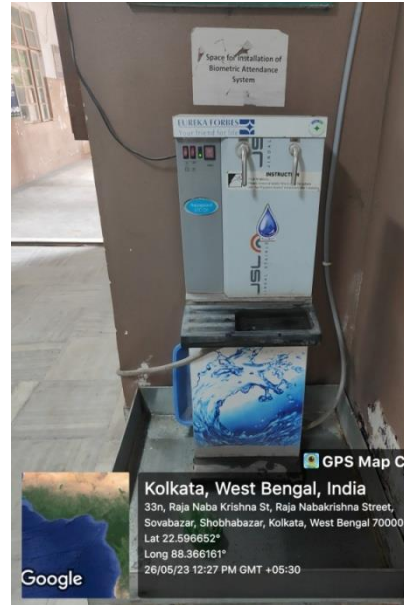
Detailed water quality analysis has not been carried out in the college. pH and conductivity of water is routinely checked in college laboratory by the students. As the water is primarily supplied by the Municipal Corporation, it can be assumed that the water is properly treated and meets the requisite norms of BIS standards. However, it is recommended to get the detailed water analysis done at least once in a year.



Water Reservoir



Water Pump



Water Purifier



Drainage in Laboratory



Water Distillation Unit in Laboratory

3.2 Energy Audit

3.2.1 Electrical Bill Analysis

Electricity is supplied by Calcutta Electricity Supply Corporation. All the Electrical appliances in the college building, hostel and staff quarter run on a single meter. The College has recently applied for a new meter. Electricity consumption in last 12 months has been depicted below. An average consumption of 3611 kWh/month is estimated during normal operating scenario.

Consumer Name	The Secretary, Seth Anandram Jaipuria College
Consumer No.	85326006012
Meter No.	572486311
Electricity Supply Company	CESC
Tariff Category	P/3ph
Contract Demand (kVA)	39.4
50% of Con. Demand (KVA)	19.7
Sanctioned load (KW)	39.4

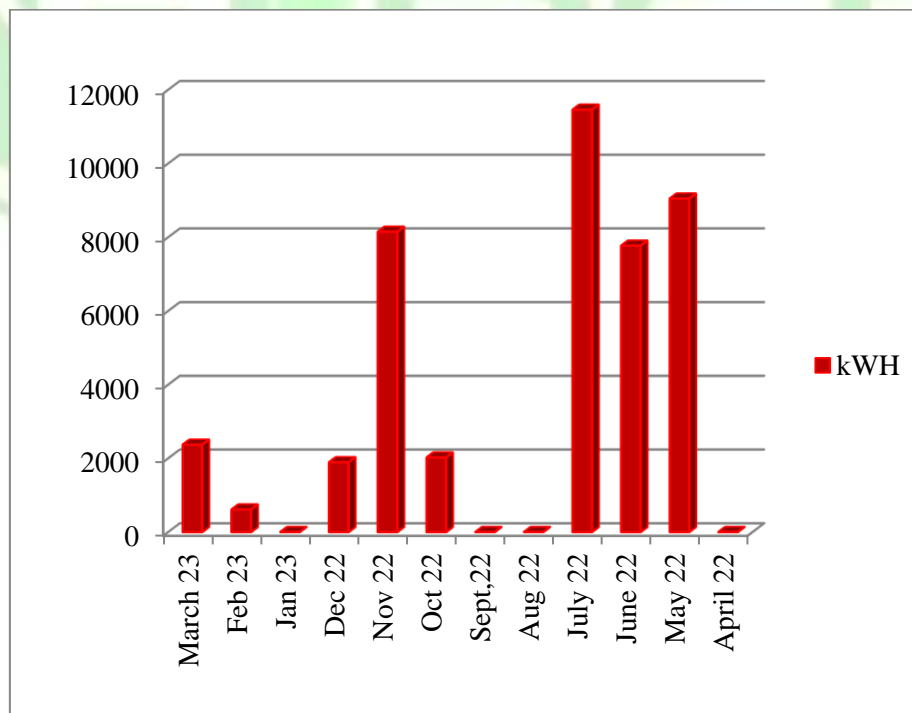


Figure 3: Electricity Consumption in Last 12 Months

3.2.2 Electrical Appliances

The commonly used electrical appliances in the College include tube lights, LED lights, Ceiling fans, refrigerators, micro wave oven, air conditioners, water purifiers, computers, pump, UPS and other power back-ups etc. The average numbers of these appliances have been enlisted in the following table. The Library is facilitated with 36 tones central air conditioning system. Laboratories have 4 split ACs, 1.5 Ton each and the Principal's Room has one 1.5 Ton window AC. All ACs are 3 star rated and the temperature is kept between 22-24 degree Celsius. The switching and operation is manual in nature. The Information technology Lab has 18 computers in total. The College has one lift which is regularly maintained and checked. Details of energy consumption in hostel and staff quarter could not be procured during audit process.

Table 3: Electrical Appliances in the College

Sl. No.	Name of Appliances	No. of Units	KWH
1	Tube Light	490	10,780
2	Compact Fluorescent Lamps (CFL)	167	1,837
3	Ceiling Fans	237	3,102
4	Water Purifiers	8	144
5	Refrigerators	9	900
6	Micro-wave Ovens	3	540
7	Air-conditioners	12	5,040
8	Grinders	3	165
9	Computers	217	1,518
10	Pumping Machines	8	1,120
11	UPS and Other Power Back-up	70	420

Table 4: Distribution of Electrical appliances

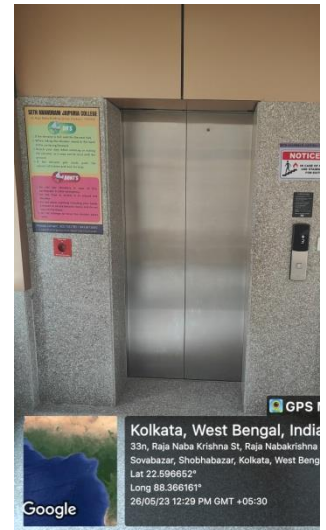
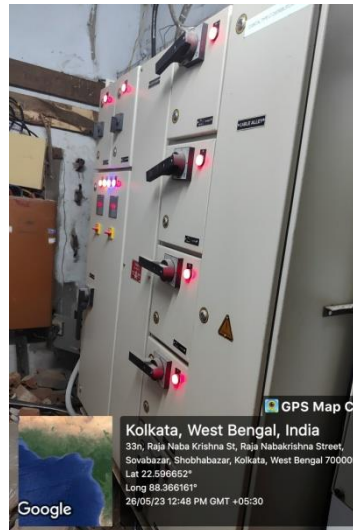
Room No. / Name	Type of Electrical Device	Quantity	Operation	
		Nos.	Hrs/Day	Days/Month
1-7	Lights, Fans	148	12	26
N1,N2,N3	Lights, Fans	69	12	26
10-29	Lights, Fans	76	12	26
Zoology Lab	Light, Fans	26	12	26
Botany Lab	Lights, Fan	13	12	26
Journalism Lab	Lights, Fan	10	12	26
Canteen	Lights, Fan	10+10	12	26
Staff Quarters	Lights, Fan	2*5	12	26
Office Room	Lights, Fan	18	12	26
Principal Room	Lights, Fan	10	12	26
IQAC room	Lights, Fan	12	12	26
GYM	Lights, Fan	8	12	26
Conference Room	Lights, Fan	14	12	26
Union Room		8	12	26
Library		88	12	26

Table 5: Air Conditioning System in the Campus

Air Conditioners							
Room No. / Name	Type	Capacity	Quantity	Power	Operation		Star Rating
		TR	Nos.	Watt/Unit	Hrs/Day	Days/Month	
	Split/ Window AC						3 Star
Library	Central Ac	36 ton	6	7000	12	26	✓
Principal room	Window Ac	1.5 ton	1	1100	12	26	✓
Teachers' room	Split Ac	1.5 ton	1	1100	12	26	✓
Physics Lab	Split Ac	1.5 Ac	1	1100	8	26	✓
Chemistry Lab	Split AC	1.5 ton	1	1100	8	26	✓
IT Lab	Split Ac	1.5 ton	1	1100	8	26	✓



Electrical Panel



Lift



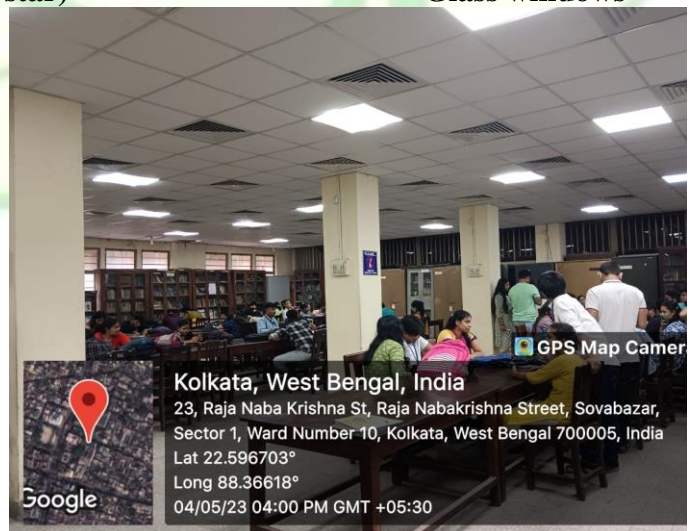
Air conditioner (3 star)



Glass windows



Natural light in class room



Library with LED lights

3.2.3 Efficient Energy Management Practices

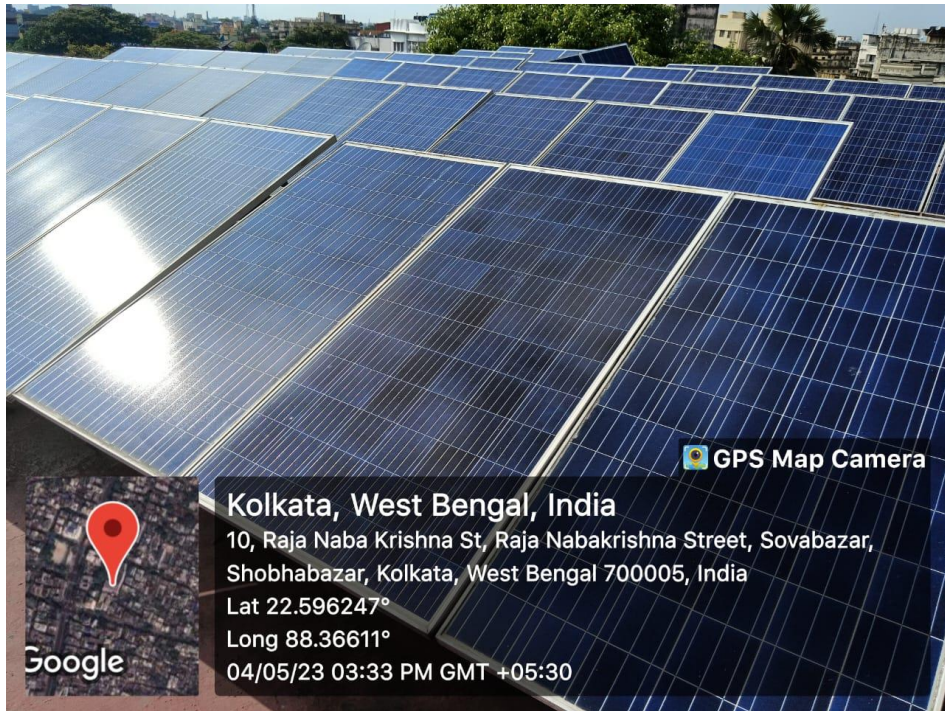
The college is gradually shifting towards LED lights by replacing existing lighting fixtures with LEDs and other energy efficient lighting fixtures to conserve energy. All ACs are 3 star

rated and the temperature is kept between 22-24 degree Celsius. The switching and operation is manual in nature. Servicing of the electrical appliances is done at regular intervals to ensure energy efficiency. Institute is utilizing the natural light to its maximum. The classroom and laboratories are designed in such a way that it allows maximum sun light and reduces requirement of artificial lights. The classrooms and offices in the premises are well ventilated. The fans are operational and adequately placed to effect the sufficient air changes. Fans installed are not star-rated. College has done indoor plantation to provide fresh air inside the premises. LED monitors and Email/ electronic communication mode is preferred to save energy. Awareness posters regarding energy conservation is being displayed in the premises. The canteen uses LPG gas for cooking purpose. However, the Institute has not adopted to any sensor based energy conservation technique. Since there is limited facility in hostel and canteen, there is no solar water heating system installed. Since the biodegradable waste generation is low, there is no Bio-gas plant.

3.2.4 Alternative Energy Resource

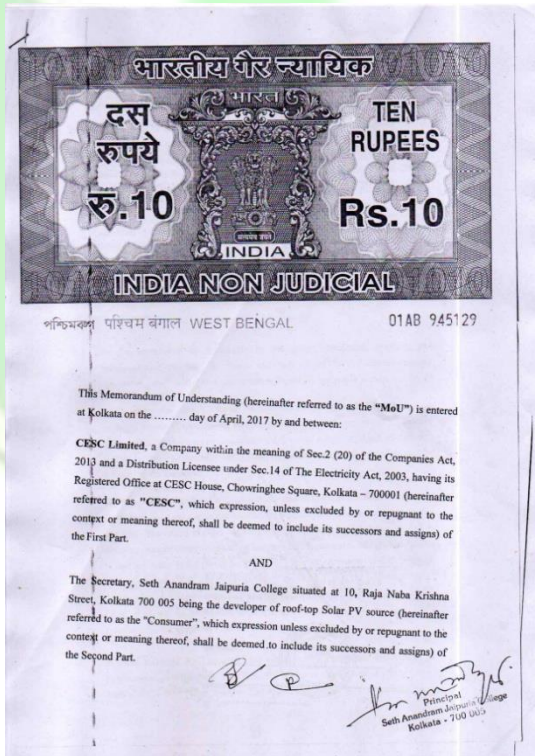
Solar energy installation: nonrenewable to renewable energy transformation

Solar energy is one of the most environment friendly renewable and clean sources of energy. The College has successfully installed one 20kWp Grid Interactive Rooftop Solar PV by Chloride Power Systems and Solutions Ltd., with the help of Govt. of West Bengal and Govt. of India, to reduce dependency on fossil fuel based electricity. The College has a MoU with the electric supply board CESC to enable net metering and interconnect the solar PV source at its distribution network available within the premises of the college and run in parallel with CESC's distribution system. Through this, the college has been benefitted both financially and environmentally. It has enhanced the institutional overall quality and upgrading knowledge of faculty members and students regarding renewable energy and environmental sustainability. After successful installation of this set up a drastically change has been seen in electricity consumption rate, it becomes less. Solar panels also help to reduce pollution and carbon footprint and makes the institute independently electrified campus. All stakeholders of the campus including the students, teachers and staffs are also made aware about its relevance and advantage.

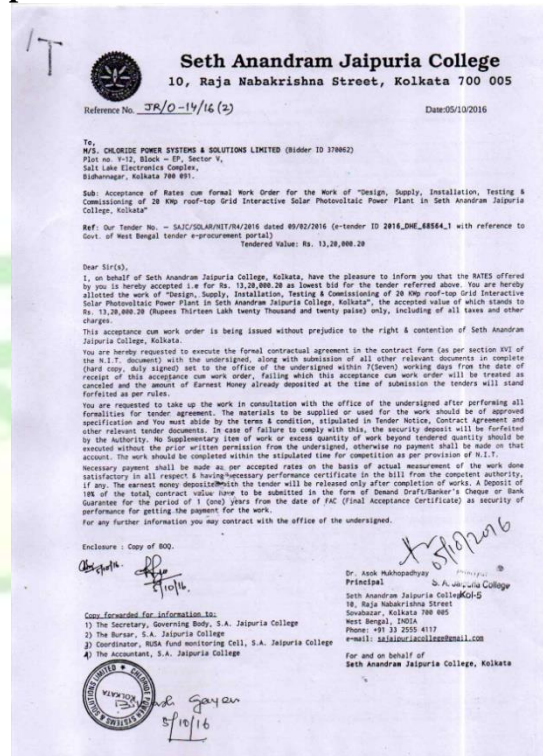


Kolkata, West Bengal, India
 10, Raja Naba Krishna St, Raja Nabakrishna Street, Sovabazar,
 Shobhabazar, Kolkata, West Bengal 700005, India
 Lat 22.596247°
 Long 88.36611°
 04/05/23 03:33 PM GMT +05:30

Installed Roof Top Solar Panel



MoU b/w College & CESC



Solar Panel Installation Work Order

3.3 Waste Management

This indicator addresses waste production and disposal of different wastes like paper, food, plastic, biodegradable, construction, glass, dust etc. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through

recycling, repair, and reuse. Solid waste generation and management is one of the most challenging issues in academic institutions. Unscientific handling of solid waste can pose threat to everyone. The survey focused on volume, type and current management practice of solid waste generated in the campus.

3.3.1 Types of waste generated in the campus

Table 6: Approximate quantity of waste generated per day (in kg)

Office	Type of Waste			
Quantity	Biodegradable	Non-Biodegradable	Hazardous	Others
< 1kg	Paper	Plastic	NIL	NIL
2 - 10 kg				
> 10 kg				
Classrooms	Type of Waste			
Quantity	Biodegradable	Non-Biodegradable	Hazardous	Others
< 1kg	Paper, Food waste	Plastic, Wrapper etc.	NIL	NIL
2 - 10 kg				
> 10 kg				
Labs	Type of Waste			
Quantity	Biodegradable	Non-Biodegradable	Hazardous	Others
< 1kg				
2 - 10 kg	Dissected specimen	Broken glassware, plastic wares etc.	Chemical	E waste
> 10 kg				
Canteen	Type of Waste			
Quantity	Biodegradable	Non-Biodegradable	Hazardous	Others
< 1kg	Vegetable peel, food waste	Plastic, Packaging products	NIL	NIL
2 - 10 kg				
> 10 kg				

3.3.2 Waste Disposal Practices Adopted by the College

The source of wastewater is Domestic Waste Water i.e., Sewage water. The Sewage water mainly comes from toilets and canteen. The wet laboratories also generate waste water. There is no Sewage Water Treatment plant in the campus to recycle the waste water for the use of flushing and gardening. The waste water is being drained to main drainage system of the city. The everyday solid waste is collected by Kolkata Municipal Corporation for necessary

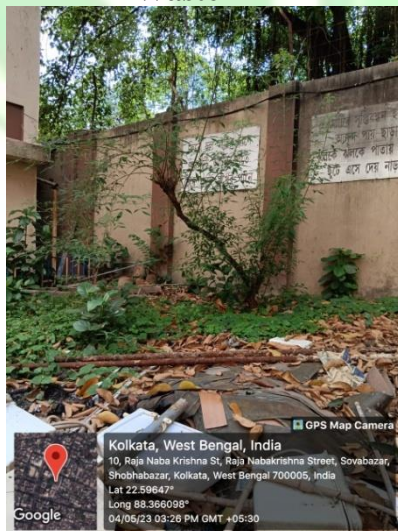
disposal. The College does not have any color coded dustbins and the segregation of waste was poorly observed. There is no biomedical or radioactive waste getting generated in the college.



Waste Bin



Drainage



Waste dumped



Laboratory



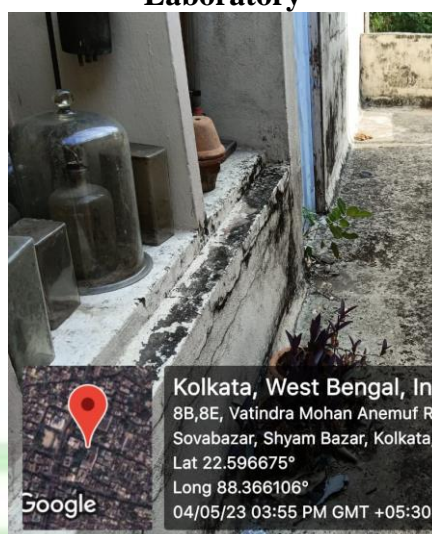
Laboratory waste



Laboratory



Waste bin



Laboratory waste

3.3.3 Reduce, Reuse, Recycle

The office and departments follow both sided printing to save energy and reduce waste. Single sided used papers are reused for writing and printing in all the departments to minimize the usage of papers. Important and confidential reports/ papers are sent for pulping and recycling after completion of their preservation period.

Broken furniture, appliance or computers are repaired and reused in terms of minimize waste.

The College has recycled 1883.4 Kg of paper which nearly saved 38 trees in the year 2022.

Very less plastic waste is generated by some departments, office, garden etc. Awareness regarding plastic pollution is spread in the campus.

Metal waste, wooden waste, unused equipments and scraps are stored and sent to authorize scrap agents for further processing. Glass bottles are reused in the laboratories.

E-waste generated in the campus is effectively managed, keeping in mind the environmental hazards that may arise if not disposed properly. The cartridges of laser printers are refilled

outside the college campus. The E- wastes and defective items from computer laboratories are being stored properly and recycled in effective Manner. The dismantled electronic spare parts are immediately sold for reuse. Generated e waste is handed over to authorized vendors for efficient recycling. In the year 2020, 140 kg of e waste have been ethically collected and channellized to authorized recyclers.



Howrah, West Bengal, India
H7WM+M93, Old Jagacha, Howrah, West Bengal 711112, India
Certificate for Recycling of Papers



Certificate for Recycling of Papers



Certificate for Recycling of E Waste

3.4 Green Campus

3.4.1 Campus Biodiversity

Approximately 2500 sq km free space is available in the campus. There is moderate vegetation in the campus including Ashwagandha, Debdaru, Jhau, Palm, Aloe Vera, Bramhi along with some indoor plants. The campus premises have also presence of common birds like crow, sparrow, Myna, Sun bird, Nightingale and domestic cat and dogs.





3.4.2 Green Campus Initiatives

The Nature Club in the campus aims to spread awareness among students regarding environmental problems. It takes various initiatives including campus cleanliness drive, Organizing Eco Fest, celebration of National science Day, various environmental and disease awareness programme, plantation drive and publication of bi annual newsletter.

Nature Club organizes Seminars, Workshops, poster drill and workshops regularly in campus and surrounding locality.

An air pollution sensor is about to be deployed in the campus as a part of a research work conducted by IIT Delhi in collaboration with St. Xavier's College and supported by WBPCB.

3.4.3 Sustainable Practices

Use of Cycles is being promoted for internal transport.

Institute has initiated banning plastic in the campus.

Email/ electronic communication mode is preferred to save papers.

Both side printing is being adopted to save paper and trees.

The premises have fire extinguishers installed at required locations which are regularly checked and maintained.

The campus has established lift and ramp for easy movement of disabled persons.

favourably endorsed
22/11/2022
Principal
Shri Anandram Jaiswara College
Kodakata-700005

I am writing to propose the formation of a "Nature Club" on [01.12.2022] in the spaces behind the Zoology Lab in our college.

Motto: "Conserve and Preserve"

Vision: Our vision is to arouse general awareness among students regarding various environmental problems that are of major concern for the better future and survival of humankind.

Mission: Our mission is to inculcate love and respect for nature among the club members and to work with a global perspective.

Objectives: The primary objective of the Nature Club is to motivate students to value the environment and raise their awareness about the critical situation of nature and the means to conserve it.

Means: The club aims to create awareness of global environmental challenges and develop ways to overcome them by organizing eco-friendly activities, botanical excursions, plantation programs, and workshops and seminars on environmental issues.

Proposed Activities:

Campus Cleanliness: Students will be encouraged to spend time cleaning the college campus and surroundings to explain the benefits of maintaining hygienic conditions. Composting bins will be placed at designated sites around the college, such as the garden and campus.

Eco Fest: The Nature Club will organize an annual Eco Fest, featuring various competitions like slogan writing, poster making, quiz, bio rangoli, creating the best out of e-waste, paper bag painting, and clay modeling.

Celebration of Science Day: The club will celebrate Science Day on 28th February 2023 to promote environmental awareness.

Environmental Awareness Program: This program aims to spread awareness among local people about various environmental problems and their effects on the environment through slogans, posters, and skits.

Disease Awareness Program: The club will organize programs to create awareness about seasonal diseases and home remedies.

Plantation: Planting medicinal plants is a regular practice of the Nature Club, maintained in the college garden under the supervision of our Principal with the motto "Plant the trees, get the breeze."

Seasonal Ornamental Flower Bed: Student members of the Nature Club will plant seasonal flower seedlings in the college garden according to winter and rainy seasons, acquainting them with common flowering plants.

Newsletter: The Nature Club will also publish a bi-annual newsletter, "NATURE," which covers topics related to conservation and recent researches.

We request your support and approval for the formation of the "Nature Club" in our college. We believe that this initiative will significantly contribute to our students' overall growth and understanding of environmental issues.

Thank you for considering our proposal. We look forward to a positive response and the opportunity to create a more environmentally conscious college community.

Yours sincerely,
Rajiv Roy

Alpita Babot Singh Ban

Nature Club in the College



Department of Computer Science & Engineering

INDIAN INSTITUTE OF TECHNOLOGY DELHI

Hauz Khas, New Delhi – 110 016 INDIA

Email Id: riju@cse.iitd.ac.in

Tel No. 91-11-26597385

Rijurekha Sen
Assistant Professor

Date: 15.03.2023

Subject: Air Pollution Sensor Deployment Request

To,
The Principal,
Jaipuria College,
Kolkata

Dear Madam/Sir,

A group of researchers from Indian Institute of Technology, Delhi (IIT-D), is conducting a one year pollution monitoring study in Kolkata, in collaboration with St. Xaviers College. We are supported by the West Bengal Pollution Control Board. The project is funded by Environmental Defence Fund (EDF), using which low cost PM 2.5 and PM 10 units have been built in IIT Delhi. One such sensing unit, equipped with 4G SIM card for data transmission to the cloud, needs to be deployed in the premises of your esteemed institution.

Our energetic field staff Sagnik Mallik, Souvik Paul, Urmimala Paul and Swatilekha Ghosh will visit your premises to install a sensor. The height of the sensor from the ground should be 20-30 feet. It should also get good circulation of air, through a window or a grill or a veranda, so that the measured PM 2.5 and PM 10 values reflect the ambient air pollution. Each unit needs a power supply, and will draw current in the order of a mobile phone charging. Additional installation hardware, like extension chord or ropes/rods will be supplied by the field staff.

We will run a pilot study Mar-Apr 2023, to check issues with power, 4G connectivity etc. The main deployment will be Sep 2023 – Feb 2024, covering Durgapuja, Diwali, and winter season. Between Apr-Sep, the unit will be taken away from your premise and kept safely in St. Xaviers college by the field staff. All analysis reports from the collected pollution data will be shared, once the study is completed.

Around 30 institutions have agreed to be part of this deployment. The names of these institutions will be part of all reports and social media posts. We are incredibly grateful for allowing us to install a sensor in your premise, and giving us the necessary support for power supply.

Thanking you,
Yours sincerely,

Rijurekha Sen
Rijurekha Sen

सहायक प्रोफेसर/Assistant Professor
कम्प्यूटर विज्ञान और इंजीनियरिंग विभाग
Dept. of Comp. Sci. & Engineering
भारतीय प्रौद्योगिकी संस्थान दिल्ली / IIT Delhi
हौज खास, नई दिल्ली / Hauz Khas, New Delhi - 110016

Deployment of Air Pollution Monitoring Sensor in the Campus



Awareness Posters



Ramp



Fire Extinguisher



Awareness Poster

Table 7: 3.5 Carbon Foot Print Analysis

Sl. No.	Parameter	
1	Total no. of vehicles used by the stakeholders (per day)	10
2	No. of Cycles used.	
3	No. of two wheelers used	4
3a	Average distance travelled (per day)	10 km for each
3b	Quantity of Fuel Used (per day)	0.5 litre for each
4	No. of four wheelers used	6
4a	Average distance travelled (per day)	10 km for each
4b	Quantity of Fuel Used (per day)	0.5 litre for each
5	No. of persons using public transportation	200
6	No. of persons using college conveyance	-
7	No. of generators used per day	1 according to necessity
7a	Amount of fuel used	
8	No. of LPG cylinders used in canteens	2
9	No. of LPG cylinders used in labs	2
10	Reams of paper used	1500 sheets/day
11	Paperless works to reduce paper usage	E communication preferred
12	Use of any other fossil fuels in the college	No
13	Any efforts to reduce the use of fuels	Yes

The total CO₂ emmission in a year from electricity consumption of the college is equivalent to 10102.422 Kg CO₂.

4. Suggestions and Recommendations

4.1 Water Management

- Installation of Rain Water Harvesting is very essential to ensure water conservation. The roof top area can be used to harness rain water especially in monsoon season which can be used for daily routine work or ground water recharging after careful monitoring.
- Monitoring of water consumption will be required for ensuring water efficiency. Water meter to be installed to monitor the consumption. The water meter readings to be recorded every day or every week at a fixed time.
- It is recommended to check water quality from water source for dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, and conductivity, total dissolved solids and E-coli/ coliform.
- The wash basin taps may be equipped with water saving fixtures.
- The flush tanks of the toilets may be fitted with dual volume system.
- Awareness campaigns and signboards need to be displayed on every floor.

4.2 Energy Management

- The energy audit recommend to avoid the use of more energy consuming electrical appliances and to replace with more environment friendly and energy efficient appliances (for example five stars rated Air conditioner, star rated fans) in the college.
- Ceiling fans have a very good scope for reducing power consumed using a technology called Brushless DC Motor or simply BLDC motor. BLDC technology, in general, has been in the market for a couple of decades. The traditional fan uses an induction motor and typically consumes 70- 90 watts. But BLDC fan, on the other hand, can reduce power consumption up to 65%.
- Prominent advantages of BLDC motor over induction motor are Lower Electricity Consumption, Longer backup on Inverters (even on Solar), improved reliability, Noise reduction, longer lifetime.
- The Hostel and Staff Quarter may use solar heating units to reduce electricity consumption.

- College may adopt sensor-based (occupancy sensors) energy conservation approach for offices, classrooms and washrooms as well.
- College may also replace existing tube lights with LEDs.
- To increase the carbon offset, it is recommended to extend the Solar PV for not just college building but also for hostel and staff quarters.
- Awareness campaigns to be organized and signboards need to be displayed on every floor.

4.3 Waste Management

- College must introduce color coded separate waste bin for efficient segregation and disposal of waste.
- Workshops need to be conducted regarding stages of waste management and 3R scheme.
- College may undertake feasibility study to install sewage water treatment in the campus to recycle waste water and use it in flush or for gardening purpose.
- Leaf litter from the campus can be effectively used for aerobic/ vermi composting, so that the composted material can also be used as good manure.
- Laboratory waste may be managed efficiently to reduce any scope of contamination.
- Try to completely ban the use of plastic in the campus, and to encourage the use of biodegradable materials as alternatives. Try to achieve the goal of plastic free campus.
- Annual agreement with recyclers/ vendors for all kind of scraps and e waste needs to be followed up.
- Awareness signboards/ posters need to be displayed on every floor.

4.4 Green Campus

- Maintenance of biodiversity is needed.
- Review periodically the list of trees planted in the garden, allot numbers to the trees and keep records.
- Nature Club may assign scientific and common name tags on the plants to spread awareness among students.

- College may consider planting tree on the land, away from city, managed by college to offset the carbon footprint.
- Emphasis may be given to develop kitchen garden and roof top garden giving emphasis on indoor and Bonsai plants.
- Students may be encouraged to engage in preparing People's Biodiversity Register (PBR) in and around the campus.
- Environment friendly lifestyles to be encouraged among students, teachers and non teaching staffs.

