

Green Audit Report  
of  
VIVEKANANDA COLLEGE

**2021-2022**

269, Diamond Harbour Road, Thakurpukur,  
Kolkata - 700063, West Bengal.



Prepared By,

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## Executive Summary

Rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the green campus for the institute which will lead for sustainable development. **Vivekananda College** is deeply concerned and unconditionally believes that there is an urgent need to address these fundamental problems and reverse the trends. Being a premier institution of higher studies, the college has initiated 'The Green Campus' programme few years back that actively promote various projects for environment protection and sustainability.

Purpose of this audit is to ensure that the practices followed in the campus are in accordance with the green policy adopted by the college, it works on several facets of Green Campus including water conservation, electricity conservation, tree plantation, waste management, paperless work, mapping of biodiversity etc. With this in mind, specific objectives of the audit is to evaluate adequacy of the management control framework of environment sustainability as well as the degree to which the departments are in compliance with the applicable regulations, policies and standards. It can make a tremendous impact on students' health and learning, college operational costs and the environment. The criteria methods and recommendations used in the audit were based on the identified risks.

## CHAPTER - 1

### INTRODUCTION

#### **1.1 Green Audit**

Environmental or Green Audit is a systematic, documented, periodic and objective review by regulated entities of facility operations and practices adopted to meet the environmental requirements (EPA, 2003). In other words, it is a management tool, comprising of systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of helping to safeguard the environment by facilitating management control of practices and assessing compliance with Institutional policies, which would include regulatory requirements and standards applicable.

Environmental auditing is essentially an environmental management tool for re assuring the effects of certain activities on the environment against set criteria or standards. Depending on the types of standards and the focus of the audit, there are different types of environmental audit. Organizations of all kinds now recognize the importance of environmental matters and accept that their environmental performance will be scrutinized by a wide range of interested parties.

Considering the present environmental problems of pollution and excessive use of natural resources, Honourable Prime Minister, Shri. Narendra Modi has declared the Mission of Swachh Bharat Abhiyan. Also, University Grants Commission has mentioned the "Green Campus, Clean Campus" mission mandatory for all higher educational institutes. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

## **1.2 Why Green Audit**

- To ensure that the performance of the institution with respect to environmental activities is in compliance with existing laws and regulations.
- To check the functionality and their operating success including water supply, energy related matters and other similar matters that are related to green operations in the campus
- To formulate or update the institution's environmental policy, if warranted.
- To measure the environmental impact of operational process related to green activities in the campus.
- To measure the performance of each green related operations and actions in the campus.
- To generate a data base of green activities for continuous monitoring to assess the success of each of them.
- To identify future potential liabilities.
- To align the institution's developmental and day to day activities with the stated vision, mission, strategies.
- To identify possible ways to reduce expenditure and running costs on equipment, appliances etc. or try to enhance revenue income.

### **1.3 Goals of Green Audit**

**College has conducted a green audit with specific goals as:**

- Assess facility of different types of waste management.
- Increase environmental awareness throughout campus.
- Identification and documentation of green practices followed by university.
- Identify strengths and weaknesses in green practices.
- Conduct a survey to know the ground reality about green practices.
- Analyse and suggest solutions for problems identified from the survey.
- Identify and assess environmental risk.
  
- The long-term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issues.
  
- To motivate staff for optimized sustainable use of available resources.

### **1.3 Objective of Green Audit**

The general objective of green audit is to prepare a baseline report on biodiversity and other resources, measures to mitigate resource wastage and improve resource quality and sustainable practices. The specific objectives are:

- To prepare a checklist of flora and fauna diversity in and around the college campus.
- To suggest measures to improve biodiversity with in the college campus.
- To monitor the energy consumption pattern of the college.
- To assess the quantity of water usage within the college campus.
  
- To suggest sustainable energy usage and water conservation practices.
  
- To find out various sources of organic and solid waste generation and mitigation possibilities.
  
- To inculcate values of sustainable development practices through green audit mechanism.

## **1.5 About Criteria VII of NAAC**

National Assessment and Accreditation Council (NAAC) is a self-governing organization that rated the institutions according to the scores assigned at the time of accreditation of the institution. Green Audit has become a mandatory procedure for educational institutes under Criterion VII of NAAC. The intention of the green audits is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring, etc. for making the institution eco-friendlier.

Students are the major strength of any academic institution. Practicing green action in any educational institution will inculcate the good habit in students of caring for natural resources. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, no vehicle day, no plastic, Rainwater harvesting, etc. will make the students good citizens of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of global warming through Carbon Foot print reduction measures.

## **1.6 Benefit of Green Audit to an Educational Institute**

There are many advantages of green audit to an Educational Institute.

- It would help to protect the environment in and around the campus.
- Recognize the cost-saving methods through waste minimization and energy conservation.
- Empower the organization to frame a better environmental performance.
- It portrays a good image of the institution through its clean and green campus.
- More efficient resource management.
- To create a green campus.

- To enable waste management through reduction of waste generation, solid and liquid.
- To create plastic-free campus and evolve health consciousness among the Stake holder.
- Recognize the cost-saving methods through waste minimizing and managing.
- 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.
- Bench marking for environmental protection initiatives.
- Financial savings through a reduction in re source use.
- Development of ownership, personal and social responsibility for the University and its environment.
- 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 University.
- Finally, it will help to build a positive impression through green initiatives for the upcoming NAAC visit.

### **1.7 Introduction of Auditing Firm**

<b>Name of Firm</b>	M/s. Sonar Bharat Environment & Ecology (P) Ltd.
<b>Address</b>	35, C. R. Avenue, 3 <sup>rd</sup> floor, Kolkata - 700012.
<b>Contact Details</b>	033-40031179/033-22113034

### **Details of Team Member**

<b>Sr. No.</b>	<b>Name</b>	<b>Designation/ Technical</b>	<b>Technical Experience /Qualification</b>
<b>1</b>	Shri Parimal Sarkar	Legal Expert	<ul style="list-style-type: none"><li>➤ M.Sc. in Disaster Management</li><li>➤ Post Graduate Diploma in Environmental Law from National Law School, Bangalore</li><li>➤ Lead Auditor in ISO 14000 (Environmental Management)</li></ul>
<b>2</b>	Shri Subrata De Sarkar	General Manager	<ul style="list-style-type: none"><li>➤ General Manager in Central Public Sector undertaking.</li><li>➤ 12 years' experience in Environmental Auditing</li><li>➤ Lead Auditor in ISO 50001:2011</li></ul>

### **Audit Team**

<b>S N</b>	<b>Name</b>	<b>Designation/Qualification</b>	<b>Experience</b>
1	Shri Suvra Majumdar	<ul style="list-style-type: none"><li>➤ Post Graduate Diploma in Energy Management (MBA)</li><li>➤ B.Tech (Electrical Engineering)</li></ul>	<ul style="list-style-type: none"><li>➤ 15 years' experience of Energy audit</li></ul>
2	Shri Gautam Ghosh	<ul style="list-style-type: none"><li>➤ Diploma in Mechanical &amp; Electrical Engineering from Calcutta Technical School</li></ul>	<ul style="list-style-type: none"><li>➤ 27 Years' experience of working in electrical engineering department in different industries.</li><li>➤ 12 years' experience in independent electrical auditing</li></ul>
3	Shri Suman Chattaraj	Environmental Specialist	<ul style="list-style-type: none"><li>➤ M.Tech in Environmental Science</li><li>➤ 20 years 'experience in Environmental Impact Studies and Auditing</li></ul>

### **1.8 List of Instruments Energy Audit**

**Following are the instrument used at the time of the Energy Audit.**

<b>Sr.</b>	<b>Instrument</b>	<b>Make/ Sr.No.</b>
1	Digital LUX Meter	HTC/2222600
2	Digital Micro OHM Meter	Innova/I-259
3	Digital Multi Meter	KusamMeco/162180630
4	Digital Clamp meter	Waco/1910149152
5	Meger	Waco/307421
6	Load analyser	Waco/2954563

### **1.9 List of Laboratory Instruments for Environmental Monitoring**

<b>Sl. No.</b>	<b>Name of Equipment</b>	<b>Make</b>	<b>Model</b>
1	GAS CHROMATOGRAPH WITH FID, TSD.	VARIAN	CP3800
2	GAS CHROMATOGRAPH MASS SPECTROMETER WITH ECD	VARIAN	CP 3800 SATURN 2200
3	GAS CHROMA TOGRAPH WITH FID for Air	DANI	Master GC
4	ION CHROMATOGRAPH	Thermo Fisher Scientific	DIONEXICS 1100
5	H.P.L.C.	VARIAN	SERIES 200
6	FTIR	Thermo Fisher Scientific	Nicolet IS10
7	ATOMIC ABSORPTION SPECTRROPHOTOMETER	VARIAN	AA 2406TA 120
8	MERCURY ANALYSER	EC	MAS 5840
9	FLAME PHOTOMETER	LOWERENCE & MAYO	381
10	SPECTRO PHOTOMETER	VARIAN	CARY 50
11	BOD INCUBATOR	MULTISPAN	DIGITAL
12	ELECTRONIC MICRO BALANCE	Citizen	CMSF

### **1.10 List of Field Equipment in Environment Department**

Sl. No.	Name of Equipment	Make	Model
1	Field Dust Sampler	Envirotech/LataEnvirotech	APM – 550, PM 2.5 & 10
2	Respirable Dust Sampler	Envirotech/LataEnvirotech	APM-460BL
3	Stack Kit Sampler	Envirotech/LataEnvirotech	APM-620, PM-602
4	Sound Level Meter (AUTOMEDTIC)	Envirotech	SLM-101
5	Sound Level Meter	Lutron	SLM-4001
6	Local Air Quality Sampler	Vayubodhan	APM-414
7	Auto Metric Weather Monitor	Spectrum Technology	WM-272
8	Depth Sampler	NA	NA

### **1.11 General steps involved in Green Audit**

- a) Systematic and exhaustive data collection.
- b) Evidence based documentation of activities.
- c) Regular monitoring.
  
- d) Provide standards and methods for improvement by establishing cost effective green action plan.

## **CHAPTER – 2**

### **VIVEKANANDA COLLEGE**

#### **2.1 About the College**

**Vivekananda College** is a state government-aided public college, affiliated to the University of Calcutta, located in Southwest Kolkata, close to the Thakurpukur metro station. The college offers both post-graduate and under-graduate courses in a number of subjects of science, arts and commerce. Founded in 1950 as Barisha College it was established under the dispersal scheme of the state government to reduce the pressure of students from the then East Pakistan, now Bangladesh.

In 2013-14, it was ranked 1 in the ranking of India Today's Nielsen survey as the best science college in Kolkata. The college is affiliated to Calcutta University, under UGC and accredited by NAAC.

#### **2.2 Location of the College**

Vivekananda College is situated in the 269, Diamond Harbour Road, Thakurpukur, Kolkata – 700063 of the West Bengal. The nearest railway station is New Garia Railway Station, Nearest Bus stand is Thakurpukur Bus Stand, also Nearest Metro Station is Thakurpukur Metro Station, and Nearest Airport is DUM DUM Airport.

#### **2.3 Vision of the College:**

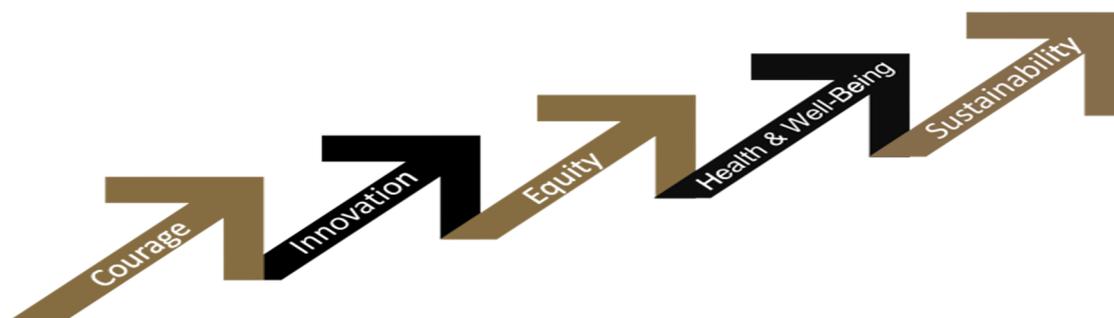
Learning is a pleasure. Learning is a right. So our vision is right to education in a joyful way. To inspire and encourage the students in a joyful learning, our motto is to create an environment that will be conducive to learning and innovation. The vision of this institution is to provide proper infrastructure and to create best opportunities to facilitate the students to carry on their higher studies. Besides creating career oriented comprehensive education system, college wants to provide an ambience that will motivate our dear students to understand the

mysteries of existence, to discover scientific truths and to realize the philosophy of this wonderful universe. Through ideal system of teaching and regular interactions, they will learn social and moral values, and thus, believe we, they will remain indebted for ever to this institution in particular and to the society in general.

Education for all irrespective of caste, creed, religion, gender and economic status and also developing future minds with the knowledge and skills to lead and innovate.

Vision:

- Courage.
- Innovation.
- Equity.
- Health & Well-Being.
- Sustainability.



#### **2.4 Mission of the College:**

The Objective of the College, advancement of learning, strongly manifests the spirit of Education for Empowerment. Accordingly, Vivekananda College ever since its inception has empowered thousands of young people, particularly those displaced from the erstwhile East Pakistan and also those belonging to the backward communities of the area. The college, in fact, enjoys now the rare distinction of catering to the educational needs of a composite section of young learners belonging to both the urban middle class of the southern suburbs of Kolkata and the rural poor of South Bengal to holding high our inner motive force 'Tomoso ma jyotirgamoy' i.e. 'from darkness, lead us to the light'.

## **2.5 Aims & Objective:**

- To examine the current practices related to the energy and natural resource (including land use) use within the campus.
- To identify and analyse significant environmental issues.
- To identify any areas for improvement to make the campus more eco-friendly
- To establish and implement environmental management in different department and spread awareness among teachers and students.

## **2.6 Campus Infrascture:**

**Vivekananda College** is a ragging free, Green campus with pollution, smoke and plastic free environment. It has a very good and systematic building infrastructure. All the classrooms are spacious, well ventilated and comfortable. **Vivekananda College** campus is itself a combination of all standards and amenities required as far as great educational infrastructure is concerned. The existing facilities are continuously upgrading and improving.

In the College following facilities are available:

- The college is well equipped with almost all the modern state of the art infrastructure to provide the students with scopes for learning.
- The institute is situated on 6.17 acre land with 50 well illuminated and well ventilated class rooms, 28 laboratories, one central library with around 45000 books along with several departmental libraries.
- The classrooms are spread over 5 building blocks, all of which are equipped with LAN/Wi-Fi facilities. 28% of all the class rooms are having ICT facilities with internet connectivity (LAN/Wi-Fi).
- All the departmental seminar rooms in science departments are connected through LAN and Arts departments are having LAN connectivity in some common strategic locations accessible to the teachers and students.

- In addition to the ICT equipped classrooms, there are 3 ICT equipped seminar halls, where regularly different lecture are arranged. The students and staff members of the college can use internet facilities and other computer aided activities in a dedicated compute centre with 35 terminals with internet connectivity.
- There is a computer centre established in the college run by third party under DOECC affiliation.

Infrastructure Units	No./Capacity
Total Number of classroom	50
Number of Laboratories	28
Number of smart classrooms	02
Number of seminar halls with ICT facilities	03
Solar panel & capacity	Installed (7 KW capacity)
Rainwater harvesting facility	Installed (33 KL capacity)
Gardens	5 Maintained 800 sqm.
Playgrounds	One (3840 sqm)
Canteen	One
Water body	One (3000 sqm)
Parking lot	Two

## **CHAPTER - 3**

### **Green audit Methodology**

#### **3.1 Utility of Green Auditing**

Green audit is used to improve existing anthropogenic activities, with the object to reduce the adverse effects of these activities upon environment. An environmental auditor will study an organization's efforts to conserve the environment in a systematic and documented manner and will produce an environmental audit report.

#### **3.2 Objectives of the Study**

The basic objective of green audit is to promote environment management and conservation in the college campus. Purpose of the audit is to identify, quantify, describe and prioritize the framework of environmental sustainability in compliance with the applicable regulations, policies and standards. Major objectives of carrying out green audit are:

- To introduce an awareness among the students regarding real concerns of environment and its sustainability.
- To secure the environment and cut down the threats posed to human health by analysing the pattern and extent of resource use on the campus.
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost.
- To bring out a present status report on environmental compliance.

### **3.3 Methodology**

In order to perform green audit, methodology included different techniques such as physical inspection of the campuses, observation and review of the documentation, interviewing key persons and data analysis, measurement of the present status of environment management in the campuses:

- Water quality assessment, consumption and management
- Air quality assessment and management
- Electricity consumption and management
- Sound pollution monitoring
- Waste management
- Bio diversity status of the campus
- Land use and land coverage
- Rain water Harvesting
- Use of alternate energy sources.

## **CHAPTER - 4**

### **LAND USE ANALYSIS of VIVEKANANDA COLLEGE**

#### **4.1 General overview of the concept of land use:**

Land use refers to man's activities and the various uses which are carried on and derived from land. Viewing the earth from space, it is now very crucial in man's activities on natural resource. In situations of rapid changes in land use, observations of the Earth from space give the information of human activities and utilization of the landscape.

#### **4.2 Methodology adopted for land use mapping :**

Three types of data that are GPS points, field survey data and Google earth data for Geo-referencing have been used in this study. Land use map of the study area have been prepared using field survey

### **CLASSIFICATION SCHEME FOR LAND USE ANALYSIS OF BUILT UP AREA**

<b>Level-I</b>	<b>Level-II</b>
1. Built- up land area	1.1 Dense 1.2 Moderate 1.3 Sparse

Therefore, attempt has been made in this study to map land use for **Vivekananda College** with a view to detect the land consumption in the built-up land area.

## LAND USE DATA OF VIVEKANANDA COLLEGE

Type of land use	Description	Area* (m <sup>2</sup> )
<b>Built up area</b>	Administrative block (incl. old PG building)	980 m <sup>2</sup>
	Science & Arts& Commerce block	2100 m <sup>2</sup>
	Jibanananda Bhawan	170 m <sup>2</sup>
	P.G. Building	330 m <sup>2</sup>
	Art Gallery	75 m <sup>2</sup>
	Canteen building	180 m <sup>2</sup>
	Staff Quarter	600 m <sup>2</sup>
<b>Built up Open space</b>	Parking lot / Open air theatre / walking path etc.	2100 m <sup>2</sup>
<b>Open area where percolation of water is possible</b>	Parks and Gardens	800 m <sup>2</sup>
	Play ground	3840 m <sup>2</sup>
	Greeneries & open scrubs etc.	11460 m <sup>2</sup>
<b>Wetland</b>	Pond	3000 m <sup>2</sup>

\* The measurement is done digitally and is having an error margin of around 2.6%

### **FINDINGS:**

**Vivekananda College**, which was established in the year 1950, has an eco-friendly environment. It has a long legacy of healthy environmental practices including periodic plantation, their preservation and maintenance. The campus to be green the ratio between built up spaces and open ground with water percolation capacity and vegetation is critical. Below the ratio in percentage

Sl. No.	Components	Ratio (%)	Comment
1.	Built up area to total area	25.49%	Low
2.	Building to total area	17.3%	Low
3.	Total open space to Total area	82.7%	High
4.	Area with recharge potential	74.51%	High
5.	Percolation surface area	62.81%	High
6.	Direct Recharge Zone (Wetland)	11.7%	Excellent

## CHAPTER – 5

### WATER QUALITY ASSESSMENT CONSUMPTION & MANAGEMENT

#### Water Quality Analysis Test Report

#### Test Report

DOC NO : QLS/SAMP/08-D/00

<b>Name &amp; Address Of the Customer :</b>  M/s. Vivekananda College 269, Diamond Harbour Road, Thakurpukur, Kolkata-700063	Report No.	: QLS/MR/W/22-23/C/873
	Date	: 14.11.2022
	Sample No.	: QLS/MR/W/22-23/873
	Sample Description	: Drinking Water
	Sample Location	: Near Canteen
	Sample Drawn On	: 05.11.2022
	Date of Performance	: 07.11.2022-12.11.2022

#### Analysis Result

##### (A) Microbiological Analysis

Sl. No.	Characteristic	Limit as per Drinking Water Standard : IS:10500, 2012Amd. 2	Test Method	Result
1.	Total Coliform Bacteria/100ml	Not Detectable	IS 15185-2016	Not Detected
2.	E.coli/100ml	Not Detectable	IS 15185: 2016	Not Detected

##### (B) Chemical Analysis

Sl. No.	Test Parameter	Test Method	As per Drinking Water Standard : IS:10500, 2012Amd. 1 & 2		Result
			Desirable Limit	Permissible Limit	
1.	pH Value at 25°C	IS 3025 (Part 11)- 1984 RA: 2019	6.5-8.5	No Relaxation	6.82
2.	Turbidity in NTU	IS 3025 (Part 10)- 1984 RA: 2017	1	5	<1.0
3.	Total Dissolved Solids (TDS) in mg/l	IS 3025(Part 16)- 1984 RA: 2017	500	2000	198
4.	Calcium(as Ca) in mg/l	IS 3025 (Part 40)- 1991 RA: 2019	75	200	25.3
5.	Chloride(as Cl) in mg/l	IS 3025 (Part 32)- 1984 RA: 2019	250	1000	68.3
6.	Iron (as Fe) in mg/l	IS 3025(Part 53)-1988 RA: 2019	1.0	No Relaxation	<0.14
7.	Magnesium(as Mg) in mg/l	APHA 24 <sup>th</sup> Edition 2023, 3500 Mg	30	100	10.7
8.	Nitrate (as NO <sub>3</sub> ) in mg/l	IS 3025 (Part 34)-1988 RA: 2019	45	No Relaxation	<0.5
9.	Free Residual Chlorine in mg/l	IS 3025 (Part 26): 1986(RA 2021)	0.2	1.0	<0.1
10.	Sulphate (as SO <sub>4</sub> ) in mg/l	IS 3025 (Part 24)-1986, RA: 2022	200	400	12.4
11.	Alkalinity (as CaCO <sub>3</sub> ) in mg/l	IS 3025 (Part 23)- 1986, RA: 2019	200	600	121.8
12.	Total Arsenic(as As) in mg/l	IS 3025 (Part 37):1988,RA 2019	0.01	No Relaxation	<0.01
13.	Total Hardness (as CaCO <sub>3</sub> ) in mg/l	IS 3025 (Part 21)-1983, 2019	200	600	107.09



**Fig. 1 : Drinking water sample collection**



**Fig. 2 : Drinking water storage tank**

## TEST REPORT

<b>Name &amp; Address Of the Customer :</b>  M/s. Vivekananda College 269, Diamond Harbour Road, Thakurpukur, Kolkata-700063	Report No.	: QLS/MR/W/22-23/C/874
	Date	: 14.11.2022
	Sample No.	: QLS/MR/W/22-23/874
	Sample Description	: Waste Water
	Sample Location	: Near Canteen Outlet
	Sample Drawn On	: 05.11.2022
Date of Performance	: 07.11.2022-12.11.2022	

### Analysis Result

Sl. No.	Parameter	TEST METHOD	Result	Limit as per CPCB for discharge of effluents	
				Inland Surface Water	Public Sewers
1	pH at 25°C	APHA 24 <sup>th</sup> Edition-2023, 4500 H+	7.81	5.5 to 9.0	5.5 to 9.0
2	Total Suspended Solid in mg/l	APHA 24 <sup>th</sup> Edition-2023, 2540 D	74	100	600
3	Chemical Oxygen Demand (as COD) mg/l	APHA 24 <sup>th</sup> Edition-2023, 5220B	269	250	---
4	Biochemical Oxygen Demand (as BOD) mg/l	IS 3025 (Part 44)-1993, RA:2019	68	30	350
5	Oil & Grease in mg/l	APHA 24 <sup>th</sup> Edition-2023, 5520A	6.3	10	20



**Fig. 3 : Waste water sample collection**

## CHAPTER – 6

### AMBIENT AIR QUALITY assessment and management

## Air Quality Test Report

DOC NO : QLS/SAMP/08-A/00

### TEST REPORT

<b>Name &amp; Address Of the Customer :</b>  M/s. Vivekananda College 269, Diamond Harbour Road, Thakurpukur, Kolkata-700063	Report No.	: QLS/MR/A/22-23/C/1231
	Date	:13.11.2022
	Sample No.	: QLS/MR/A/22-23/1231
	Sample Description	: Ambient Air
	Sample Mark	: Near Main Gate
	Report No.	: QLS/MR/A/22-23/C/1231

### Analysis Result

Location : Near Main Gate		Date of sampling : 04.11.2022-05.11.2022		
Sampling Done by: B.Mondal/ C.Sahoo		Sampling done as per : CPCB Guidelines (Volume-1)		
Environmental Condition: Clear & Sunny		Average Temperature : 28°C		
Barometric Pressure : 752 mm of Hg		Average Humidity : 25%		
Sl. No.	Pollutants	Result	Limit as per CPCB	Method of Test Reference
1	Particulate matter (<10µm) in µg/m <sup>3</sup>	61	100	IS: 5182 (Part-23), RA-2017
2	Particulate matter (<2.5µm) in µg/m <sup>3</sup>	29	60	USEPA CFR-40,Part-50, Appendix-L
3	Sulphur dioxide (SO <sub>2</sub> ) in µg/m <sup>3</sup>	6.7	80	IS: 5182 (Part-2)-2001, RA-2017
4	Nitrogen dioxide (NO <sub>2</sub> ) in µg/m <sup>3</sup>	24.2	80	IS: 5182 (Part- 6)-2006, RA-2017
5	Carbon Monoxide (CO) in µg/m <sup>3</sup>	690	2000	IS: 5182 (Part-10):1999,RA-2014
<b>NOTE:</b> Limit as per CPCB notification, New Delhi, 18 <sup>th</sup> November 2009, for Ambient air quality.				



**Fig. 4 : Ambient Air sample collection Near Main Gate**

## TEST REPORT

<b>Name &amp; Address Of the Customer :</b>  M/s. Vivekananda College 269, Diamond Harbour Road, Thakurpukur, Kolkata-700063	Report No.	: QLS/MR/A/22-23/C/1232
	Date	:13.11.2022
	Sample No.	: QLS/MR/A/22-23/1232
	Sample Description	: Ambient Air
	Sample Mark	: Near Play Ground

## Analysis Result

Location : Near Central Library			Date of sampling : 04.11.2022-05.11.2022	
Sampling Done by: B.Mondal/ C.Sahoo			Sampling done as per : CPCB Guidelines (Volume-1)	
Environmental Condition: Clear & Sunny			Average Temperature : 28°C	
Barometric Pressure : 752 mm of Hg			Average Humidity : 25%	
Sl. No.	Pollutants	Result	Limit as per CPCB	Method of Test Reference
1	Particulate matter (<10µm) in µg/m <sup>3</sup>	119	100	IS: 5182 (Part-23), RA-2017
2	Particulate matter (<2.5µm) in µg/m <sup>3</sup>	61	60	USEPA CFR-40,Part-50, Appendix-L
3	Sulphur dioxide (SO <sub>2</sub> ) in µg/m <sup>3</sup>	7.1	80	IS: 5182 (Part-2)-2001, RA-2017
4	Nitrogen dioxide (NO <sub>2</sub> ) in µg/m <sup>3</sup>	25.0	80	IS: 5182 (Part- 6)-2006, RA-2017
5	Carbon Monoxide (CO) in µg/m <sup>3</sup>	782	2000	IS: 5182 (Part-10):1999,RA-2014
<b>NOTE:</b> Limit as per CPCB notification, New Delhi, 18 <sup>th</sup> November 2009, for Ambient air quality.				



**Fig. 5 : Ambient Air sample collection near Play Ground**

## CHAPTER – 7

### NOISE MONITORING

#### Ambient Noise Monitoring Status

DOC NO : QLS/SAMP/08-C/00

### TEST REPORT

<b>Name &amp; Address Of the Customer :</b> M/s. Vivekananda College 269, Diamond Harbour Road, Thakurpukur, Kolkata-700063.	<b>Report No.</b> : QLS/MR/A/22-23/C/1233 <b>Date</b> : 13.11.2022 <b>Sample No.</b> : QLS/MR/A/22-23/1233 <b>Sample Description</b> : Ambient Noise <b>Sample Performance</b> : 04.11.2022-05.11.2022
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Sampling Done By: B. Mondal

Sampling Guideline : As per IS: 9876: 1981 (RA-2001)

Sample No.	Date of Monitoring	Location	Leq dB (A) Day Time	Leq dB (A) Night Time
1233	01.11.2022 & 02.11.2022	Near Main Gate	61.9	53.6

Code/ Category	Leq dB (A)Day Time	Leq dB (A)Night Time	<b>NOTE:</b> Day Time : 06.00 Hr. – 22.00 Hr. Night Time : 22.00 Hr. – 06.00 Hr.
A/Industrial	75	70	
B/Commercial	65	55	
C/Residential	55	45	
D/Ecological Sensitive	50	40	



**Fig. 6 : Noise Level Monitoring**

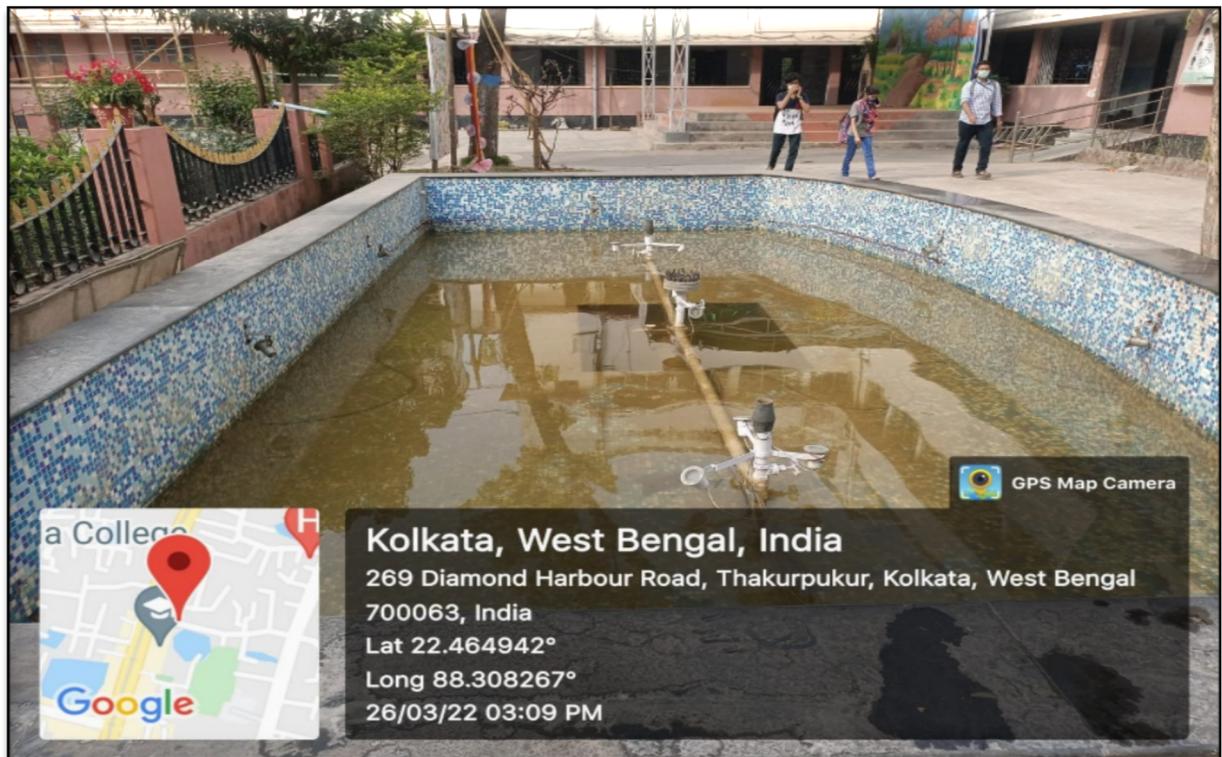
## CHAPTER - 8

# Rain water Harvesting System

The campus is having an installed rainwater harvesting capacity. The rooftop of Arts and Commerce block is connected to a common conduit collector. The water collected from the rooftop is directed towards an underground storage tank with 33.102 kilo litre or 8745 US Gallons capacity. The water is used in watering of garden and parking lot washing.

This system is actually utilising around 40 to 45% of the rainwater harvesting catchment available for the college

Water leakages are continuously checked to prevent wastage of water by the employee.



**Fig. 7 : Rain water Harvesting Plant**



**Fig. 8 : Water recharging point**

## CHAPTER – 9

### ENERGY AUDIT

#### ELECTRICITY CONSUMPTION (IN UNIT) AND MANAGEMENT

##### 9.1 General Details:

<b>Sl.No.</b>	<b>PARTICULARS</b>	<b>DETAILS</b>	
1	Name & Address of College	Vivekananda College 269, Diamond Harbour, Thakurpukur, Kolkata-63	
	Web Site	<a href="http://www.vckolkata63.org/">http://www.vckolkata63.org/</a>	
2	Name of Contact Officer	Dr. Tapan Kumar Poddar	
	Designation	Principal	
	Name of Alternative Officer	Dr. Rajarshi Mitra	
	Designation	Assistant Professor (Department of Environmental Science)	
3	Telephone No.	9903025356	
	Mobile No.		
	Fax No.	vivekanandacollege63@gmail.com	
	e-mail ID		
	No. of shift		
No. of Employees (Permanent & Casual)	113		
4	Electricity Consumption	Imported (Purchased) 3670.50	
5	Specific Energy Consumption	Fuel	Electricity
		Rs.8,100/- (monthly)	Rs. 9,60,750/- (Per year) approx..
6	LPG	Rs.800/(Monthly) approx.	
7	EPI	5.47	

## 9.2 Electrical Details

### a) Transformers

	<b>No. 1</b>
Voltage Ratio	N/A
KVA	N/A
% Impedence	N/A

### b) Electricity Consumption

	<b>Particulars</b>	<b>Demand</b>
A	Contract demand KVA	210
B	Maximum demand	210
C	Total Energy units consumed / month	2336.5 approx.
D	Avg. Power Factor (P.F.)	0.99
E	Avg. Energy bills (Rs/month)	Rs.80,062/-

### c) Detailed list of Electric Motors operating in the college

<b>S.NO.</b>	<b>NAME OF THE PLANT</b>	<b>RATING OF MOTOR (KW)</b>	<b>NO. OF MOTORS</b>
1	Vivekananda College, Thakurpukur, Kolkata-63	3.2 KW	2 nos.

d) **Connected Load**

	<b>EQUIPMENT</b>	<b>TOTAL NUMBERS</b>	<b>LOAD IN KW (TOTAL)</b>
A	Motors : Greater than 10kW	2 Nos.	3.2 KW
	: Less than 10 kW	-	-
B	AC & Ventilation with TR capacity		
a)	Others (Package ACs/ Split ACs / Windows ACs), with TR	<b>Room AC of Split/Window type –</b> 152.25 KW	
C	Total Process Load (in kW)	155.45 KW	
D	Total Lighting Load (in kW) & Luminaries details	<b>No's of lighting luminaries</b> (LED+T/L+ (including fan ) Tube Light, Led Light, Metal etc.= 5.4 KW Electric Fan - 15.59 KW Exhaust Fan - 39.00 KW	
	<b>Total Load (in KW)</b>	<b>215.44 KW</b>	

### **9.3 Use of Alternate Energy**

The college has an installed capacity of 7 KW solar power generations. The solar power system is supposed to be connected with the grid power. Hence some of the conventional electricity consumption is reduced by the installed capacity. However, following the devastating cyclonic storm (Amphan), the whole system is damaged and due to college closure it has not been restored so far.

There are two diesel generator (DG) sets installed within the college premises to provide the departments particularly the office and laboratories with emergency supports in case of grid failure.

For reducing carbon emission, and dependence on fossil fuel, the institution has resorted to using green energy by harnessing solar power. In order to increase generation of solar energy, installation of solar panels in the open space around the building was being considered. This helps in reducing Carbon emission.

#### ***1. Energy conservation :***

Best practice of our college is use of **solar energy** to produce electricity. Actually solar energy system converts the sun's energy into another form of energy, like electricity. Although, we have installed fewer panels to reach a desired power target. This plan was to reduce the cost of electric bills. 5 years back, we have installed these solar panels and hope it will last for another 20 years. This energy source is now very essential for our college; as it is a renewable source of energy. Moreover, it is environment friendly.

We have replaced with **LED bulbs** all the previously installed filament lights scattered around the college campus. As these bulbs use more than 75% less energy than the early installed bulbs. LED stands for light emitting diode. 85% of the energy in LEDs is converted into light and only 5% is wasted as heat. However, the inner workings of LED bulbs are quite a bit different from

other standard bulbs of the market. It is now the most efficient lights on the market. Replacing the other standard bulbs like CFL in our college campus we found energy efficient light which has lessened our consumed electricity bills. Show the lesson we have learnt by using this LED bulbs that it produce bright light while using very little electricity consumption. Moreover, LED has thermal management capacity and has configuration to manage heats. LED bulb emits light in a specific direction. Actually, we found LED produce light up to 90% more efficiently than the earlier installed CFL bulbs.

## ***2. Use of renewable energy :***

Renewable energy is **useful energy that is collected from renewable resources**, which are naturally replenished on a human timescale, including carbon neutral sources like sunlight, wind, rain, tides, waves, and geothermal heat energy. Sunlight is one of our planets most abundant and freely available energy resources. By using photovoltaic cells to capture and convert the sun's rays into electricity, solar panels transform light into usable energy. College has set up solar plant to light up the college campus and the area in front of the college building.



**Fig. 8 : Solar Power System for Green Energy**

## **CHAPTER - 10**

### **Waste Management**

The present Prime Minister of India Sri Narendra Modi launched 'Swachh Bharat Abhiyan' (Clean India Mission) on 2nd October, 2014. In this mission, the proper use of dust/waste bins is one of the major priorities. To implement this mission, collective mass effort is necessary. For proper segregation and management proper use of waste bins is the only solution for waste management purpose in the college campuses.

The functioning of the college exerts negligible stress on waste management. This has been achieved owing to the consciousness programmes arranged periodically for the students and staff. These programmes have highlighted the influence of anthropogenic activities on the environment. Moreover, a number of practices have been initiated to reduce the generation of wastes.

#### **10.1 Solid Waste**

Biodegradable wastes products originate from college canteen are store in small pit for composting which are later used as compost fertilizer in garden plant. Soft weeds and waste from canteen are sometimes disposed in a digesting chamber for use in vermicomposting.



**Fig. 8 : Solid Waste dustbin**

Non degradable solid wastes are produced through routine activities includes paper, plastics, glass, metals and packaging materials etc. The wastes are collected and segregated properly at each level and source. The care taker of the college has the responsibility of overseeing the timely collection of waste at each floor.

The sweepers collect the solid waste, segregate it and gather it in separate dustbins based on the recyclability and biodegradability. Cleanliness drives organized by also NSS units regularly. The institution discourages plastic use in the campus.

### **10.2 Liquid Waste**

The source of wastewater is Domestic Waste Water i.e., Sewage water. The Sewage water mainly comes from laboratory of different departments, toilets of college, hostel, kitchen and canteen. Those waters are used for gardening purpose.

### **10.3 E-Waste**

Substantial quantity of e waste is generated due to extensive use of computer.

All members particularly students have been advised not to throw used pendrive etc. any where, but to keep in designated bins. Waste thus collected is stored in secured place.

E-Waste is accumulated in a separate room, stock of such waste as on date is quite substantial.

## **CHAPTER – 11**

### **ENVIRONMENT AUDIT**

#### **Biodiversity Status of the College Campus**

##### **11.1 Introduction**

**Vivekananda College** campus is very rich in the term of biodiversity. To conserve this biodiversity, our first need is to learn about the existing diversity of the place. Unless we know whom to conserve, we will not be able to plan proper conservation initiatives. Also it is important to have an understanding of the biodiversity of an area so that the local people can be aware of the richness of biodiversity of the place they are living in and their responsibility to maintain that richness.

##### **11.2 Objective**

The main objective of this study is to get a baseline data of bio-diversity of the area which will include:

1. Documentation of the floral diversity of the area: its trees, herbs, shrubs, climbers and aquatic vegetation.
2. Documentation of the major faunal groups like mammals, reptiles, amphibians, birds and among the insects, butterflies and dragonflies.
3. Documentation of the specific interdependence of floral and faunal life.

### Transportation of the College

Transport system of **Vivekananda College** is well connected. It is situated at a distance of 2 km. from Thakurpukur Metro Station. New Garia Railway station is near by 13 km from the College. Nearest Air Port is Dum Dum Airport, it is situated at a distance of about 32 km from the College.

### Location Map



**Fig. 13 : Location Map**

### 11.3 Method of Study

Brief methodology for the floral and faunal survey is given below:

- a) Sampling was done mostly in random manner.
- b) Surveys were conducted for the maximum possible hours in day time.
- c) Tree species were documented through physical verification on foot and photographed each species as much as possible.
- d) The total area was surveyed by walking at day time.
- e) For faunal species we emphasized mainly on the direct sighting. Also call of various birds and amphibians and nesting of some faunal species were considered as direct evidences.
- f) Observing mammals depend critically on the size of the species and its natural history. Diurnal species are common and highly visible. Nocturnal species, however, are rare and difficult to detect. Small mammals like the field rats were found near their burrows, particularly during their entry or exit times in or out from their burrows respectively. In some cases, deposits and footprints were also observed that served as a potential clue for the presence and absence of the concerned species. These secondary evidences were all noted with time and space co-ordinates.
- g) Birds are often brightly coloured, highly vocal at certain times of the year and relatively easy to see. Sampling was done on the basis of direct sighting, call determination and from the nests of some bird species
- h) Reptiles were found mostly by looking in potential shelter sites like crevices of building, logs, tree hollows and leaf litter and also among and underneath the hedges. Sometimes some species, particularly the garden lizards were also observed in open spaces (on twigs and branches and even on brick constructions) while they were basking under direct and bright sunlight.

### 11.4 Plant diversity in the College Campus

**Vivekananda College** premises having about 6.17 acre of land have unique plant diversities. These include some large trees, shrubs and herbs.

These plants are listed and depicted as following:

#### List of the Plants of College Campus

Sl. No.	Scientific Name	Common Name	Family	Comment
1.	<i>Abutilon indicum</i>	<i>Patari</i>	Malvaceae	Shrub
2.	<i>Acacia auriculiformis</i>	<i>Akashmani</i>	Mimosaceae	Tree
3.	<i>Achras zapota</i>	<i>Chiku</i>	Sapotaceae	Tree
4.	<i>Achyranthes aspera</i>	<i>Apang</i>	Amaranthaceae	Herb
5.	<i>Adhatodavastica</i>	<i>Basak</i>	Acanthaceae	Shrub
6.	<i>Aegle marmelos</i>	<i>Bel</i>	Rutaceae	Tree
7.	<i>Allamanda violacea</i>	<i>Harkakra</i>	Apocynaceae	Liana
8.	<i>Alocasia indica</i>	<i>Mankachu</i>	Araceae	Shrub
9.	<i>Alstoniascholaris</i>	<i>Chhatim</i>	Apocynaceae	Tree
10.	<i>Alternanthera philoxeroides</i>	<i>Barmasak</i>	Amaranthaceae	Herb
11.	<i>Amaranthus spinosus</i>	<i>Kantanote</i>	Amaranthaceae	Herb
12.	<i>Amaranthus viridis</i>	<i>Bon note</i>	Amaranthaceae	Herb
13.	<i>Andrographis paniculata</i>	<i>Kalmegh</i>	Acanthaceae	Herb
14.	<i>Annona reticulata</i>	<i>Nona</i>	Annonaceae	Tree
15.	<i>Anthocephalus cadamba</i>	<i>Kadam</i>	Rubiaceae	Tree
16.	<i>Areca catechu</i>	<i>Supari</i>	Arecaceae	Tree
17.	<i>Artocarpus heterophyllus</i>	<i>Kanthal</i>	Moraceae	Tree
18.	<i>Averrhoa carambola</i>	<i>Kamaranga</i>	Oxalidaceae	Tree
19.	<i>Azadirachta indica</i>	<i>Neem</i>	Meliaceae	Tree
20.	<i>Bacopa monnieri</i>	<i>Bramhi</i>	Scrophulariaceae	Herb
21.	<i>Bambusa sp.</i>	<i>Bans</i>	Poaceae	Herb
22.	<i>Barleria cristata</i>	<i>Jati</i>	Acanthaceae	Shrub
23.	<i>Bauhinia acuminata</i>	<i>Swetkanchan</i>	Caesalpiniaceae	Tree
24.	<i>Bauhinia purpurea</i>	<i>Raktakanchan</i>	Caesalpiniaceae	Tree
25.	<i>Bixa orellana</i>	<i>Latkan</i>	Bixaceae	Tree
26.	<i>Boerhavia diffusa</i>	<i>Punornova</i>	Nyctaginaceae	Herb
27.	<i>Borassus flabellifer</i>	<i>Tal</i>	Arecaceae	Tree
28.	<i>Broussonetia papyrifera</i>	Paper mulberry	Moraceae	Tree
29.	<i>Caesalpinia pulcherrima</i>	<i>Krishnachura</i>	Caesalpiniaceae	Tree
30.	<i>Calotropis procera</i>	<i>Akanda</i>	Asclepiadaceae	Shrub
31.	<i>Canna indica</i>	<i>Kalabati</i>	Cannaceae	Herb

Sl. No.	Scientific Name	Common Name	Family	Comment
32.	<i>Capsicum annuum</i>	Lanka	Solanaceae	Herb
33.	<i>Carica papaya</i>	Pepe	Caricaceae	Tree
34.	<i>Cassia sophera</i>	Kalkasunde	Caesalpiaceae	Shrub
35.	<i>Cassia tora</i>	Chakunda	Caesalpiaceae	Herb
36.	<i>Casuarina equisetifolia</i>	Jhau	Casuarinaceae	Tree
37.	<i>Centella asiatica</i>	Thankuni	Apiaceae	Herb
38.	<i>Cestrum nocturnum</i>	Hasnuhana	Solanaceae	Shrub
39.	<i>Chloris barbata</i>	Finger grass	Poaceae	Herb
40.	<i>Cleome rutidosperma</i>	Hurhuria	Capparidaceae	Shrub
41.	<i>Clerodendrum infortunatum</i>	Ghetu	Verbenaceae	Shrub
42.	<i>Clitorea ternatea</i>	Aparajita	Papilionaceae	Climber
43.	<i>Coccinia indica</i>	Telakucha	Cucurbitaceae	Climber
44.	<i>Cocos nucifera</i>	Narikel	Arecaceae	Tree
45.	<i>Colocasia esculenta</i>	Kachu	Araceae	Herb
46.	<i>Commelina benghalensis</i>	Kansira	Commelinaceae	Herb
47.	<i>Commelina diffusa</i>	Manaina	Commelinaceae	Herb
48.	<i>Cucurbita maxima</i>	Mistikumro	Cucurbitaceae	Climber
49.	<i>Cuscuta reflexa</i>	Swarnalata	Cuscutaceae	Parasitic hbrs
50.	<i>Cycas sp.</i>	Manirajphul	Cycadaceae	Tree
51.	<i>Cyperus kyllinga</i>	Gothubi	Cyperaceae	Herb
52.	<i>Dalbergia sissoo</i>	Sishu	Papilionaceae	Tree
53.	<i>Delonix regia</i>	Gulmohar	Caesalpiaceae	Tree
54.	<i>Dentella repens</i>	Sheem	Rubiaceae	Herb
55.	<i>Desmodium gangeticum</i>	Chalani	Papilionaceae	Herb
56.	<i>Eclipta alba</i>	Kesut	Asteraceae	Herb
57.	<i>Eichhornea crassipes</i>	Kachuripana	Pontederiaceae	Aq. herb
58.	<i>Eragrostis tenella</i>	Sursurighas	Poaceae	Herb
59.	<i>Erythrina indica</i>	Palte	Papilionaceae	Tree
60.	<i>Ficus benghalensis</i>	Bot	Moraceae	Tree
61.	<i>Ficus elastica</i>	Rubber tree	Moraceae	Tree
62.	<i>Ficus religiosa</i>	Aswathwa	Moraceae	Tree
63.	<i>Gliricidia sepium</i>	Saranga	Papilionaceae	Tree
64.	<i>Grewia asiatica</i>	Phalsa	Malvaceae	Tree
65.	<i>Hedychium coronarium</i>	Dolonchampa	Zingiberaceae	Shrub
66.	<i>Hibiscus mutabilis</i>	Sthalpadma	Malvaceae	Shrub
67.	<i>Hibiscus rosa-sinensis</i>	Jaba	Malvaceae	Shrub
68.	<i>Hygrophylla spinosa</i>	Kulekhara	Acanthaceae	Herb
69.	<i>Impatiens balsamea</i>	Dopati	Balsaminaceae	Herb
70.	<i>Ipomoea aquatica</i>	Kalmi	Convolvulaceae	Aq. herb
71.	<i>Jasminum sambac</i>	Belphul	Oleaceae	Shrub
72.	<i>Lagerstroemia flos-reginae</i>	Jarul	Lythraceae	Shrub
73.	<i>Lantana camara</i>	Chotra	Verbenaceae	Shrub

Sl. No.	Scientific Name	Common Name	Family	Comment
74.	<i>Lemna perpusilla</i>	<i>Khudepana</i>	Lemnaceae	Aq. herb
75.	<i>Leucaena leucocephala</i>	<i>Subabul</i>	Mimosaceae	Tree
76.	<i>Lippia geminata</i>	<i>Motmotia</i>	Verbenaceae	Shrub
77.	<i>Lycopersicon esculentum</i>	<i>Tomato</i>	Solanaceae	Herb
78.	<i>Malvaviscus arboreus</i>	<i>Lankajaba</i>	Malvaceae	Shrub
79.	<i>Mangifera indica</i>	<i>Aam</i>	Anacardiaceae	Tree
80.	<i>Melia azedarach</i>	<i>Mahaneem</i>	Meliaceae	Tree
81.	<i>Michelia champaca</i>	<i>Swarnachampa</i>	Magnoliaceae	Tree
82.	<i>Mikania scandens</i>	<i>Assam lata</i>	Asteraceae	Climber
83.	<i>Mimusops elengi</i>	<i>Bakul</i>	Sapotaceae	Tree
84.	<i>Mollugo spergula</i>	<i>Gimashak</i>	Molluginaceae	Herb
85.	<i>Momordica charantia</i>	<i>Uchche</i>	Cucurbitaceae	Climber
86.	<i>Murraya exotica</i>	<i>Kamini</i>	Rutaceae	Tree
87.	<i>Nerium odorum</i>	<i>Karabi</i>	Apocynaceae	Shrub
88.	<i>Nyctanthes arbor-tristis</i>	<i>Sieuli</i>	Oleaceae	Tree
89.	<i>Ocimum sanctum</i>	<i>Tulshi</i>	Lamiaceae	Herb
90.	<i>Oplismenus burmannii</i>	Basket grass	Poaceae	Herb
91.	<i>Oxalis corniculata</i>	<i>Amrul</i>	Oxalidaceae	Herb
92.	<i>Peltophorum pterocarpum</i>	<i>Radhachura</i>	Caesalpiniaceae	Tree
93.	<i>Peperomia pellucida</i>	<i>Luchipata</i>	Piperaceae	Herb
94.	<i>Phoenix sylvestris</i>	<i>Khejur</i>	Arecaceae	Tree
95.	<i>Pistia stratiotes</i>	<i>Topapana</i>	Araceae	Aq. herb
96.	<i>Pluchea indica</i>	<i>Kukranda</i>	Asteraceae	Shrub
97.	<i>Polyalthia longifolia</i>	<i>Debdaru</i>	Anonaceae	Tree
98.	<i>Polygonum hydropiper</i>	<i>Panimorich</i>	Polygonaceae	Tree
99.	<i>Psidium guajava</i>	<i>Payara</i>	Myrtaceae	Tree
100.	<i>Pteris sp.</i>	Brake fern	Pteridaceae	Fern
101.	<i>Rosa centifolia</i>	<i>Golap</i>	Rosaceae	Shrub
102.	<i>Roystonea regia</i>	Bottle palm	Arecaceae	Tree
103.	<i>Ruellia tuberosa</i>	<i>Potpoti</i>	Acanthaceae	Herb
104.	<i>Sagittaria sagittifolia</i>	Chhotokut	Alismataceae	Aq. herb
105.	<i>Samanea saman</i>	<i>Khirish</i>	Mimosaceae	Tree
106.	<i>Schenoplectus articulatus</i>	<i>Chirchiraghas</i>	Cyperaceae	Herb
107.	<i>Sida rhombifolia</i>	<i>Berela</i>	Malvaceae	Herb
108.	<i>Solanum melongena</i>	<i>Begun</i>	Solanaceae	Shrub
109.	<i>Solanum nigrum</i>	<i>Kukmachi</i>	Solanaceae	Herb
110.	<i>Spirodela polyrhiza</i>	<i>Tip pana</i>	Lemnaceae	Aq. herb
111.	<i>Swietenia macrophylla</i>	<i>Boromehogani</i>	Meliaceae	Tree
112.	<i>Swietenia mahagoni</i>	<i>Mahagoni</i>	Meliaceae	Tree
113.	<i>Syzygium aquem</i>	<i>Golapjam</i>	Myrtaceae	Tree
114.	<i>Syzygium cumini</i>	<i>Kaloram</i>	Myrtaceae	Tree
115.	<i>Syzygium samarangense</i>	<i>Jamrul</i>	Myrtaceae	Tree

Sl. No.	Scientific Name	Common Name	Family	Comment
116.	<i>Tabernaemontana divaricata</i>	<i>Tagar</i>	Apocynaceae	Shrub
117.	<i>Tagetes patula</i>	<i>Ganda</i>	Asteraceae	Shrub
118.	<i>Tamarindus indicus</i>	<i>Tetul</i>	Mimosaceae	Tree
119.	<i>Tectona grandis</i>	<i>Segun</i>	Verbenaceae	Tree
120.	<i>Thevetia nerifolia</i>	<i>Kolke</i>	Apocynaceae	Tree
121.	<i>Typha angustata</i>	<i>Hogla</i>	Typhaceae	Herb
122.	<i>Urena lobata</i>	<i>Bon okra</i>	Malvaceae	Shrub
123.	<i>Urtica dioica</i>	<i>Bichuti</i>	Urticaceae	Herb
124.	<i>Vinca rosea</i>	<i>Nayantara</i>	Apocynaceae	Herb
125.	<i>Ziziphus jujuba</i>	<i>Kul</i>	Rhamnaceae	Tree
126.	<i>Ziziphus nummularia</i>	<i>Ban kul</i>	Rhamnaceae	Tree



**Fig. 14 : Major plants in the campus area**

The List of Butterflies:

Sl. No.	Common Name	Scientific Name	Family
1.	Blue Tiger	<i>Tirumala limniace</i> [Cramer]	<i>Nymphalidae</i>
2.	Brown King Crow	<i>Euploea klugii</i> [Moore]	<i>Nymphalidae</i>
3.	Chocolate Grass Yellow	<i>Eurema sari sodalist</i> [Linnaeus]	<i>Pieridae</i>
4.	Commander	<i>Moduza procris</i> [Cramer]	<i>Nymphalidae</i>
5.	Common Albatross	<i>Appias albina</i> [Linnaeus]	<i>Pieridae</i>
6.	Common Bush Brown	<i>Mycalesis perseus</i> [Fabricius]	<i>Nymphalidae</i>
7.	Common Castor	<i>Ariadne merione</i> [Cramer]	<i>Nymphalidae</i>
8.	Common Crow	<i>Euploea core</i> [Cramer]	<i>Nymphalidae</i>
9.	Common Emigrant	<i>Catopsilia pomona</i> [Fabricius]	<i>Pieridae</i>
10.	Common Evening Brown	<i>Melanitis leda</i> [Linnaeus]	<i>Nymphalidae</i>
11.	Common Five Ring	<i>Ypthima baldus</i> [Fabricius]	<i>Nymphalidae</i>
12.	Common Four Ring	<i>Ypthima huebneri</i> [Kirby]	<i>Nymphalidae</i>
13.	Common Grass Yellow	<i>Eurema hecabe</i> [Linnaeus]	<i>Pieridae</i>
14.	Common Gull	<i>Cepora nerissa</i> [Fabricius]	<i>Pieridae</i>
15.	Common Indian Palmfly	<i>Elymnias hypermnestra</i> [Linnaeus]	<i>Nymphalidae</i>
16.	Common Jay	<i>Graphium doson</i> [C. & R. Felder]	<i>Papilionidae</i>
17.	Common Jezebel	<i>Delias eucharis</i> [Drury]	<i>Pieridae</i>
18.	Common Mime	<i>Papilio clytia</i> [Linnaeus]	<i>Papilionidae</i>
19.	Common Mormon	<i>Papilio polytes</i> [Linnaeus]	<i>Papilionidae</i>
20.	Common Pierrot	<i>Castalius rosimon</i> [Fabricius]	<i>Lycaenidae</i>
21.	Common Rose	<i>Pachliopta aristolochiae</i> [Fabricius]	<i>Papilionidae</i>
22.	Common Three Ring	<i>Ypthimanareda</i> [Kollar]	<i>Nymphalidae</i>
23.	Dark Band Bushbrown	<i>Mycalesis mineus</i> [Linnaeus]	<i>Nymphalidae</i>
24.	Dark Glassy Tiger	<i>Parantica agleoides</i> [C. & R. Felder]	<i>Nymphalidae</i>
25.	Dark Grass Blue	<i>Zizeeria karsandra</i> [Moore]	<i>Lycaenidae</i>
26.	Forget – me – not	<i>Catochrysops strabo</i> [Fabricius]	<i>Lycaenidae</i>
27.	Gram Blue	<i>Euchrysops cnejus</i> [Fabricius]	<i>Lycaenidae</i>
28.	Grey Pansy	<i>Junonia atlites</i> [Linnaeus]	<i>Nymphalidae</i>
29.	Large Three Ring	<i>Ypthimanareda</i> [Kollar]	<i>Nymphalidae</i>
30.	Lime Butterfly	<i>Papilio demoleus</i> [Linnaeus]	<i>Papilionidae</i>
31.	Mottled Emigrant	<i>Catopsilia pyranthe</i> [Linnaeus]	<i>Pieridae</i>
32.	Peacock Pansy	<i>Junonia almanac</i> [Linnaeus]	<i>Nymphalidae</i>
33.	Plain Tiger	<i>Danaus chrysippus</i> [Linnaeus]	<i>Nymphalidae</i>
34.	Pysche	<i>Leptosia nina</i> [Fabricius]	<i>Pieridae</i>
35.	Silver Forget – me – not	<i>Catochrysops panormus</i> [C.&R. Felder]	<i>Lycaenidae</i>
36.	Striped Albatross	<i>Appias libythea</i> [Fabricius]	<i>Pieridae</i>

Sl. No.	Common Name	Scientific Name	Family
37.	Striped Tiger	<i>Danaus genutia</i> [Cramer]	<i>Nymphalidae</i>
38.	Tailed Jay	<i>Graphium agamemnon</i> [Linnaeus]	<i>Papilionidae</i>
39.	Tawny Coster	<i>Acraea violae</i> [Fabricius]	<i>Nymphalidae</i>
40.	Three Spot Grass Yellow	<i>Eurema blanda</i> [Linnaeus]	<i>Pieridae</i>
41.	Tiny Grass Yellow	<i>Eurema smilax</i> [Linnaeus]	<i>Pieridae</i>



**Fig. 15 : Some common butterflies in the campus area**

*The List of Birds :*

<b>Sl. No.</b>	<b>Common Names</b>	<b>Vernacular Name</b>
1.	Fulvous-breasted Woodpecker	<i>Lal buk Kaththokra</i>
2.	Black-rumped Flameback	<i>Sonali dana Kath Thokra</i>
3.	Blue-throated Barbet	<i>Nil kanthibasantabouri</i>
4.	Coppersmith Barbet	<i>Basanta Bouri</i>
5.	Common Hoopoe	<i>Mohanchura</i>
6.	Common Kingfisher	<i>Chhoto Machhranga</i>
7.	Stork-billed Kingfisher	***
8.	White-throated Kingfisher	<i>Machhranga</i>
9.	Common Hawk Cuckoo	***
10.	Asian Koel	<i>Kokil</i>
11.	Greater Coucal	<i>Kubo</i>
12.	Alexandrine Parakeet	***
13.	Rose-ring Parakeet	<i>Tia</i>
14.	Asian Palm Swift	***
15.	House Swift	***
16.	Rock Pigeon	<i>Payera</i>
17.	Spotted Dove	<i>Chhit Ghughu</i>
18.	Spotted Owlet	<i>Pancha</i>
19.	Yellow-footed Green Pigeon	<i>Harial</i>
20.	Bronzed Winged Jacana	<i>Jal Pipi</i>
21.	Black Kite	<i>Chil</i>
22.	Shikra	***
23.	Little Cormorant	<i>Pandubi</i>
24.	Indian Cormorant	<i>Pan kaouri</i>
25.	Little Egret	<i>Bak</i>
26.	Cattle Egret	<i>Go Bak</i>
27.	Indian Pond Heron	<i>Koch bak</i>
28.	Black-crowned Night Heron	***
29.	Asian Openbill	<i>Samukkhhol</i>

Sl. No.	Common Names	Vernacular Name
30.	Brown Shrike	<i>Chasmapakhi</i>
31.	Long-tailed Shrike	***
32.	Rufous Treepie	<i>Hari chachha</i>
33.	House Crow	<i>Pati Kak</i>
34.	Large-billed Crow	<i>Dar Kak</i>
35.	Ashy Wood Swallow	***
36.	Black Hooded Oriole	<i>Bene bou</i>
37.	Black Drongo	<i>Finge</i>
38.	Red-throated Flycatcher	***
39.	Oriental Magpie Robin	<i>Doyel</i>
40.	Asian Pied Starling	<i>Goshalikh</i>
41.	Common Myna	<i>Shalikh</i>
42.	Jungle Myna	<i>Jhunti Shalikh</i>
43.	Red-whiskered Bulbul	<i>Sipahi Bulbul</i>
44.	Red Vented Bulbul	<i>Bulbuli</i>
45.	Plain Prinia	***
46.	Zitting Cisticola	***
47.	Common Tailorbird	<i>Tuntuni</i>
48.	Greenish Warbler	***
49.	Blyth's Reed Warbler	***
50.	Jungle Babbler	<i>Chhatare</i>
51.	Purple-rumped Sunbird	<i>Moutushi</i>
52.	Purple Sunbird	<i>Moutushi</i>
53.	House Sparrow	<i>Charai</i>
54.	White Wagtail	<i>Sada Khanjana</i>
55.	White-browed Wagtail	***
56.	Citrine Wagtail	***
57.	Yellow Wagtail	<i>Khanjana</i>
58.	Grey Wagtail	***
59.	Paddy-field Pipit	***
60.	White-breasted Waterhen	<i>Pal murgi</i>



**Fig. 16 : Some common Birds in the campus area**

*The List of Dragonflies:*

Sl. No.	Common Name	Scientific Name	Family
1.	Common Clubtail	<i>Ictinogomphus rapax</i>	Gomphidae [Clubtails]
2.	Blue-tailed Green Darner	<i>Anax guttatus</i>	Aeshnidae [Darners]
3.	Trumpet Tail	<i>Acisoma panorpoides</i>	LIBELLULIDAE [Skimmers]
4.	Scarlet Marsh Hawk	<i>Aethriamanta brevipennis</i>	
5.	Rufous-backed Marsh Hawk	<i>Brachydiplax chalybea</i>	
6.	Little Blue Marsh Hawk	<i>Brachydiplax sobrina</i>	
7.	Ditch Jewel	<i>Brachythemis contaminata</i>	
8.	Granite Ghost	<i>Bradinyopyga geminata</i>	
9.	Ruddy Marsh Skimmer	<i>Crocothemis servilia</i>	
10.	Ground Skimmer	<i>Diplacodes trivialis</i>	
11.	Fulvous Forest Skimmer	<i>Neurothemis fulvia</i>	

12.	Pied Paddy Skimmer	<i>Neurothemis tullia</i>	
13.	Green Marsh Hawk	<i>Orthetrum sabina</i>	
14.	Wandering Glider	<i>Pantala flavescens</i>	
15.	Rufous Marsh Glider	<i>Rhodothemis rufa</i>	
16.	Common Picture Wing	<i>Rhyothemis variegata</i>	
17.	Coral-tailed Cloud Wing	<i>Tholymis tillarga</i>	
18.	Red Marsh Trotter	<i>Tramea basilaris</i>	
19.	Black Marsh Trotter	<i>Tramea limbata</i>	
20.	Crimson Marsh Glider	<i>Trithemis aurora</i>	
21.	Greater Crimson Glider	<i>Urothemis signata</i>	
22.	Brown Dusk Hawk	<i>Zyxomma petiolatum</i>	
23.	Emerald-flanked Marsh Hawk	<i>Brachydiplax farinose</i>	



**Fig. 17 : Some common dragonflies in the campus area**

*The List of Damselflies :*

Sl. No.	Common Name	Scientific Name	Family
1.	Pigmy Dartlet	<i>Agriocnemis Pygmaea</i>	COENAGRIONIDAE [Marsh Darts]
2.	Pruinosed Dartlet	<i>Agriocnemis Femina</i>	
3.	Tiny Hooded Dartlet	<i>Agriocnemis sp.</i>	
4.	Orange-tailed Marsh Dart	<i>Ceriagrion Cerinorubellum</i>	
5.	Coromandel Marsh Dart	<i>Ceriagrion Coromandelianum</i>	
6.	Senegal Golden Dartlet	<i>Ischnura Senegalensis</i>	
7.	Black Marsh Dart	<i>Onychargia Atrocyana</i>	
8.	Saffron-faced Blue Dart	<i>Pseudagrion Rubriceps</i>	
9.	Pied Bush Dart	<i>Copera ciliata</i>	PLATYCNEMIDIDAE

**11.5 Checklist of Reptiles:**

Sl. No.	Common name	Scientific Name	Bengali Name
1	Chamaeleon	<i>Calotes versicolor</i>	Girgiti
2	Common House Gecko/Gekko, Lizard	<i>Hemidactylus Frenatus</i>	Tiktiki
3	Checkered Keelback	<i>Xenochrophis Piscator</i>	Joldhora
4	Buff Striped Keelback	<i>Amphiesma stolatum</i>	Hele
5	Rat Snake	<i>Zamenis Longissimus</i>	Darash
6	Skink	<i>Lampropholis sp.</i>	Anjani



**Fig. 18 : Some common Reptiles in the campus area**

### 11.6 Checklist of Mammals:

Sl. No.	Common name	Scientific name	Bengali name
1	Indian palm squirrel	Funambulus sp.	Kathberali
3	Insectivorous bat	Suborder Microchiroptera	Chamchike
4	House mouse	Mus musculus	Indur
5	Rat	Rattus norvegicus	Dhere indur
6	Cat	Felis catus	Biral



**Fig. 19 : Some common Mammals in the campus area**

### 11.7 Checklist of Ferns and Seasonal Flowers

Sl. No.	Local Name	Common Name	Scientific Name
1.	Fern	Fern	<i>Pteris spp.</i>
2.	Gulab	Rose	<i>Rosa sp.</i>
3.	9 o' clock plant	9 o' clock plant	<i>Portulaca grandiflora</i>
4.	Joba	Hibiscus	<i>Hibiscus rosa-sinensis</i>
5.	Marigold, Ganda	Marigold	<i>Tagetes erecta</i>
6.	Aparajita	Aparajita	<i>Clitoria ternatea</i>
7.	Maiden Pink, China pink	Maiden Pink	<i>Dianthus chinensis</i>
8.	Sandhyamani	Four o clock flower,	<i>Mirabilis Jalapa</i>
9.	Nayantara	Periwinkle	<i>Catharanthes roseus</i>
10.	Shiuli	Parijat	<i>Nyctanthes arbor-tristis</i>
11.	Sthalapadma	Confederate rose	<i>Hibiscus mutabilis</i>
12.	Tagar	Tagar	<i>Tabernaemontana divaricata</i>
13.	Madhabilata	Burma creeper	<i>Quisqualis indica</i>

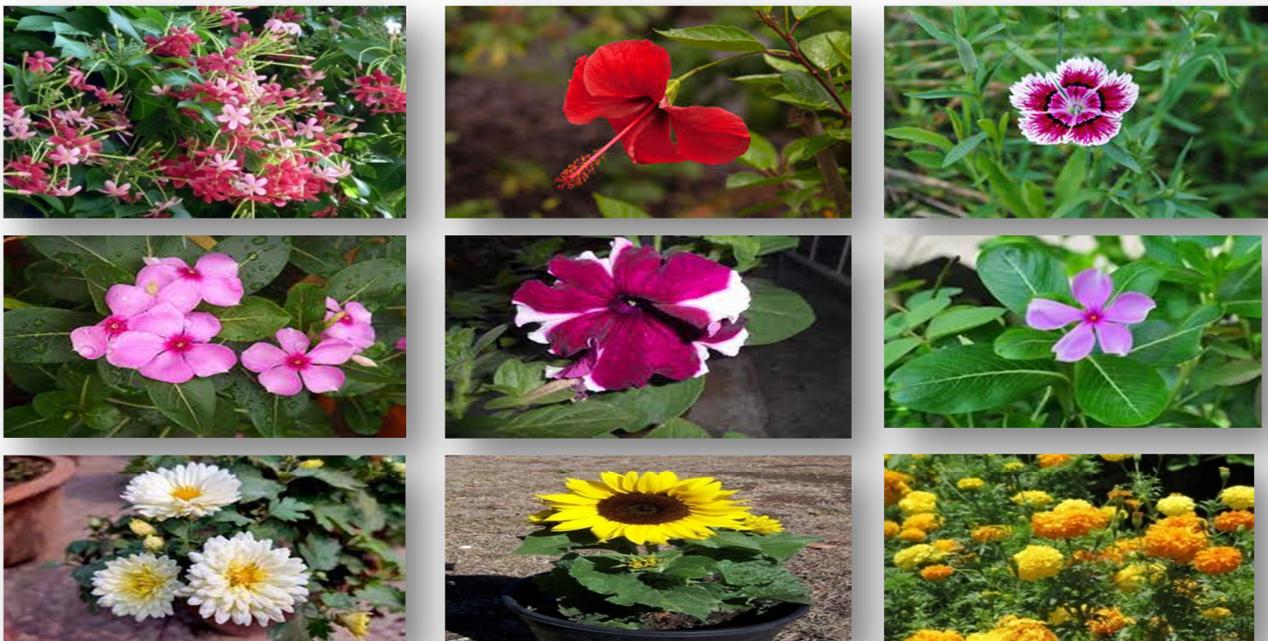


Fig. 20 : Flowering plants of the college premises

## **CHAPTER - 12**

### **GREEN INITIATIVES**

**Vivekananda College** aims to protect and conserve its biodiversity, fresh and clean ambiance through the following green initiatives to protect and conserve nature.

#### **12.1 Plantation Programme**

Plantation programme of **Vivekananda College** promotes environment management and conservation in the college campus with the following objectives:

- i) To motivate the students to keep their surroundings green and clean by undertaking plantation of trees.
- ii) Promote ethos of conservation of water by minimizing the use of water.
- iii) Motivate students to imbibe habits and life style for minimum waste generation, source separation of waste and disposing the waste to the nearest storage points.
- iv) To create awareness amongst public and sanitary workers, so as to stop the indiscriminate burning of waste which causes respiratory diseases.
- v) To minimize the use of plastic bags, not to throw them in public places as they choke drains and sewers, cause water logging and provide breeding ground for mosquitoes.
- vi) Organize tree plantation programmes, awareness programmes regarding various environmental issues like global warming and educate children about utility of plants.
- vii) Organize Nature Trail in Botanic Garden/Parks/Forest so as to know about the Bio-diversity.

The college has trees and plants that make the college campus green. The college campus has around 100 trees and many herbs including medicinal plants.

## **12.2 Green computing practice:**

Being an academic institution, papers are used for various purposes like exam answer sheets, circulars, notices, office work, document printing, and Xeroxing. Since the trees are cut for paper manufacturing, the sequestration of carbon is reduced increasing carbon footprint. To cut down the carbon footprint, the university administration and various departments follow paperless methods of communication by using emails, online forms submission, etc. The paperless work was helpful in reducing tons of CO<sub>2</sub>. Tons of biomass are saved by this green computing practice

## CHAPTER – 13

### Consolidation of Audit Findings

Green Audit will create a greater appreciation and under-standing of the impact of college activities on the environment. **Vivekananda College** has successfully been able to identify the impacts on the environment through the various auditing exercises. The green auditing exercise has brainstormed and provided insights on practical ways to reduce negative impact on the environment. Participating in this green auditing procedure has increased knowledge about the need of maintaining sustainability of the college campus. It will create awareness around the use of the Earth's resources in your home, college, local community and beyond. **Vivekananda College** should adopt an Environmentally Responsible Purchasing Policy and work towards creating and implementing a strategy to reduce the environmental impact through its purchasing decisions.

#### ***13.1 Preparation of Action Plan***

Management's policies referring to College and approach towards the use of resources need to be considered in purview of green audit report. An environmental policy should be formulated by the management of the college. The college should have a policy on green awareness raising or training programmes for students and staff, seminars on Environment Awareness are often organized by different departments of the institution, green awareness policy right from kitchen staff to procurement policy by the management. Based on the policies, college should have an action plan. The green auditing report will be a base line for the action plan to be evolved.

### **13.2 Follow up Action and Plans**

Green Audit is an exercise which generates considerable quantities of valuable environment and resource management information. The time and effort and cost involved in this exercise is often considerable and in order to be able to justify this expenditure, it is important to ensure that the findings and recommendations of the audit are considered at the correct level within the organization and action plans and implementation programmes will be conducted on the basis of the audit findings.

### **13.3 Environmental Education**

The following environmental education programmes may be implemented in the college before the next green auditing:-

Training programmes in solid waste management, liquid waste management setting up of biodiversity garden, tree management, medicinal plant nursery, vegetable cultivation, water management, energy management, landscape management, pollution mitigation methods, and water filtration methods.

- Give priority to environmental clubs and its programmes
- Set up model rainwater harvesting system, vegetable garden, medicinal plant garden, butterfly garden etc.
- Conduct exhibition on throw away plastic danger, recyclable products etc.
- Display various slogans and pictures to protect environment.
- Implement chemical treatment system for waste water from the laboratories and incinerators.

## CHAPTER - 14

### 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 utilizing economic, financial, social and environmental resources. Green audits can “add value” to the management approaches being taken by the college and is a way of identifying, evaluating and managing environmental risks (known and unknown). There is scope for further improvement, particularly in relation to waste, energy and water management. The college in recent years consider 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 activities and become a more sustainable institution.

#### 14.1 Suggestions

- a) Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact through its purchasing decisions.
- b) Increase recycling education on campus.
- c) Increase awareness of Environmentally Sustainable Development – Use every opportunity to raise public, government, industry, foundation, and college awareness by openly addressing the urgent need to move toward an environmentally sustainable future.
- d) Collaborate for Interdisciplinary Approaches – Convene college faculty and administrators with environmental practitioners to develop interdisciplinary approaches to curricula research initiatives, operations, and outreach activities that support an environmentally sustainable future.
- e) Increase reduce, reuse, and recycle practices in campus.

## **14.2 Recommendations:**

- a) Noise level monitoring shall be done as per the guideline of “Noise Pollution (Regulation and Control) Rules ‘2000’.
- b) The Biodiversity is to be maintained while considering the plantation in future.
- c) Fire safety audit is required.
- d) Declare the campus plastic free and implement it thoroughly.
- e) Regular check-ups and maintenance of pipes, overhead tanks, and plumbing systems should be done by the engineering section to reduce overflow, leakages, and corrossions.
- f) Exhaust Gas shall be monitored, analysed and check regularly.

### **Fire Extinguisher**

- More fire extinguishers should be placed on each floor.
- Calibration of fire extinguisher should be done before expiration.

### **Energy Consumption**

- Sensor light may be fixed in the toilets for conservation of energy.
- Replace incandescent and CFL lamps with LED Light
- Replace LCD computer monitors with LED monitors.
- Solar straight light can be installed in the open space around the building
- Cleaning of tube light/bulbs should be do neon a regular basis to remove dust.

## ACKNOWLEDGEMENT

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- (ii) Dr. Rajarshi Mitra – Assistant Professor,  
(Department of Environmental  
Science)

For all the assistance provided to the audit team of Sonar Bharat Environment & Ecology Pvt. Ltd.



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**Scope:** Consultancy Services on Safety Related Study, Audit Services for Energy, Green, Electrical & Safety and Providing Services Related to Obtaining Statutory Approvals

Division	: 70	Current issue date	: 14.10.2022
Class	: 70.22	Current expiry date	: 13.10.2025
Process(es) not applicable	: 8.3	1st Surveillance due	: 13.10.2023
Certificate number	: IND/QMS/NAB-C3313/3200	2nd Surveillance due	: 13.10.2024
Attachment(s)	: None		

  
H. Narasimhaiah  
Director

Certificate of compliance has an expiry period of 3 years from the current certification cycle start date but shall be considered as expired if the surveillance audit programme indicated in this certificate of compliance is not implemented to maintain confidence that the certified management system continues to fulfil requirements unless otherwise supported by a letter of continued compliance issued by the registered office of Integrated Quality Certification Pvt. Ltd. Certificate of compliance shall be updated in website/registry as suspended and/or withdrawn if the surveillance programme prior to the due date indicated above is not coordinated and implemented. Written information on any significant organizational changes with impact on the certificate of compliance shall be communicated to Integrated Quality Certification Pvt. Ltd prior to the planned audit schedule.

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