

Green Audit Report

2021-2022



VASANTA COLLEGE FOR WOMEN
(Admitted to the Privileges of Banaras Hindu University)
Krishnamurti Foundation India, Rajghat Fort,
VARANASI



Prepared by
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काशी हिन्दू
विश्वविद्यालय



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Certificate

This is to certify that “**Green Audit**” for **Vasanta College for Women, Rajghat Fort, Varanasi-221001** has been conducted in June 2022 to assess the environmental impact and green initiatives planning and efforts made to implement them in the college campus based on institutional working framework. The Green initiatives carried out by the Institution was found to be satisfactory. The efforts taken by the management and faculty towards sustainable environment on-campus is appreciable.

Place: Varanasi
Date: 30th, June, 2022


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Acknowledgement

Green Audit Assessment Team wishes to acknowledge the management of Vasanta College for Women for entrusting this important work on us. We appreciate the cooperation of the faculty and staff of the college for their help in data collection and information as and where required. Our special thanks to Prof. Alka Singh, Principal, Vasanta College for Women, for giving us necessary inputs to carry out the vital yet comprehensive exercise of green audit.

Profile of Audit Team Members

The external team for Green Audit consisted of

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Disclaimer:

Green Audit Team has prepared this report for Vasanta College for Women, Rajghat fort, Varanasi based on input data collected on site or submitted by the representatives of college complemented with the best judgment capacity of the expert team. While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered. It is further informed that the calculations are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from the use of any information, statements or projections in the report.

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Executive Summary

Educational institutions now-a-days are becoming more sensitive to environmental factors and more concepts are being introduced to make them eco-friendly. 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. The activities pursued by colleges can create a variety of adverse environmental impacts. The environmental assessment should be conducted in such a way that it provides, as specifically as possible, a baseline reference for future sustainability programming. Green audit is defined as an official examination of the effects a college has on the environment.

Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. Green auditing and the implementation of mitigation measures is a win-win situation for all the college, the learners and the planet. It can also create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of green impact on campus. Green auditing promotes financial savings through reduction of resource use. It gives an opportunity for the development of ownership, personal and social responsibility for the students and teachers. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus, it is imperative that the college evaluates its own contributions toward a sustainable future.

At Vasanta College for Women, the audit process involved initial interviews with administration to clarify policies, activities, records and the role of staff and students in the implementation of mitigation measures. Data collection onsite was through the questionnaire, review of records, observation of practices and observable outcomes.

The baseline data prepared for the Vasanta College for Women, shall prove to be a useful tool for campus greening, resource management, planning of future projects, and a document for ensuring sustainable development of the college. The data from the report will allow the college to compare its programmes and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects. It is expected that the college administration will be committed to implement the green audit recommendations made by the team through its report. This green audit report is submitted with the Vasanta College for Women authorities for its betterment in the years to come.

Best wishes

Prof. Kavita Shah
Institute of Environment and Sustainable Development
Banaras Hindu University – 221005.

1. Introduction

About the Vasanta College for Women

Vasanta College for Women is one of the oldest colleges of Varanasi, situated at Rajghat Fort, Varanasi. Established in 1913 by Dr. Annie Besant and is affiliated to Banaras Hindu University. The college is situated in heart of Varanasi with a campus area of 1,77,973.61 Sq. Ft. The college runs Undergraduate courses in 19 subjects and post-graduate courses in 11 subjects as well as Ph.D. programme under the aegis of Krishnamurti Foundation India. The college also offers Certificate/Diploma & Advance Diploma Courses under UGC Career Oriented Courses and BHU special Course of Studies. The college solemnizes the confluence of visionary ideals and objectives of Dr. Annie Besant, Shri Jiddu Krishnamurti and Bharat Ratan Pt. Madan Mohan Malviya. Maintaining its rich legacy for more than a hundred years, the college provides the opportunity to young women for quality higher education and aims to work for an inclusive society that promotes and protects dignity, equality, social justice and human rights for all. The college has been accredited “B” by NAAC in its second cycle of accreditation in 2015.

Campus map and layout

S. No.	Building Name	Basement (Sq.ft.)	G. Area (Sq.ft.)	F. Area (Sq.ft.)	F. Area (Sq.ft.)	S. Area (Sq.ft.)	F. Area (Sq.ft.)	T. Area (Sq.ft.)	F. Area (Sq.ft.)	Roof Area (Sq.ft.)
1.	New Building	-	5753	5753	5753	-	-	5753	-	5753
2.	Canteen	2600	2600	2600	-	-	-	-	-	-
3.	Library	-	3350	3350	3350	-	-	-	-	-
4.	Administrative Building	-	2724	2724	-	-	-	-	-	2724
5.	Home Science/ Psychology Building	-	3300	3300	-	-	-	-	-	3300

6.	Geography Building	-	4276	4276	-	-	4276
7	Conference Hall	-	631		-	-	-
8	Assembly Hall	1334	4481	4481	4481	-	4481
9	Staff Room	-	1443	1443	-	-	1443
10	Painting Dept.	-	3411	3411	-	-	3411
11	Play Ground	-	20231	-	-	-	-
Total area		3934	52200	31338	13584	0	25388
Total area covered		1,26,444 Sq. Ft.					



Figure 1. Satellite map showing location of Vasanta College for Women

General information about the college

A. General Information

Name of the institution	Vasanta College For Women
Address	Rajghat Fort, Varanasi-221002, U.P.
Contact Details	+91 542 2441187
Website	www.vasantakfi.ac.in
Location	Krishnamurti Foundation India, Rajghat Fort, Varanasi

B. Infrastructure

Built up area (including others)	52,200 Sq.Ft.
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Campus area	1,77,973.61 Sq.Ft.
Roof area	25388 Sq.Ft.
Open space (including greenery area)	1,25,773.61 Sq.Ft.
Build up area	52,200 Sq.Ft.
Greenery area	35,000 Sq.Ft.
No. of auditorium – AC/ Non-AC	One (Non-AC)
Library	01
Laboratories	-
Pharmacy	-
Playground	01
Student's Hostels	02
Canteen	01
Transport facilities	

C. Courses and Class duration

Class duration	09:00 AM to 04:00 PM
Courses	
Under Graduate (UG)	Hindi, Urdu, English, Sanskrit, Ancient Indian History Culture & Archaeology, Home Science, Philosophy, Geography, Music (Instrumental/Vocal), Painting, Economics, History, Political Science, Sociology, Psychology, French*, Commerce, Education (B.Ed.)
Post Graduate (PG)	Hindi, English, History, Geography, Economics, Psychology, Education (M.Ed.), Home Science, Political Science, AIHC & Archaeology, Sociology, Urdu*, Sanskrit*, Philosophy, Urdu, Sanskrit and Philosophy
Research (Ph.D.)	Hindi, English, Economics, Psychology
Certificate, Diploma & Advance Diploma (UGC Career Oriented Courses)	Travel and Tourism Management, Mass Communication
Diploma/Certificate courses under Special Course of Studies (BHU)	<ul style="list-style-type: none"> 2-Year (4-Semester) Diploma Course in Office Management & Business Communications (Part Time)

- Certificate Program in Health Care Management (6-month, 1 semester Part Time)
- Diploma in Microfinance and Entrepreneurship (One year 2-semester Part Time)
- 1-Year (2 Semester) PG Diploma in Gender & Women Studies

Part Time Diploma

French

Certificate Course (Online)
(Run by Edtech Company Young Skilled India (YSIID Solutions Pvt. Ltd., a govt. of India certified startup DIPP 1656) under NEAT, AICTE, Ministry of Education scheme)

(i) Management Certificate Course
(ii) Professional & Life Skills Certificate Courses

Total No. of working days

Six days a week

D. Human Resources

Total Staff	149
Total Student uptake 2022-23	Around 3000
Teacher: Student Ratio	01: 36
Girl Student: Boy Student Ratio	NA

2. NEED FOR GREEN AUDIT

As environment sustainability is becoming an increasingly important issue for the nation, the role of higher education institutions in environmental sustainability becomes more pertinent. Green Audit is a process of systematic identification, quantification, recording, reporting and determining whether institutional practices are eco-friendly and sustainable. It aims to analyze environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. Green audit is a useful ecological tool and official examination for a college to determine how and where they are in using the natural resources as energy or water, in view of which the college can consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for recycling project or to improve waste minimization. It allows the college to evaluate its own contributions towards a sustainable future.

The rapid urbanization and economic development at local, regional and global level have led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric carbon-di-oxide from the environment. In recent times, the Green Audit of an institution has become of paramount importance for self-assessment of the institution which reflects its role in mitigating the present environmental problems. Vasanta College for Women is committed to responsible stewardship of resources and to demonstrate leadership in sustainable academic practices. The college supports the climate neutrality goals as outlined by the Government of India and monitors the sustainability of the research and education mission through the Green Audit of its campus.

2.1. NAAC CRITERIA VII ENVIRONMENTAL CONSCIOUSNESS

The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory for Higher Education Institutions to have an annual Green Audit Report under Criterion VII of NAAC. Moreover, it is part of Corporate Social Responsibility of the Higher Education Institutions to ensure that they contribute towards the reduction of the global warming by taking measures to minimize their Carbon Footprint. Green Audit thus intends to upgrade the environmental condition inside and around the institution.

3. OBJECTIVES OF GREEN AUDIT

1. To assess the quality of water and soil in the college campus.
2. To quantify the solid and liquid waste generated on campus and its management.
3. To prepare a list of green practices adopted by the college and assess their performances on a yearly basis.
4. To provide a database for corrective actions and future development plans.
5. To identify the gaps and give plans/recommendations to improve the greenenvironment on campus.

4. AUDIT METHEDODOLOGY

The purpose of the green audit of VCM campus is to ensure following on campus.

The present Green Audit of the Institution comprises of the following stages:

I. Pre-Audit Stage:

Identification of target areas for green auditing was carried out.

II. Audit Stage:

Collection and collation of onsite data were made through:

1. Review of previous records and policies
2. Onsite physical inspection of the campus
3. Interaction with the stakeholders
4. Collection of data and observation
5. Focus Group Discussions

III. Post-Audit Stage:

Collected data were analysed, final report was prepared and recommendations to overcome the flaws and to keep a watch on the action plan were made.

4.1. MAJOR AREAS OF AUDIT REPORT

For Green Audit the following 5 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.

- (i) Water Audit and its Management
- (ii) Energy Audit and its Management
- (iii) Waste Audit and its Management
- (iv) Green Practices on Campus
- (v) Carbon Footprint

5. WATER AUDIT AND ITS MANAGEMENT

Water Audit can be defined as a qualitative and quantitative analysis of water consumption to identify the means of reducing, reusing and recycling water. Water auditing is conducted to evaluate the quality, availability and usage of water; the facilities available and methods adopted to revitalize and use it so that the resources are intact without leading to deterioration. As per the standards provided by Manual on Water supply and Treatment, Ministry of Urban Development, GoI, water requirement for higher educational institute is 45L per capita.

The major water source in the campus is ground water. The college has 2 borewell in the campus which are in working condition and are being used for water withdrawal. The daily water consumption for the entire campus including hostel premises when in full strength and operational is 110.27 KL per day. In the campus water is largely used for drinking, cooking, cleaning, irrigation and laboratory. The organization does not have any automatic leak detection system however, all the leakages are prevented by manual observation and through regular maintenance of pipelines. No leakage of water from pipes was observed by the auditing team.

Storage of water is in 8 overhead tanks, 1 with the capacity of 5 KL and rest others with 0.5 KL capacity each. Water from overhead tanks is then distributed to washrooms, basins, laboratory and water purifiers/ coolers installed in the college premise. Water coolers fitted with RO purifiers are provided in each building in the campus as a source of safe drinking water. A Third-party contractor is appointed by the college for their annual maintenance.

Wastewater Management:

- Wastewater is mainly generated from washings, toilet flushing, canteen kitchen and washroom on each floor of all the buildings.
- Currently, sanitary wastewater generated is sent to municipal sewer line.

Water Conservation Initiatives:

1. **Rain water harvesting:** Rain water harvesting is being practiced in the residential area of the college.
2. **Water dripping from the air conditioners:** The water dripping from air conditioners in the college is collected in buckets for watering garden plants inside the campus.
3. **Reuse of effluents of the Laboratories:** The water effluents from the Home Science laboratory is channelized through pipes and used for irrigation in garden area.



Figure: Effluent from home science lab is being channelized for irrigation purposes

4. No leakage of water from faucets and pipes were noticed by the audit team.

Note: Proper water consumption data was not provided, hence total water usage and average monthly water consumption could not be calculated.

6. ENERGY AUDIT AND ITS MANAGEMENT

According to Energy Conservation Act, 2001, Energy Audit is the verification, monitoring, and analysis of the use of energy including submission of a technical report containing recommendations for improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption. The energy audit is key to a systematic approach for decision making in the area of energy management. The areas of major consumption of electricity by an institution include:

	Quantity	Power consumption per unit
Lights	02	1000 W
	113	36 W
	214	40 W
	101	20 W
LED bulbs and tubes	133	09 W
CFL lights	34	23 W
	15	27 W
Fans (ceiling + standing)	123	50 W
	290	60 W
	36	100 W
	15	150 W
	04	60 W
Computers and laptops	177	85 W
Projectors	20	400 W
CCTV cameras	32	10 W
LCD panels as notice boards	-	-
Air conditioners	15	1.5 Ton, 3 Star
-No. and capacity		
Pumps	3	01 Pc. - 4000 W
-HP capacity		01 Pc. - 2000 W
		01 Pc. - 500 W
Refrigerator	5	1 pc - 100 W
-Capacity		1 pc - 250 W
		1 pc - 150 W
		1 pc - 500 W
		1 pc - 250 W

Campus lights	4	30 W
- Solar		
- Tube lights		
- -Other		
Aquaguard water filters and coolers:	9	500 W
Genset availability and capacity Diesel genset:	2	1 pc - 30 KVA 1 pc - 45 KVA
Fans (ceiling + standing)	02	1000 W
	113	36 W
	214	40 W
	101	20 W

Energy sources utilized by all the departments and services of college include electricity. The monthly and yearly average electricity consumption is 2113 KWH/month and 25356 KWH/year respectively. The major use of the energy is at administrative building, academic buildings, Library and canteen. In addition to this, there are two sound free diesel generator (DG sets) installed for meeting the energy requirements during power cuts. Conventional tube lights, LEDs, CFLs and fans are installed in classrooms, halls and library. For efficient energy consumption and saving on electric bill, the college has initiated the process of replacing incandescent bulbs and tube lights with LEDs.



Figure : DG sets for Electricity Backup

The LPG cylinder consumption is approximately 01-03 cylinder per day depending upon the no. of students (commercial connection). LPG cylinders are used mainly in canteen kitchen for cooking and home science laboratory. In campus premise the LPG cylinders are housed separately in a fenced storage shed outside the building for security perspective. 1 cylinder of 19 kg generates 881.6 MJ (Mega Joules) of energy.



Figure: LPG cylinders housed separately in a storage shed outside the main campus building for safety

Table: Energy Consumption pattern of the college for a month

Name of Electric Equipment	No.	Watt	Hours	Days	Total (Watt)	Total (Kwh)
Light	2	1000	5	25	250000	
	113	36	5	25	508500	
	214	40	5	25	1070000	
	101	20	5	25	252500	
				Total	2081000	2081
LED Bulbs and Tubes	133	9	5	25	149625	149.625
CFL Light	34	23	5	25	97750	
	15	27	5	25	50625	
				Total	148375	148.375
Fans (Celling + Standing)	123	50	5	25	768750	
	290	60	5	25	2175000	
	36	100	5	25	450000	
	15	150	5	25	281250	
	4	60	5	25	30000	
				Total	3705000	3705

Computers and Laptop	160	85	7	25	2380000	
	17	85	7	25	252875	
				Total	2632875	2632.88
Projectors	20	400	2	20	320000	320
CCTV	32	10	24	30	230400	230.4
LCD Panels as Notice Boards	0		0	0	0	0
Air Conditioners (No and Capacity)	15	1500	4	25	2250000	2250
Pumps	1	4000	4	25	400000	
	1	2000	4	25	200000	
	1	500	3	25	37500	
				Total	637500	637.5
Refrigerator	1	100	24	30	72000	
	2	250	24	30	360000	
	1	150	24	30	108000	
	1	500	24	30	360000	
				Total	900000	900
Campus Lights	4	30	12	30	43200	43.2
Aquagard Water filters and Coolers	9	500	24	30	3240000	3240
Genset Availability and Capacity Diesel Genset	1	30000	2	25	1500000	
	1	45000	2	25	2250000	
				Total	3750000	3750
Total energy consumption for a month					13854750	13854.755

Electricity Conservation Initiative:

- 1) **Energy efficient appliances:** The electrical appliances used in the college are star rated equipment which saves energy such as LED Bulbs/ CFL lights, 3-4 star rated air conditioners and refrigerators.
- 2) **Rooftop Solar heaters:** Rooftop solar heaters are installed in the hostels of VCW college for conserving electricity.



Figure: Rooftop solar heaters in hostels of VCW college

3) **Fuel Energy Audit:** The fuel energy audit determines the approximate use of petrol or diesel by the vehicles inside the College. It also includes the efforts taken by the college to conserve the fuel. The conventional source of fuel for the vehicles is petrol and diesel. Maximum students of the college use bus, teaching and non-teaching staff of college and visitors use two-wheeler and four-wheeler vehicles. Number of fourwheelers is 30 and they consume 1,125 litres of fuel/month whereas 150 are two-wheelers and they consume 1,875 litres of fuel/month.

Major findings are given in the table below:

1.	Total number of Students	3000 Approx.
2.	Total number of Teachers	82
3.	Number of non-teaching staff	67
4.	Total Number of vehicles used by the stakeholders of the college. (per day)	
5.	No. of cycles used	75
6.	No. of two wheelers used (average distance travelled and quantity of fuel and amount used per day)	150 (Average Distance: 15 km/day, 75 litre of fuel/day, Rs. 7275)
7.	No. of cars used (average distance travelled and quantity of fuel and amount used per day)	30 Approx. (20 km/day, 45 litre of fuel/day, Rs. 4400)

8.	No. of persons using common (public) transportation (average distance travelled and quantity of fuel and amount used per day)	2000 Person (12 km/day)
9.	No. of persons using college conveyance by the students, nonteaching staff and teachers (average distance travelled and quantity of fuel and amount used per day)	384 Person, (40 km/day, 120 Liter Diesel/day, Rs. 10800)
10.	Number of visitors with vehicles per day?	50
11.	Number of generators used every day (hours). Give the amount of fuel used per day.	Two,
12.	Number of LPG cylinders used in the canteen (Give the amount of fuel used per day.	03 LPG Cylinders, 01/03 Cylinders used per day depending on the No. of students

3. **Fire Fighting System:**In VCW, ABC MAP 90 and CO₂ type fire are installed in the Class Rooms, Administrative Building, Library, Canteen, Assembly Hall, Generator Room, Buses etc.

Fire Safety Audit

Total no. of Fire extinguishers installed		37 Pcs.	
Fire exists		NA	
No. of Fire Extinguishers	Type	Capacity	Area
25	ABC	5/6 KG	Class Rooms, Library, Canteen, Admin. Block Assembly Hall etc.
01	CO ₂	4.5 KG	Generator Room
11	ABC	2 KG	Buses



Figure: Fire Extinguishers installed at the campus premise

7. CARBON FOOTPRINT

The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Among these greenhouse gases, carbon dioxide is the most prominent one, comprising of 416 ppm of the Earth's atmosphere. Each human being is contributing towards adding green-house gases to the atmosphere depending upon his day-to-day activities and usage of instruments and machineries for different purpose. A carbon footprint is the total sum of carbon dioxide emissions released into the Earth's atmosphere through by an organization, event, product, or a person.

An understanding about the same of any institute where large number of anthropogenic activities are happening is important to assess the contribution of emission of gases that are responsible for Green House Effect. Auditing for carbon footprint of VCW Campus was done using a detailed questionnaire, so that the impact of the community on environment can be assessed.

There are some standards and guidelines to measure GHG emissions like GHG protocol, ISO 14064, the more comprehensive one Life Cycle Assessment (LCA), market-based mechanisms like Clean Development Mission (CDM), and Voluntary Carbon Standards (VCS), etc. Out of them, ISO 14064 is an offset protocol and independent, voluntary GHG project accounting standard helps to quantify GHG emission of the organization, event, product, or person. From the provided data of annual electricity bill, annual fuel and LPG consumption of VCW, the carbon footprint is calculated by multiplication with their emission factor which is about 352.42 T CO₂ annually.

Table: Carbon Footprint Calculation for VCW for 2021-2022.

S. No.	Source	Rate	Quantity Days/ Year	Total Quantity	Annual Equivalent CO ₂
1.	Electricity	0.82 kgCO ₂ /kWh	13854.755 kWh/month × 12	166257.06 kWh	136.33 T CO ₂
2.	Fossil fuel (LPG Cylinder)	1.9 kgCO ₂ /kWh	19 kg × 3 cylinders × 300 days	17.1 T	32.49 T CO ₂
3.	Fossil fuel (2-wheeler)	2.3 kgCO ₂ eq/L	75 liter/day × 300 days	22.5 kL	51.75 T CO ₂
4.	Fossil fuel (Cars)	2.3 kgCO ₂ eq/L	45 liter/day × 300 days	13.5 kL	31.05 T CO ₂
5.	Fossil fuel (College bus)	2.8 kgCO ₂ eq/L	120 liter/day × 300 days	36 kL	100.8 T CO ₂
Total					352.42 T CO₂

No. of activity days in 2021-22: 300 days

Table: Remediation for Carbon Footprint for VCW for 2021-2022

S. No.	Source	Rate	Quantity Days/ Year	Total Quantity	Annual Equivalent CO ₂
1.	Solar Electricity	0.82 kgCO ₂ /kWh	300 kWh/Month × 12	3600 kWh	2.95 T CO ₂
2.	Paper Recycling	0.26 kgCO ₂ /kL	1 T	1 T	0.26 T CO ₂
3.	Cycles	2.68 kg/L	75 cycles × 300 days/50 × 4	0.11 T	0.29 T CO ₂
Total					3.5 T CO₂

The International Organization for Standardization (ISO) also provides some general standards for

- Greenhouse gas emissions at Organization level (ISO 14064 - 1) and
- Greenhouse gas emissions at project level (ISO 14064 - 2)
- Specifications to validate and verify relevant accountings are documented in (ISO 14064 - 3)

8. WASTE AUDIT AND ITS MANAGEMENT

Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities which can cause health problems. Solid waste is the unwanted or useless solid material generated from all sorts of daily activities. Solid waste management averts the adverse impacts on the environment and human health.

Waste generation on campus

The solid waste data from the VCW was collected from all the buildings along with the support services. Different kinds of solid waste including paper wastes, canteen wastes, plastic wastes are majorly generated in the campus. These solid wastes have been classified into two categories- biodegradable and non-biodegradable. Waste bins were provided on each floor, in staff rooms, laboratories, washrooms, kitchen and in the entire campus area. Liquid waste generation from the two labs (psychology and home science) has also been recorded. No issues regarding municipal dump yard, garbage heap, sewerline, open drainage, etc in the near vicinity of the campus were recorded.

Signage for no littering has been put up in the college premises.



Figure: Waste bins at different locations in the college premise



Figure: Initiative taken to promote no littering in the college premise

Biodegradable wastes

Bio-degradable wastes comprising of food wastes, canteen waste, and other organic wastes are added to a compost pit that is dug out. The organic wastes filled in the pits are subjected to composting which forms a best practice in the campus. In addition to the organic waste generated from different units, large sources of organic wastes other than kitchen wastes (college canteen, etc) like leave litter, terrestrial weeds etc that are generated from maintaining and cleaning the campus are also added to the in-house compost pit. All the paper waste generated from the classrooms, libraries, offices, etc is collected and sold out to the scrap dealers. Human waste is disposed via sewage pipes of the municipal corporation. Dustbins are installed in good numbers and are placed throughout the campus to avoid littering.

Non-biodegradable waste

Non-biodegradable waste consisting of e-waste, plastic wastes, glass wastes, unused equipments is weeded out by the college on the regular basis and given to the scrap-dealers who further re-cycle the waste. Other non-biodegradable wastes such as sanitary napkins are disposed-off with the help of the incineration machine installed in the washroom.



Figure: Sanitary napkin incineration machine installed in the washroom.

Liquid waste disposal

Large green area of the college campus allows for percolation of water into the soil thereby facilitating recharging of underground water reserves. College only uses non-potable water for maintaining its gardens and farms. Sprinkles are used in the campus for irrigation. Rain water harvesting is also being practiced in the VCW campus. To promote effective conservation of water, the college has replaced regular water fixtures with water efficient fixtures like dual flush and low flow systems. In house facility to wash clothes in the campus is available. Grey water generated is being treated and thereafter the recycled water is being used for various purposes. Conscious efforts are made by the gardening committee to use new plant varieties requiring less water to further this initiative.



Figure: Water percolation from different buildings being utilized for gardening

Hazardous waste

VCW does not have any labs dealing with hazardous material.

Initiatives taken for waste management

Paper waste recycling: Old copies, answer sheets and other used papers generated in college are being recycled by using a paper shredder machine. The shredded paper is then collected and sent to the paper recycling unit. For every 1 ton of shredded paper,

the company provides 400 registers with college name/logo printed on cover page for distribution to the under privileged children.



Figure: Paper shredder machine for waste paper recycling

9. GREEN CAMPUS MANAGEMENT

Water Quality Assessment

Water samples from borewell which is the main water source of the college campus and drinking water sample were collected and analysed for its physicochemical parameters. These samples were collected, preserved and transported to the laboratory and analysed for various physio-chemical parameters. The major parameters analysed include alkalinity, total dissolved solids (TDS), chloride, total hardness, pH, electrical conductivity (EC). The results are presented in the Table below. The results are comparable with the values of drinking water standards prescribed by different agencies.

Physicochemical parameters of water samples

S.No.	Parameters	Drinking water	Borewell	Standard Value (BIS)
1.	pH	6.92	7.5	6.5-8.5
2.	TDS (mg/L)	181.3	337	500
3.	EC (μ S/cm)	363	390	-
4.	Total Hardness (mg/L)	171	187	200
5.	Ca Hardness (mg/L)	95	-	-

6.	Chloride (mg/L)	10.496	19	-
7.	Alkalinity (mg/L)	77	124	200
8.	Total Coliform (MPN/100 mL)	Nil	Nil	0
9.	Fecal Coliform (MPN/100 mL)	Nil	Nil	0

Soil Quality Assessment

Soil samples were collected from two different locations of the campus and analysed for the basic parameters. The results are tabulated and presented in the table below.

Soil Quality Assessment

S.No.	Parameter	Location 1 (Ground area)	Location 2 (Garden area)
1.	pH	6.9	7.6
2.	Total Kjeldhal Nitrogen (mg/kg)	2.5	2.9
3.	Total organic carbon (%)	1.0	1.5
4.	Phosphate (mg/kg)	0.15	0.3

Air Quality Assessment

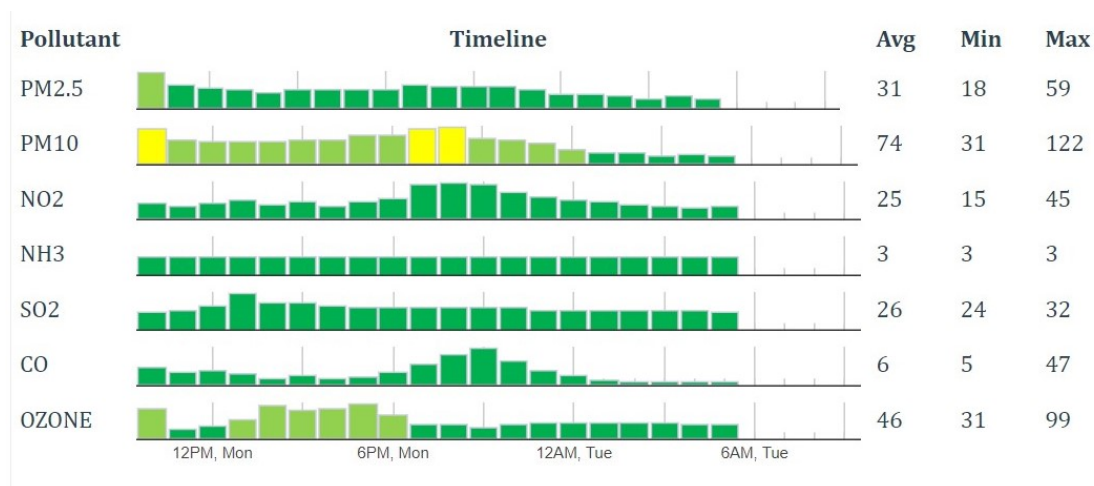


Figure: Concentration of air pollution on the audit day (14/06/2022)



Figure: Air Quality Index on the audit day (14/06/2022)

Green cover

VCW garden has good biodiversity and contains ~80 species of plants, shrubs and trees. The garden area is spread in ~35,000 sq. ft, where students spend their free time during lunch and for reading books during lecture break. The college campus is divided into 12 parts which consists of new building, canteen, library, etc. all the parts are full of greenery having diverse types of plant species, comprising mainly of ornamental plants and fruit bearing plants. College has a separate medicinal garden spread in an area of 300 sq. ft. All the plants are randomly planted in the college premise and scientific names are not displayed. Irrigation is performed mainly by groundwater borewell and by overflow water from the rooftop. There are conscious efforts made by the gardening committee to use new plant varieties requiring less water to further this initiative. Organic manure prepared from the compost pit of the college and VCW campus is being used in the fields as organic fertilizers. It can be observed that college has about 450 plants, which were adequate based on the total area of the college campus. Special attention has been given to plants like *Mangifera indica* (Mango), *Syzygium cumini* (Jamun), *Citrus limon* (Lemon), *Delonix regia* (Gulmohar), *Magnolia champaca* (Champa), *Azadirachta indica* (Neem), *Saraca asoca* (Ashoka), *Adansonia digitata* (Baobab) etc. A continuous monitoring of the biodiversity is carried out by students, teaching and non-teaching staff. The college

also has a gardening committee which is actively engaged in maintaining the ecofriendly environment. To promote eco- practices, seeds, saplings and planting pots are given/presented as a souvenirs at college events/programmes.The KFI campus also consist of its own dairy farm consisting of approx. 60 cows for proving milk in the hostel and KFI campus and cow dung is further utilized for preparation of organic manure.



Figure: Dairy Farm in the KFI campus



Figure: Compost pit for preparation of manure from cowdung



Figure: Compost pits for leaves litter, food waste and the manure produced

Green Initiatives

1. Tree plantation and Annual village camp

College has conducted plantation drives in which about 1000 Arjun trees (*Terminalia arjuna*) were planted near the banks of river Ganga under Corporate Social Responsibility program in collaboration with Uttar Pradesh Pollution Control Board, Varanasi for prevention of erosion from the base.

Under Unnat Bharat Abhiyan, a flagship program of Ministry of Human Resource Development (MHRD), Govt. of India, the college has adopted five villages i.e. Kotwa, Sarai Mohana, Khalispur, Rajapur and Dinapur with the mission to participate with the people of rural India in identifying development challenges and evolving appropriate solutions for accelerating sustainable growth. With this motive Literacy Campaign following Health Awareness Program, Plastic free zone, Swachhata Abhiyan, Corona Awareness Program, distribution of Sanitary Pads and medicines, Plantation drive was conducted.

2. Plastic free campaign

- a. To reduce plastic waste in the college premise and to incline students towards reduce-reuse-recycle and buyback concept, the college management has jointly partnered with SIDBI-DICCI under the project named as “Swachh Kashi Swavalambi Kashi” partnership. Under this initiative a Reverse Vending Machine is installed in the college administrative building, in which waste plastic bottle are inserted and in return rewards are obtained.



Figure: Reverse Vending Machine for plastic bottles and signage for its proper usage

- Eco-friendly paper plates or stainless-steel utensils are being used in the college canteen instead of plastic cutlery.
- Left out waste plastic pipes and tubs are being re-used as planters which looks aesthetically pleasing.



Figure: Reusing plastic tubs as planters



Figure: Reusing waste elbow pipes left from plumbing work as planters

Green campus program

The plantation drive in each year is conducted during the monsoon as “Varsha Mangal” program in which trees are planted by the students and a cultural program is organized related to the nature.



Figure: Varsha Mangal program for plantation drive

- Fallen tree log in the campus is being utilized as sitting arrangement in the campus.



Figure: Reuse of wooden logs as sitting arrangement for open discussionsessions

Flora in the VCW campus:

S. No.	Botanical name	Common name	Number of trees/plants
1.	<i>Acecia catechu</i>	Khair/kattha	47
2.	<i>Achyranthes aspera</i>	Chaff-flower, Prickly Chaff Flower, Devil's Horsewhip	300
3.	<i>Aegle marmelos</i>	Bael, Bilwa	6
4.	<i>Alstoniascholaris</i>	Devils tree	2
5.	<i>Amorpha fruticose</i>	False Indigo Bush	2
6.	<i>Artocarpus heterophyllus</i>	Jackfruit	2
7.	<i>Azadirachta indica</i>	Neem	20
8.	<i>Bacopa monnieri</i>	Brahmi	1
9.	<i>Bauhinia variegata</i>	Butterfly tree	4
10.	<i>Bougainvillea sp.</i>	Bouganvillea	14
11.	<i>Butea monosperma</i>	Palash	1
12.	<i>Callindrahaematocephale</i>	Red powder puff	3
13.	<i>Calotrophisprocera</i>	Madar	2
14.	<i>Carissa carandas</i>	Kerenda, Karonda	2
15.	<i>Cascabelathevetia</i>	Kaner	4
16.	<i>Cassia fistula Linn.</i>	Golden Shower Tree, Pudding Pipe Tree,	2
17.	<i>Cinnamomum tamala</i>	Tejpatta	3
18.	<i>Cissus quadrangularis</i>	Hathjod	2

19.	<i>Citrus limon</i>	Lemon	2
20.	<i>Citrus sinensis</i>	Orange or Sweet Orange	1
21.	<i>Codiaeum variegatum</i>	Garden Croton	28
22.	<i>Cordia dichotoma</i>	Indian Cherry, Gunda	1
23.	<i>Crassula ovata</i>	Jade plant	3
24.	<i>Crepe Jasmine</i>	Pinwheel Flower	56
25.	<i>Dalbergia sisso</i>	Seesam	2
26.	<i>Delonix regia</i>	Gulmohar	10
27.	<i>Dracaena trifasciata</i>	Snake plant	9
28.	<i>Duranta repens</i>	Pigeon Berry or Sky Flower	198
29.	<i>Dysoxylum</i>	Bamboo Palm or Areca Palm	14
30.	<i>Elaeocarpus angustifolius</i>	Rudraksh	1
31.	<i>Elettaria cardamomum</i>	Cardamom (Elaichi)	2
32.	<i>Epipremnum aureum</i>	Golden Pothos, Money Plant	1
33.	<i>Ficus benghalensis</i>	Banyan	3
34.	<i>Ficus elastica</i>	Rubber Plant	1
35.	<i>Ficus racemosa</i>	Cluster Fig (Goolar)	2
36.	<i>Ficus religiosa</i>	Peepal	5
37.	<i>Foeniculum vulgare</i>	Fennel plant	1
38.	<i>Foeniculum vulgare</i>	Ornamental plants	1
39.	<i>Holoptelea integrifolia</i>	Chilbil	11
40.	<i>Impatiens balsamina</i>	Gulmehandi	125
41.	<i>Jasminum</i>	Chameli	2
42.	<i>Jasminum multiflorum</i>	Kund	1
43.	<i>Kalanchoe pinnata</i>	Mother of Thousands, Miracle Leaf	8
44.	<i>Kigelia africana</i>	Sausage Tree	1
45.	<i>Lawsonia inermis</i>	Mehandi	1
46.	<i>Lilium</i>	Lily	5
47.	<i>Mangifera indica</i>	Mango (aam)	8
48.	<i>Manilkara zapota</i>	Chicle, Sapodilla	1

49.	<i>Michelia</i>	Champa	1
50.	<i>Milletia pinnata</i>	Dithori	1
51.	<i>Mitragyna speciosa Korth</i>	Kratom	2
52.	<i>Moringa oleifera</i>	Shehjan	3
53.	<i>Morus nigra</i>	Shehtoot	1
54.	<i>Murrayakoenigii</i>	Curry patta	4
55.	<i>Murrayapaniculata</i>	Kamini	184
56.	<i>Neolamarckiacadamba</i>	Kadamb	1
57.	<i>Nyctanthes arbor tristis</i>	Parijat	2
58.	<i>Ocimumtenuiflorum</i>	Holy Basil, Tulsi	5
59.	<i>Phyllanthus emblica</i>	Amla	2
60.	<i>Piceaabies</i>	Norway Spruce	3
61.	<i>Plumeria pudica</i>	Chameli	1
62.	<i>Prosopis cineraria</i>	Sammi	1
63.	<i>Psidium guajava</i>	Guava	3
64.	<i>Punica granatum</i>	Anar	1
65.	<i>Sansevieria trifasciata</i>	Snake Plant	2
66.	<i>Santalum album</i>	Chandan	4
67.	<i>Saracaasoca</i>	Ashok	140
68.	<i>Syzygium cumini</i>	Jamun	3
69.	<i>Tabernaemontanadivaricata</i>	Chandni	47
70.	<i>Tagetes</i>	Marigold	220
71.	<i>Tamarindus indica</i>	Tamarind	2
72.	<i>Tectona grandis</i>	Sagwan	10
73.	<i>Terminalia arjuna</i>	Arjun	17
74.	<i>Thespesia populnea</i>	Portia Tree	2
75.	<i>Thuja occidentalis</i>	Morpankh	1
76.	<i>Tradescantia spathacea</i>	Rheo	1
77.		Pakdi	3
78.		Roopmanjri	11
79.		Laltena	50



Aegla marmelos



Agave americana



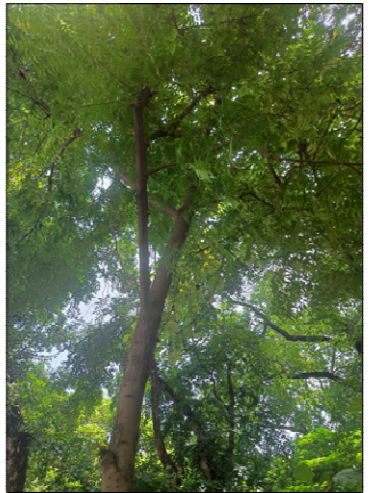
Albizia chinensis



Albizia julibrissin



Asparagus racemosus



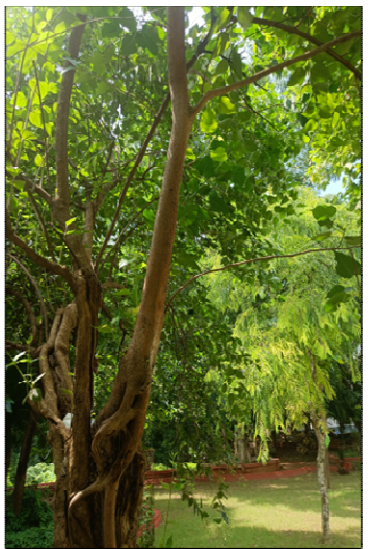
Azadirachta indica



Codiaeum variegatum



Codiaeum variegatum



Ficus religiosa



Impatiens balsamina



Murraya paniculata



Nerium oleander



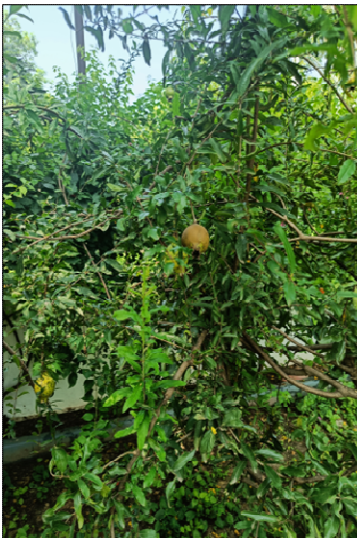
Nectanthes arbor-tristis



Phyllanthus emblica



Polyalthia longifolium



Punica granatum



Thevetia peruviana



Tagetes patula

10. CONCLUSION AND RECOMMENDATIONS:

Green audits “adds value” to the management approaches being taken by the college and is a way of identifying, evaluating and managing environmental risks (both known and unknown). The green audit reports assist in the process of attaining an eco-friendly approach to the development of the college. Hope that the results [resented in the green auditing report will serve as a guide for educating the college community on the existing environment related practices and resources being used at the college as well as spawn new intricacies and innovative practices.

Due to the onset of Covid-19 pandemic the college has been functioning in online mode since March 2020 as students were asked to stay back home. Therefore, the green audit for this academic is not a true reflection of an institution running in full physical mode with students and faculty. Nevertheless, in view of the findings of the green audit team some of the recommended actions are suggested to support the management practices of VCW. These actions if considered and implemented between audits it will help the college to grow in a clean and green sustainable campus.

Actions recommended from the green audit are mainly adjustments in management practices. Some actions requires purchases to replace inefficient items. Such action could be expected to be implemented between audits or at least considered and rejected, based on factors other than environmental protection grounds.

- Signage on water conservation were not seen in washrooms or near water purifiers.
- Conduction of “switch off” drills in the campus to create awareness among the students from energy conservation.

- Scientific names of the plants and trees in the campus premise should be displayed.
- Separate dustbins for proper segregation of biodegradable and non-biodegradable wastes should be installed for disposing-off the wastes.
- Covered waste bins should be installed in classroom and areas where are open bins.
- Replacing the old tube lights with the new LED tubes.
- 5-star rated Air Conditioners, Fans and LED bulbs should be used.
- In campus premises electricity should be shut down from main building supply after occupancy time, to prevent power loss.