A REPORT ON
GREEN AUDIT
AT
GOVERNMENT RAZA POST GRADUATE COLLEGE, RAMPUR

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Go Green India, Green Audit Team is very thankful to the management of **Government Raza Post Graduate College, Rampur** for assigning us this important work of Green Audit. The audit was conducted in December 2023. We appreciate the co-operation extended to our team for the completion of study.

Our special thanks to:

- Principal of the College–Dr. Deepa Agarwal
- Head, Department of Botany- Dr. Hitendra Kumar Singh
- Assistant Professor, Department of Botany- Dr. Durgesh Singh Yadav
- Other Teaching & Supporting Staff of the Institute

For giving us necessary inputs to carry out this very vital exercise of Green Audit. We are also thankful to the staff members who were actively involved while collecting the data and conducting field measurements.

DISCLAIMER

Go Green India, Green Audit Team has prepared this report for **Government Raza Post Graduate College, Rampur** based on input data submitted by the representatives of the Institute complemented with the best judgement capacity of the expert team.

It is further informed that the conclusions 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 any use of the information, statements or forecasts in the report.

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DATE: 18/12/2023

Reg No.: EM-300297/22

Certificate No.: 11153/T

National Productivity Council

(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Mrs. / Ms. KRISHNA KANT DUBEY

son / daughter of Mr. SHREEKANT DUBEY *has passed the National Certification Examination for Energy Managers held in* JULY 2022 *conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.*

He / She is qualified as ***Certified Energy Manager****. This certificate is valid till the Bureau of Energy Efficiency issues an official certificate.*

Place: Chennai, India

Date : 9th November 2022

Digitally Signed:DEVERAPALLI SREENIVASULU
Wed Nov 09 18:25:18 IST 2022
CoE, NPC AIP Chennai

Controller of Examination

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EXECUTIVE SUMMARY

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crisis. On this background it becomes essential to adopt the system of the green campus for the institute which will lead to sustainable development. **Government Raza P.G. College, Rampur** 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' program few years back that actively promote the various projects for the environment protection and sustainability.

The purpose of this audit was to ensure that the practices followed in the campuses are in accordance with the green policy adopted by the institution, it works on several facets of Green Campus including water conservation, electricity conservation, tree plantation, waste management, paperless work, mapping of biodiversity etc. With these issues in mind, the specific objectives of the audit are to evaluate the 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 recommendation used in the audit were based on the identified risks. We do hope that this report will be beneficial for the institute.

AUDIT PARTICIPANTS

On behalf of college:

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Dr. Deepa Agarwal	Principal, Govt. Raza P.G. College, Rampur
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Name	Position	Qualification
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UTILITY OF GREEN AUDIT

These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment. A green auditor will study an organization's environmental effects in a systematic and documented manner and will produce a green audit report.

OBJECTIVES OF THE STUDY

The main objectives of the green audit are to promote the environment management and conservation in the institute campus. The purpose of the audit is to identify, quantify, describe and prioritize the framework of environment sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out green audit are –

To introduce and make aware students to real concerns of environment and its sustainability.

To secure the environment and cut down the threats posed to human health by analyzing 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.

METHODOLOGY

In order to perform green audit, the methodology included different techniques such as physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. The study covered the following area to summarize the present status of environment management in the campus:

- Water consumption and management
- Air quality assessment and management
- Sound pollution monitoring
- Electricity consumption and management
- Waste disposal and recycling technique & their management
- Biodiversity status of the campus

CHAPTER 1 WATER CONSUMPTION & MANAGEMENT

1.1 Methodology followed for conducting water system study

Step 1: Reconnaissance or Walk-through survey

- Understanding of existing water sourcing, storage and distribution facility.
- Assessing the water demand and water consumption areas/processes.

Step 2: Secondary Data Collection through the Discussion with Institute executives, past records, Available technical literature/specifications

- Analyze historic water use and wastewater generation
- Field measurements for estimating current water use
- Metered & unmetered supplies.
- understanding of "base" flow and usage trend at site
- Past Water Bills
- Wastewater Treatment scheme & costs etc.

Step 3: Site Water Management Planning (based on site operations and practices)

- Preparation of water flow measurement plan to quantify water use at various locations
- Wastewater flow measurement and sampling plan
- Instruments availability like Ultrasonic Water Flow Meter, Doppler type Flow meter, Stop Watch, measuring cylinders, Power Analyzer etc.

Step 4: Conduction of Detailed Water Audit & Measurements

- Conduction of field measurements to Quantify water/wastewater streams
- Power Measurement of Pumps/Motors
- Measurement of suction & discharge pressure at various pumps
- Wastewater sampling & analysis
- Establishing Water Consumption Pattern
- Detection of potential leaks & water losses in the system
- Assessment of productive and unproductive usage of water
- Determine key opportunities for water consumption reduction, reuse & recycle.

Step 5: Preparation of Water Balance Diagram with Sustainable Water

Management Plan

- Documentation of collected & analyzed Water Balancing and Measurement details
- Projects and procedures to maximize water savings and minimize water losses.
- Water Metering and Accounting System
- Opportunities for Water Conservation based on Reduce/ Recycle/ Reuse/ Regeneration/ Recharge options with Cost Benefit Analysis

Step 6: Water Flow Measurement

The water flow measurement was conducted using transit time ultrasonic flow meter at the discharge side of the pumps or any suitable location. The step wise methodology is given below,

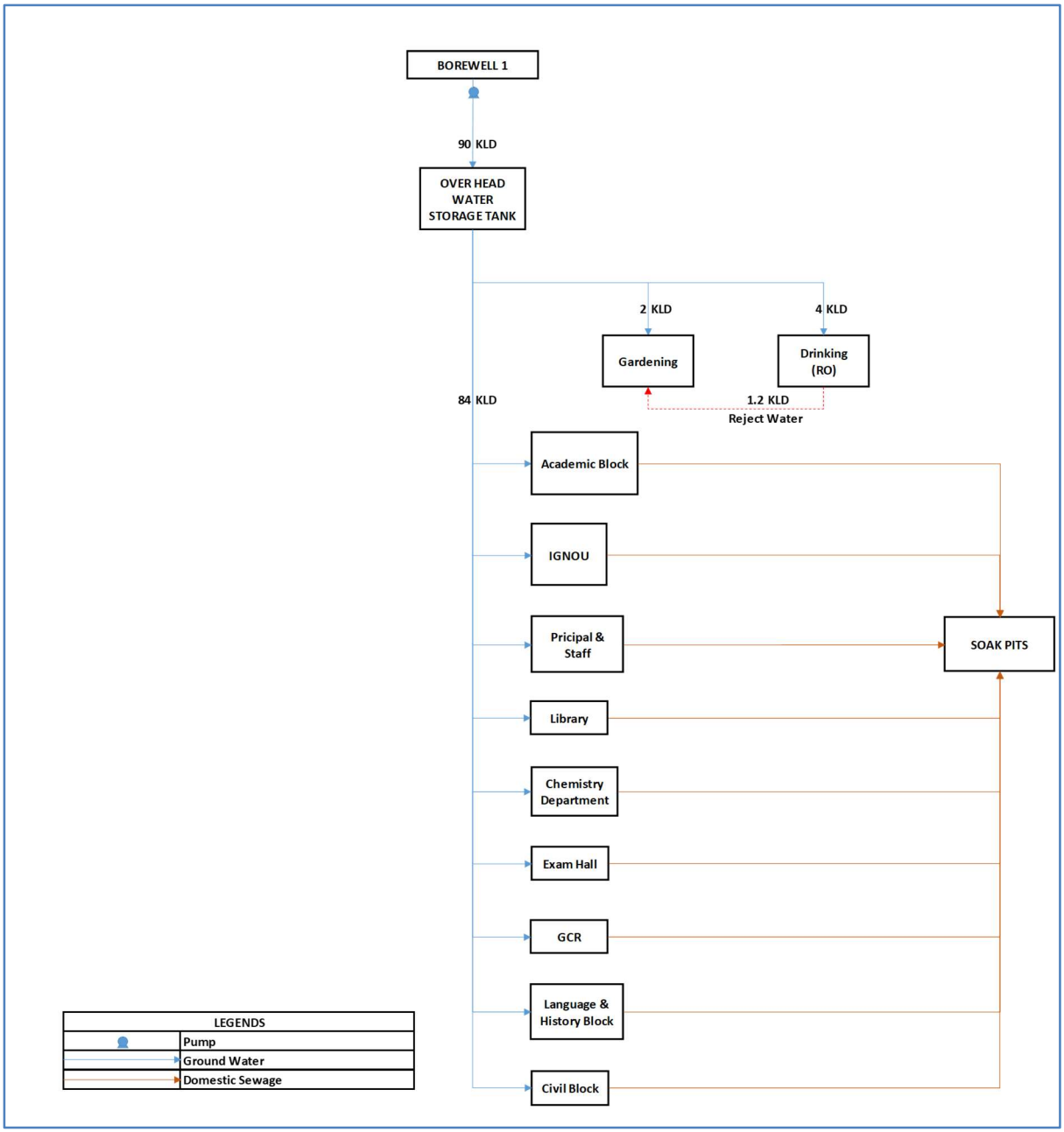
- A suitable location for measurement of flow rate was identified on discharge pipeline of the pump and initial pipe preparation was done by cleaning and filing of pipe at measurement location
- The circumference of pipe for calculating the external diameter was measured by inch tape and the pipe thickness was measured by digital thickness gauge or by measurement of spare pipe.
- The parameter like pipe diameter, type of pipe, water temperature, pipe thickness, roughness etc. are input in the ultrasonic flow meter
- Based on above input values, the flow meter reflects the distance between the traducers to be positioned on the pipe while measuring the flow
- The traducers are placed on the surface of the pipe (filed surface) at the same distance given by flow meter
- The ultrasonic flow meter displays instantaneous values of water flow rate in m^3/hr. The average of these values may be considered as flow rate of water.

Existing Scenario:

The Institute uses about 90-120 m^3 per day of water for domestic use like drinking, hand washing, canteen, flushing, laboratory, etc. It is observed that the groundwater is of good quality and used in all areas of institute for domestic activities. Based on the daily abstraction of borewell a water balance diagram is prepared for the institute. It must be noted that water flow meters are not installed on the borewell & other supply lines therefore according to the flow measured by the audit team through ultrasonic water flow meter was considered. The flow was multiplied by the running hours of borewell pumps which gave a rough estimate of the daily

water abstracted & the same was balanced for the different sections of the college. The diagram is as follows:

Figure 1 : Water Balance Diagram of the College according to present water distribution scheme



The following observations were made during the measurements & water balance preparation:

1. The borewell is operated in a typical fashion of continuous working.

2. Water is pumped to overhead water tank & from there it is transferred to the buildings.

3. The flow of borewell 1 was found to be 9.25 m^3/hour & it runs for approx. 10 hours daily. The power consumption of the pump was found to be 2.2 kW.

4. There are no water flow meters installed at borewells as well as any other sections of the institute.

5. The water consumption was found to be more than the standard i.e. 16 liter/person/head (90000 liters for 6000 people that includes students, teachers, staff & visitors) than the CPHEEO (Central Public Health & Environmental Engineering Organization) standard which is 45 liters/person/head.

During the audit, a detailed building survey including process area was conducted to measure the flow rates of the fixtures, inspection of flushes and analyzing the water use practices of officials. To optimize water, use in the buildings for domestic purpose, the following observations and suggestions are made based on the building survey during the water audit:

- **Optimize water flow in hand washing and other taps:**

Water flow rates in hand washing taps vary from 2.5 to 8 lpm; however, about 50 % sampled taps have flow rates > 5 lpm. Although Institute have optimized the water flow in handwashing taps in the common hand wash area of unit by installing aerator taps where the flow in taps is > 5lpm. Similarly, it is suggested to install flow restrictors in the hand washing taps of the other Institute area to reduce the excess flow in hand wash taps to 5 lpm. Generally, the water efficient hand washing taps use 3-5 lpm only.

Picture 1: Picture of water efficient Aerator Taps

- **Install Tank Banks in present water flushing tanks installed with closets for less ground water consumption**

  In toilets raw water is used for flushing and about 10 litres of water is used per flush. To reduce the flushing water per flush, it is suggested to install scientifically designed easy to install 'Tank-Bank' in the existing flush tanks. By just placing tank bank in the flush tank, we displace and save water equal to the space occupied by the tank bank for every flush. This will save about 30% of flush water in toilets. The existing 10 litres flush tanks can also be replaced by Water efficient flushes with dual flush Cistern 3-6 litres capacity flush tanks to save water. This will save about 60% of the flush water in toilets.

Picture 2: Picture of Tank Banks

- **Install waterless Urinals for fresh ground water Savings**

The institute can explore the possibility of installing waterless urinal systems. The water consumption is quite high in the traditional urinal flushing systems that uses about 2-3 litres of water per flush. The waterless urinal systems can give an approx. savings of 90-95% in urinal flushing.

Here is how it works:

- Urine flows into the drain insert of the **"New Water Less System"**
- Inside of the **"New Water Less System"** the urine moves through a floating layer of immiscible gel liquid, which creates a barrier, preventing sewer gases and urine odors from entering the restroom area.
- The urine below the Gel barrier over spills into the central tube and travels down into

the drain line.

- Approximately 1500 sanitary uses are possible with just 3 ounces of Gel. When the Gel liquid is gone, it is simply replenished. This only takes about 20 seconds to perform and the **"New Water Less System"** is not touched.
- Urine sediments are retained within the "New Water Less System". Replacement is easy and need only be done 2 to 4 times per year depending on traffic to the urinal.

Other more complex arrangements cannot compare to the superior efficiency and simplicity of the design. A urinal's internal trap way may become clogged without urinal trap inserts included. urinals do not need to be cleaned out. They are simply changed out as explained above. In addition, our urinals help retain urine sediments.

Picture 3: Picture of Waterless Urinals

Benefits of the Waterless Approach: Urinals save more than just water: they save time, and money. The upkeep of traditional flush urinals can be expensive, and maintenance in certain instances can take hours. The waterless fixtures eliminate the need for flush valve repairs, waste line clean outs, deodorizers, and blockage removals.

- **Explore the possibility of installing a Sewage Treatment Plant within the campus for Domestic Sewage Wastewater Recycling**

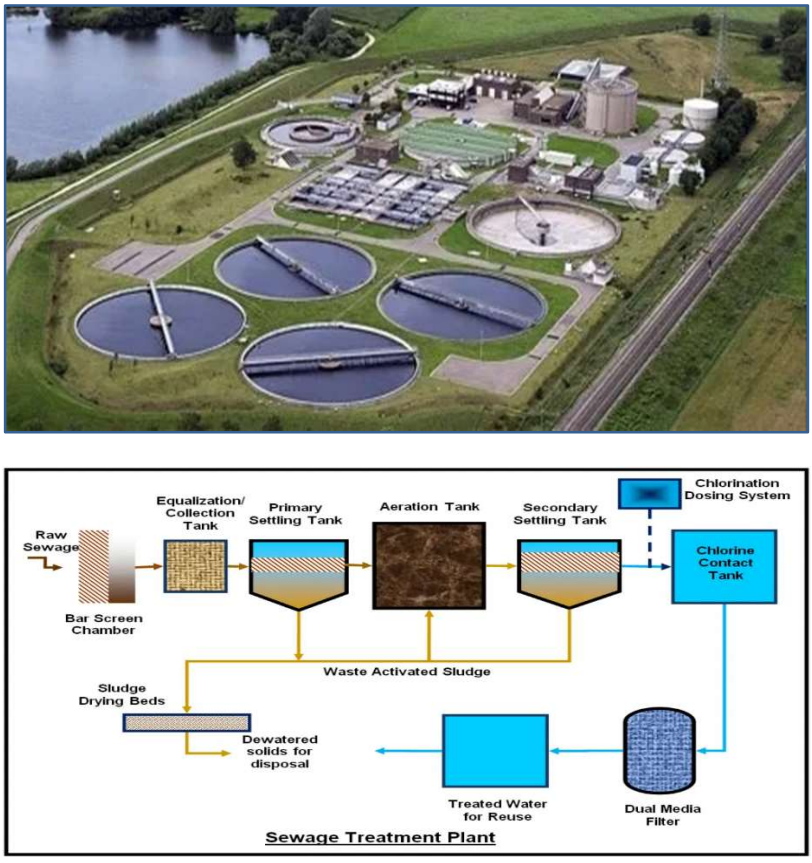
The institute has almost 7000 students as well as staff, the quantum of domestic sewage generated by the population in the campus is quite considerable. Sewage treatment can reduce the current ground water intake, it can be used for gardening & flushing purpose.

Introduction to Sewage Treatment:

Sewage treatment is a type of wastewater treatment which aims to remove contaminants from sewage to produce an effluent that is suitable to discharge to the surrounding environment or an intended reuse application, thereby preventing water pollution from raw sewage discharges.

Sewage contains wastewater from households and businesses and possibly pre-treated industrial wastewater. There are a high number of sewage treatment processes to choose from. These can range from decentralized systems (including on-site treatment systems) to large centralized systems involving a network of pipes and pump stations (called sewerage) which convey the sewage to a treatment plant. For cities that have a combined sewer, the sewers will also carry urban runoff (stormwater) to the sewage treatment plant. Sewage treatment often involves two main stages, called primary and secondary treatment, while advanced treatment also incorporates a tertiary treatment stage with polishing processes and nutrient removal. Secondary treatment can reduce organic matter (measured as biological oxygen demand) from sewage, using aerobic or anaerobic biological processes.

Picture 4: Picture of Sewage Treatment Plant & Basic Flow diagram



Sewage treatment is an environmental best practice which reduces water as well as land

pollution. The overall aim of treating sewage is to produce an effluent that can be discharged to the environment while causing as little water pollution as possible, or to produce an effluent that can be reused in a useful manner. This is achieved by removing contaminants from the sewage. It is a form of waste management.

The institute can discuss internally & explore the scope of installing the facility in the future.

- **Enhance Training and awareness of the employees at all levels and placing 'water saving' posters/slogans at various locations:**

It is suggested that the Institute student & employees at all levels should be made aware and trained on 'Water Saving & Conservation' and 'Good Housekeeping Practices'.

Therefore, it is recommended to periodically organize Awareness Programs for student & employees including workers on Water Conservation. It is also suggested that prominent water saving labels/posters should be placed/located in the Institute at noticeable locations like process area; near hand washing taps; washrooms, reception office etc. This will create awareness & sense of responsibility among staff/employees/visitors.

- **Regularly calibrate & maintain existing water flow meters**

The water meters are not installed at various important locations including borewells. It is suggested to install water flow meters preferably mechanical type flow meters at locations like borewell lines & on the transfer lines of old & new buildings.

- **Maintain logbook of daily groundwater abstraction**

The Institute is suggested to continue record the water abstraction data, maintain logbook of daily groundwater abstraction. The following format may be used for maintaining and recording the meter data on daily basis:

Table 1: Format for maintaining logbook for water meters

Meter no.	Date DD/MM/YYYY	Initial reading (A)	Final reading (B)	Water quantity used (m^3) [B-A]	Cumulative total (m^3)

1.2 Water Storage Profile

Institute has 1 overhead water storage tanks of 300 m^3 capacity to meet the daily water needs. The details of tank are as follows

Table 2: Water Storage profile

Sr. No.	Name	Qty.	Total Storage Capacity (m^3)
1	**Overhead Tank**	1	300

Picture 5: Picture of Water Storage Tank

CHAPTER 2 RAIN WATER HARVESTING

Table 3: Average Rainfall Data of Rampur (2018-2022)

Rainfall data (in mm) of Rampur during 2018-2022													
Year	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEPT**	**OCT**	**NOV**	**DEC**	**TOTAL**
2018	0	0.7	0	7.9	3.1	21.9	153.8	336.3	92.7	14.4	0	0	630.8
2019	12.9	31.3	4.4	7	0	42.4	213.1	114	99.2	2	0.8	50.2	577.3
2020	49.8	6.6	25.5	14.4	27.3	55.2	108.9	142	14.4	0	0	0	444.1
2021	21.7	5.2	0	0	78.9	136.2	202.1	51.8	35.4	165	0	0	696.3
2022	63.6	33	0	0	24.4	6	51.4	104.2	155.1	167.4	0	0	605.1
Grand Total Rainfall													**2954**
Average Rainfall													**590.7**

(SOURCE: hydro.imd.gov.in)

CALCULATIONS OF AVERAGE RAINWATER HARVESTING PER YEAR

Annual rainfall availability in Rampur = 590.7mm or 0.591 m.

This amount of annual rainfall is outpoured on the roof catchment of Government Raza P.G. College, then the total rainfall availability is = 7000m^2 x 0.591 m = 4137 m^3

If the run off from the pavements & and adjoining area be considered then the total availability becomes 11500m^2 x 0.591 m = 6796.5 m^3

Since Rampur is in moderate altitude, the evaporation loss is also in the moderate to low tune. Still if we consider 15% evaporation and other losses, in that case also a total of 6796.5 x 0.85= **5777 m^3** of rainwater per year is being harvested & sent back to the ground by recharging through 2 number of recharging pits.

Picture 6: Rain water Recharging Pits installed in the College premises


GPS Map Camera
Rampur, Uttar Pradesh, India
R2CP+VHM, Jail Area, Rampur, Uttar Pradesh 244901, India
Lat 28.821818° Long 79.03689°
24/05/22 07:14 AM
GRPGC RMP Rain water harvesting


GPS Map Camera
Rampur, Uttar Pradesh, India
R2CP+5R4, Saijni Nankar, Rampur, Uttar Pradesh 244901, India
Lat 28.820449° Long 79.03712°
24/05/22 08:46 AM
GRPGC RMP Rain water harvesting

CHAPTER 3 AIR QUALITY MONITORING

Since air quality plays a vital role for good health. Air quality monitoring instrument is used to monitor quarterly the criteria pollutants. Since the institute doesn't have its own air pollution monitoring device, but devices are installed by Uttar Pradesh Pollution Control Board at various locations which are within a radius of 10 km from the institute. The data is available on UPPCB website www.uppcb.com . The most important air quality parameters, which are measured, are PM 10. The other criteria pollutants such as NO2, SO2 with AQI (Air Quality Index) are measured.

Table 4: Air quality monitoring data

Months	PM10	SO2	NO2	AQI
	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
Dec-22	134.07	4.152	16.38	116
Jan-23	88.58	12.36	15.80	85.6
Feb-23	96.39	7.52	18.52	91.2
Mar-23	119.30	13.61	20.92	106.4
Apr-23	179.81	23.01	20.91	146.4
May-23	148.14	18.64	19.82	125.6
Jun-23	121.44	14.55	15.17	108
Jul-23	130.98	14.66	15.22	113.6
Aug-23	141.74	13.58	14.90	120.8
Sep-23	141.84	14.64	16.06	121.6
Oct-23	141.49	13.46	14.78	120.8
Nov-23	144.86	13.32	14.47	123.2

(SOURCE: www.uppcb.com)

As the institute has a lush green campus, almost 60-70% of its area is covered with grass, bushes & large trees, the air quality is good inside the campus. For maintaining the air quality of the campus as well as the surroundings almost 80% of the staff & students use public transport for commuting. They use bicycles as well. Students are not allowed to take their personal vehicles inside the campus.

CHAPTER 4 SOUND POLLUTION MONITORING

The human ear is constantly being assailed by man-made sounds from all sides, and there remain few places in populous areas where relative quiet prevails. There are two basic properties of sound, (1) loudness and (2) frequency. Loudness is the strength of sensation of sound perceived by the individual. It is measured in terms of Decibels. Just audible sound is about 10 dB, a whisper about 20 dB, library place 30 dB, normal conversation about 35-60 dB, heavy street traffic 60-75 dB, boiler factories 120 dB, jet planes during take-off is about 150 dB, rocket engine about 180 dB. The loudest sound a person can stand without much discomfort is about 80 db. Sounds beyond 80 dB can be regarded as pollutant as it harms hearing system. The WHO has fixed 45 dB as the safe noise level for a city to avoid sleep disturbances. For international standards a noise level up to 65 dB is considered tolerable. Frequency is defined as the number of vibrations per second. It is denoted in Hertz (Hz). Sound pollution is another important parameter that is taken into account for green auditing of the College Campus. Different sites were chosen for the monitoring purpose.

Table 5: Measured Decibels at various Locations

Room No./Lab	Max db	Min db
Class Room 1-8	45	30
Class Room 9-13	42	32
Exam Hall	41	39
Seminar Hall	37	32
IGNOU	46	37
Principal's Office	55	49
Library	35	28
Botany Laboratory	44	40
Zoology Laboratory	39	36
Computer Lab	41	30
Near Main Gate	57	48
Corridor Ground Floor (Admin)	51	45
Chemistry Laboratory	37	35
Physics Laboratory	40	38
Psychology Laboratory	40	35
Geography Laboratory	38	34
GCR	49	44
B.Ed. Department	50	43

Room No./Lab	Max db	Min db
Principal's Residence	30	28
Garden	39	32
Washroom	51	48

CHAPTER 5 ELECTRICITY CONSUMPTION (IN UNITS) AND MANAGEMENT

All the data and corresponding savings were analyzed and calculated in part-1 at energy audit report. The details of energy consumption are tabulated below.

Total Annual Electricity Consumption, Utilities/ Grid + DG Sets (kWh) + Solar	52762 kWh (Grid Supply) 4305 kWh (DG Supply) 14784 kWh (Solar Approx.) Total: 71851 kWh per annum

Yearly Electrical Consumption (Pashchimanchal Vidyut Vitran Nigam Limited):71851 kWh (Approx.)

Suggestion

Monitor the daily solar kWh readings of each installed Inverter and maintain monthly record.

Picture 7: Rooftops Solar Power system installed in the College premises

CHAPTER 6 WASTE DISPOSAL

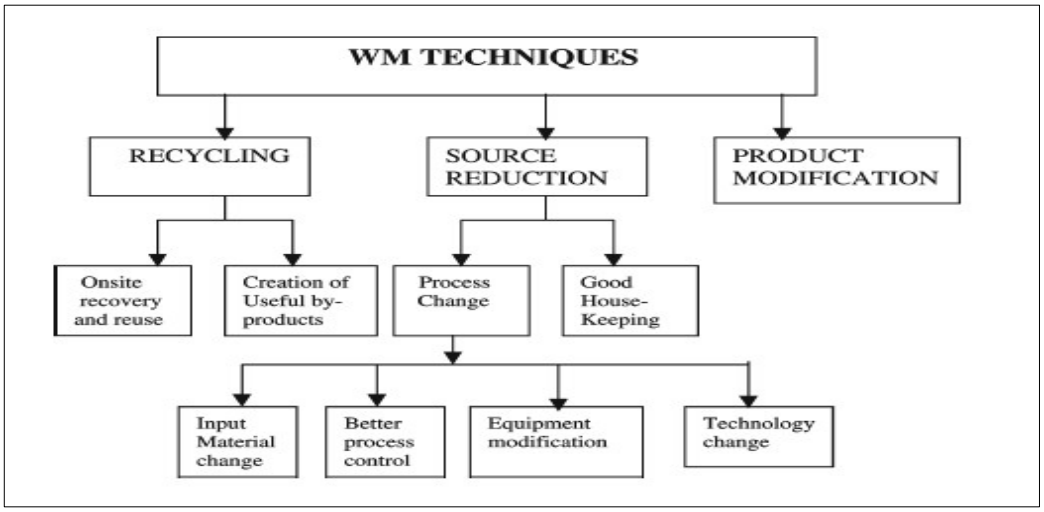
6.1 Introduction to waste disposal

Waste disposal include the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process.

Waste can be solid, liquid, or gas, each type has different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological and household. In some cases, waste can pose a threat to human health. Waste is produced by human activity, for example, the extraction and processing of raw materials. Waste management is intended to reduce adverse effects of waste on human health, the environment or aesthetics.

Waste management practices are not uniform among countries (developed and developing nations) regions (urban and rural areas), and residential and industrial sectors can all take different approaches.

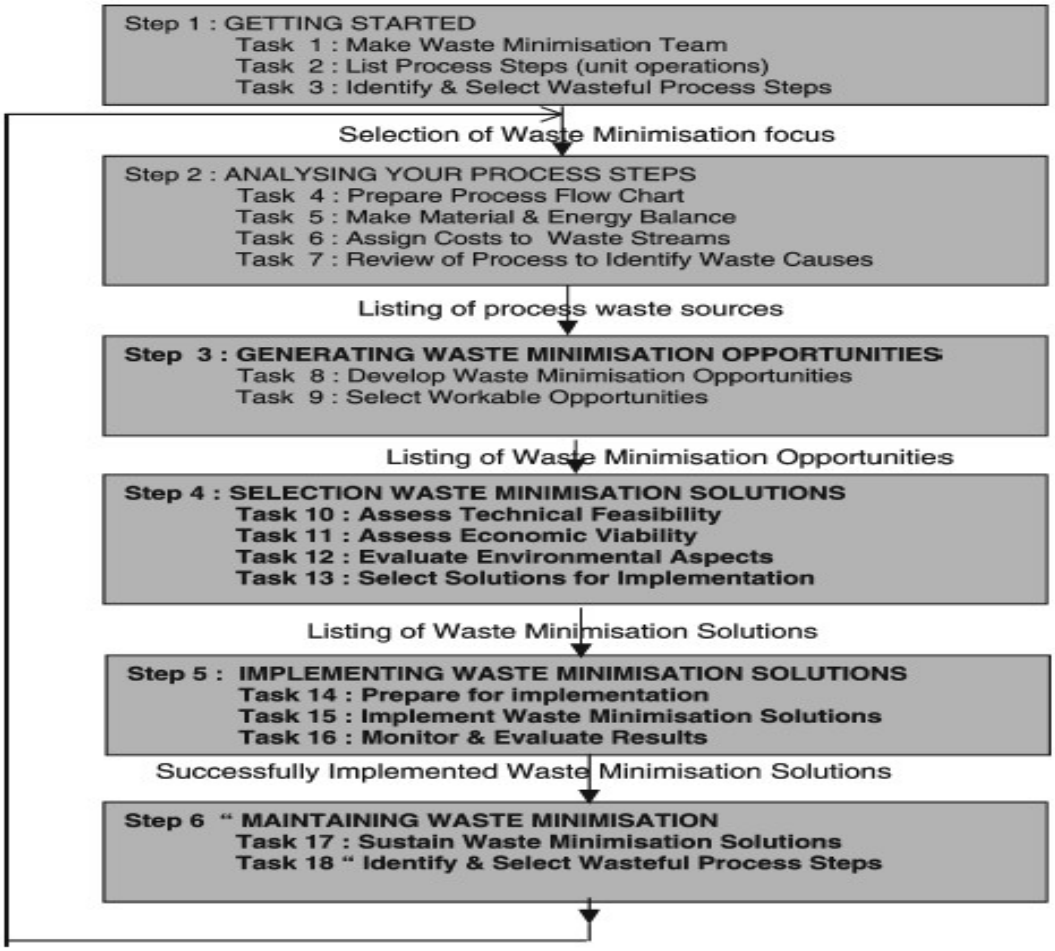
Figure 2 : Waste Management Techniques



A large portion of waste management practices deal with municipal solid waste which is the bulk of the waste that is created by household, industrial, and commercial activity.

Government Raza P.G. College has not employed waste bins for proper segregation of solid wastes in the campus.

Figure 3 : Step Wise Waste Management Plan



6.1.1 Separate your waste

A rather obvious but still not fully adapted way to improve waste management at home is to separate your waste in an efficient manner. Many people still only use one garbage bin where they collect all of their waste.

However, mixing several waste types is a significant problem since it makes recycling quite hard.

Therefore, without separation of waste, precious resources may be wasted.

Moreover, if toxic waste is disposed into the normal garbage, this could lead to serious level of soil contamination and water pollution since these toxic items may end up in landfills rather

than in special treatment facilities.

The college doesn't have separate bins for dry & wet waste, therefore it is suggested to install separate waste bins for different wastes at different sections of the campus so that the ecological footprint of the college can be improved.

6.1.2 Learn to repair rather than to discard things

Another efficient measure to improve your eco-footprint is to repair your things rather than to buy new ones. As a society, we often tend to dispose of our used items pretty soon, even if they only have minor issues. Rather than disposing of these items, try to repair them. In our nowadays world, repairing things is pretty easy since we have numerous free videos online on how to repair things of your daily life.

It must be noted that the e-waste is being used in the classes for demonstration purpose.

6.1.3 Reuse and recycle

You should also try to reuse your old things, for instance, if you have family members or friends who do not want to use old but still working items anymore, ask them if you can have them in order to reuse those items.
Conversely, if you have old things you don't use anymore, offer them to family or friends who may be happy to reuse those items.
If no one wants to have your old items, at least make sure that you separate your waste properly in order to make recycling processes as efficient as possible.

6.1.4 Don't buy single-use batteries

In order to reduce waste, don't use single-use batteries.
Instead, use rechargeable batteries which can be used several times in order to save our natural resources and to fight resource depletion.
Moreover, batteries often contain elements that can be quite toxic to our environmental system. Thus, make sure that you dispose of them according to your local waste disposal regulations and do not dispose of them in the household garbage!

6.1.5 Create a compost site

Institute has in house canteen which generate household & kitchen waste. An optimal way to deal with your organic household waste would be to create a compost site. Compost sites are quite convenient since you can dispose of all of your vegetable and fruit waste there.
After a while, this kind of waste will be fully decomposed by microorganisms and your waste will vanish in an entirely natural way.
It should be noted that institute has installed compost pits to recycle bio degradable waste such as vegetable waste, dry leaves etc.

6.1.6 Use your compost instead of using conventional fertilizer

Making things even better, the institute can use the end product from the composting process as a natural fertilizer for your plants in your garden. By doing so, the institute do not have to use conventional fertilizers, as they often contain harmful chemicals which in turn can lead to soil and water pollution.
Instead the institute have plenty of natural fertilizer from your compost site all year long. Thus, the institute can not only improve your ecological footprint by using this kind of natural fertilizer, but can also save significant amounts of money in the long run.

6.1.7 Avoid bottled water

The use of bottled water is still quite common. However, especially the use of plastic bottled water is a quite big environmental issue since it implies the production of excessive levels of unnecessary plastic waste.
In many regions, there is even no need to use bottled water since tap water quality is excellent.
Since we live in the region where water quality is reasonably good. Hence, use tap water instead of bottled water in order to reduce your waste production.

6.1.8 Use electronic media instead of paper

In order to reduce paper waste, it is also crucial that you switch from physical printing to electronic media instead. In our current times, in most cases, there is no need to print on paper anymore.
Electronic media, like the use of smartphones, makes it even easier and more convenient for you compared to printouts, since you do not have to carry your printouts with you.
Instead, you only have a small pocket device which is as powerful as the computer Ronald Reagan when he was president.

Therefore, the next time you consider buying a book, use the e-book version instead of the paper version in order to reduce your ecological footprint and to save our natural resources.

6.1.9 Reusable containers

In general, try to use reusable containers as often as possible.

You can use these reusable containers many times instead of using disposable containers which will often end up in the trash bin after just a single use.

To improve your ecological footprint even further, use reusable containers made out of metals or glass instead of plastic ones.

By doing so, you can reduce the production of plastic waste.

Moreover, you may also be able to improve your health, since plastic is often associated with unhealthy components which could contaminate your food under certain circumstances.

6.1.10 Avoid plastic packaging

The production of plastic waste is one of our biggest environmental problems which we have to fight as humanity.

Plastic waste not only ends up in our ocean and leads to significant water pollution, it also contributes to global warming since a big fraction of plastic waste is burned, which leads to the emission of harmful greenhouse gases like carbon dioxide.

6.1.11 Reduce garbage production

In general, you should try to reduce your waste production in every part of your daily life whenever possible. Waste is quite harmful to our environmental system since the burning of waste leads to significant levels of greenhouse gas emissions. Moreover, the waste that ends up in landfills can lead to soil pollution and also to groundwater pollution. Making things worse, waste production in general implies the depletion of our natural resources.

Thus, make sure to reduce your waste production in your daily life.

There are numerous ways to do so. Just ask yourself what impact your behavior has on our environment.

This will be enough to determine if your waste production behavior is sustainable or if you should make changes in order to improve your ecological footprint.

Institute has already recycling paper waste by converting it into thawed paper & compressing to prepare usable items like pen stand & decorative pieces.

Recommendations:

- It is suggested to install separate waste bins for different wastes at different sections of the campus so that the ecological footprint of the college can be improved.
- Institute can set up a kitchen garden in the campus. this will lead to availability of fresh vegetables for the institute kitchen making it more sustainable and reducing the pollution cause due to vehicle engage in transportation of vegetable goods.
- Institute need to prepare environmental and sustainability policy showing their goals and objectives towards overall sustainable development.

CHAPTER 7 BIODIVERSITY STATUS OF THE CAMPUS

Government Raza P.G. College is situated in the vicinity of green area as well as agricultural areas rich in biodiversity. The institute has almost 70 % of its area covered with grass, shrubs, bushes, plants & large trees. 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 bio-diversity of an area so that the local people can be aware of the richness of bio-diversity of the place they are living in and their responsibility to maintain that richness.

In today's world, among the popular conservation measures which are taken to spread wildlife and environmental awareness, butterfly gardens can be placed in a significant position. To create butterfly garden, we need to know which associate plants and other fauna are present in the surrounding. This study allows us to understand the faunal and floral diversity of the surrounding areas of the college premises and their inter-relationship.

7.1 Objectives:

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

- Documentation of the floral diversity of the area, its trees, herbs, shrubs and climbers.
- Documentation of the major faunal groups like mammals, reptiles, amphibians, birds and butterflies.
- Documentation of the specific interdependence of floral and faunal life.

7.2 Method of Study:

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

1. Sampling was done mostly in random manner.
2. The total area was surveyed by walking at day time.
3. Surveys were conducted for the maximum possible hours in day time.

4. Tree species were documented through physical verification on foot.

5. 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.

6. 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.

7. Birds are often brightly colored, 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.

8. Reptiles were found mostly by looking in potential shelter sites like the under surface of rocks, logs, tree hollows and leaf litter and also among and underneath the hedges.

9. Amphibians act as potential ecological indicators. However, most of them are highly secretive in their habits and may spend the greater part of their lives underground or otherwise inaccessible to biologists. These animals do venture out but typically only at night. They were searched near pond, road beside wetland and in other possible areas. Diurnal search operations are also successful.

10. Active invertebrates like the insects require more active search. For larger

11. winged insects like butterflies, random samplings were carried and point sampling was also done.

12. The easiest way to observe many of the invertebrates is simply looking for them in the suitable habitat or microhabitat. Searching was carried out under stones, logs, bark, in crevices in the walls and rocks and also in leaf litter, dung etc. Slugs and snails are more conspicuous during wet weather and especially at night when they were found using a torch.

7.2.1 Faunal Species:

S. No.	Common name	Scientific name	Family
1	Common myna	*Acidotheres tristis*	Sturnidae
2	Jungle babbler	*Turdoides terricolor*	Timallidae
3	House sparrow	*Pesser domesticus*	Passeridae
4	House crow	*Cornus splendens*	Corvidae
5	Common hoopoe	*Upupa epops*	Upupidae
6	Greater coucal	*Centropus Sinesis*	Cuculidae
7	Indian pond heron	*Ardeola grayii*	Ardeidae
8	Rose ringed parakeet	*Psittacula krameri*	Psittacidae
9	Red-vented bulbul	*Pycnonotus cafer*	Pycnonotidae
10	Common kingfisher	*Alcedo bengalensis*	Akcedinidae
11	Black drongo	*Dicrurus Macrocercus*	Dicruridae
12	Indian palm squirrel	*Funambulus palmarum*	Sciuridae
13	Indian rat snake	*Pytus mucosa*	Colubridae
14	Plain tiger butterfly	*Danais chrysippus*	Nymphalidae
15	Common crow butterfly	*Euploea core*	Nymphalidae
16	Tawny coster butterfly	*Acraea violae*	Nymphalidae
17	Angled castor butterfly	*Ariadne ariadne*	Nymphalidae
18	Blue moon butterfly	*Hypolimnas bolina*	Nymphalidae
19	Diadem butterfly	*Hypolimnas missipus*	Nymphalidae
20	Common sailor butterfly	*Neptis hylas*	Nymphalidae
21	Spotted rustic butterfly	*Phalanta phalanta*	Nymphalidae
22	Baronet butterfly	*Euthalia nais*	Nymphalidae
23	Common evening brown butterfly	*Melantis leda*	Nymphalidae
24	Dark brand-bush brown butterfly	*Mycalesis mineus*	Nymphalidae
25	Lemon pansy butterfly	*Junonia lemonias*	Nymphalidae
26	Common jay butterfly	*Graphium doson*	Papilionidae
27	Common rose butterfly	*Pachliopta aristolochiae*	Papilionidae
28	Lime butterfly	*Papilio demoleus*	Papilionidae
29	Common mormon butterfly	*Papilio polytes*	Papilionidae
30	Three-spot grass yellow butterfly	*Eurema blanda*	Pieridae
31	Common grass yellow butterfly	*Eurema hecabe*	Pieridae
32	Common jezbel butterfly	*Delias eucharis*	Pieridae
33	Common emigrant butterfly	*Catopsilia crocale*	Pieridae
34	Motled emigrant butterfly	*Catopsilia pyranthe*	Pieridae
35	Cobra	*Naja Naja*	Elapidae
36	Frog	*Rana tigrina*	Ranidae
37	Common toad	*Bufo*	Bufonidae

S. No.	Common name	Scientific name	Family
38	Mangoose	*Herpestes*	Herpestidae
39	Monkey	*Macaca mulatta*	Cercopithecidae
40	Cat	*Felis catus*	Felidae
41	Dog	*Canis lupus*	Canidae
42	Serpent eagle	*Spilornis cheela*	Accipitridae
43	Kite	*Milus migrans*	Accipitridae
44	Yellow Oriole	*Oriolus oriolus*	Oriolidae
45	Cuckoo	*Cuculus canorus*	Cuculidae
46	Bushchat	*Saxicola rubicola*	Muscicapidae
47	Tit	*Parus major*	Paridae
48	Shelduck	*Tadorna tadorna*	Anatidae
49	Grasshopper	*Caelifera*	Acrididae
50	Earthworm	*Lumbricina*	Lumbricidae
51	Firefly	*Photinus*	Lampyridae
52	Spider	*Araneus*	Aranaeidae
53	Magpie	*Pica pica*	Corvidae
54	Dove	*Columbina passerina*	Columbidae
55	Rock pigeon	*Columba livia*	Columbidae
56	Moorhen	*Gallinula chloropus*	Rallidae
57	Fruitfly	*Drosophila*	Drosophilidae
58	Honeybee	*Apis mellifera*	Apidae
59	Termites	*Odontotermes*	Termitidae
60	Ant	*Lasius niger*	Formicidae

7.2.2 Floral Species (Pots):

S. No.	Common name	Botanical name	Family
1	Dumb canes	*Dieffenbachia Seguine*	Arecaceae
2	Dracaena Mahatma	*Dracaena*	Asparagaceae
3	Sansevieria Snake Plant	*Dracaena trifasciata*	Asparagaceae
4	Widow's Thrill	*Kalanchoe Brasiliensis*	Crassulaceae
5	Arrowhead Plant	*Syngonium Podophyllum*	Araceae
6	Snake plant	*Dracaena trifasciata*	Asparagaceae
7	Swampweeds	*Hygrophila Spinosa*	Acanthaceae
8	Christmas Tree	*Araucaria columnaris*	Araucariaceae
9	Red sanadalwood	*Petrocarpus Santalinus*	Fabaceae
10	Money plant	*Epipremnum aureum*	Araceae

S. No.	Common name	Botanical name	Family
11	Legacy Plant	*Aglaonema*	Araceae
12	Croton Gold Dust	*Codiaeum Variegatum*	Euphorbiaceae
13	Garden croton	*Codiaeum Variegatum*	Euphorbiaceae
14	Moses in the cradle	*Tradescantia Spathacea*	Commelinaceae
15	Dracaena	*Dracaena Fragrans*	Asparagaceae

7.2.3 Floral Species (Large Trees & Plants):

S. No.	Common name	Botanical name	Family
1	Neem	*Azadirachta Indica*	Meliaceae
2	Mango	*Mangifera Indica*	Anacardiaceae
3	Indian gooseberry/amla	*Phyllanthus Emblica*	Phyllanthaceae
4	Cluster fig/ gular	*Ficus racemose*	Moraceae
5	Brahmraksas/ Giant taro	*Alocasia macrorrhizos*	Araceae
6	Sacre fig/ peepal	*Ficus religiosa*	Moraceae
7	Banyan	*Ficus benghalensis*	Moraceae
8	Snake plant	*Dracaena trifasciata*	Asparagaceae
9	Guava	*Psidium guajava*	Myrtaceae
10	Money plant	*Epipremnum aureum*	Araceae
11	Jswant	*Hibiscus*	Malvaceae
12	Bael/bengal quince	*Aegle marmelos*	Rutaceae
13	Rose	*Rosa indica*	Rosaceae
14	Curry tree	*Murraya koenigii*	Rutaceae
15	Aloe vera	*Aloe Indica*	Asphodelaceae
16	Henna	*Lawsonia inermis*	Lythraceae
17	Mugna/drumstick tree	*Moringa oleifera*	Moringaceae
18	Jamun	*Syzygium cumini*	Myrtaceae
19	Vidya/thuja	*Thuja*	Cupressaceae
20	Canna plant	*Canna indica*	Cannaceae
21	Shankhpushpi plant	*Convolvulus prostratus*	Convolvulaceae
22	Sadasuhagan	*Catharanthus trichophyllus*	Apocyanaceae
23	Brahmi	*Bacopa monnieri*	Plantaginaceae
24	Indian rosewood	*Dalbergia sissoo*	Fabaceae
25	Pomegranate	*Punica granatum*	Lythraceae
26	Ashoka tree	*Saraca asoca*	Fabaceae
27	Shahtut/mulberry tree	*Morus alba*	Moraceae
28	Jasmine	*Jasminum sambac*	Oleaceae
29	Green tea plant	*Camellia sinensis*	Theaceae
30	Sevanti	*Chrysanthemum*	Asteraceae
31	Raatrani	*Cestrum nocturnum*	Solanaceae
32	Madagascar palmyra palm	*Borassus madagascariensis*	Arecaceae
33	Harsingar	*Nyctanthes arbor tristis*	Oleaceae
34	Semal-Red silk cotton	*Bombax ceiba*	Bombacaceae
35	Ashoka	*Polyalthia longifolia*	Annonaceae
36	Teak (sagaun)	*Tectona grandis*	Verbenaceae
37	Date Palm	*Phoenix sylvestris*	Arecaceae

S. No.	Common name	Botanical name	Family
38	Arjun	*Terminalia arjuna*	Combretaceae
39	Spurflower	*Coleus*	Lamiaceae
40	Monkey jack-fruit	*Atrocarpus lacucha*	Moraceae
41	Pink kaner	*Nerium*	Apocynaceae
42	Jamun	*Syzygium cumini*	Myrataceae
43	Bel	*Aegle marmelos*	Rutaceae
44	Paper mulberry	*Morus papyrifera*	Moraceae
45	Bitter leaf	*Vernonia amygdalina*	Asteracea
46	Copper leaf	*Acalypha wilkesiana*	Euphorbiaceae
47	Pinwheel flower	*Tabernaemontana*	Apocynaceae
48	Arabian Jasmine	*Jasminium sambac*	Oleaceae
49	Hemp	*Cannabis sativus*	Cannabaceae
50	Chaff flower	*Achyranthus*	Amaranthaceae
51	Cliver	*Galium*	Rubiaceae
52	Garden cress	*Coronopus*	Brassicaceae
53	False shamrock	*Oxalis*	Oxalidaceae
54	Sowthistle	*Sonchus*	Asteraceae
55	Carrot grass	*Parthenium*	Asteraceae
56	Pathari	*Launaea*	Asteraceae
57	Makoi	*Solanum nigrum*	Solanaceae
58	Pigweed	*Amaranthus*	Amaranthaceae
59	Coat-button	*Tridax*	Asteraceae
60	Punarnava	*Boerhaevia*	Nyctaginaceae
61	Floss -flower	*Ageratum*	Asteraceae
62	Ivy-gourd	*Coccinia cordifolia*	Cucurbitaceae
63	Katuk	*Sauropus androgynus*	Phyllanthaceae
64	Bhuiavla	*Phyllanthus amarus*	Phyllanthaceae
65	Bachelor's button	*Gomphrena*	Amaranathaceae
66	Indian birthwort	*Aristolochia ereantha*	Lamiaceae
67	False mallow	*Malvastrum*	Malvaceae
68	Kanghi	*Abutilon indicum*	Malvaceae
69	Litchi	*Litchi chinensis*	Sapindaceae
70	Manila tamarind	*Pith ecellobium*	Fabaceae
71	Golden shower tree	*Cassia fistula*	Fabaceae
72	Molshree	*Mimusops elengi*	Sapolaceae
73	Frangipani	*Plumeria*	Apocynaceae
74	Meswak	*Salvadora*	Salvadoraceae
75	Spider lily	*Crinum*	Amaryllidaceae
76	Sago palm	*Cycas*	Cycadaceae

S. No.	Common name	Botanical name	Family
77	Orange jasmine	*Murraya paniculata*	Rutaceae
78	Squirrel's tail	*Justicia*	Acanthaceae
79	Pink pixie paper flower	*Bougainvillea*	Nyctaginaceae
80	River red gum	*Eucalyptus*	Myrtaceae
81	Periwinkle	*Vinca rosea*	Apocynaceae
82	Spiderwort	*Tradescantia*	Commelinaceae
83	Guduchi	*Tinospora*	Menispermaceae
84	Bottle brush tree	*Callistemon*	Myrtaceae
85	Lemon	*Citrus limon*	Rutaceae
86	Senna	*Cassia offinalis*	Fabaceae
87	White Fig	*Ficus virens*	Moraceae
88	Ber	*Ziziphus*	Rhamnaceae
89	Rose	*Rosa rubiginosa*	Rosaceae
90	Beggar's Tick	*Biden pilosa*	Asteraceae
91	Bermuda grass	*Cynodon*	Poaceae
92	Spider plant	*Chlorophytum*	Asparagaceae
93	Croton	*Codiaeum variegatum*	Euphorbiaceae
94	Crown of thorns	*Euphorbia milli*	Euphorbiaceae
95	Areca palm	*Dypsis lutescens*	Aracaceae
96	Jungle geranium	*Ixora*	Rubiceae
97	Ratanjyot	*Jatropha*	Euphorbiaceae
98	Cypress	*Cupressus*	Cupressaceae
99	Castor	*Ricinus communis*	Euphorbiaceae
100	Arrowroot	*Canna*	Cannaceae
101	Buttercup	*Ranunculus*	Ranunculaceae
102	Common chickweed	*Stellaria media*	Caryophyllaceae
103	Blue pimpernal	*Anagallis arvensis*	Primulaceae
104	Spiderweed	*Cleome*	Capparaceae
105	False amaranth	*Digeria muricata*	Amaranthaceae
106	Bhringraj	*Eclipta alba*	Asteraceae
107	Sheild Dapperling	*Lepiota cristata*	Agaricaceae
108	Mushroom	*Agaricus*	Agaricaceae
109	Umbrella polypore	*Polyporus*	Polyporaceae
110	Shiashkanta	*Mimosa rubicaulis*	Fabaceae
111	Cockscomb	*Celosia*	Amaranthaceae
112	Prickly Poppies	*Argemone maxicana*	Papaveraceae
113	Life plant	*Bryophyllum*	Crassulaceae
114	Madwoman's milk	*Euphorbia heloscopia*	Euphorbiaceae
115	Rain lily	*Zephyranthus*	Amaryllidaceae

S. No.	Common name	Botanical name	Family
116	Golden reishi	*Ganoderma*	Ganodermataceae
117	Butterfly pea	*Clitoria ternatea*	Fabaceae

CHAPTER 8 RECOMMENDATIONS

- It is suggested to install separate waste bins for different wastes at different sections of the campus so that the ecological footprint of the college can be improved.
- Optimize water flow in hand washing and other taps
- Enhance Training and awareness of the employees at all levels and placing 'water saving' posters/slogans at various locations:
- Water quality parameters should be checked on an interval of 6 months by competent preferably PWD or NABL certified laboratory.
- Install water flowmeters, preferably mechanical type & maintain existing water flow meters
- Install tank banks in existing water flush tanks to avoid wastage of water in flushing.
- Maintain logbook of daily groundwater abstraction
- The college campus is well bio-diversified, medicinal plantations are there too in the campus. Plantation of fruit plants will attract more birds.
- Explore the possibility of installing waterless urinals for reducing the ground water consumption.
- Explore the possibility of Installing a sewage treatment plant for waste water recycling. The quantum of sewage to be treated is quite considerable. The treated water can be reused for gardening & flushing. Moreover, sewage treatment & reuse is an environmental best practice.
- Install vermicompost pits for composting, it will provide nutrient rick compost for the plants & trees within the campus.
- There is need to form a green monitoring committee. The priority of this body is to maintain the greenery of the college campus.
- The green monitoring team should consist of members from teaching staffs, non-teaching staffs, and students and if possible, try to include some local interested people also.
- Improve the Sustainable use of resource and ecology balance of the college campus must be maintained through the year.
- Sound and air quality monitoring should be done on regular basis.
- The prolific use of insecticides/pesticides should be checked as these harmful chemicals are detrimental and instrumental for killing of insects/butterflies which are

natural prey for the birds.

CHAPTER 9 CONCLUSION

This audit involved extensive consultation with all the campus team, interactions with key personnel on wide range of issues related to Environmental aspects. has Environmental Committee for sustainable use of resources. The audit has identified several observations for making the campus premise more environment friendly. The recommendations are also mentioned with observations for campus team to initiate actions.

The audit team opines that the overall site is maintained well from environmental perspective. There are no major observations but few things are important to initiate urgently are waste management records by monthly inventory of waste, rainwater harvesting recharge; water balance cycle and periodic inspection of buildings housekeeping and environment policy.

CHAPTER 10 TRANSPARENCY OF GREEN AUDIT REPORT

Green Audit report of College/Universities is one of the useful means of demonstrating organization/Institution's commitment to openness and transparency. If an Institute believes it has nothing to hide from its stakeholders, then it should feel confident enough to make its Green Audit reports freely available to those who request them. As a basic rule, Green Audit reports should be made available to all stakeholders.