Environment & Green Audit

Report of

Quantum University, Mandawar, Roorkee (Uttarakhand)

Prepared and Submitted By

Innovative Energy Conservation Solutions

IECS

10/9/2022

Registrar
Quantum University

INNOVATIVE ENERGY CONSERVATION SOLUTIONS

A: 205, Eco Towers, Shivalik Enclave Sector 125, Greater Mohali-140301
E: Pankaj@iecsolutions.in
T: +91-9685613238

DATE
October 10, 2022
PLACE OF WORK: CHANDIGARH

Energy, Environment & Green Audit Certificate

Is Issued To

Quantum University, Mandawar, Roorkee (Uttarakhand)

for successful completion of Energy, Environment & Green Audit of the University for the Period FY 2022-23, conducted by **M/s Innovative Energy Conservation Solutions.** This Energy, Environment & Green Audit included Sectoral Audits in the reports i.e., Water, Energy, Waste cum Material, Air Quality & Noise, Bio-diversity, outdoor environment, Health & well-being, Activities and Institutional management aspect cover.

The University is certified to have done exceptionally well to conserve energy, environment and ensuring sustainable development for the assessment period.

Duration of Audit: Oct-22
Date of Issue: 10/09/22

Innovative Energy Conservation Solutions

Thank You

Registrar
Quantum University

www.iecsolutions.in
Pankaj Bhate

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ACKNOWLEDGEMENT

We extend our sincere thanks to the management of Quantum University, Mandawar, Roorkee for taking up the initiative to conduct Quality Audits of Environment & Green Audit. We appreciate the co-operation extended to our team for the completion of study.

We hereby express our sincere thanks to **Quantum University, Mandawar, Roorkee** for their proactive support and courtesy extended to the IECS team during field study. We also thank other officials from **Quantum University, Mandawar, Roorkee** for their cooperation and support provided during data collection. We are also grateful to all those we interacted with, during the audit who gave us some operational insights.

We hereby submit the Environment & Green Audit Report for your reference.

Innovative Energy Conservation Solutions
Proprietor
#303, Eco Tower
Shivalik Enclave Khanar
Sector 125, Punjab- 140301

Registrar
Quantum University

AUDIT PARTICIPANTS

On behalf of university:

Name	Position/Department
Mr. Karan Babbar	Civil and engineering Dept.

On behalf of IECS

Name	Position	Qualification
Mr. Khalid Khan	Consultant	M. Tech in Energy & Environmental Studies B. Tech Mechanical Engineering Certified Energy Auditor
Mr. Pankaj Dhote	Consultant	M. Tech in Energy & Environmental Studies B. Tech Electrical Engineering Certified Energy Auditor CEA-28926
Mr. Yashul Dehariya	Consultant	M. Tech in Energy & Environmental Studies B.Tech. Mechanical Engineering
Mr. Vishal Dhiman	Associate	B.Tech Electrical Engineering

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CHAPTER 1 INTRODUCTION

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 University which will lead to sustainable development. Quantum University, Mandawar, Roorkee 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 University 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 initiatives adopted by the institution, it works on several factors 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 follow the applicable regulations, policies, and standards. It can make a tremendous impact on students' health and learning, University 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 University.

An Environment and Green Audit is the first step to reducing a building's water, waste, energy and carbon footprint and environmental impact. The analysis of the consumption of water and energy as well as the generation of waste is used to provide recommendations on solutions such as rainwater harvesting, water and waste management, and energy management including the addition of renewable energy. The objective of the Environment Audit is to transform to be self-reliant and self-sustainable in water and energy and create a zero-waste campus.

Upcoming and future regulations for buildings will require to following of green norms and energy-efficient measures including the Energy Conservation Building Code (ECBC). Hence, Environment Audits will help buildings to achieve the norms.

Through the audit report, our endeavor is to provide cost-effective and long-term solutions in a continuous process of conservation of resources. The data collected over a period of an audit duration has been presented through appropriate visual representations for easy understanding of the technical information. Glossary, abbreviations, units of measurement and references are provided for those who are further interested.

This Environment and Green Audit Report is meant for academic and research purposes only. For legal issues, a separate study is required, and hence the results of this report cannot be used as evidence for any legal case within India or abroad.

CHAPTER 2 OBJECTIVE, SCOPE & METHODOLOGY OF THE STUDY

2.1 Objective of Environment and Green Audit

- To understand the awareness of employees and learners towards environmental conservation
- To recognize the initiative taken by organization towards environmental conservation
- To understand and recognize the effects of an organization on the environment and vice versa
- To ensure that the natural resources are utilized properly as per national policy of environment
- To study waste minimization and safe disposal of waste particularly hazardous wastes
- Initiatives for water conservation & its management
- Contribution and participation by various stakeholders in the environmental conservation and management
- To diagnose and find out solutions for the environmental problems
- To facilitate the stakeholders with different aspects of waste management

2.2 Scope of Work

- Water Consumption & Management
- Waste Management System
- Outdoor Environment -AQI
- Noise Level Survey
- Carbon Footprint Auditing
- Health and Wellbeing Assessment

2.3 Methodology

Table 1: Methodology adopted to conduct environment and green audit

Step	Objective	Activities
Step 1	Audit of historical data	Review of previous records and policies. This was carried out in order to understand the various initiatives taken by the university towards sustainable environmental conservation and amelioration. For the purpose, office registers, visitor's book, purchase registers, office communications, policy level documents of AC/ EC were also examined. Further, the published material such as prospectus, university annual reports, bulletins, and other magazines were also studied by the audit team for getting information / data on the target aspects.
Step 2	Screening survey or walk-through audit	Two walk-through Audits were conducted by the Team which were followed up by a few more visits to review the accuracy of data. The team went to each department, centers, Library, canteen etc. Data about the general information was collected by observation and interview. Special guided visits of the campus were conducted along with University Team and his team of teachers, non-teaching staff. This was preliminary data collection phase communicating with the management of the details of Building drawings analysis, utility bills analysis, various environment management plan etc.
Step 3	On-site investigations	Inspection of site for water, waste, and environment information. Detailed Measurements conducted for all electrical and electro- mechanical devices including lights, fans, motors, pumps, ACs, water equipment. Verification of online data submitted through ground survey and observations Measurement &Inspection of water, waste and environmental issues including flooding, storm water system.
Step 4	Data Analysis	The collected data was analyzed and visually represented using pie-charts, bar graphs, tabulations in each of the audit areas. They were assessed against existing benchmarks and

Step	Objective	Activities
		standards. Details of Recommendations were formulated for the University to continue the ongoing journey of sustainable ECO campus.
Step 5	Documentation and Report	Preparation of detailed report with documentation, calculation and all technical information, summary, and recommendations

CHAPTER 3 ABOUT THE UNIVERSITY

Quantum University is a private university in Uttarakhand, India. The University was earlier known as Quantum Global Campus Roorkee. The University campus is in the town of Roorkee with its corporate office in Dehradun. Quantum University Roorkee was founded in 2017 by industrialist Shri Shyam Sunder Goyal. The core programs initially offered by the University were in the disciplines of Engineering and Management. In 2018 the university started programs in Graduate Studies.

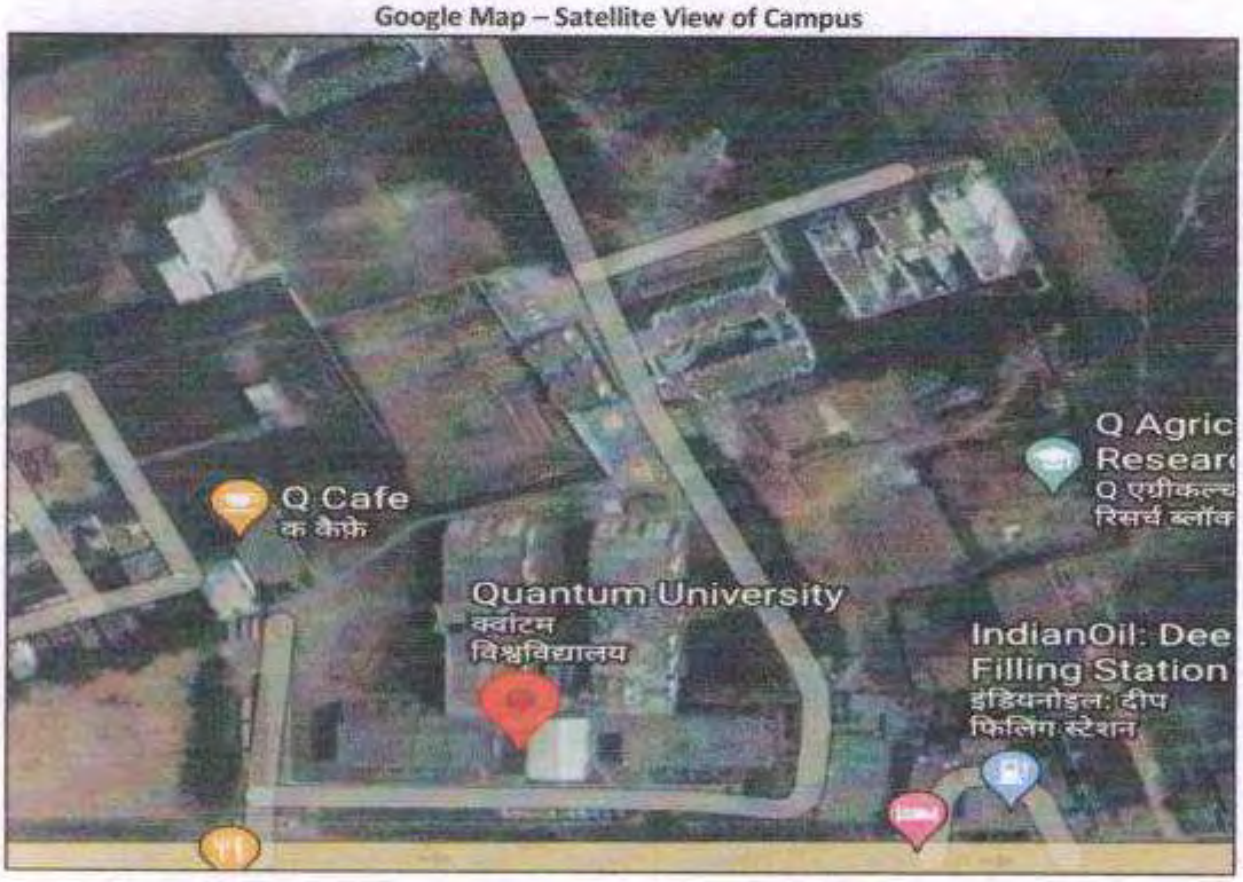
The University is located outside the town of Roorkee on the Roorkee-Dehradun Highway. Well connected through road network of Delhi to Dehradun. Neatest Railway station is Saharanpur (30 Min) in UP and Roorkee (30 Min) in Uttarakhand. Nearest Airport is Jolly Grant (45 KM) Dehradun. Quantum University has Three boys' hostels (1200 seats) and One Girl Hostel (600 Seats). The campus spreads over an area of 30 acres.

The university is approved by the Government of Uttarakhand and by the University Grants Commission (UGC)

Quantum University provides undergraduate, postgraduate, and integrated courses, as well as diploma programmes, through the following schools and departments: It specialised in IR4.0 Based technology having world class infrastructure in Cyber Security, AI&ML, Data Analytics, Robotics, IoT, Electrical Vehicle Technology, Smart Agriculture, IT Enablement in Management specially CRM and Finance, Graphic Design and VFX. The university enjoys technological support from leading giants like Xebia, Palo alto, Certiport US, Salesforce, Automation Anywhere, Microsoft, Oracle, Amazon etc. The details of the courses offered are as follows-

1) School of Technology
    a) Department of Engineering
    b) Department of Computer Applications
2) School of Business
3) School of Graduate Studies
    a) Department of Commerce & Finance
    b) Department of Sciences
    c) Department of Humanities & Social Sciences
4) School of Agricultural Studies
5) School of Media Studies & Design
6) School of Health Sciences
7) School of Hospitality & Tourism
8) School of Law

Google Map – Satellite View of Campus



CHAPTER 4 ENVIRONMENT AUDIT

4.1 Water Consumption & Management

Water audit is a systematic process of objectively obtaining a water balance of the Unit by measuring flow of water from the source of water withdrawal or treatment, through the distribution system, and into areas where it is used, treated, and finally discharged or re-used.

4.1.1 Objectives of Water Audit

Conducting a water audit involves calculating the existing water use and water balance, and then identifying and prioritising the options for saving water to achieve an improved water balance within a defined time period.

A detailed description of the current and the achievable water balance is an important deliverable of the Water Audit Report. This includes assessing the water quantity and quality at various user points which are mapped to assist in developing reduction, recycle and reuse opportunities.

4.1.2 Methodology followed for conducting water system study

Step 1: Reconnaissance or Walk-through survey to Understanding of existing water sourcing, storage, and distribution facility. Assessing the

- water consumption
- water quality
- water treatment
- water discharge
- Water Monitoring
- re-use pattern

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

Step 3: Site Water Audit 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 Analyser etc.

Step 4: Conduction of Detailed Water Audit & Measurements

Step 5: Preparation of Water Audit Report with Sustainable Water Management Plan

4.1.3 Existing Scenario:

The University has 2 borewells for fresh water supply & consumption of about 310 KLD for domestic use like drinking, hand washing, canteen, flushing etc. It is observed that the supply water is of good quality and used in all areas of university for domestic activities.

- In India, the design of water supply systems has been done using certain standards. Currently the standard being used is NBC, 2016. This specifies a consideration of use of the following:
- For communities with a population of between 20,000 to 100,000 @ 100 to 135 liters per head per day (Max. 135 lpcd has been considered).
- Persons working in normal working hours i.e., Staff @ 45 liters per head per day
- Visitors in the University @ 15 liters per head per day

The details of the residents living in Campus (Day and Night) are as per Table2.

Thus, total maximum permissible water Consumption as per Standards laid as per NBC, 2016 is given in Table below

Table 2: Total permissible water Consumption as per Standards laid as per NBC, 2016

Sl. No.	Particulars (Per day)	Nos.	Maximum water consumption per Person per day (Liters)	Total Maximum water consumption Liters per Day
1	Nos. of full-time residents in University Campus		135	
2	Nos. of Day time persons (Students and staff)		45	
3	No of Visitors		15	
	Grand Total			

An attempt was made as per NBC, 2016 to understand the demand of water supply and waste water generated.

Annual Average Water Intake per day = 310 KL/Day out of which Approx 29-30 KL/days was used in plantation and rest 280 KL/Day used for domestic consumption.

Actual Water Demand = 310 Kilo Liters Per day

Existing water consumption is on the higher side against the standard water consumption but University is very concern and working in water conservation activities to reduce LPCD.

Waste Water Generation = 80% water consumption= 248 kilo liters per day.

4.1.4 Water Storage Profile

University has 57 overhead water storage tank to meet the daily water needs. The details of tanks are as follows.

Table 3: Water Storage capacity details of university

Area/Tank Water Capacity in Litres	Water Tanks & their capacities
A Block	4 Nos X 8000 Litres
B Block	4 Nos x 8000 Litres
C Block	1 Nos x 2000 Litres
D Block	2 Nos x 3000 Litres
Health Science Laboratory	1 Nos x 2000 Litres
Mess	4 Nos x 800 Litres
L.M.D.	1 Nos x 2000 Litres
Canteen	3 Nos x 3000 Litres
Hostel 1	9 Nos x 1800 Litres
Hostel 2	9 Nos x 1800 Litres
Hostel 3	3 Nos x 6000 Litres
Girls Hostel	14 Nos x 1800 Litres
Guest House	2 Nos x 4000 Litres

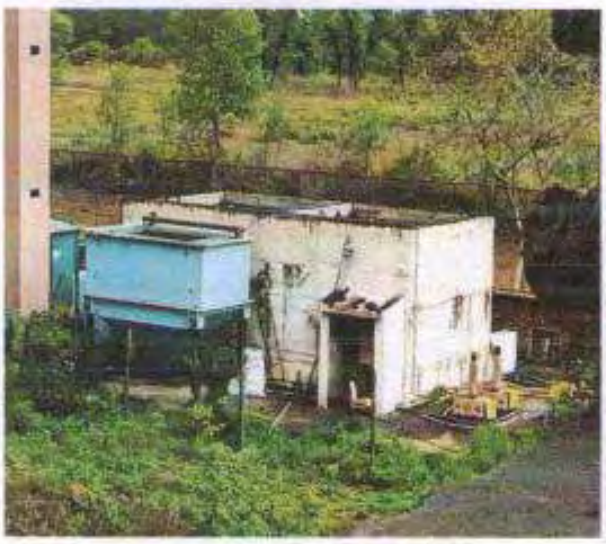
4.1.5 Management & Conservation of Water Resources

- The University has taken several initiatives for management & conservation of water resources such as installing posters of water conservation at various locations.
- The university having World Water Day Celebration at inside and outside of campus to awareness water conservation importance

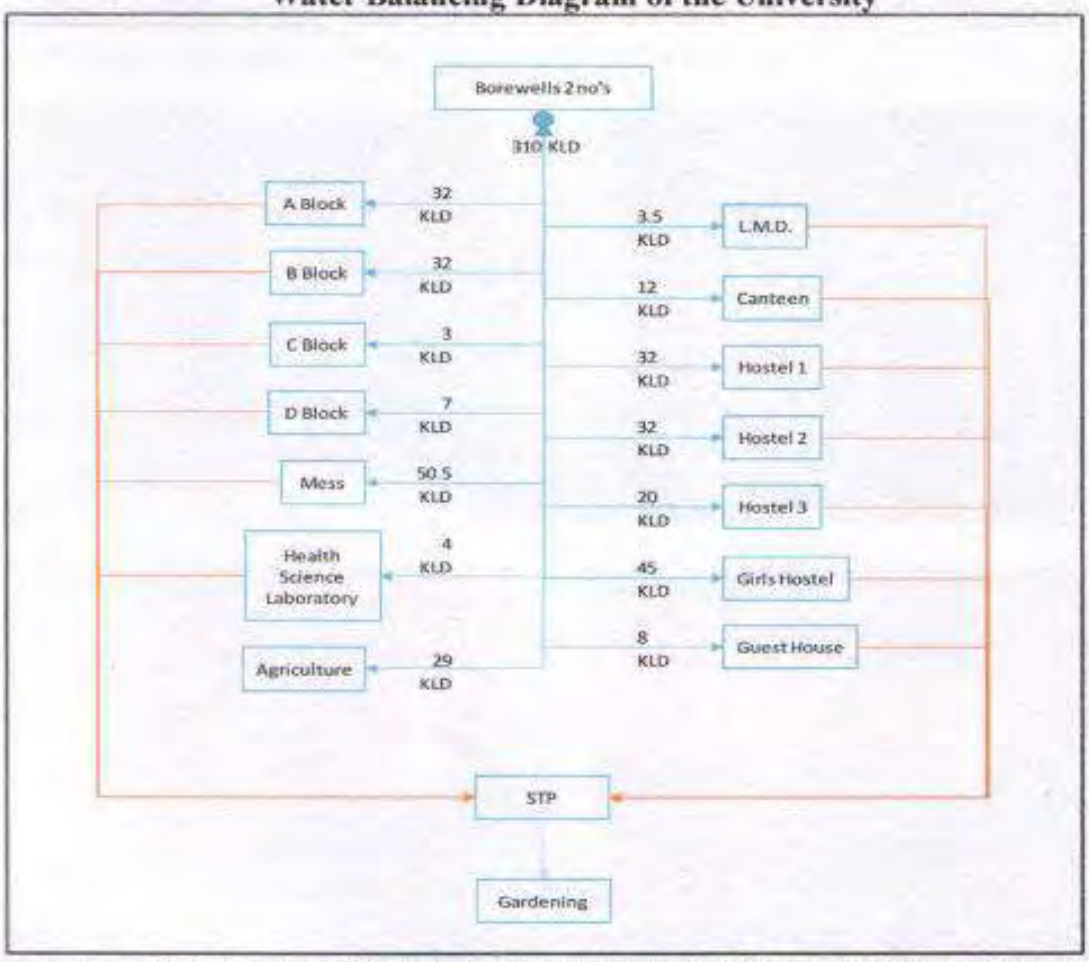

विश्व जल दिवस (World Water Day)
जल संरक्षण जागरूकता कार्यक्रम


विश्व जल दिवस (World Water Day)
जल संरक्षण जागरूकता कार्यक्रम

- Water quality parameters have been tested in the health science laboratory on a regular basis.
- University having Rain Water harvesting system installed
- Sewage treatment plant has been installed for waste water treatment & it has been reused in gardening



Water Balancing Diagram of the University



It should be noted that the water flow meters are not installed on the borewell pipelines as well as at the other sections. The balancing is prepared according to the running hours of the borewell pumps & on the occupancy.

4.1.6 Recommendation

- **Reduce Water consumption in Toilets for flushing.**
  Flush tank capacities are about 6-10 liters/flush. Use tank bank in existing flush tanks to reduce 2-3 liters water per flush or install water efficient cistern/flush tank with capacity 3/6 liters per flush.

  It is suggested to install following water efficient fixtures in the buildings to save domestic water consumption. Overall, 15-20% domestic water consumption will be reduced by installing and maintaining suggested fixtures:

- **Retrofit flow restrictors in hand washing taps and other taps:**

  Retrofit high flow rate hand washing taps with 'aerators and flow restrictors' to have 3-5 lpm flow rate in hand washing taps and 7 lpm flow rate in pantry and other taps in the buildings. Water flow rates in hand washing taps vary from 1.5 to 12 lpm; however, about 25 % sampled taps have flow rates > 5 lpm as shown in table below. Although University have optimized the water flow in handwashing taps in the common hand wash area of unit by installing foot operated taps where the flow in taps is > 5lpm. Similarly, it is suggested to install flow restrictors in the hand washing taps of the other University 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.

- **Arrest Leakages in urinals, pipelines as well as handwashing & drinking water taps to avoid wastage of fresh water.**

  A lot of leakages were found in various sections, due to these leakages fresh groundwater is being wasted. It is recommended to arrest these leakages in various sections.

Leakage in borewell pipelines & urinals

Leakage & overflow in drinking water tank

- **Stop use of fresh water in toilet flushing, instead use recycled, treated wastewater or raw water.**

  It is suggested to use low quality water for flushing instead of good quality filtered water.

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

  It is suggested that the University 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. This will create awareness & sense of

responsibility among staff/employees/visitors.

- **Maintain logbook of daily Inlet Water from Municipal corporation**

The University is suggested to continue record the water consumption data by maintaining logbook. The following format may be used for maintaining and recording the meter data on daily basis:

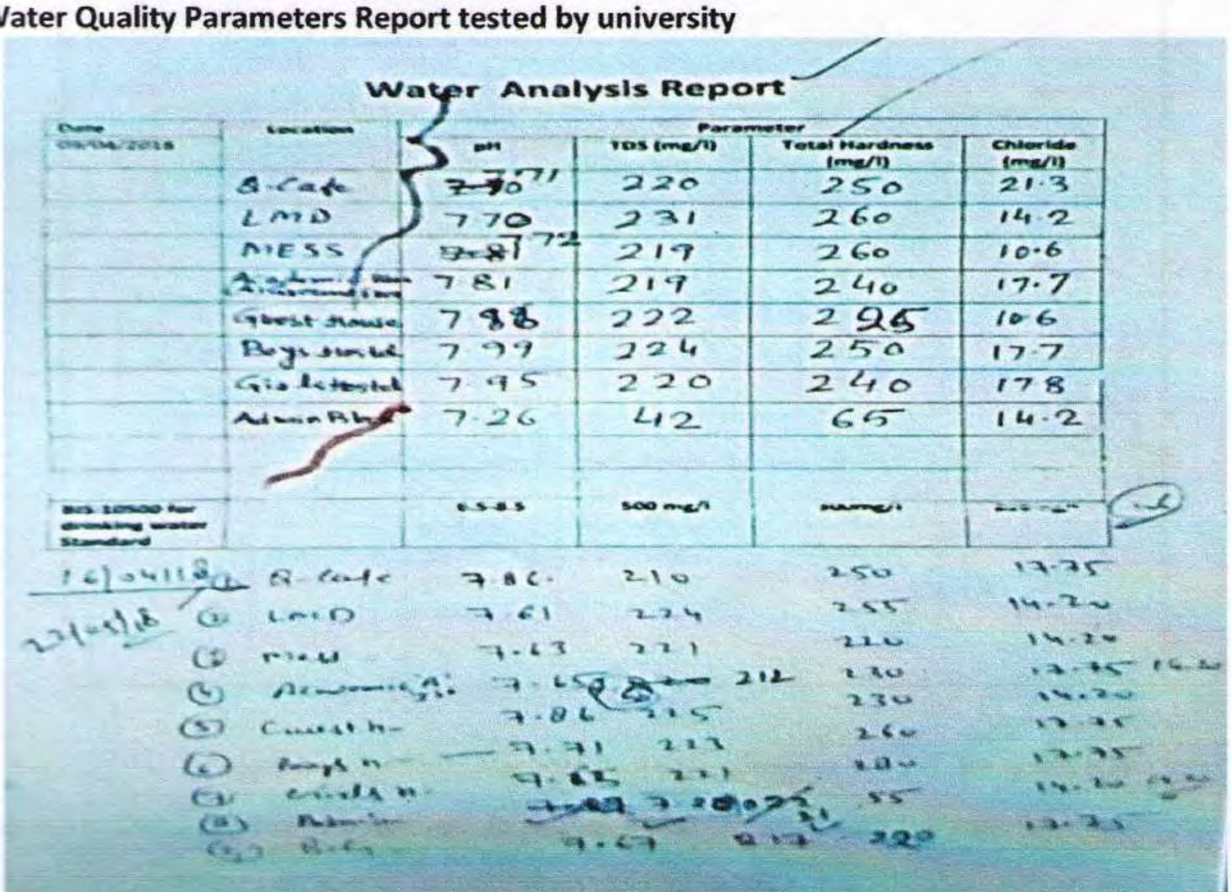
Format for maintaining logbook for water meters

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

- Automatic switching system is not installed for pump sets used for overhead tank filling. We recommend to install automatic switching of pump based on the tank level to reduce excess operation of pump & avoid the over flow of water.

- At present the water quality parameters are checked inside the university premises by the life sciences laboratory. Quality of water in terms of fresh water supply and domestic and effluent discharges need to check periodically by NABL and MoEF & CC approved laboratory.

Water Quality Parameters Report tested by university



Water Analysis Report

Date	Location	pH	TDS (mg/l)	Total Hardness (mg/l)	Chloride (mg/l)
[illegible]	B-Cafe	7.71	220	250	21.3
	LMD	7.70	231	260	14.2
	MESS	7.72	219	260	10.6
	[illegible]	7.81	219	240	17.7
	Guest House	7.88	222	295	10.6
	Boys Hostel	7.99	224	250	17.7
	Girls Hostel	7.95	220	240	17.8
	Admin Blk	7.26	42	65	14.2
BIS 10500 for drinking water Standard		6.5-8.5	500 mg/l	[illegible]	[illegible]

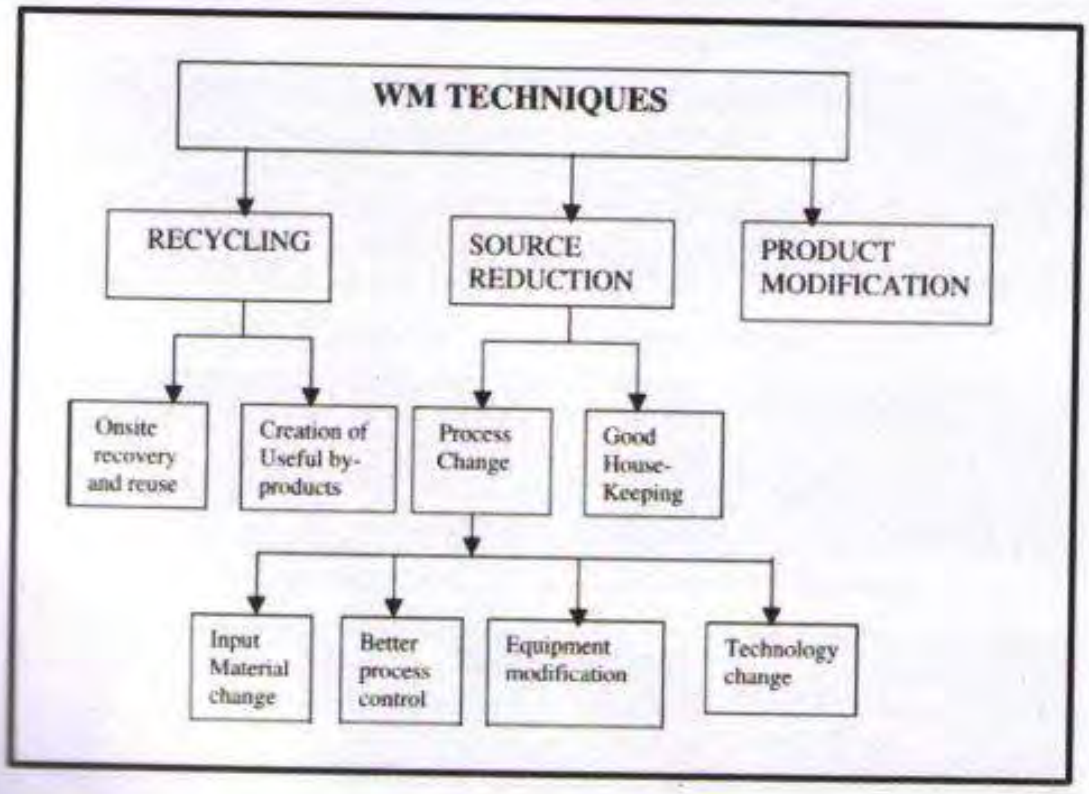
4.2 Waste Management System

4.2.1 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.

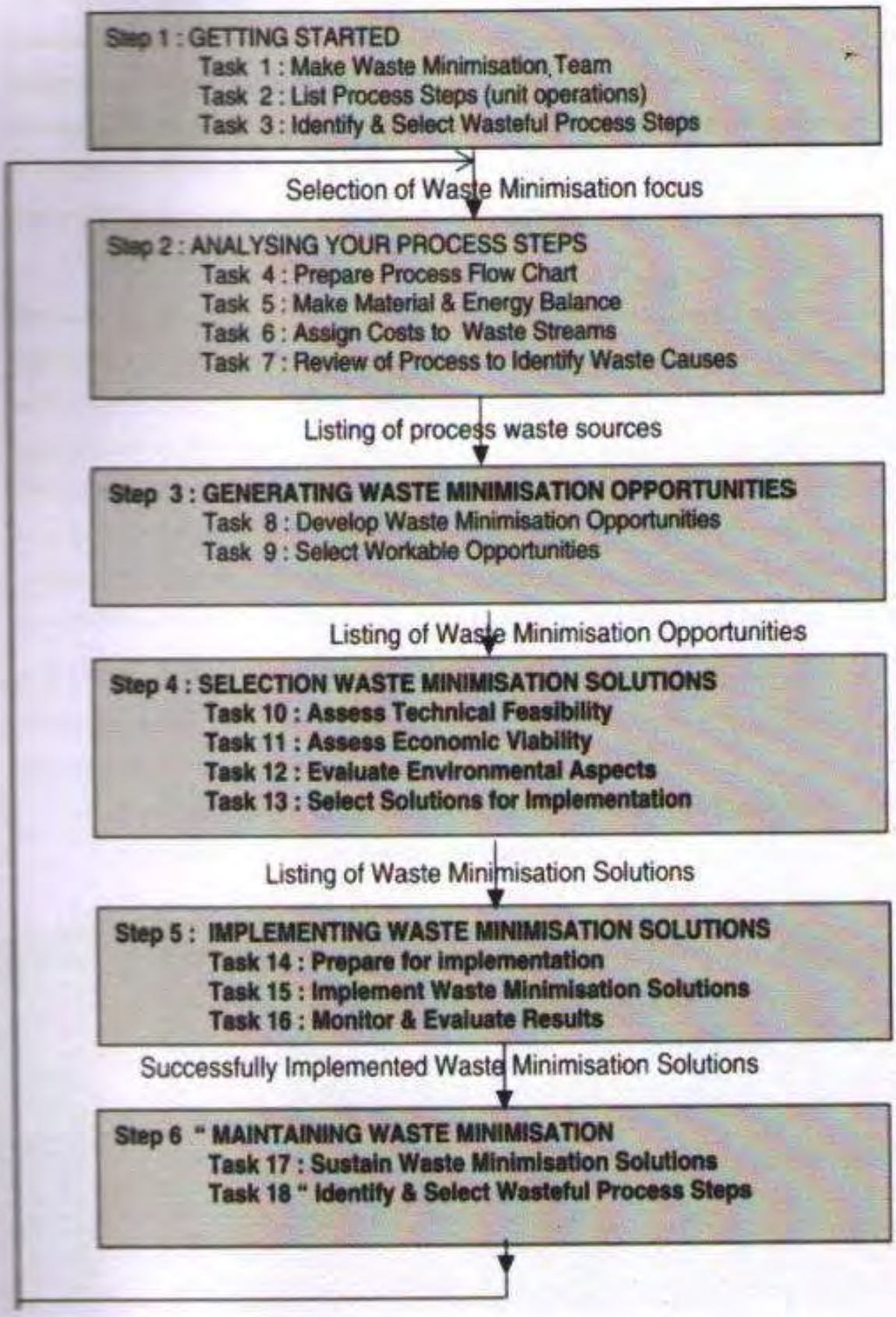
Waste can be solid, liquid, or gas, each type has different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological, and household. In some cases, waste can pose a threat to human health. Waste is produced by human activity, for example, the 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 all can take different approaches.



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. University has employed waste bins for proper segregation of solid wastes in the campus.

Stepwise strategies for implementation of waste management system



4.2.2 Existing Scenario:

The Institution has taken up various initiatives to maintain an environment friendly campus by considering the management of the *degradable and non-degradable waste*. The Institution implements effective waste management through waste segregation, reusing and recycling of the waste. Students and faculties actively involved by knowing their perspective about the waste management techniques in the campus.

University further encourages environment friendly practices mentioned as follow:

- **Solid waste management**

The wastes generated in the University is segregated on daily basis as wet and dry waste in green and blue colored dust bins respectively, installed at different places, however no data is available with university regarding the quantity of waste (Biodegradable, Non-biodegradable, and E Waste) generated in the University.

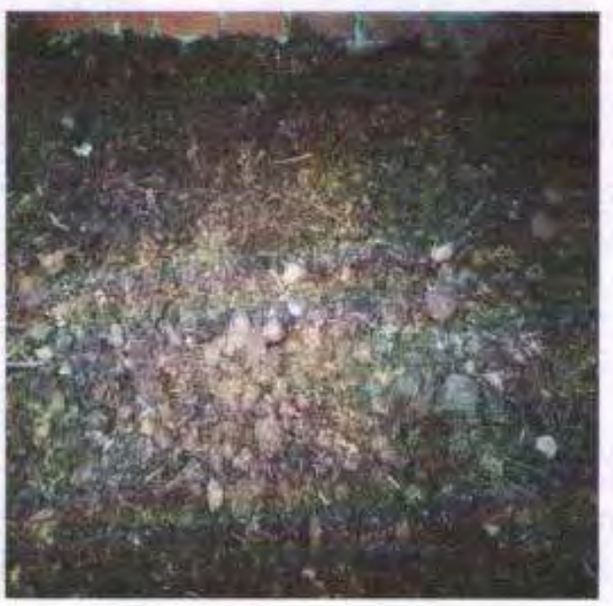
The University has kept 2 different colored dustbins (i.e., Blue & Green) for collecting waste from all around the University campus & hostels. Dry waste like plastic bottles, paper, cardboard etc. is segregated and collected in blue dustbins, wet waste like organic waste or kitchen waste such as vegetable peels, left-over food etc. is segregated and collected in green dustbins.

Colour coded dustbins for example black for domestic hazardous waste, blue for dry waste /recyclable waste, green for wet waste/ biodegradable waste have been arranged in the University for the waste collection.

- Proper segregation of waste as per the type of waste (Biodegradable and Non- Bio degradable) is being done in the University campus.

Various eco-friendly approaches were used throughout the year. Special efforts were put in by the University for reusing and recycling wastes. Various compost Pits were dug in inside campus and segregation of wet & dry waste and then finally to compost which is being used in college biodiversity.



- University has in house canteen & mess which generates household & kitchen waste. For wet waste i.e., the food waste disposal the university has tie-ups with nearby piggeries. It was observed that a lot of food is wasted by the students in mess. About 20-25 kg/day waste is generated in the canteen & about 95 kg/day is generated in mess

Waste Management through Recycling and Reusing

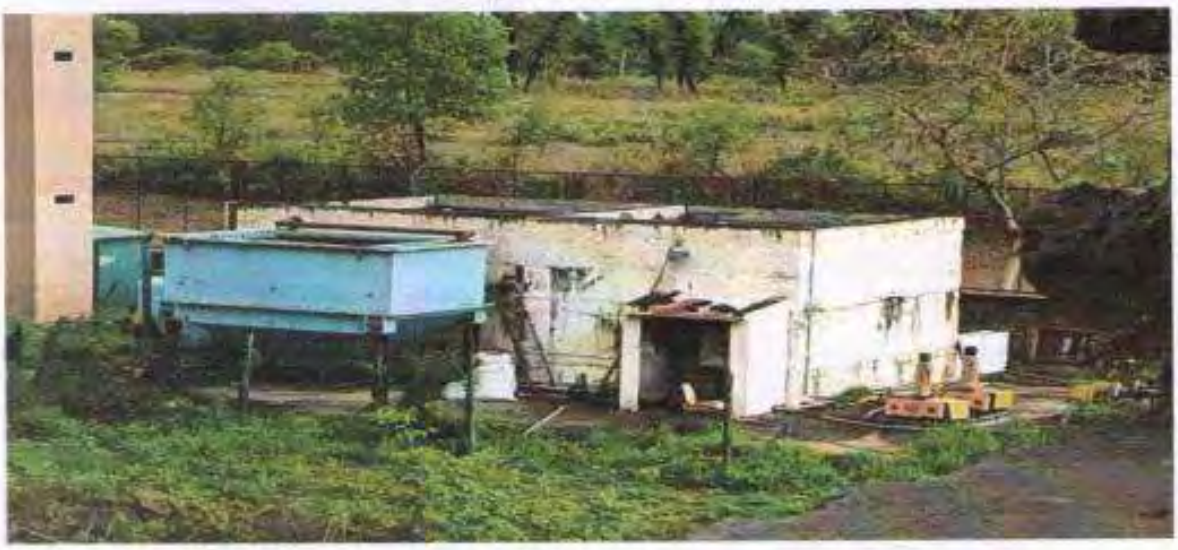
University undertakes following sustainable campus initiatives regarding solid waste management:

- Old/ used papers were collected and reused in printing for internal work.

Liquid waste management

- Institution also conducts discussions with students, teaching, and non-teaching staff to make them aware about the liquid waste management techniques and reduction methods.
- The University has numbers of grounds and lawns to be irrigated. A huge quantity of water is required to irrigate them through normal water pipe system. University uses the tertiary water for the irrigation supplied by the existing STP.

Sewage treatment Plant



The overall scheme would comprise of Bar Screen, Oil& Grease tanks MBBR Reactor, Compact Sewerage Treatment Plant (Tubedek Media, Fab Media), Activated Carbon filter, Sand filter, High efficiency fine pore diffusers diffused aeration system.

UNIT DESCRIPTION

BAR SCREEN CHAMBER

The function of the bar screen is to prevent entry of solid particles above a certain size: such as plastic cups, paper dishes, polythene bags, etc. into the STP. (if these items are allowed to enter the STP, they clog and damage the STP pumps, and cause stoppage of the plant.) The screening is achieved by placing a screen made from vertical bars, placed across the sewage flow. The gaps between the bars may vary between 10 and 25 mm. STPs may have two screens: A coarse bar screen with larger gaps between bars, followed by a fine bar screen with smaller gaps between bars. If this unit is left unattended for long periods of time, it will generate a significant amount of odor: it will also result in backing of sewage in the incoming pipelines and chambers.

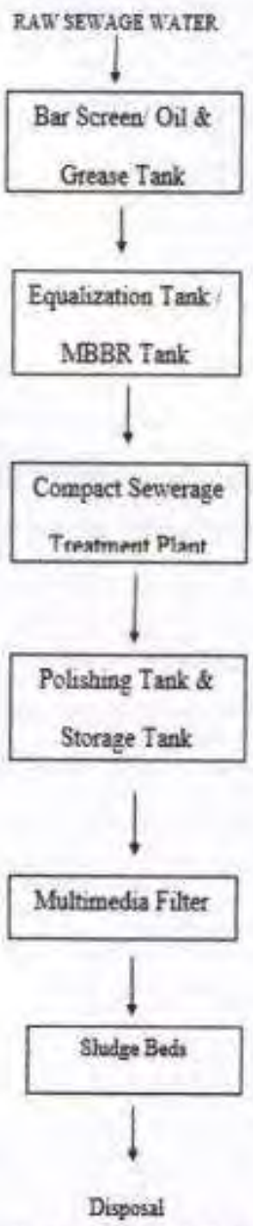
OIL AND GREASE TRAP

The oil and grease trap are placed at the discharge point of the canteen/ kitchen area itself to arrest

solid and fatty matter at source or it is placed after screen chamber so as prevent the fatty matter to enter Equalization chamber. The wastewater output from this unit is taken to the equalization tank. The solids and fats that are separated in this unit are disposed of along with other biodegradable waste, and can be used as feed for piggeries.

The use of skimmers in industrial applications is often required to remove oils, grease, and fats prior to further treatment for environmental discharge compliance. By removing the top layer of oils, water stagnation, smell and unsightly surface scum can be reduced. Placed before an oil water treatment system an oil skimmer may give greater overall oil separation efficiency for improved discharge wastewater quality. It should be noted that all oil skimmers will pick up a percentage of water with the oil which will need to be decanted to obtain concentrated oil. Separating grease from the wastewater at source ensures that the contact time between solids and wastewater is kept to a minimum, so that the wastewater does not absorb additional organic pollutant loads (starch, carbohydrates, proteins) due to leaching of these substances from the solids. (Rather than building a larger STP to digest this extra organic matter, it is far more economical to prevent the organic matter from entering the STP.)

STP block Diagram and Capacity



COLLECTION CUM EQUALIZATION TANK

The sewage from the bar screen chamber and oil, grease and grit trap come to the equalization tank. The equalization tank is the first collection tank in an STP. Its main function is to act as buffer: To collect the incoming raw sewage that comes at widely. Equalization tank is used only for buffering the daily fluctuations in the sewage flow quantity. The equalization tank must be of sufficient capacity to hold the peak time inflow volumes. Equalization tank with a capacity to hold 4-6 hours of average hourly flow should be

adequate.

SEWAGE LIFT PUMPS

Sewage transfer pump is use to lift sewage from equalization tank to anoxic chamber. Its typical pair of pumps (working and standby). The pumping rate can be set at a calibrated uniform flow, so that downstream units are not affected by fluctuating flows. These pumps are submersible pump submersed into the equalization tank.

PRIMARY TUBE SETTLER

Primary tube settler is Incorporated before the biological process to settle down the agglomerate form after Equalization and function of the clarifier is threefold: Allow settling of biomass solids in the Mixed Liquor coming out of the flocculation, to the bottom of the clarifier to thicken the settled biomass, in order to produce a thick underflow to produce clear supernatant water, in the overflow from the clarifier feed to Aeration Tank. All the above actions occur due to gravity. The thick biomass is re-circulated back to the aeration tank.

MBBR

Moving bed biofilm reactor (MBBR) is a biological technology used for wastewater treatment process suitable for municipal and industrial application. Another common name is moving bed film reactor. It was invented in the 1980s. MBBR offer an economical solution for wastewater treatment. STP MBBR technology is the use of a moving bed biofilm reactor in sewage treatment plants.

MBBR wastewater treatment system enables efficient results of the disposal using low energy. The technology is used to separate organic substances, nitrification, and denitrification. MBBR design is made of an activated sludge aeration system. The sludge is collected on the plastic carriers which have a large internal surface area. The surface area in the carriers optimizes the contact of water, air, and the bacteria.

MBBR activated sludge is the application of MBBR media to an overloaded treatment plant when upgrading.

Main units design parameters:

1. Quantity 240KL / day
2. PH 7 – 8
3. Total Suspended Solids 150-200 mg / l
4. BOD 250 – 350 mg/ l
5. COD 400 – 600 mg / l
6. Oil & Grease 5-10mg / l

4.2.3 Recommendations to improve the existing practice of waste management

- **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 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 easy since we have numerous free videos online on how to repair things of your daily life.

- **Reuse and recycle rather than throughout campus**

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 do not 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.

- **Avoid buying of single-use batteries**

In order to reduce waste, do not 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!

- **Avoid buying and usage of Plastic 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.

- **Reusable containers**

To improve your ecological footprint even further, use reusable containers made from metals or glass instead of plastic ones. By doing so, University can reduce the production of plastic waste & can use

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

- **Use a meal plan**

On a global scale, enormous amounts of food are wasted every day, while many people suffer from starvation at the same time. Thus, in order to avoid this kind of unnecessary food waste, you should start to use a meal plan. By doing so, you know exactly what you must buy every day or week. You also save yourself from buying too much food which may end up in the trash bin. Using this meal plan on your smartphone instead of paper would further improve your eco-footprint since you would also save paper.

- **Avoid plastic packaging**

The production of plastic waste is one of our biggest environmental problems which we must 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.

- **Minimize food wastage in mess**

Huge quantity of food is being wasted by the students. The university must take stricter measures to avoid wastage of food as it consumes valuable sources like energy in the form of LPG, electricity as well as water & human work.

- **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 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.

4.3 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. The most important air quality parameters, which are measured, are Humidity, PM 2.5 & PM 10. The other criteria pollutants such as Ozone, Carbon Monoxide, NO2, SO2 and Lead are not measured because there are no nearby industries located near the University, which are emitting these pollutants.

Air Quality Index (AQI) transforms complex air quality data of criteria pollutants into a single number (index value), with nomenclature and Color. AQI was launched on 17 October 2014 in India to disseminate information on air quality in an easily understandable form for the general public. AQI has six categories of air quality which are defined as Good, Satisfactory, Moderately Polluted, Poor, very poor and Severe. AQI is considered as 'One Number- One Color-One Description' for the common man to judge the air quality within his vicinity.

Table 4: AQI Index Details

AQI	Associated Health Impacts
Good (0–50)	Minimal Impact
Satisfactory (51–100)	May cause minor breathing discomfort to sensitive people.
Moderately polluted (101–200)	May cause breathing discomfort to people with lung disease such as asthma, and discomfort to people with heart disease, children, and older adults.
Poor (201–300)	May cause breathing discomfort to people on prolonged exposure, and discomfort to people with heart disease
Very Poor (301–400)	May cause respiratory illness to the people on prolonged exposure. Effect may be more pronounced in people with lung and heart diseases.
Severe (401-500)	May cause respiratory impact even on healthy people, and serious health impacts on people with lung/heart disease. The health impacts may be experienced even during light physical activity.

4.3.1 Existing Scenario:

The ambient air quality has been assessed through scientifically designed ambient air quality monitoring network. The monitoring network was designed based on the following considerations:

- Meteorological conditions
- Topography
- Likely impacts and sensitive receptors

Ambient air quality monitoring network was established as per CPCB guidelines in triangular method @120-degree orientation of three sampling locations.

University does not have its own air quality monitoring device installed.

- For good air quality inside the campus the students are not allowed to use their personal vehicles.
- The staff & students are encouraged to take college buses for daily commuting.

4.3.2 Recommendation

Since the building is naturally ventilated, indoor air quality is not a major concern. indoor plants can be added in administrative areas and hanging pots in corridors can be added to increase biodiversity improve air quality can be provided in the administrative areas on all floors.

Indoor plants - Dieffenbachia amoena, Chlorophytum comosum and Epimnum auries

4.4 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.

Table 5: Details of sound level dB of different sources

S. No	Particulars
1	Just audible sound is about 10 dB,
2	A whisper about 20 dB,
3	Library place 30 dB,
4	Normal conversation about 35-60 dB,
5	Heavy street traffic 60-75 dB,
6	Boiler factories 120 dB,
7	Jet planes during take-off is about 150 dB,
8	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 considered for green auditing of the University Campus. On the Sampling Basis at different sites were chosen for the monitoring purpose. Noise Levels are tabulated below.

4.4.1 Existing Scenario:

During the visit, the sample for DB Levels has been taken for different classrooms. Survey of DB was done with DB Meter to know the noise and pollution levels due to internal and external noise presence in different areas. Following table shows the result out measurement.

Table 6: DB Levels reading by measurement done at different rooms

Sr No	Particular	Maximum DB level Recorded	Minimum DB Level Recorded
1	VC Sir Office	49	46
2	Registrar Office	53	45
3	Director Office	49	47
4	Chairman Sir	45	43
5	Vice Chairman Sir	45	44
6	Conference Room	47	44
7	Conference Room	51	45
8	Admin Office	39	34
9	Room A005	38	37
10	Director QSB Office	30	29
11	Exam Cell	40	38
12	Conference Hall I Floor	41	41
13	Conference Hall I Floor	37	35
14	Dean Office	57	54
15	Accounts	62	56
16	DEEPRO Office	48	44
17	Ex Pro VC Room	50	43
20	Shyamji Auditorium	37	35
22	B Tech Auditorium	37	32
26	Mini Auditorium	35	33
28	Moot Court	59	53
30	IT Office Computer Lab	48	41
31	Server Store Computer Lab	44	42
32	Computer Lab 1 &2	41	40
33	Principal Office	42	40
35	Room B006	35	31
36	Estate Officer Office	34	33
37	Boys Hostel G Floor (G 17)	56	55
38	Boys Hostel New(G06)	55	53
39	Girls Hostel G Floor	56	52
42	VC Residence	42	40
44	Guest House	40	38
45	Main Gate	65	62
46	Veranda	56	52

There were few areas of higher DB Levels because the University academic building is just situated near to road side which sometimes creates noise otherwise DB levels are within limits and the University campus has no noise pollution.

4.5 Carbon Footprint Auditing

Commutation of stakeholders has an impact on the environment through the emission of greenhouse gases into the atmosphere consequent to burning of fossil fuels (such as petrol and diesel vehicles). The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide, and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions.

An important aspect of doing an audit is to be able to measure your impact so that we can determine better ways to manage the impact. In addition to the water, waste, energy, and biodiversity audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created. One aspect is to consider the distance and method travelled between home and University every day. It undertakes the measure of bulk of carbon dioxide equivalents exhaled by the organization through which the carbon accounting is done. It is necessary to know how much the organization is contributing towards sustainable development. It is therefore essential that any environmentally responsible institution examine its carbon footprint.

4.5.1 Efforts to Reduce Carbon Footprints

- Most of students and some employees use university buses to commute.
- Students coming from areas/villages adjoining mandawar make use of public transport to reach University.
- University has installed grid-connected rooftop solar photovoltaic power plant of capacity 110 kWp on various buildings in the University since past 6 years.

Solar Panel on the Building

- An ETC solar water heater of capacity 12000 litres is installed.

Solar water Heater on the Building

- The water geysers, lights, and fans in both the hostel buildings run fully on solar power generated by the SPV plant on campus.
- Auto sensors are installed in classrooms, no occupancy no electricity consumption.
- University also took an initiative to replace old tube lights with energy efficient LED lights in the premises
- Power efficient re-wiring was also done throughout the campus to increase energy efficiency of its systems, reduce energy loss and improved safety of the building occupants and residents on campus.
- Ensuring that the lights, fans, computers, and other systems on campus are turned off, unplugged, or kept in power saving mode when they are not in use.
- Energy Conservation drive and poster competition

4.5.2 Recommendations

- Develop the policy associated with reduction of carbon emission as primary aim.
- To reduce carbon footprint and pollution of transportation to the campus through use of buses, public transport, walking, bicycling and E-vehicles.
- The Green computing or E- work is helping the organization to reduce footprint very effectively.
- Improve the awareness among the faculty, students, and other employees regarding Clean Development Mechanism (CDM) to reduce the consumption of electricity and natural resources.
- Establish a system of carpooling among the staff to reduce the number of four wheelers coming to the University.
- Establish a more efficient cooking system to save gas.
- Discourage the students using two wheelers for their commutation.
- If Possible, make the campus Vehicle free for at least a day in the week.
- In the teacher cabins it was found that the staff does not turn off the lights & fans when there is no occupancy, it is recommended to encourage teachers to turn off the equipment in the condition of unoccupancy.

Fans & Lights in running condition while the cabins are unoccupied

4.6 Health and Wellbeing Assessment

The world health organization (WHO) defined health with a phrase that modern authorities still apply. Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. In 1986, the WHO again updated definition of health as- A resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities."

Health and well-being are a critical component of any green or environment audit. Overall health and well beings of occupants is the most important aspect of Indian Green Building Congress- Campus rating system also.

The observations in health and wellbeing covers areas as below:

1. Providing clean ambient atmosphere to the occupants.
2. Ensure that the campus design caters to differently abled and senior citizens
3. Provide access to all basic amenities, to encourage walking and thereby improve quality of life
4. Provide health & wellbeing facilities, to enhance physical, emotional, and spiritual well-being of campus occupants- health 7 well-Being facilities include, but not limited to, aerobics, gymnasium, swimming pool, yoga, meditation, indoor games, outdoor games, playground, etc. Additionally, provide healthcare, emergency & security facilities within the campus such as first-aid/ clinic, pharmacy, emergency alarm, surveillance system etc., in the campus
5. Promote welfare of the construction workforce by providing safe and healthy work conditions.
6. Work for other personal, inter-personal and community issues like mental health, anti-ragging, hygiene etc.

4.6.1 Observation:

1. University has been found to provide the right and best atmosphere for developing and sustaining an individual and community health and well-being in the best possibly way.
2. The University campus is complete friendly to differently abled and senior citizens.
3. All facilities inside the campus are easily and conveniently available.
4. The University regularly conducts seminars, workshops, and community programs in addition to having counselling and helpline nos. Through various clubs, committees and associations related to mental health through helpline, hygiene, anti-ragging initiatives, balanced diet etc.

4.6.2 Good Ideas Implemented

1. Environment day celebration and plantation Drive.




Inside Campus Nursery

Agricultural crops produced inside campus

CHAPTER 5 GREEN AUDIT

5.1 Biodiversity status of the University campus

Quantum University is situated at the chhutmalpur road in mandawar near Roorkee city but campus is rich in biodiversity. To conserve this biodiversity, our first need is to learn about the existing biodiversity of the place. Unless we know whom to conserve, we will not be able to plan proper conservation initiatives. Also, it is important to understand 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 one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen that a single tree produces is enough to provide one day's supply of oxygen for people. So, while we are busy studying and working on earning those good grades, all the trees on campus are also working hard to make the air cleaner for us. Trees on campus impact our mental health as well; studies have shown that trees greatly reduce stress, which a huge deal is considering many students are under some amount of stress.

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.

5.1.1 Method of Study:

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

- Sampling was done mostly in random manner.
- The total area was surveyed by walking at day time.
- Surveys were conducted for the maximum possible hours in day time.
- Tree species were documented through physical verification on foot.
- 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.

- 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.
- Birds are often brightly coloured, highly vocal at certain times of the year and relatively easy to see. Sampling was done based on direct sighting, call determination and from the nests of some bird species.
- Reptiles were found mostly by looking in potential shelter sites like the under surface of rocks, logs, tree hollows and leaf litter and among and underneath the hedges.
- 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.
- Active invertebrates like the insects require more active search. For larger
- Winged insects like butterflies, random samplings were carried and point sampling was also done.
- 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 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.

5.1.2 Existing Biodiversity Status

The University has diverse range of flora and fauna in the campus. Environment team has been formulated in the University to ensure the sustainable protection of the biodiversity within the University premises. University has well maintained herbal garden which mainly includes the herbal and medicinal plants. In addition to these different types of variety of trees, plants, shrubs etc. are grown in different areas of the University details of which are as follows:

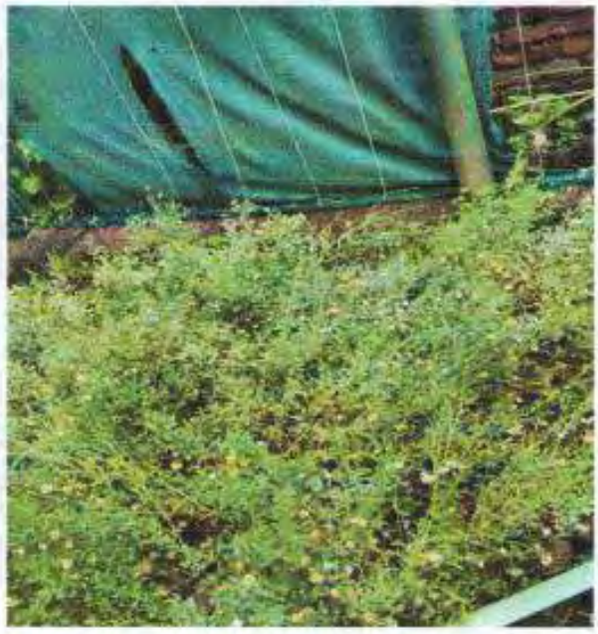
S.No.	Particulars	No. of Shrubs	Trees	Potted plants
1.	University Campus	70	195	137

Plant nursery

There is a small plant nursery in the University, where seedlings of seasonal plants are raised, Transplanting Beds and potted plants are kept and maintained.

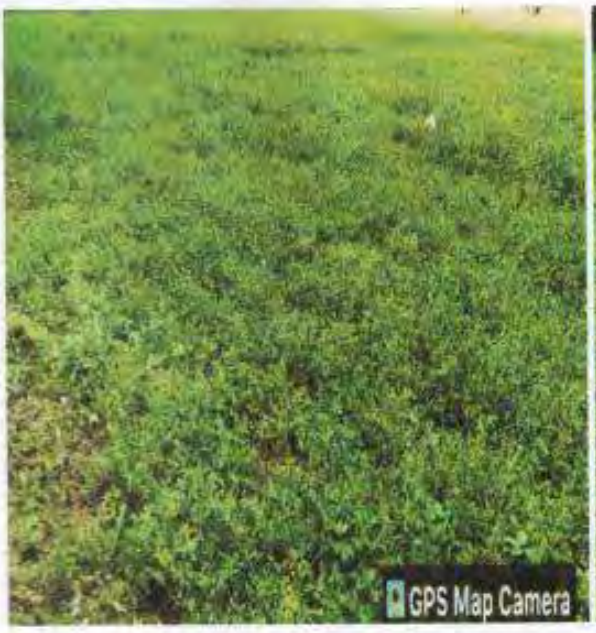
About 250 foliage and flowering ornamental potted plant of different sizes and approximately 28 different species are maintained in Plant Nursery.

Inside Campus Nursery



Plants grown in pots

Green cover (grass/bushes)



Large trees

5.1.3 Details of Tree, Flora, fauna, and potted plants are tabulated below

S. No.	Common name	Botanical name	Family	No's
1	ROYAL PALM	*Roystonia regia*	Arecaceae	6
2	GOLDEN PALM	*Dypsis lutescens*	Arecaceae	4
3	GULMOHAR	*Delonix regia*	Fabaceae	4
4	LONGLEAF INDIAN PINE	*Pinus roxburghii*	Pinaceae	2
5	TEMPLE PLANT	*Hygrophila corymbosa*	Acanthaceae	17

S. No.	Common name	Botanical name	Family	No's
6	EUCALYPTUS	*Eucalyptus*	Myrtaceae	77
7	MANGO	*Mangifera Indica*	Anacardiaceae	1
8	NORTH INDIAN ROSEWOOD	*Dalbergia sissoo*	Fabaceae	2
9	CHICKRASSIA	*Chuckrasia tabularis*	Meliaceae	23
10	BABOOL	*Vachellia nilotica*	Fabaceae	6
11	SILVER BISMARK PALM	*Bismarckia nibilis*	Arecaceae	14
12	CHINESE FAN PALM	*Livistona chinesis*	Arecaceae	38
13	HIBISCUS	*Hibiscus sinesis*	Malvaceae	1

5.1.4 Flora diversity (Shrubs)

S. No.	Common name	Botanical name	Family	No's
1	PIN WHEEL FLOWER	*Tabernaemontana divaricata*	Apocyanaceae	5
2	SAMBUNG	*Gynura procumbens*	Asteraceae	5
3	FIREBUSH	*Hamelia patens*	Rubiaceae	6
4	ZEBRA PLANT	*Aphelandra squarossa*	Acanthaceae	4
5	CHINESE JUNIPER	*Juniperus chinesis*	Cupressaceae	4
6	ROSEMARY	*Salvia rosamarinus*	Lamiaceae	4
7	DURANTA	*Duranta erecta*	Verbenaceae	6
8	WEEPING FIG	*Ficus benjamina*	Moraceae	10
9	BROODBOOM	*Cycadophyta*	Zamiaceae	4
10	MEXICAN BLUE FAN PALM	*Brahea armata*	Arecaceae	4
11	WESTERN REDCEDAR	*Thuja plicata*	Cupressaceae	6
12	BLACK TEA TREE	*Camellia sinensis*	Theaceae	5
13	DRAGON TREE	*Dracaena draco*	Asparagaceae	4
14	FORTUNE'S SPINDLE	*Euonymus fortunei*	Celastraceae	3

5.1.5 Potted Plants

S. No.	Common name	Botanical name	Family	No's
1	Lady leaf palm	*Rhapis*	Arecaceae	50
2	Nepthytis	*Nepthytis*	araceae	45
3	Saplings			42

5.1.6 Fauna diversity has been studied and documented as below:

S. No.	Common name	Scientific name	Family
1	Common myna	*Acidotheres tristis*	Sturnidae
2	Jungle babbler	*Turdoides terricolor*	Timallidae
3	Spotted owlet	*Athene brama* .	Strigidae
4	Common hawk cuckoo	*Hierococcyx varius*	Cuculidae
5	Booted eagle	*Aquila pennata*	Accipitridae
6	House sparrow	*Pesser domesticus*	Passeridae
7	Rock pigeon	*Columba livia*	Columbidae
8	House crow	*Cornus splendens*	Corvidae
9	Large billed crow	*Corvus Macrorhynchos*	Corvidae
10	Common hoopoe	*Upupa epops*	Upupidae
11	Greater coucal	*Centropus Sinesis*	Cuculidae
12	Black kite	*Milvus migrans*	Accipitridae
13	Cattle egret	*bubulcus iris*	Ardeidae
14	Rose ringed parakeet	*Psittacula krameri*	Psittacidae
15	Red-vented bulbul	*Pycnonotus cafer*	Pycnonotidae
16	Common kingfisher	*Alcedo bengalensis*	Akcedinidae
17	Indian peafowl	*Pavo cristatus*	Phasianidae
18	Black drongo	*Dicrurus Macrocercus*	Dicruridae
19	Indian palm squirrel	*Funambulus palmarum*	Sciuridae
20	Indian rat snake	*Pytus mucosa*	Colubridae
21	Spectacled cobra	*Naja naja*	Elapidae
22	Russell's Viper	*Daboia russelii*	Vipridae
23	Indian flying fox	*Pteropus medius*	Pteropodidae
24	Indian pariah dog	*Canis lupus familiaris*	Canidae
25	Gray Langoor	*Semnopithecus entellus*	Cercopithecidae
26	Rhesus Monkey	*Macaca mulatta*	Cercopithecidae
27	Plain tiger butterfly	*Danais chrysippus*	Nymphalidae
28	Blue tiger butterfly	*Danais limniace*	Nymphalidae
29	Common crow butterfly	*Euploea core*	Nymphalidae
30	Tawny coster butterfly	*Acraea violae*	Nymphalidae
31	Angled castor butterfly	*Ariadne ariadne*	Nymphalidae
32	Blue moon butterfly	*Hypolimnas bolina*	Nymphalidae
33	Diadem butterfly	*Hypolimnas missipus*	Nymphalidae
34	Common sailor butterfly	*Neptis hylas*	Nymphalidae
35	Spotted rustic butterfly	*Phalanta*	Nymphalidae
36	Baronet butterfly	*Euthalia nais*	Nymphalidae
37	Common evening brown butterfly	*Melantis leda*	Nymphalidae

S. No.	Common name	Scientific name	Family
38	Dark brand-bush brown butterfly	*Mycalesis mineus*	Nymphalidae
39	Lemon pansy butterfly	*Junonia lemonias*	Nymphalidae
40	Common jay butterfly	*Graphium doson*	Papilionidae
41	Common rose butterfly	*Pachliopta aristolochiae*	Papilionidae
42	Lime butterfly	*Papilio demoleus*	Papilionidae
43	Common mormon butterfly	*Papilio polytes*	Papilionidae
44	Three-spot grass yellow butterfly	*Eurema blanda*	Pieridae
45	Common grass yellow butterfly	*Eurema hecabe*	Pieridae
46	Common jezbel butterfly	*Delias eucharis*	Pieridae
47	Common emigrant butterfly	*Catopsilia crocale*	Pieridae
48	Motled emigrant butterfly	*Catopsilia pyranthe*	Pieridae

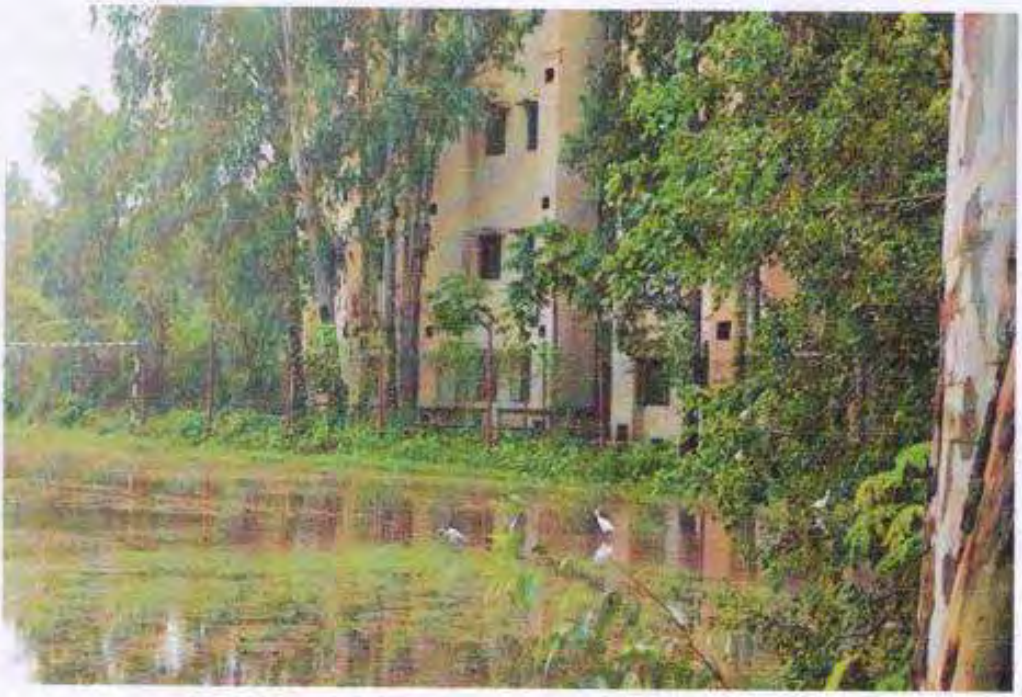
Fauna

Because of the lush green environment present in the University premises University has become the habitat for the number of birds and animals. Diverse range of birds and animals for example peacock, sparrows, myna, parrots, crows, cuckoo, pigeon, owl, woodpecker and monkey, squirrels, dogs are living freely in the. Staff and students of University takes care of the food for these birds and animals. Arrangements are made for the bird and animal feeders and houses at the appropriate areas in the University. All these species of flora and fauna work together in the ecosystems in the form of intricate web to maintain the balance and support of all life forms within the University campus.

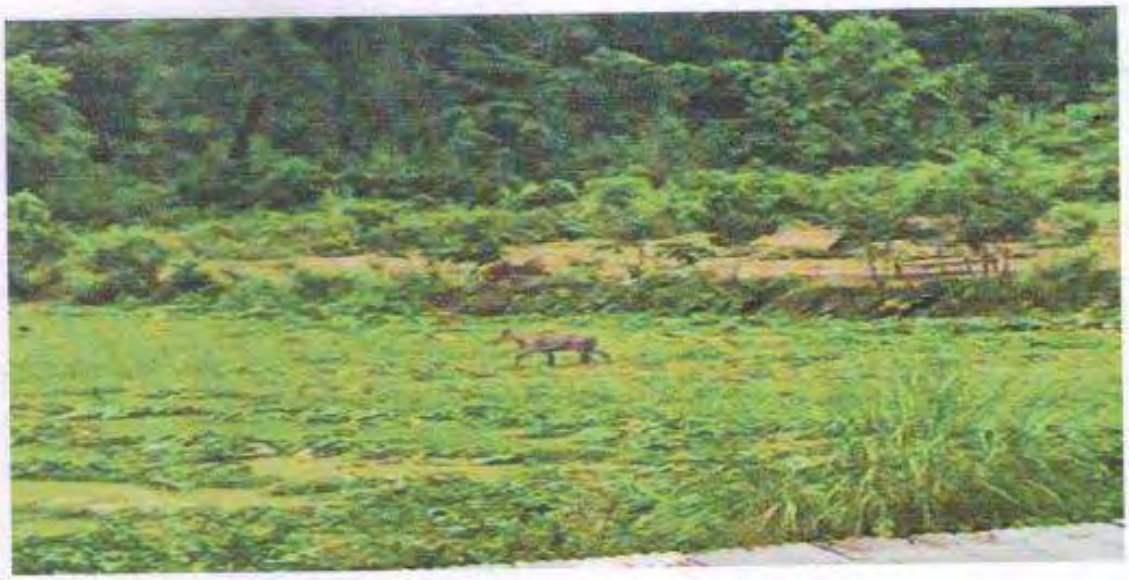
Our Winged Partners

University is blessed to be a home to several beautiful winged friends due to its lush green surroundings & beautiful fruit garden. Students and staff ensure their wellbeing by feeding and caring them. Students and staff create and use different types of bird feeders to attract the birds to visit us

Cattle egrets in the campus



Blue-bull near the university campus



Ant colony in the campus

5.1.7 Recommendation

- Plant and tree species that attract birds and butterflies can be planted to increase biodiversity of the campus.
- Plant species attracting birds and butterflies
- Create automatic drip irrigation system during summer holidays.
- Beautify the University building with maximum use of oxygen generating indoor plants

- Encouraging students and conducting competitions among departments for making students and staff more interested in making the campus green.
- Enhance the training, awareness campaign, program, and celebration of environment & earth day to improve the knowledge about biodiversity and ecology to student and staff.
- The effort of documenting and collecting detailed information of flora and fauna in the Campus has emerged as one of the innovative endeavors of approaching the current challenges relating to ecology and environmental deterioration. The need to create awareness about various environmental problems, maybe be fulfilled by involving more stakeholders in the biodiversity audit survey.
- The biodiversity audit survey must be conducted every five years to update the information.
- Horticulture and landscaping should be done to ensure biodiversity is maintained.

CHAPTER 6 SUMMARY OF RECOMMENDATIONS

6.1 Conclusion of Audit

An Environment and green audit of any academic institution reveals, ways by which University can reduce water consumption, improve waste management and reduction in emission of carbon dioxide in the environment. It is a process to investigate and ask ourselves whether we are also contributing to the degradation of the environment and if so, in what manner and how we can minimize this contribution and bring down to zero and preserve our environment for future generation. This process of green audit enables us to assess our life style, action and assess its impact on the environment. Environment & Green auditing is the process of identifying and determining whether institutional practices are eco- friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period excess use of resources, viz., energy, water, chemicals are become habitual for everyone especially, in common areas. Now, it is necessary to check whether our activities are consuming more than required resources? Whether we are handling waste carefully? Environment & Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one.

6.1.1 Water Conservation Recommendation

- Reduce Water consumption in Toilets for flushing.
- Retrofit flow restrictors in hand washing taps and other taps:
- Stop use of filtered water in toilet flushing, instead use recycled, treated wastewater or raw water.
- Enhance Training and awareness of the employees and student at all levels and placing 'water saving' posters/slogans at various locations:
- Maintain logbook of daily Inlet Water from Municipal corporation
- Automatic switching system is not installed for pump sets used for overhead tank filling. We recommend to install automatic switching of pump based on the tank level to reduce excess operation of pump & avoid the over flow of water.
- Quality of water in terms of fresh water supply and domestic and effluent discharges need to check periodically by NABL and MoEF & CC approved laboratory.
- Arrest the water leakage identified during the study. As there were several points observed

and reported to University coordinator.

6.1.2 Recommendations to improve the existing practice of waste management

- Installation of waste paper recycling plant:
- Learn to repair rather than to discard things
- Reuse and Recycle rather than throughout campus
- Avoid buying of single-use batteries
- Avoid buying and usage of Plastic bottled water
- Use electronic media instead of paper
- Reusable containers
- Use a meal plan
- Avoid plastic packaging
- Install vermicompost pits for dry leaves & foliage from the large trees.
- Reduce garbage production

6.1.3 Carbon Foot Print Reduction Recommendations

- Develop the policy associated with reduction of carbon emission as primary aim.
- To reduce carbon footprint and pollution of transportation to the campus through use of buses, public transport, walking, bicycling and E-vehicles.
- The Green computing or E- work is helping the organization to reduce footprint very effectively.
- Improve the awareness among the faculty, students, and other employees regarding Clean Development Mechanism (CDM) to reduce the consumption of electricity and natural resources.
- Establish a system of carpooling among the staff to reduce the number of four wheelers coming to the University.
- Establish a more efficient cooking system to save gas.
- Discourage the students using two wheelers for their commutation.
- If Possible, make the campus Vehicle free for at least a day in the week

6.1.4 Health and Wellbeing Recommendations:

The university should form a Happiness and Well Being club for creating and ensuring a stress -free atmosphere in the University.

- It will aim at encouraging students to express their problems freely.

- The club will organize various activities and workshops throughout the year to encourage students to inculcate confidence and possess zeal to live a meaningful and happy life.
- The activities conducted under the club ensure holistic development of the students to enhance their overall experience of being a happy individual and to serve the society as an asset.
- Celebration of happiness week, conducting of workshops and seminars are some of the activities that can be conducted by the club.
- The club also gives an opportunity to the students to develop their personalities holistically and train them to introspect themselves to understand the actual meaning and significance of happiness.
- The conclusive goal of the club would be to create a healthy, positive, and happy environment in the University

6.1.5 Biodiversity improvement Recommendation

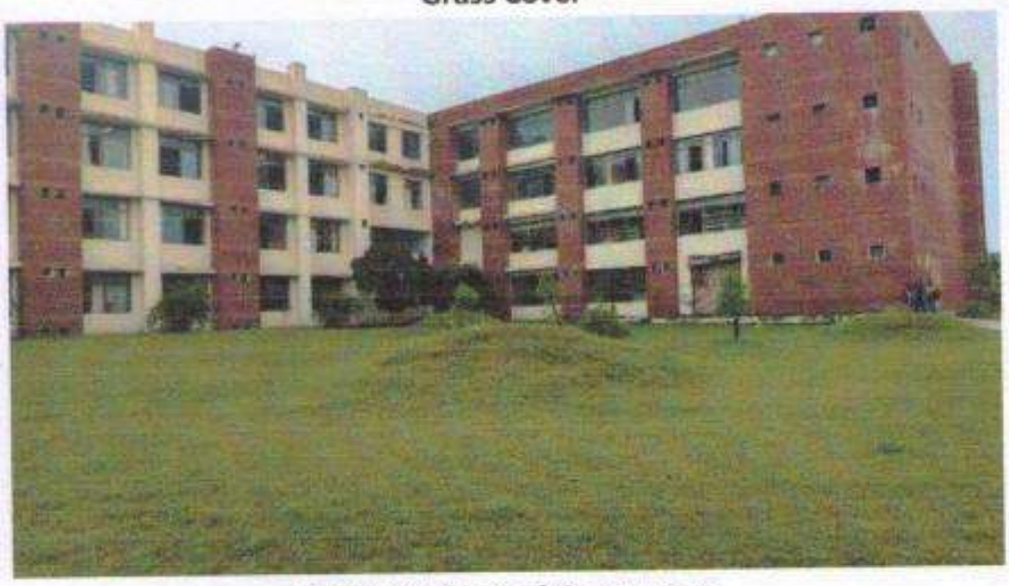
- Plant and tree species that attract birds and butterflies can be planted to increase biodiversity of the campus.
- Plant species attracting birds and butterflies
- Create automatic drip irrigation system during summer holidays.
- Beautify the University building with maximum use of oxygen generating indoor plants
- Encouraging students and conducting competitions among departments for making students and staff more interested in making the campus green.
- Enhance the training, awareness campaign, program, and celebration of environment & earth day to improve the knowledge about biodiversity and ecology to student and staff.
- The effort of documenting and collecting detailed information of flora and fauna in the Campus has emerged as one of the innovative endeavors of approaching the current challenges relating to ecology and environmental deterioration. The need to create awareness about various environmental problems, maybe be fulfilled by involving more stakeholders in the biodiversity audit survey.
- The biodiversity audit survey must be conducted every five years to update the information.
- Horticulture and landscaping should be done to ensure biodiversity is maintained.

CHAPTER 7 ANNEXURES

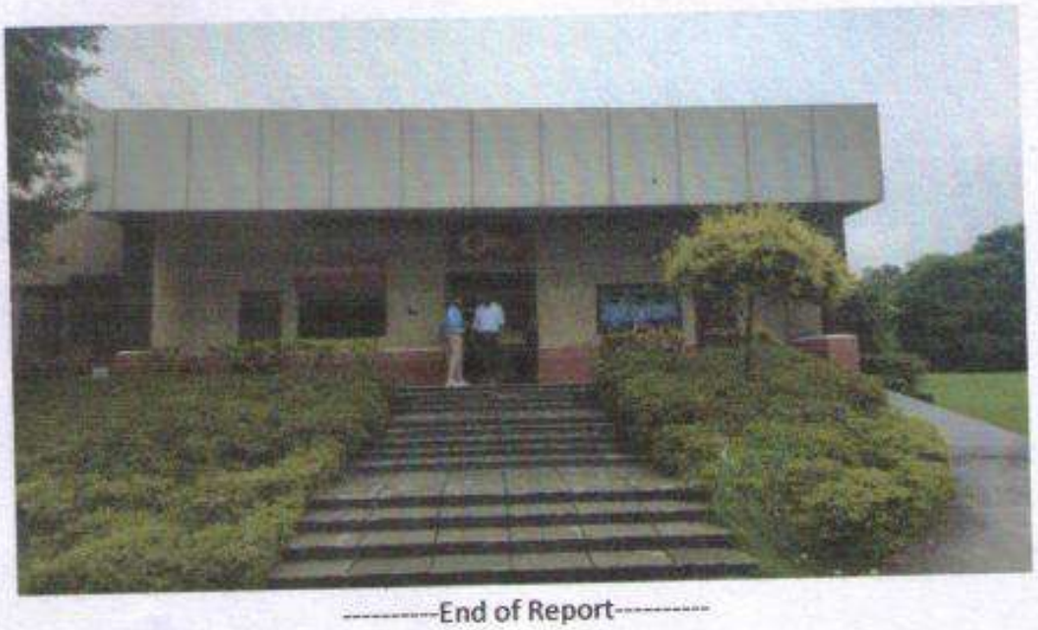
Annexure -1 Existing Plantation Details

Large trees in the campus

Grass Cover



Shrubs in-front of the canteen



----------End of Report----------

Registrar
Quantum University