GREEN AUDIT AND QUALITY AUDIT REPORT

ON

WATER AUDIT, ENERGY AUDIT,

WASTE MANAGEMENT AUDIT,

GREEN CAMPUS MANAGEMENT AUDIT

AND ENVIRONMENT AUDIT

OF

NEW HORIZON COLLEGE OF ENGINEERING

BELLANDUR MAIN ROAD, NEAR MARATHAHALLI,

BENGALURU – 560 103

2023-24

NEW HORIZON
COLLEGE OF ENGINEERING
New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade. Accredited by NBA

ECO ENERGIME ENGINEERS LLP

ENHANCING RESOURCE EFFICIENCY

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OF

NEW HORIZON COLLEGE OF ENGINEERING

BELLANDUR MAIN ROAD, NEAR MARATHAHALLI,

BENGALURU – 560 103

2023-24

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We would be happy to provide any further clarifications, if required, to facilitate the implementation of the recommendations.

We received full co-operation and support from the concerned personnel/ staff members of the college. They took key interest and gave valuable inputs during the course of study. We would like to thank:

Chairman – New Horizon Educational Institutions, Bangalore

And other Staff in personnel who have given full co-operation and support. They took a keen interest and gave valuable inputs during the course of study.

Certificate

This is to certify that M/s. Eco Energime Engineers LLP, Bengaluru has conducted **Green Audit** and **Quality Audit** that comprises of **Water Audit, Energy Audit, Waste Management Audit, Green Campus Management Audit, and Environment Audit** of **"New Horizon College of Engineering, Bengaluru"** during the **November 2023 to October 2024**.

The audit involves field visit, measurements and observations, verification of bills, log books, data base, maintenance registers and interview with staffs, and this gives an overview of the existing system. In an opinion and to the best of our information and according to the information given to us, said Quality Audit gives a true and fair view in conformity with auditing principles.

For Eco Energime Engineers LLP

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EEELLP ACKNOWLEDGEMENT

EEELLP Team thanks the Management of **New Horizon College of Engineering, Bengaluru** for assigning this interesting work to us. We appreciate the cooperation extended to our team during the entire process.

Our special thanks to **The Registrar – Mr H N Suryaprakash & Team of colleagues** for giving us necessary support and inputs to carry out this very vital exercise.

We would like to thank Principal, the Head of Departments and staff members who were actively involved while collecting the data and conducting field measurements.

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DISCLAIMER

The audit team has prepared this report for **New Horizon College of Engineering, Bengaluru** based on input data submitted by the representatives of College complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the recommendations are arrived following best judgments 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.

For Eco Energime Engineers LLP

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ABBREVIATION AND ACRONYMS

1.	A	:	Amperes
2.	AC	:	Air Conditioner
3.	APFC	:	Automatic Power Factor Controller
4.	BBMP	:	Bruhat Bengaluru Mahanagara Palike
5.	BESCOM	:	Bangalore Electricity Supply Company
6.	BWSSB	:	Bangalore Water Supply and Sewerage Board
7.	CC Camera	:	Closed Circuit Camera
8.	DG	:	Diesel Generators
9.	EE Fan	:	Energy Efficient Fan
10.	E-Waste	:	Electronic Waste
11.	etc.	:	Etcetera
12.	FTL	:	Fluorescent Tube Light
13.	GHG	:	Green House Gas
14.	Hz	:	Hertz
15.	HP	:	Horse Power
16.	HT	:	High Tension
17.	I	:	Current
18.	ICT	:	Information and Communications Technology
19.	IQAC	:	Internal Quality Assurance Cell
20.	ISO	:	International Organization for Standardization
21.	kgs	:	Kilograms
22.	kL	:	Kilo Liters
23.	kV	:	kilo volt
24.	kVA	:	kilo volt ampere
25.	kVAr	:	Reactive kilo volt ampere
26.	kW	:	Kilo Watt
27.	kWh	:	kilo Watt hour
28.	kWp	:	kilo Watt peak
29.	Lab	:	Laboratory
30.	LCD	:	Liquid Crystal Display
31.	LED	:	Light Emitting Diode
32.	LT	:	Low Tension
33.	mA	:	Milli Amperes
34.	MoU	:	Memorandum of Understanding
35.	NA	:	Not Applicable
36.	NAAC	:	National Assessment and Accreditation Council
37.	Nos.	:	Numbers
38.	NSS	:	National Service Scheme
39.	Prim/Sec	:	Primary/Secondary
40.	PF	:	Power factor

41.	PG	:	Post Graduate
42.	Ph.D.	:	Doctor of Philosophy
43.	PV	:	Photo Voltaic
44.	Rs.	:	Rupees
45.	RO	:	Reverse Osmosis
46.	RR. No.	:	Revenue Register Number.
47.	SMV	:	Sir. Mokshagundam Visvesvaraya
48.	S. No.	:	Serial Number
49.	Sq. Ft.	:	Square Feet
50.	Sq.m.	:	Square Meter
51.	SRTPV	:	Solar Roof Top Photo Voltaic
52.	TL	:	Tube Light
53.	TR	:	Ton of Refrigeration
54.	TV	:	Television
55.	UG	:	Under Graduate
56.	USD	:	United States Dollar
57.	V	:	Volts
58.	W	:	Watts
59.	Wi-Fi	:	Wireless Fidelity
60.	Wp	:	Watt peak
61.	#	:	Number

EXECUTIVE SUMMARY

Conducting Quality Audit covering areas such as water audit, energy audit, waste management audit, green campus management audit and environment audit (carbon foot print perspective only), in college helps to increase the awareness levels of stakeholders, staffs and students, to understand its advantages towards impact on sustainable future.

The New Horizon College of Engineering Campus is very **well maintained, clean and neat**, which emphasis the resource allocation (man power, finance and support) by management and importance given for **clean and hygiene environment for students, staffs and stakeholders**.

Considering the fact that the institution is Engineering College, there is significant environmental research both by faculty and students. The environmental awareness initiatives are **substantial**. The installation of solar PV systems, solar hot water systems, STP treated water for gardening purposes, and rain water harvesting system are **noteworthy**.

Besides, environmental awareness programmes initiated by the management and administration shows how the campus is going green.

As part of Quality Audit of campus, we carried out campus monitoring, including Illumination and Ventilation of the class room. It was observed that Illumination and Ventilation is **adequate** considering natural light and fresh air circulation.

From the Quality Audit study, it was observed the college had taken various initiatives and implemented best practices in conserving natural resources that include:

A. Best Practices Implemented for Water Conservation

- Water consumption monitoring
- Dual water piping systems for wash rooms
- Low flow taps
- Rain water harvesting
- Water less urinals
- Regular testing of water quality
- Sewage treatment plant
- Maintenance team
- Posters for creating awareness

B. Best Practices Implemented for Energy Conservation

- Day light integration in class rooms, staff rooms, hostels and common areas
- Use of LED lights
- Solar Roof Top Photo Voltaic (SRTPV) system for power generation
- Use of energy efficient air conditioning systems such as VRV and inverter AC units
- Use of Solar water heaters for hot water generation
- Complaints and maintenance monitoring registers
- Use of LED/ LCD monitors
- Use of sign boards and posters for awareness creation

C. Best Practices Implemented for Waste Management

- Zero waste campus campaign
- Color code bins for waste collection
- Organic Waste Composting Machine
- Leaf composter
- Sewage Treatment Plant
- Posters on plastic ban

D. Best Practices Implemented for Green Campus Management

- Campaign on Plastic free campus
- Green landscaping
- Paperless office
- Gardening is maintained by separate team

E. Best Practices Implemented for Carbon Footprint Analysis

- Campaign on environment conservation
- Color Code Bins for waste segregation
- Posters on environment conservation
- Promoting use of electric vehicles

Quality Audit will be a valuable tool in the management and monitoring of environmental and sustainable development programs of the college.

1. INTRODUCTION

New Horizon College of Engineering is an Autonomous college affiliated to Visvesvaraya Technological University (VTU), approved by the All India Council for Technical Education (AICTE) & University Grants Commission (UGC). It is accredited by NAAC with 'A' grade & National Board of Accreditation (NBA). New Horizon College of Engineering is located in the heart of the IT capital of India, Bangalore. The college campus is situated in the IT corridor of Bangalore surrounded by MNCs and IT giants such as Intel, Accenture, Capgemini, ARM,Symphony, Wipro, Nokia, JP Morgan and Cisco to name a few.

NHCE has a scenic and serene campus that provides an environment which is conducive for personal and intellectual growth. The infrastructure acts as a facilitator for the effective delivery of the curriculum. NHCE boasts of state-of-the-art facilities for its students.

They are given utmost encouragement in their areas of interest by providing hi-tech facilities backed by faculty support. The institute places highest priority on innovative programs that include both traditional classroom theory and professional skills training. There is a strong impetus on overall personality development of the students with emphasis on soft skills.

Students are supported through mentoring and counseling systems. The management offers scholarships to meritorious students. At NHCE, we understand and respect our role as educators and from the moment a student walks into the campus, he/she is well guided to know his/her strengths and choose an area of functional specialization. This enables students to concentrate their efforts and energies to gain the competitive edge.

QUALITY POLICY

To provide educational services of the highest quality both curricular and co-curricular to enable students integrate skills and serve the industry and society equally well at global level.

VALUES

- Academic Freedom
- Integrity
- Inclusiveness
- Innovation
- Professionalism
- Social Responsibility

VISION

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

MISSION

- To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.
- To encourage long-term interaction between the academia and industry through their involvement in the design of curriculum and its hands-on implementation.
- To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

Committee and Cells

Internal Quality Assurance Cell (IQAC)

To create quality, to maintain quality, to enhance quality in all spheres – that is the task of the IQAC or the Internal Quality Assurance Cell of the college. The IQAC is the central quality- monitoring body of the institution. It functions under the Chairmanship of the Principal and comprises senior faculty members, representative from the local community and a student representative. Its aim is to develop and maintain a system to promote academic and administrative excellence.

The IQAC functions with the belief that excellence and quality are not one-time goals but continuous processes. To this end, the IQAC meets on a regular basis. New programs, up gradation of infrastructure and increasing the effective functioning of all systems are some of the major concerns of the IQAC.

Campus Area and Built-up area

The area of the campus (built up and total) is given in table 1-1.

S. No.	Description	Units	Details
1	Engineering Campus total area	Acres	11.32
2	Built up area	Sq.mts.	62244

Table 1-1: College Area

Internal Quality Auditing Team – 2023-24

The college management constitutes the internal Quality Auditing team including students, staff, stakeholders, employees, and alumini's every year. Table 1-2 gives the list of internal Quality Auditing team for the year 2023-24.

S. No.	Name	Designation	Role
1	Dr. Manjunatha	Principal	Chairman
2	Mr. H N Suryprakash	Registrar	Member
3	Dr. Anandhi RJ	Dean Academics	Member
4	Dr. Anitha Rai	Director – Library & Alumni Relations	Member
5	Dr. Aravinda K	Prof & HoD-ECE	Member
6	Dr. A.B. Gurulakshmi	Prof. ECE	Member
7	Dr. G. Rajesh	ASP - ECE	Member
8	Dr. Sanjeev Sharma	Dean QAIIE	Convener

Table 1-2: Internal Quality Audit Team

Facilities available for physical wellness

The management has provided physical wellness equipment in the hostel, open (outdoor gym) near NSB block, indoor gym in BSB, Indoor Arena in Sandeep Unnikrishnan Block, playground and basketball court. Pictures of the playground, gym and open space gym are given in figure 1.1.

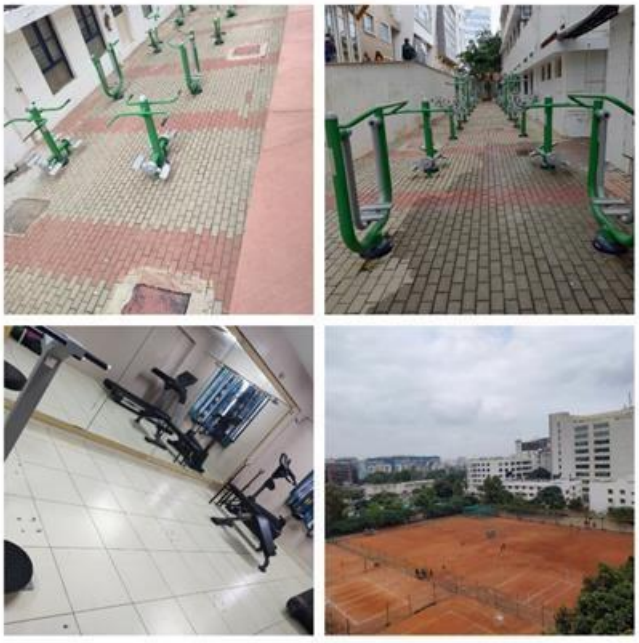

Figure 1-1: Facilities inside the campus for physical wellness

Overview of Green Audit:

Green Audit helps college / facility to:

- Understand the usage of electricity, water and other natural resources
- Identify opportunities to conserve various natural resources
- Identify various technological improvements
- Evaluate the techno-commercial of identified conservative measures
- Create awareness among the students and staff
- Disseminate the commitment of management towards saving nature
- Develop a culture among students, staff and management to be socially responsible

2. PRE – AUDIT PHASE

A pre-audit meeting is a prerequisite for the Audit; it helps to meet and discuss about the schedule and documents required during the audit. The pre-audit meeting was conducted at New Horizon College of Engineering, Bellandur Main Road, Bengaluru in October 202. During the meeting, introduction of team members, scope and objectives of the audit were discussed.

Management Commitment

The Management of the college has shown significant commitment towards Quality Auditing during the pre-audit meeting. They were ready to encourage all green activities. It is decided to promote all activities that are environment friendly such as awareness programmes on the environment, campus farming, planting more trees on the campus etc., after the Quality Auditing.

College administration is vital to the process of realizing campus sustainability, and college policy is an essential instrument for any substantial change in the campus environment.

Scope and goals of Quality Auditing

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues. Quality Auditing is one among them for educational institutions.

Once a baseline is established, the data can serve as a point of departure for further action in campus greening. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects.

This data will also provide a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs. This audit initiative focused initially on educating colleges and universities through workshops, guidebooks, fact sheets and ensuring compliance through inspections and self-audits.

3. ON-SITE AUDIT PHASE

3.1. Scope / Target Areas of Quality Auditing

3.1.1. Water Audit

Water Audit addresses water consumption, water sources, appliances and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

3.1.2. Energy Audit

Energy Audit addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability.

3.1.3. Waste Management Audit

Waste Audit addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of adverse environmental impacts, most of which are well known and not in need of elaboration.

3.1.4. Green Campus Management Audit

Green campus initiatives are becoming an integral part of modern day's university systems. Green campus Audit helps in maintaining the air and water clean. It regulates the climatic conditions and provides a healthy and comfortable environment for living.

3.1.5. Environment Audit

Environment Audit addresses the usage of fossil fuels (coal, diesel, petrol and gas). The mode of commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels.

3.2. Audit Methodology and Approach

The methodology and approach adopted for the study involve various steps that include:

- Review of Document and records
- Review of Policies
- Review of MoU
- Review of various measures implemented
- Site Walkthrough
- Data Collection
- Interviews

3.2.1. Review of Document and Records

Electricity bills, Water bills, equipment register, list of appliances, office registers, internal Quality Audit document, purchase document, were reviewed and relevant data and inputs required for analysis have been collected.

3.2.2. Review of Policies

College has various policies that include safety policy, environment policy, and Anti-ragging policy.

A. Safety Policy:

An organization's safety policy is a recognized, written statement of its commitment to protect the health and safety of the students and employees, as well as the surrounding community. The college has provided the safety wears to all in the laboratory and wearing them has been made mandatory.

All the students, teaching and non-teaching staff, maintenance and house-keeping staff have been given training to use fire extinguishers in emergency situations of fire and explosion. Fire extinguishing cylinders have been installed in each floor and in laboratory areas. Safety policy statements and use of fire extinguisher has been posted at each block and the same is shown in the figure 3-1. Sample photos of fire extinguishers and fire hydrant system are as shown in figure 3-2.

Figure 3-1: Safety Policy

Figure 3-2: Fire Extinguisher and Fire hydrant system

B. Environmental Policy:

The college is ISO certified for quality, environment, health and safety. The copy of the ISO certification is given in Figure 3-3.

CERTIFICATE OF COMPLIANCE

INTERNATIONAL CERTIFICATION SERVICES PVT. LTD.

This is to certify that the QUALITY MANAGEMENT SYSTEM of

NEW HORIZON COLLEGE OF ENGINEERING

Ring Road, Marathalli Bellandur Post, Bangalore - 560 103, Karnataka, India.

has been assessed and registered as complying with the requirements of the following International Standard:

ISO 9001:2008

The Quality Management System applicable to:

Scope: Providing Educational Services from Admission till Placement Assistance for Bachelor of Engineering, M.Tech, MCA and MBA Programs.

Registration No. : RQ91/6289
Registered Date : 02nd January, 2016
Valid Upto : 14th September, 2018

JAS-ANZ

IAF

Managing Director
International Certification Services Pvt. Ltd.

Accredited by Joint Accreditation System of Australia and New Zealand

Validity of this certificate is based on periodic audits of the management system defined by the above scope and is contingent upon prompt, written notification of significant changes to the management system and/or its components thereof shall be immediately communicated to ICS.

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained at www.icsindia.com

Figure 3-3: ISO Certificate

C. Anti-Ragging policy:

Ragging in all its forms shall be totally banned in the entire institution, including its departments, constituent units, all its premises (academic, hostel, sports, canteen, etc.)

whether located within the campus or outside and in all means of transportation of students whether public or private. 'Ragging is banned' poster is placed in each block of the campus and a sample photo is as shown in the figure 3-4.

Figure 3-4: Anti-ragging poster

D. Quality policy:

The Quality Assessment and Skill Development Center is established to increase the effectiveness of each member in particular and the institution as a whole. Based on the requirements of each institution, QASDC is offering varied training programs to all the faculties, including the supporting staff to help them to better their performances and to enhance their work skills.

The center is also focusing on developing various kinds of assessment tools for all the staff members of The New Horizon College of Engineering, in order to discover their potential and skills. With this assurance, the center ensures that all the members of the institution are availing of all help and support that is provided by QASDC, for strengthening their capabilities, which in turn enables to empower the student fraternity. The quality policy posters available in the college are shown in figure 3-5.

Figure 3-5: Quality policy

3.2.3. Review of various measures implemented

During the Green Audit study, it was observed the college has taken various initiatives in conserving natural resources that include:

- Green Audit team including Management, Staff and Students
- Installation of Solar Roof Top Photo Voltaic (SRTPV) system for power generation
- Installation of pressurized water system for solar panel cleaning and maintenance
- Installation of LED tube lights to reduce electricity consumption
- Water flow meter to monitor the water consumption
- Dual water piping system for washrooms and toilets, to use STP treated water for flushing
- Low flow taps for water conservation
- Water less urinals for water conservation
- Sewage treatment and using the treated final water for toilet flushing, gardening and cleaning purposes
- Rain water collection system and filters are available in all buildings. The collected water is filtered and is stored in the sumps

- Regular testing of water quality parameters
- Installation of waste segregation bins at all the rooms to separate the dry and wet waste
- Installation of aerators in water taps to conserve water
- Installation of LCD/LED monitors for all the desktops to conserve electricity
- Switching OFF lights and fans whenever not in use to save electricity
- Food waste is collected separately and given to piggeries.
- The use of Sign boards in all the class-rooms, staff-rooms and library were observed, to create awareness for energy conservation among the students and staff.
- The use of sign boards in all the wash rooms were observed, to create awareness for water conservation
- Training is conducted on regular basis regarding usage of fire extinguisher, conservation of resources such as electricity, water, food and green campus.

The Institution has received award from AICTE – National Level – **Clean and Smart Campus Awards 2019** – for the initiatives implemented by the college towards sustainability. The picture of the certificate of appreciation is given in figure 3-6.

Figure 3-6: Certificate of clean and smart campus award

3.2.4. Site Walk through

Site walk through was conducted with staff members, students and audit team members. Staff and students have shown very keen interest in the data collection process and methods to be followed in field data collection. The staff and students have given inputs and suggestions for resource conservation as well.

College Infrastructure

New Horizon College of Engineering campus has various blocks and departments. Each floor has state of the art class rooms, staff rooms, laboratories libraries and many more. Details of infrastructure are as follows:

- ATM – Indian Bank
- Outdoor Gym
- Indoor Gym
- Cafeteria/Canteen/Food Courts
- Courier/DTP
- Sports and Games
- Indoor and Outdoor Stadium
- Power Backup
- Recreation Centre
- First Aid Clinic
- 24 Hrs Ambulance Facility
- Facilities like lift, ramps and toilets for specially abled students
- Auditorium (800 Capacity)
- Smart Class room
- 4 Seminar Halls (200 Capacity each)
- Conference Rooms
- Board Room
- RO Water Plants with Cooler
- Transport (20 Buses)
- Stationery & Reprography
- Safety Norms & Checks
- Sewage treatment plant
- Rain water harvesting
- Hostel (separately for girls & boys)
- Library
- Digital Library
- Staff Room
- Common Room for girls and boys

All the classrooms and staff rooms are well ventilated and the integration of day-light is well utilized. This has helped in optimized usage of electricity for lights and fans during day time.

3.2.5. Inventory Collection

To understand the types of appliances used, inventory collection was carried out by the audit team members. The various types of appliances used are lights, fans, geysers, RO water plants etc. The consolidated list of inventories is given in table 3-1.

S. No.	Inventory Type	Quantity
1	FTL	2019
2	LED lamps	2513
3	Ceiling Fan	1825
5	RO Plant	3
6	Geysers	22

Table 3-1: Consolidated list of Inventories

3.2.6. Interviews

To collect the various data, information and operating patterns, interviews were conducted with college staff (Principal, teaching staff, non-teaching staff) and students. The consolidated information from the interviews is given in the following sub-sections.

3.2.6.1. List of Holidays:

The lists of holidays were collected during the study and the same is given in figure 3-7.

NEW HORIZON COLLEGE OF ENGINEERING
LIST OF HOLIDAYS FOR 2024

SL NO	DATE	DAY	List of Holidays	Remarks
1	01.01.2024	Monday	New Year	Will be compensated in December 2023
2	15.01.2024	Monday	Makara Sankranti	
3	26.01.2024	Friday	Republic Day	
4	27.01.2024	Saturday	4th Saturday	20.01.2024 3rd Saturday is working
5	08.03.2024	Friday	Maha Shivratri	
6	09.03.2024	Saturday	2nd Saturday	02.03.2024 1st Saturday is working
7	25.03.2024	Monday	Holi	
8	29.03.2024	Friday	Good Friday	
9	09.04.2024	Tuesday	Ugadi	
10	11.04.2024	Thursday	Ramzan	
11	01.05.2024	Wednesday	May Day	
12	10.05.2024	Friday	Basava Jayanthi	
13	11.05.2024	Saturday	2nd Saturday	04.05.2024 1st Saturday is working
14	17.06.2024	Monday	Bakrid	
15	17.07.2024	Wednesday	Muharram	
16	15.08.2024	Thursday	Independence Day	
17	16.08.2024	Friday	Varamahalakshmi Vrata	03.08.2024 1st Saturday is working
18	07.09.2024	Saturday	Ganesha Chaturthi	
19	16.09.2024	Monday	Id Milad	
20	02.10.2024	Wednesday	Gandhi Jayanthi/ Mahalaya Amavasye	
21	11.10.2024	Friday	Ayudha Puja	
22	12.10.2024	Saturday	Vijayadashami	
23	31.10.2024	Thursday	Naraka Chaturdashi	
24	01.11.2024	Friday	Kannada Rajyotsava/ Lakshmi Puja	
25	02.11.2024	Saturday	Deepavali/Balipadyami	
26	25.12.2024	Wednesday	Christmas	

Note:

- The list does not include Ambedkar Jayanthi (14.04.2024) as it falls on Sunday.

Figure 3-7: List of Holidays

3.2.6.2. Tentative Schedule of College:

The tentative schedule of the college is 09.00 AM to 4:50 PM. The details of the sessions are given in table 3.2.

S. No.	Description	Timings
1	Session – I	09.00 AM to 10.00 AM
2	Session – II	10.00 AM to 11.00 AM
3	Break	11.00 AM to 11.10 AM
4	Session – III	11.10 AM to 12.10 PM
5	Lunch	12.10 PM to 12.50 PM
6	Session – IV	12.10 PM to 01.50 PM
7	Session – V	01.50 PM to 02.50 PM
8	Break	02.50 PM to 03.00 PM
9	Session – VI	03.00 PM to 04.00 PM
10	Session – VII	04.00 PM to 05.00 PM

Table 3-2: Tentative College Schedule

3.2.6.3. Staff and Students of College:

The number of staff includes teaching, non-teaching, and house-keeping is given in the table 3-3. The number of students includes both boys and girls.

S. No.	Staff	Students
1	698	5554

Table 3-3: Number of staff and students

4. WATER AUDIT

4.1. Facility description

The water audit study involved carrying out various observations and analysis, to realistically assess usage of water and potential for water conservation. BWSSB and Bore-well are the sources of water, for facilitating the water supply requirement of the entire campus.

BWSSB water received at main sump of 1000 kL near ground at gate no.3. From the main sump, then the water further distributed to SVB block, CSB block, NSCB block, SMV block and RC block sumps by hydro pneumatic pumps of 3 Nos. to maintain the water level in the sumps.

The list of sumps and location details are given in table 4.1.

S. No.	Location	Sump	Source of water
1	Near Ground (Gate-3)	Main Sump	From BWSSB
2	SVB Block	Surface Sump - PVC Tanks	From Main Sump
3	CSB Block	UG Sump - RCC Tank	From Main Sump
4	NSCB Block	UG Sump - RCC Tank	From Main Sump
5	SMV Block-Main Store	UG Sump - RCC Tank	From Main Sump
6	RC Block	UG Sump - RCC Tank	From Main Sump

Table 4-1: Details of sumps and location

The details of list of tanks installed in various blocks with capacity, type of tank and installed location are given in table 4.2.

S. No.	Block Name	Location	PVC Tank	RCC Tank
1	SVB Block	Terrace	5 kL x 2 No. for Raw Water 5 kL x 2 No. for Hot water inlet 2 kL x 1 No. for Drinking Water - This drinking water tank supplies water for SVB block and Hemu Kalani block	-
2	Hemu Kalani Block	Terrace	2 kL x 3 No. for Raw Water	

S. No.	Block Name	Location	PVC Tank	RCC Tank
3	CSB Block	Terrace	2 kL x 1 No. Drinking Water - LHS 2 kL x 1 No. Drinking Water - RHS	Fire Water Tank - LHS - 2 No. Raw Water Tank - LHS - 2 No. Fire Water Tank - RHS - 2 No. Raw Water Tank - RHS - 2 No.
4	NSCB Block	Terrace	2 kL x 2 No. for Raw Water 2 kL x 1 No. for Drinking Water	
		Ground Floor	2 kL x 1 No. Drinking Water - near open gym area	
5	SBS Block	Terrace	2 kL x 1 No. Drinking Water	Fire Water Tank - 1 No. Raw Water Tank - 1 No.
		Ground Floor	2 kL x 1 No. Drinking Water - behind the building	
6	SMV Block	Terrace	5 kL x 2 No. for Raw Water 2 kL x 1 No. for Hot water inlet 2 kL x 1 No. for Drinking Water	
		Ground Floor	2 kL x 1 No. Drinking Water - in Main store area	
7	RC Block	Terrace	2 kL x 1 No. for Raw Water 2 kL x 1 No. for Hot water inlet	
8	JKR Block	Terrace	500 litre x 1 No. for Hot water inlet & Raw water 2 kL x 1 No. for Drinking Water - This drinking water tank supplies water for RC block and JKR block	

Table 4-2: Details of tanks, type and location

Based on the source, usage, type and recycling, water is classified as following types in the college campus that include:

- Raw Water
- Drinking Water
- Hot Water
- Rain Water
- Sewage Water
- Treated Water (from Sewage Treatment Plant)
- RO Reject Water

Details of the various types of water usages are discussed in detail, in the following sections.

4.1.1. Raw Water System

The raw water is consumed in the following areas:

- RO Input
- Hostel – Bathrooms
- Washrooms
- Cleaning
- Laboratories
- Garden

The schematic of overall raw water distribution system of the campus is given in figure 4-1.

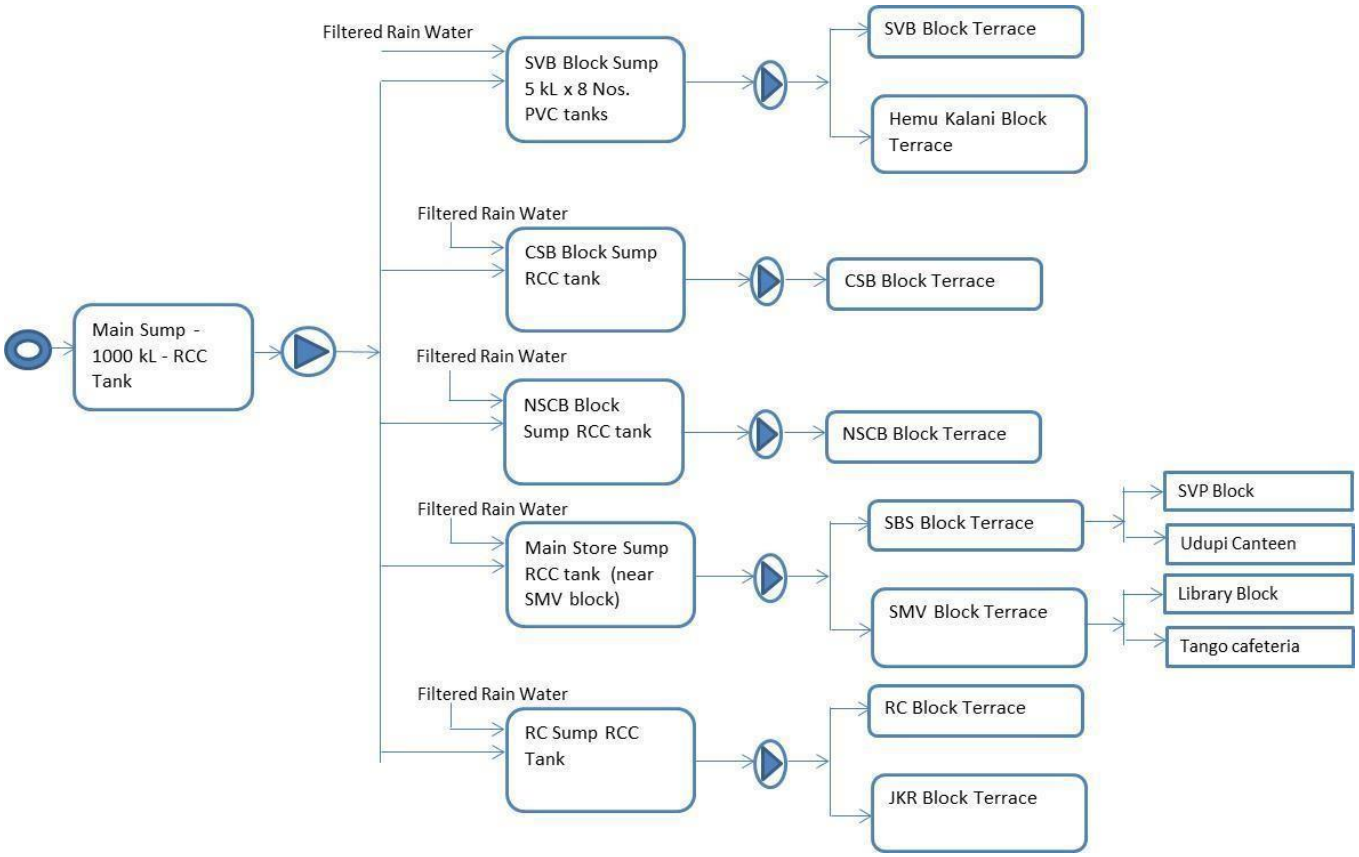

Figure 4-1: Schematic of Overall Raw Water Distribution System

- The main water sump (BWSSB) capacity is 1000 kL, and it is located at the entrance of gate No.3 (near playground area).
- BWSSB water flow meter is located at Gate 3. Figure 4.2 shows the BWSSB water flow meter and main water sump located near Gate 3.
- From the main water tank, the water is transferred to the sump (SVB, CSB, NSCB, SMV, RCB) by hydro pneumatic pumps. Three numbers of hydro-

pneumatic pumps are available in the pump room near the main water sump. From the main sump, the water is distributed to various sumps through underground water pipe lines. Control and regulation valves are provided in the water distribution system for better operation and control.

- From the sump tank, the water is pumped to the overhead tanks located in the terrace by submersible pumps. The pictures of UG Sumps and Overhead tanks are given in figure 4.2 and figure 4.3.

Figure 4-2: Sumps in the campus

Figure 4-3: Overhead tanks in the campus

RC Block Sump:

The raw water from main sump is received in the RC block sump. Filtered rain water is also connected to this sump. Two numbers of submersible pumps have been installed in the sump, to pump the raw water from sump to overhead tanks.

One submersible pump transfers water from RC block sump to overhead tanks in RC block terrace. From the overhead tank, water is supplied to meet the water needs of this block.

The other submersible pump transfers raw water from RC block sump to overhead tank in JKR block terrace. From the overhead tank, water is supplied to meet the water needs of this block.

SMV Block Sump:

The raw water from main sump is received in the SMV block (main store) sump. Filtered rain water is also connected to this sump. Three numbers of submersible pumps have been installed in the sump, to pump the raw water from sump to overhead tanks.

One submersible pump transfers water from SMV block sump to overhead tanks in SMV block terrace. From the overhead tank, water is supplied to meet the water requirement of SMV block, Library block and Tango cafeteria.

The second submersible pump transfers raw water from SMV block sump to overhead tank in SBS block terrace. From the overhead tank, water is supplied to meet the water needs of SBS block, SVP block and Udupi Canteen.

The third submersible pump is used to transfer water from sump to hot water inlet tank directly.

SVB Block Sump:

The raw water from main sump is received in the SVB block sump. Filtered rain water is also connected to this sump. Two numbers of submersible pumps have been installed in the sump, to pump the raw water from sump to overhead tanks.

One submersible pump transfers water from SVB block sump to overhead tanks in SVB block terrace. From the overhead tank, water is supplied to meet the water needs of this block.

The other submersible pump transfers raw water from SVB block sump to overhead tank in Hemu Kalani block terrace. From the overhead tank, water is supplied to meet the water needs of this block.

CSB Block Sump:

The raw water from main sump is received in the CSB block sump. Filtered rain water is also connected to this sump. One number of submersible pump is installed in the sump, to pump the raw water from sump to overhead tanks. From the overhead tank, water is supplied to meet the water needs of this block.

NSCB Block Sump:

The raw water from main sump is received in the NSCB block sump. Filtered rain water is also connected to this sump. One number of submersible pump is installed in the sump, to pump the raw water from sump to overhead tanks. From the overhead tank, water is supplied to meet the water requirement of this block.

4.1.2. Drinking Water System

The drinking water requirement of the entire campus is met by RO water system installed the campus. Three numbers of RO plant is available in the campus. Two numbers of RO plants are installed in NSCB block and one number of RO plant is installed in SVB block. The schematic of drinking water system is given in figure 4.4.

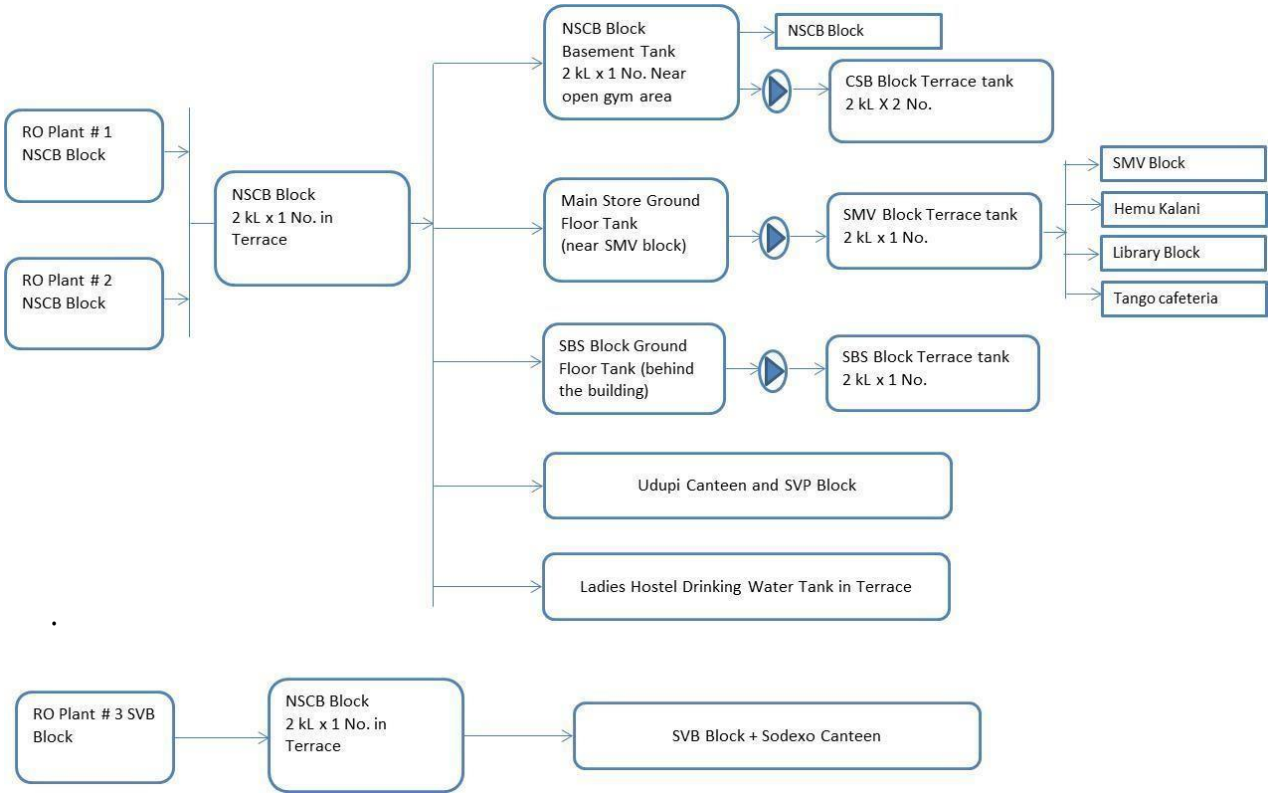

Figure 4-4: Schematic of drinking water system in the campus

4.1.2.1. NSCB Block RO Plant

- The input for the RO plant comes from the overhead tanks
- The output water from two numbers of RO plant in NSCB block is stored in the overhead drinking water tank (2000 Litres x 1 No) available in NSCB block.
- The RO reject water is sent to sump
- The RO back wash water is collected and sent to STP for recycling
- From the overhead drinking water tank, plumbing lines are distributed to all the blocks across the campus. For better control and maintenance purposes, water tanks are kept at some of the blocks, the details are explained below
    - NSCB block ground floor (near open gym area), one number of 2000 litres drinking water tank is available. The input supply to this tank is from the main drinking water distribution header. From the ground floor drinking water tank, water distribution line is given to CSB block terrace drinking water tank of two numbers each 2000 litres capacity
    - One number of 2000 litres capacity drinking water tank is available in ground floor of main store (near SMV block). The input supply to this tank is from the main drinking water distribution header. From the ground floor drinking water tank, water is pumped to SMV block terrace drinking water tank – 2000 litres capacity, one number. From this drinking water tank, the drinking water is supplied to SMV block, Hemu Kalani block, Library block and Tango cafeteria
    - One number of 2000 litres capacity drinking water tank is available in ground floor of SBS block (behind the building). The input supply to this tank is from the main drinking water distribution header. From the ground floor drinking water tank, water is pumped to SBS block terrace drinking water tank – 2000 litres capacity, one number. From this tank, the water is supplied to the SBS block. The picture of RO plant installed in the campus is given in figure 4.5.

Figure 4-5: RO water treatment plant in the campus

4.1.2.2. SVB Block RO Plant

- The input for the RO plant comes from the overhead tank
- The output water from RO plant in SVB block is stored in the overhead drinking water tank (2000 Litres x 1 No) available in SVB block.
- The RO reject water is sent to sump
- The RO back wash water is collected and sent to STP for recycling
- From the overhead drinking water tank – one number of 2000 litres capacity, the drinking water is supplied to SVB block and Sodexo canteen.

The drinking water coolers and water dispensers are available in each floor of all the blocks. Sample photos of the water coolers and water dispensers are given in figure 4.6.

RO water is used for cooking in the hostel and canteens.

Figure 4-6: RO water treatment plant in the campus

4.1.3. Hot Water System

The hot water is mainly consumed in hostels for bathing purposes. The hot water requirement for bathing is met by solar water heater systems and electrical heaters (geysers) installed in the hostel bathrooms.

Apart from this, hot water for drinking purposes in canteen is supplied by water drums (water is heated in cooking gas stoves and stored in a water drum). In few places water dispenser with electrical heating option is also available for supplying drinking hot water. Electrical kettles are also provided in some of the departments for drinking water purposes.

The details of solar water heater systems, capacity and installed location are given in table 4.3. The pictures of solar water heater installed in the hostels are given in figure 4.7.

S. No.	Block	Location	SWH	Capacity, Litres	Total Capacity, Litres
1	SVB	Terrace	2	500	1000
2	SMV	Terrace	2	500	1000
3	SBS	Terrace	2	500	1000
4	RC	Terrace	2	500	1000
5	JKR	Terrace	2	500	1000
				Total	5000

Table 4-3: Details of Solar heater systems

Figure 4-7: Solar water heater installed in the campus

The details of electrical water heaters and installed location are given in table 4.4. The pictures of electrical water heater installed in the hostels are given in figure 4.8.

S. No.	Block	Location	Electrical Heaters
1	SVB	Bathrooms	4
2	SMV	Bathrooms	7
3	SBS	Bathrooms	10
4	RC	Bathrooms	3
5	JKR	Bathrooms	8
		Total	**32**

Table 4-4: Details of Electrical water heaters

Figure 4-8: Electrical water heaters installed in hostels

The hot water supplied in canteen for drinking purposes is shown in figure 4.9.

Figure 4-9: Hot water supplied in canteen

The hot water dispenser available in college for drinking purposes is shown in figure 4.10.

Figure 4-10: Hot water dispenser available in college

4.1.4. Rain Water System

- The college campus has a well designed and engineered rain water harvesting system in place for rain water harvesting.
- Ground water recharging is done with rainwater collected from the roof and open space.
- Bore well recharge well is available for ground water recharge
- The rain water from terrace of each of blocks is brought to ground level through pipes and rain water filters are connected. The filtered rain water is then connected to the sumps available in each building respectively.
- There is provision of storing rain water in STP final treated water tank. Pipeline interconnections are available to regulate the water towards STP final treated water tank.
- During rainy seasons, the intake of water from BWSSB is reduced and maximum utilization of rain water collected in the sumps are utilized to the maximum possible extent.
- Figure 4-11 depicts the sample rain water filters installed in each blocks.

Figure 4-11: Rain water harvesting system in the campus

4.1.5. Sewage Water System

- The sources of waste water in the college campus of all blocks are as follows

    - Washrooms
    - Toilets
    - Kitchen
    - Hostel
    - Labs
    - Canteen

- Waste water from the above mentioned sources are collected and treated at sewage treatment plant (STP). The capacity of STP is 200 kLPD (kilo Litres Per Day)
- The plumbing system (waste water collection, waste water transfer to STP, STP treated water storage and STP treated water to land scaping) is very well designed, the pipes are laid underground, and access / chambers are provided to regulate and control the flow of water.
- The treated water from the STP is distributed via underground pipes to the entire campus for flushing, Cleaning and gardening purposes.
- All the blocks have dual water piping system to use STP treated final water for flushing purposes
- The picture of STP facility is show in figure 4.12.

Figure 4-12: Sewage Treatment Plant

Figure 4.13 depicts the STP Schematic. Figure 4.14 depicts STP block diagram

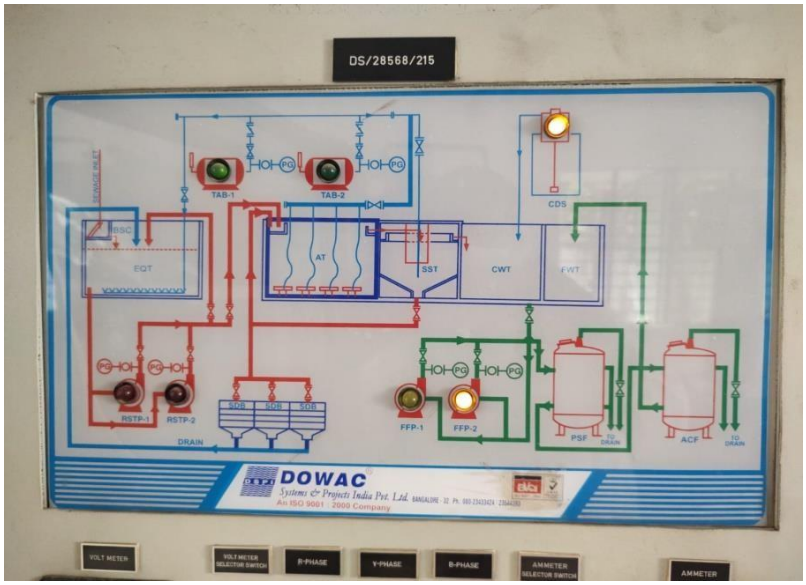

Figure 4-13: STP Schematic

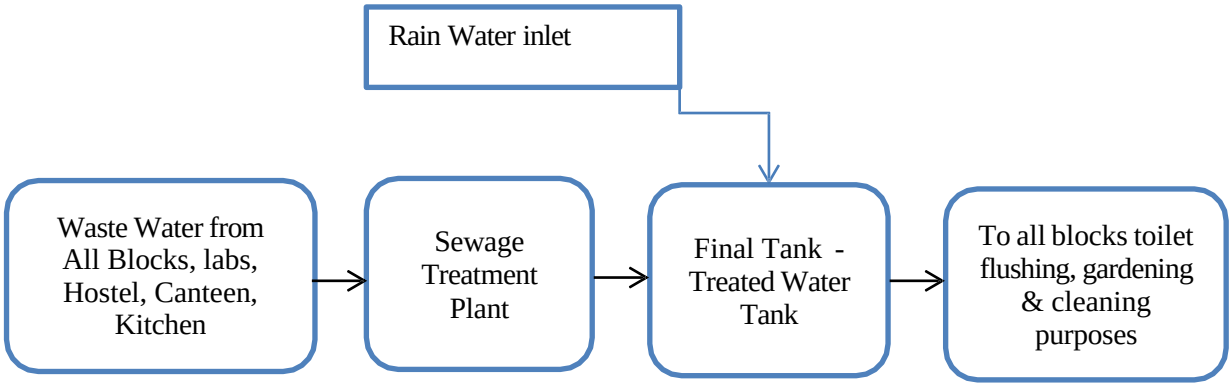

Figure 4-14: STP Block Diagram

4.2. Best Practices Implemented for Water Conservation

4.2.1. Water Flow Meter

One number of water flow meter is installed near gate# 3 to quantify the water used. Regular monitoring of water consumption data and recording of data is being carried out. The water flow meter is shown in figure 4-15.

Figure 4-15: Water flow meter installed in the campus

4.2.2. Dual water piping system for wash rooms

The toilets and rest rooms in all the blocks of the college campus have been provided with dual water piping system. The dual water piping system consists of raw water piping network and STP treated final water piping network.

The STP treated final water is used for flushing in the toilets.

This method of processing the sewage water to convert as treated water, and utilizing in all possible areas would have resulted in substantial amount of water savings.

Figure 4-16: Dual water piping system installed in the campus

4.2.3. Low flow taps

Low flow taps perform better with less water usage when compared to regular taps. These taps compensate the water pressure and give defined water flow rate, therefore less water wastage & more savings on water bills. The advantages of low flow taps are as follows:

- Saves water
- Reduced water bill
- Optimized flow rate
- Different flow patterns (shower/Foam)
- Annual Savings upto 10,000 litres/Year/tap

The picture of low flow taps used in the college is shown in figure 4.17.

Figure 4-17: Low flow taps installed in the college

4.2.4. Water less urinals

Traditional water based urinals are one of the major water consumer in any facility. Apart from the water usage, the cost for handling raw water to the urinals is an added expenditure. Also, maintaining the water taps and flushes for urinals will add to maintenance cost aswell.

To overcome these challenges and as part of water conservation measure, the management has initiated the water less urinals implementation in campus.

The advantages of water less urinals are as follows:

- Saves water
- Reduces water bill
- Reduces maintenance cost
- Reduces water handling cost (electricity cost for pumping raw water)
- Reduces usage of chemicals
- Improves overall bathroom hygiene

The poster of water less urinals is shown in figure 4.18.

Figure 4-18: Water less urinals installed in the college

4.2.5. Rain water harvesting

Rainwater harvesting is the simple process or technology used to conserve rainwater by collecting, conveying, purifying and storing of rainwater for later use.

The benefits of rainwater harvesting system are listed below.

- Helps in reducing the water bill.
- Decreases the demand for water.
- Reduces the need of bore well water
- Promotes both water and energy conservation
- Improves the quality and quantity of groundwater
- It is an excellent source of water for landscape irrigation

The college campus has a fully integrated rain water harvesting system for each blocks and inter-connections are available between blocks, STP and storm water chambers.

The purchase bills of the rain water harvesting system related procurement has been verified during the study. Sample purchase invoice is given in figure 4.19.

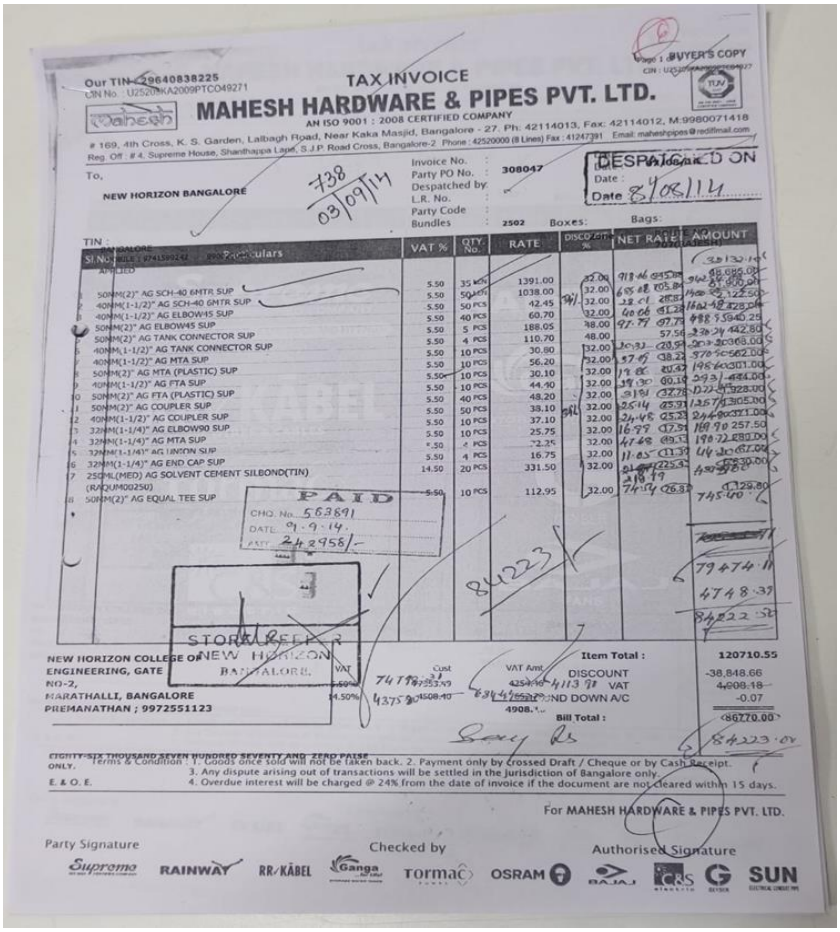

Figure 4-19: Sample procurement bills for rain water harvesting system

4.2.6. Regular testing of water quality

Testing water quality on a regular basis is an important part of maintaining a safe and reliable source. The test result allows to properly addressing the specific problems of a water supply. This will help ensure that the water source is being properly protected from potential contamination, and that appropriate treatment is selected and operating properly.

It is important to test the suitability of water quality for its intended use, whether it be livestock watering, chemical spraying, or drinking water. This will assist in making informed decisions about your water and how you use it. The sample water test report is given in figure 4.20. Water testing is done by college, on regular basis to ensure quality of water used for drinking and other purposes.

Regular testing is important to :

- identify existing problems
- ensure water is suitable for the intended use, especially if used for drinking by humans and animals
- track changes over time
- determine the effectiveness of a treatment system

A TO Z ENVIRO TEST HOUSE LLP

Recognised by MoEF & CC, Certified By : ISO 9001 : 2015, ISO 45001 : 2018 & ISO 14001 : 2015

C-56, KSSIDC Industrial Estate, Veerasandra, Hosur Road, Bangalore-560 100.

Ph.: 080-2960 0330 Mob.: 98456 65241 E-mail : enquiry2022.eth@gmail.com

TEST REPORT

Name & Address of the Customer : **M/s. NEW HORIZON ENGINEERING COLLEGE.**
Kadubisanahalli, Outer Ring Road, Marathahalli,
Bangalore-560103.

Sample Code	ETH/AUG-24/97-1		
Date of Sample Collection	24/08/2024	**Date of Sample Receipt**	24/08/2024
Analysis Commenced Date	26/08/2024	**Analysis Completed Date**	29/08/2024
Sample Description	RO Drinking Water (Netaji Subhas Chandra Bose Block)	**Report Issue Date**	29/08/2024
Qty. Received	2 Ltrs	**Sample Received Condition**	Good
Sample Appearance	Clear Liquid		
Sampling Details	Sample Collected by A to Z Enviro Test House LLP Representative.		

SL. NO	PARAMETERS	UNIT	RESULTS	Requirement Acceptable Limits	Permissible limit in the absence of alternate source	TEST METHOD
				As per IS 10500: 2012		
Physico Chemical Parameters						
1	Colour	Hazen units	<1.0	5	15	IS 3025(Part -04) 2021
2	Odor	--	Agreeable	Agreeable	Agreeable	IS 3025(Part -05) 2018
3	pH Value @25°C	--	6.85	6.5-8.5	No relaxation	IS 3025(Part -11) 2022
4	Taste	--	Agreeable	Agreeable	Agreeable	IS 3025(Part -08) 2023
5	Turbidity	NTU	<1.0	1	5	IS 3025(Part -10) 2023
6	Total Dissolved Solids	mg/L	29.7	500	2000	IS 3025(Part -16) 2023
General Parameters						
7	Calcium as Ca	mg/L	4.1	75	200	IS 3025(Part -40)1991(RA2019)
8	Chloride as Cl	mg/L	11.4	250	1000	IS 3025(Part -32)1988(RA2019)
9	Magnesium as Mg	mg/L	0.5	30	100	IS 3025(Part -46) 2023
10	Total Hardness as $CaCO_3$	mg/L	12.2	200	600	IS 3025(Part -21)2009(RA2019)
11	Total Alkalinity as $CaCO_3$	mg/L	9.7	200	600	IS 3025(Part -23) 2023
12	Total Ammonia as NH_3.N	mg/L	<0.1	0.5	No relaxation	IS 3025(Part -34)1988(RA2019)
13	Fluoride as F	mg/L	<0.1	1.0	1.5	IS 3025(Part -60)2008(RA2019)
14	Nitrate as NO_3	mg/L	0.9	45	No relaxation	IS 3025(Part -34)1988 (RA2019)
15	Sulphate as SO_4	mg/L	2.0	200	400	IS 3025(Part:24/Sec I)2022
16	Residual Free Chlorine	mg/L	<0.1	0.2	1.0	IS 3025 (Part -26)2021
17	Sulfide as S^{2-}	mg/L	Nil	0.05	No relaxation	IS 3025(Part -29) 2022

A TO Z ENVIRO TEST HOUSE LLP BANGALORE

29/8/24

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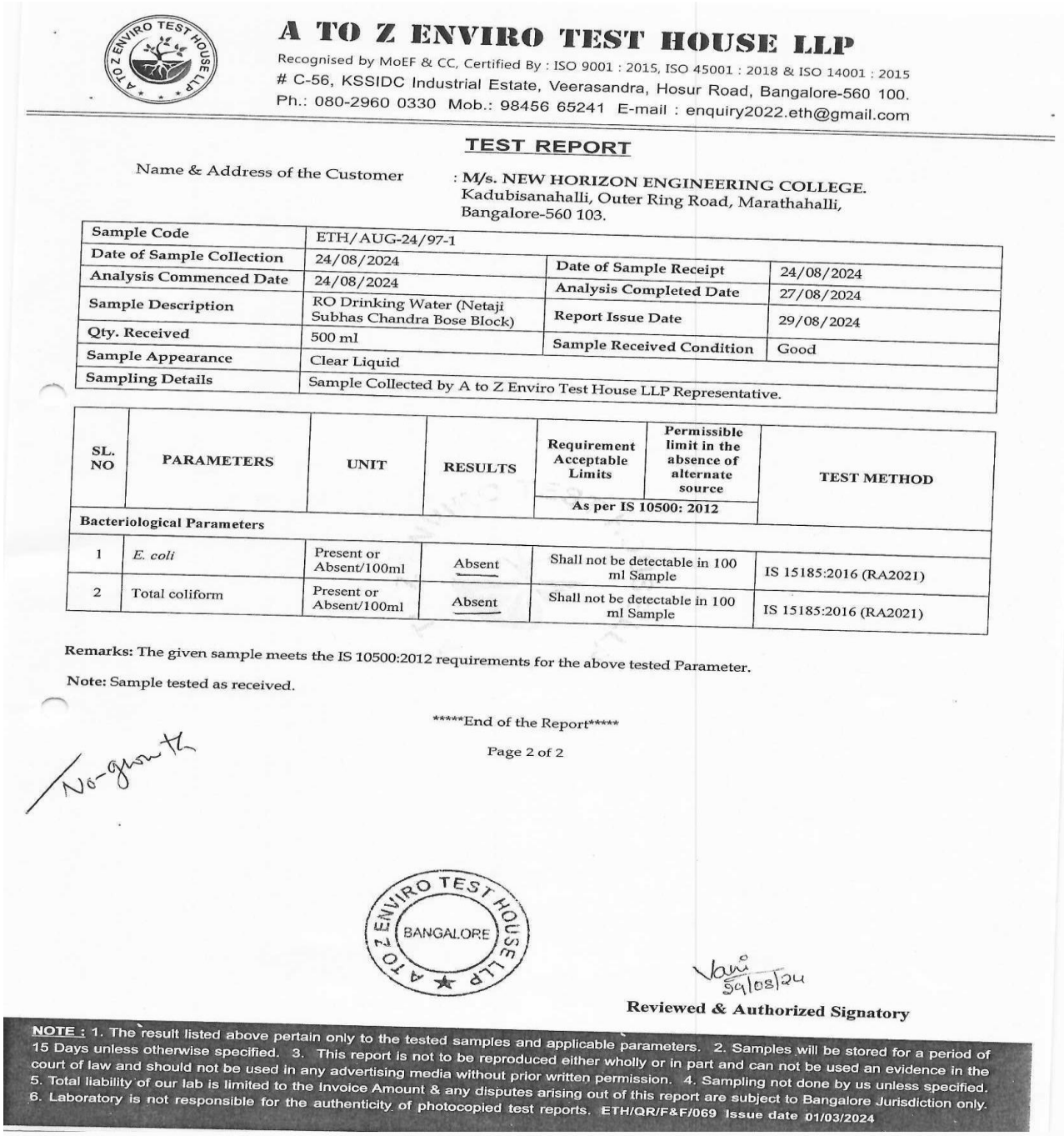

A TO Z ENVIRO TEST HOUSE LLP

Recognised by MoEF & CC, Certified By : ISO 9001 : 2015, ISO 45001 : 2018 & ISO 14001 : 2015
C-56, KSSIDC Industrial Estate, Veerasandra, Hosur Road, Bangalore-560 100.
Ph.: 080-2960 0330 Mob.: 98456 65241 E-mail : enquiry2022.eth@gmail.com

TEST REPORT

Name & Address of the Customer : M/s. NEW HORIZON ENGINEERING COLLEGE. Kadubisanahalli, Outer Ring Road, Marathahalli, Bangalore-560 103.

Sample Code	ETH/AUG-24/97-1		
Date of Sample Collection	24/08/2024	Date of Sample Receipt	24/08/2024
Analysis Commenced Date	24/08/2024	Analysis Completed Date	27/08/2024
Sample Description	RO Drinking Water (Netaji Subhas Chandra Bose Block)	Report Issue Date	29/08/2024
Qty. Received	500 ml	Sample Received Condition	Good
Sample Appearance	Clear Liquid		
Sampling Details	Sample Collected by A to Z Enviro Test House LLP Representative.		

SL. NO	PARAMETERS	UNIT	RESULTS	Requirement Acceptable Limits	Permissible limit in the absence of alternate source	TEST METHOD
				As per IS 10500: 2012		
Bacteriological Parameters						
1	*E. coli*	Present or Absent/100ml	Absent	Shall not be detectable in 100 ml Sample		IS 15185:2016 (RA2021)
2	Total coliform	Present or Absent/100ml	Absent	Shall not be detectable in 100 ml Sample		IS 15185:2016 (RA2021)

Remarks: The given sample meets the IS 10500:2012 requirements for the above tested Parameter.

Note: Sample tested as received.

*****End of the Report*****

Page 2 of 2

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Figure 4-20: Sample water testing report

Useful tests are available to help determine the health and safety of a water supply, and the performance of a water treatment system. Details of various tests are as follows:

- **Basic water potability**

  Include tests for coliform bacteria, nitrates, pH, sodium, chloride, fluoride, sulphate, iron, manganese, total dissolved solids, and hardness.

- **Coliform bacteria**

  Indicate the presence of microorganisms in the water that are potentially harmful to human health.

- **Nitrate**

  A common contaminant found mainly in groundwater. High nitrate concentrations can be particularly dangerous for babies under six months, since nitrate interferes with the ability of blood to carry oxygen.

- **Ions**

  Ions such as sodium, chloride, sulphate, iron, and manganese can impart objectionable taste or odor to water.

- **Sulfate**

  Excessive amounts of sulfate can have a laxative effect or cause gastrointestinal irritation.

- **Fluoride**

  Fluoride is an essential micro-nutrient, but excessive amounts can cause dental problems.

- **Total dissolved solids**

  Represent the amount of inorganic substances (i.e. sodium, chloride, sulphate) that are dissolved in the water. High total dissolved solids (TDS) can reduce the palatability of water.

- **Additional testing**

  Other tests may be appropriate if a particular contaminant is suspected in the water. For instance, groundwater sources are sometimes tested for arsenic, selenium, and uranium. Both surface and groundwater sources may also be tested for pesticide contamination.

4.2.7. Sewage Treatment Plant

The procedure for removing contaminants from the wastewater basically from the household sewage is called sewage treatment. It has to undergo the chemical, physical and biological procedure to remove these contaminants and give out an environmentally safe treated effluent. A semi-solid slurry called the sewage sludge is the by-product of the sewage treatment. This sludge is further processed before it is suitable for land application.

The institution has installed STP with capacity of 200 kLPD and the quantity of final treated water is 75% of the total capacity, which is 150 kLPD.

The details of water savings and cost savings due to installation of STP is given in table 4.5.

S. No.	Description	Unit	Values
1	STP capacity	kLPD	200
2	Quantity of final treated water from STP	kLPD	150
3	Quantity of water reused @ 50% utilization factor	kLPD	75
4	No. of working days per year	days	250
5	Annual Quantity of water reused (saved)	kLPD	18750
6	Average water cost	Rs./Litre	0.086
7	Annual cost savings achieved	Rs. lakh/year	16.125

Table 4-5: Annual water and cost savings by installation of STP

4.2.8. Maintenance Team

The college management has formed separate operations & maintenance team, house-keeping team and security personnel's for maintaining the cleanliness of various areas inside the campus.

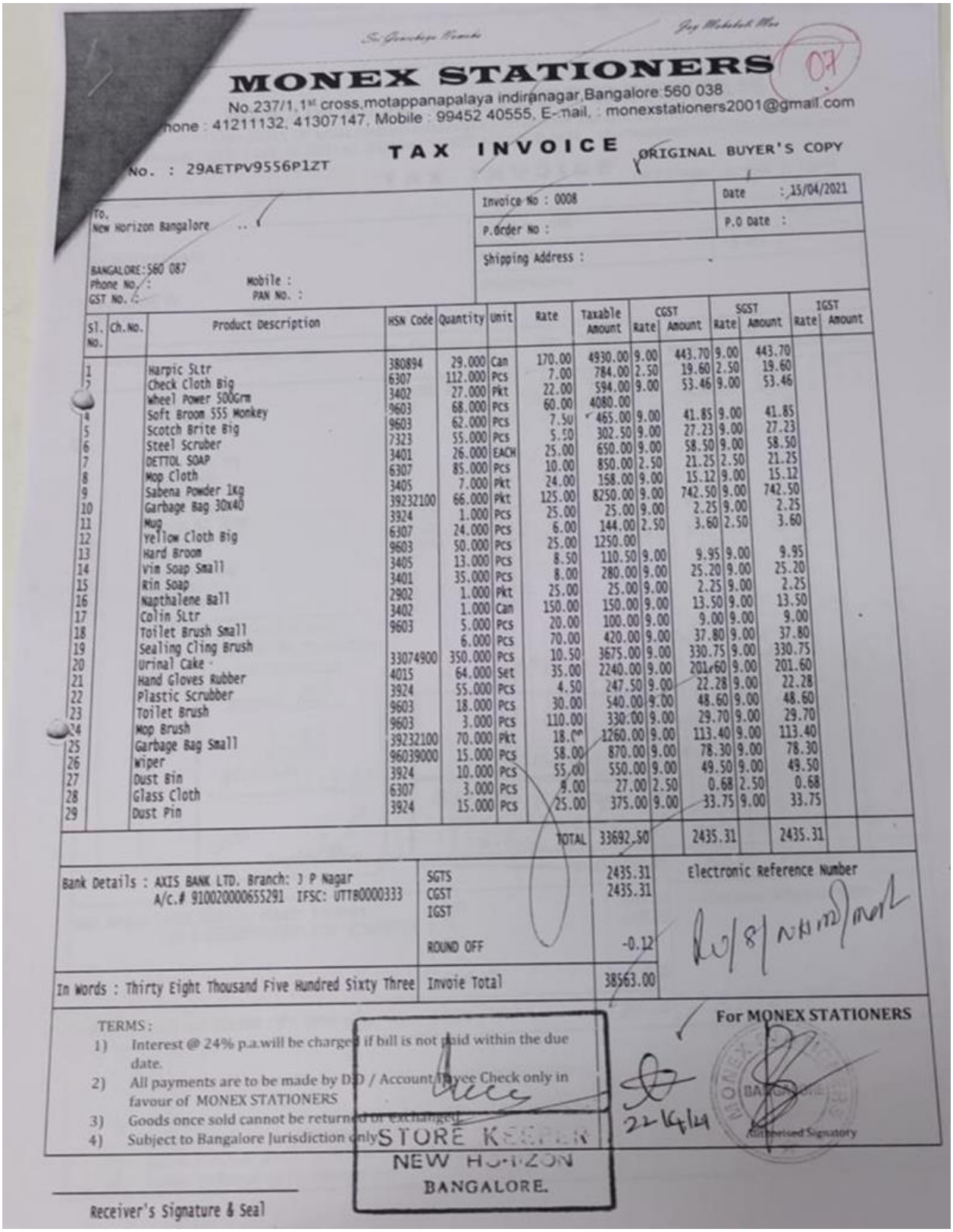
During the audit, walk through survey was carried out to observe the maintenance of the electrical panels, water distribution system, housekeeping and log book/ records for maintenance and housekeeping.

The entire campus is maintained clean and tidy. The electrical panels, panel rooms in each block, sub-station, DG set area, water distribution system, STP area, terrace water tanks, solar water heaters, SRTPV systems, class rooms, office rooms, hostels, kitchen and dining area, canteen, auditorium, library, playground, corridors, walk ways, and toilets & wash rooms, is found to be well maintained and cleaned on regular intervals.

The college campus has a dedicated team for maintenance of the campus. The breakup of the maintenance team members are given in table 4.6. Sample bill copy of list of items purchased for housekeeping and maintenance is given in figure 4.21.

S. No.	Department	No. of Staffs
1	Electrical	16
2	Maintenance	12
3	House Keeping	101
4	Security	63
5	Transport	18
	Total	**210**

Table 4-6: Details of maintenance staffs



MONEX STATIONERS

No.237/1,1st cross,motappanapalaya indiranagar,Bangalore 560 038
Phone : 41211132, 41307147, Mobile : 99452 40555, E-mail, : monexstationers2001@gmail.com

07

GST No. : 29AETPV9556P1ZT

TAX INVOICE

ORIGINAL BUYER'S COPY

To,
New Horizon Bangalore ..
BANGALORE:560 087
Phone No. :
GST No. :
Mobile :
PAN NO. :

Invoice No : 0008
Date : 15/04/2021
P.Order No :
P.O Date :
Shipping Address :

Sl. No.	Ch.No.	Product Description	HSN Code	Quantity	Unit	Rate	Taxable Amount	CGST Rate	CGST Amount	SGST Rate	SGST Amount	IGST Rate	IGST Amount
1		Harpic 5Ltr	380894	29.000	Can	170.00	4930.00	9.00	443.70	9.00	443.70		
2		Check Cloth Big	6307	112.000	Pcs	7.00	784.00	2.50	19.60	2.50	19.60		
3		Wheel Power 500Grm	3402	27.000	Pkt	22.00	594.00	9.00	53.46	9.00	53.46		
4		Soft Broom 555 Monkey	9603	68.000	Pcs	60.00	4080.00						
5		Scotch Brite Big	9603	62.000	Pcs	7.50	465.00	9.00	41.85	9.00	41.85		
6		Steel Scruber	7323	55.000	Pcs	5.50	302.50	9.00	27.23	9.00	27.23		
7		DETTOL SOAP	3401	26.000	EACH	25.00	650.00	9.00	58.50	9.00	58.50		
8		Mop Cloth	6307	85.000	Pcs	10.00	850.00	2.50	21.25	2.50	21.25		
9		Sabena Powder 1kg	3405	7.000	Pkt	24.00	168.00	9.00	15.12	9.00	15.12		
10		Garbage Bag 30x40	39232100	66.000	Pkt	125.00	8250.00	9.00	742.50	9.00	742.50		
11		Mug	3924	1.000	Pcs	25.00	25.00	9.00	2.25	9.00	2.25		
12		Yellow Cloth Big	6307	24.000	Pcs	6.00	144.00	2.50	3.60	2.50	3.60		
13		Hard Broom	9603	50.000	Pcs	25.00	1250.00						
14		Vim Soap Small	3405	13.000	Pcs	8.50	110.50	9.00	9.95	9.00	9.95		
15		Rin Soap	3401	35.000	Pcs	8.00	280.00	9.00	25.20	9.00	25.20		
16		Napthalene Ball	2902	1.000	Pkt	25.00	25.00	9.00	2.25	9.00	2.25		
17		Colin 5Ltr	3402	1.000	Can	150.00	150.00	9.00	13.50	9.00	13.50		
18		Toilet Brush Small	9603	5.000	Pcs	20.00	100.00	9.00	9.00	9.00	9.00		
19		Sealing Cling Brush		6.000	Pcs	70.00	420.00	9.00	37.80	9.00	37.80		
20		Urinal Cake	33074900	350.000	Pcs	10.50	3675.00	9.00	330.75	9.00	330.75		
21		Hand Gloves Rubber	4015	64.000	Set	35.00	2240.00	9.00	201.60	9.00	201.60		
22		Plastic Scrubber	3924	55.000	Pcs	4.50	247.50	9.00	22.28	9.00	22.28		
23		Toilet Brush	9603	18.000	Pcs	30.00	540.00	9.00	48.60	9.00	48.60		
24		Mop Brush	9603	3.000	Pcs	110.00	330.00	9.00	29.70	9.00	29.70		
25		Garbage Bag Small	39232100	70.000	Pkt	18.00	1260.00	9.00	113.40	9.00	113.40		
26		Wiper	96039000	15.000	Pcs	58.00	870.00	9.00	78.30	9.00	78.30		
27		Dust Bin	3924	10.000	Pcs	55.00	550.00	9.00	49.50	9.00	49.50		
28		Glass Cloth	6307	3.000	Pcs	9.00	27.00	2.50	0.68	2.50	0.68		
29		Dust Pin	3924	15.000	Pcs	25.00	375.00	9.00	33.75	9.00	33.75		
						TOTAL	33692.50		2435.31		2435.31		

Bank Details : AXIS BANK LTD. Branch: J P Nagar
A/c.# 910020000655291 IFSC: UTTB0000333

SGTS	2435.31
CGST	2435.31
IGST	
ROUND OFF	-0.12
Invoie Total	38563.00

Electronic Reference Number

In Words : Thirty Eight Thousand Five Hundred Sixty Three

TERMS :
1) Interest @ 24% p.a.will be charged if bill is not paid within the due date.
2) All payments are to be made by D.D / Account Payee Check only in favour of MONEX STATIONERS
3) Goods once sold cannot be returned or exchanged
4) Subject to Bangalore Jurisdiction only

For MONEX STATIONERS

STORE KEEPER
NEW HORIZON
BANGALORE.

22/4/21

Authorised Signatory

Receiver's Signature & Seal

Figure 4-21: Sample procurement bills for housekeeping and maintenance items

4.2.9. Other measures implemented for water conservation

- Regular checking and maintenance of pipelines are done to control water wastage
- Water conservation awareness campaigns are organized, dedicated staff members have been deputed for this activity and support of trust members is also extended
- Usage of sign boards in all the wash rooms are posted to create awareness for water conservation, sample photos are taken during the audit and are shown in figure 4-22.

Figure 4-22: Posters to conserve water

4.3. Recommendations for Water Audit

- Installation of water flow meters for individual blocks and monitoring the block wise water consumption
- Regular checking of taps and valves to avoid leaks and water wastage
- Conduct seminars, workshops and exhibitions on water conservation

5. ENERGY AUDIT

5.1. Facility Description

New Horizon College of Engineering, Bellandur campus receives power supply from the state electricity board (BESCOM – Bangalore Electricity Supply Company Limited) S7 Murgeshpalya at HT 11 kV. NHCE has availed power supply, with connection – RR. No 6083066719 (S7HT7) with 1HT2C2 tariff.

Incoming power supply from BESCOM is received at the transformer yard inside the college premises. The 11 kV rated HT power supply is stepped down to LT 433V, by one number of 500 kVA rated transformer. Transformer unit installed inside college premises is as shown in the figure 5-1.

Figure 5-1: Transformer unit Installed in the campus

The name plate details of transformer are given in table 4-1.

S. No.	Description	Units	Details
1	Rated Capacity	kVA	500
2	Rated Voltage Prim/Sec	kV	11/0.433
3	Rated Current Prim/Sec	A	2.6-24/6.66-64
4	Type of Cooling	-	ONAN
5	Frequency	Hz	50
6	Impedance	-	4.48%

S. No.	Description	Units	Details
7	Phase	-	3
8	Make	-	Kiran Power Rectification Services (P) Ltd. (KPRS)

Table 5-1: Name plate details of transformer

The LT supply from the transformer is taken to the main distribution panel located inside the Electrical panel room near the transformer yard. Electrical panel room is as shown in the figure 5-2. One number of 400 kVAr rated capacitor bank have been installed at the main incomer panel for power factor improvement.

Figure 5-2: Electrical panel Room

Figure 5-3: APFC panel

Power supply cables from the electrical panel room is distributed to the various distribuition panels placed inside the blocks. From the main LT sub-station panel room, power supply is catered to individual blocks. There is an feeder pillar installed near the NSB block. From this feedar pillar the power is supplied to SVP block, NSB block, RC block and JKR block. For all the other remaining blocks, the power is supplied directly from the LT sub-station panel room. Figure 5.4 shows the feeder pillar near the NSB block. The electrical panels located in various blocks sample pictures are given in figure 5.5.

Figure 5-4: Feeder Pillar near NSB block

Figure 5-5: Electrical distribution panels in various blocks

Two numbers of DG (Diesel Generator) sets are used for backup power supply, during power failure from BESCOM. DG set installed at the college premises is shown in the figure 5-6. The name plate specification rating of the DG set is shown in the table 5-2.

Figure 5-6: Diesel Generator (DG) sets

S. No.	Description	Unit	DG # 1	DG # 2
1	Rated Capacity	kVA	500	250
2	Rated voltage	Volts	415	415
3	Rated current	Ampere	696	347.8
4	Frequency	Hz	50	50
5	Power factor	-	0.80	0.80
6	Rated Demand	kVA	500	250
7	Rated Power	kW	400	200
8	Make	-	Caterpillar	Leroy Somer

Table 5-2: DG set specifications

5.1.1. Tariff Structure

The sanctioned contract demand of the campus is 475 kVA at specified voltage of 11 kV. Electricity supply from BESCOM is billed under 1HT2C2 schedule of tariffs. The tariff includes demand charges of Rs. 240 per kVA, and energy charges of Rs.8.20 per kWh.

The kVA demand charges @ Rs. 240/kVA of maximum demand recorded during the month or 85% of the contract demand, whichever is higher

5.1.2. Electricity Consumption Data

Details of electricity consumption for the last two years have been collected and Salient features of electrical energy details are given in table 5-3.

S. No.	Description	Unit	Details
1	Contract Demand	kVA	475
2	Demand Charges	Rs./kVA	240
3	Maximum Demand Recorded during last three years	kVA	446
4	Average Monthly Energy Consumption during last three years	kWh	87057.53
5	Average System Power Factor		0.987
6	Average Energy Charges considered for savings calculations	Rs./ kWh	9.73

5.1.3. SRTPV (Solar Roof Top Photo Voltaic) system

SRTPV (Solar Roof Top Photo Voltaic) system was installed at the terrace of SVP (Mechanical) block and in NSB block. The capacity of SRTPV installed in SVP block is of **25 kWp** rated and the capacity of SRTPV installed in NSB block is of **5 kWp** rated.

The SRTPV is off-grid system type with battery backup. During the audit, photo of SRTPV systems are collected and is shown in figure 5-8 and figure 5-9.

Figure 5-8: Solar rooftop PV system installed in SVP block

Figure 5-9: Solar rooftop PV system installed in NSB block

The solar power generated from **25 kWp** system installed in the SVP block is consumed by the electrical loads in the SVP block only. The 5 **kWp** system installed in NSB block supplies power to NSB block lighting loads.

The SRTPV system panels are well maintained and cleaned on regular basis. To remove the dust accumulated on the solar panel cells, pressurized water system is used for cleaning. The picture of the pressurized water cleaning system is given in figure 5.10.

Figure 5-10 Pressurized water cleaning for SRTPV systems

5.2. Measurements & Observations

Main LT incomer of Campus

The power parameters were observed at main LT incoming panel. The parameters such as incoming voltage, variation in load current, kW, kVA, kVAr, power factor and frequency were monitored from the existing meter installed in the main incomer panel. Summary of observed power parameters at the main LT incoming supply panel during typical working day is given in table 5-4.

S. No.	Description	Phase	V	I	kW	kVA	kVAr	PF	Hz
1	Main LT Incomer	R	241.0	368.0	86.9	88.7	17.6	0.98	49.9
		Y	244.0	371.0	89.6	90.5	12.8	0.99	49.9
		B	243.6	382.0	92.1	93.1	13.1	0.99	50.0
					268.7				

Table 5-4: Power parameters at main incomer panel room

The UPS power is supplied to computers and server loads. Each block has separate UPS system. Table 5.5 gives the list of UPS system available in each block and its rated capacity.

S. No.	Block	Capacity, kVA	Quantity, Nos.
1	Sub-station	15	2
2	Sub-station	3	1
3	SHK Block	20	1
4	SHK Block	15	1
5	SHK Block	3	1
6	SHK Block	3	1
7	SV Block	3	1
8	SV Block	3	1
9	SV Block	3	1
10	Library	30	1
11	Library	10	1
12	NSC Block	30	1
13	NSC Block	30	1
14	NSC Block	30	1
15	NSC Block	30	1
16	NSC Block	15	1
17	NSC Block	12.5	1
18	NSC Block	10	1
19	NSC Block	10	1
20	NSC Block	10	1
21	NSC Block - Solar	5	1
22	Auditorium	3	1
23	SMV	3	1
24	SMV	3	1
25	SBC Block	15	1
26	SBS Block	3	1
27	RC Block	3	1
28	JKR Block	5	1
29	SVP Block	25	1
30	CSB Block	15	1
31	CSB Block	5	1
32	CSB Block	100	1
33	CSB Block	5	1
34	Main Gate	1	1
35	Main Gate	2	1

S. No.	Block	Capacity, kVA	Quantity, Nos.
36	SVP Block	20	2
37	SVP Block - Solar	25	1
38	Store	1	1

Table 5-5: List of UPS and its rated capacity

Note: ***As part of regular practice the inverters and batteries are always kept in a separate room and electrical panel rooms are separate.***

5.3. Best Practices Implemented for Energy Conservation

During the study, observations were carried out on the usage of the inventories in the college building premises. In the intension of saving the electricity, various measures have been adopted in the college. Computers and AC units are used only during the working hours, after completion of class hours – fans, lights, computers and AC units are found to be turned OFF. This practice is followed across the college premises (class rooms, labs, staff rooms, office rooms, library and auditoriums).

5.3.1. Day-light Integration:

During the audit phase classrooms, Staff-rooms, computer lab, seminar hall, UPS & batteries room and library areas were surveyed for illumination levels and fresh air-circulation. It was observed most of the rooms are well ventilated and day-light integrated; sample photos are shown in figure 5-11 and figure 5-12.

Figure 5-11: Well-ventilated and day-light integrated rooms

Figure 5-12: Well-ventilated and day-light integrated Staff room and class room

5.3.2. Installation of LED lights

Many of the FTL in all the blocks of the campus are replaced with LED lights. LED tube lights are used in the class rooms, staff-rooms, corridors, hostel, dining area, building façade lighting and in the library area. Sample photo of LED lamp used in the some of the location of the college area are shown in figure 5-13.

Figure 5-13: Use of LED lights

The cost savings by installation of LED lights are given in table 5-6.

S. No.	Description	Unit	Values
1	Rated Wattage of LED lamps installed	W	20
2	Quantity of LED lamps installed	Nos	2513
3	Rated wattage of lamps used earlier	W	40
4	Savings per lamp by installation of LED lamps	W	20
5	Total savings	kW	50.26
6	Working hours per day	hours	8
7	No. of working days per year	days	250
8	Annual electricity savings	kWh	100520
9	Average electricity cost	Rs./kWh	9.73
10	Annual cost savings achieved per year	Rs. lakh/year	9.78
11	CO2 mitigations per year	Tons/year	85.44

Table 5-6: Annual cost savings by installation of LED lights

5.3.3. Installation of VRV and Inverter AC Systems

The conventional air cooled AC units are replaced with energy efficient VRV and Inverter type AC units. Purchase bills of energy efficient AC units are reviewed during the study and sample bill copy is given in figure 5-14 and figure 5-15.

Figure 5-14: VRV Air Conditioning Unit

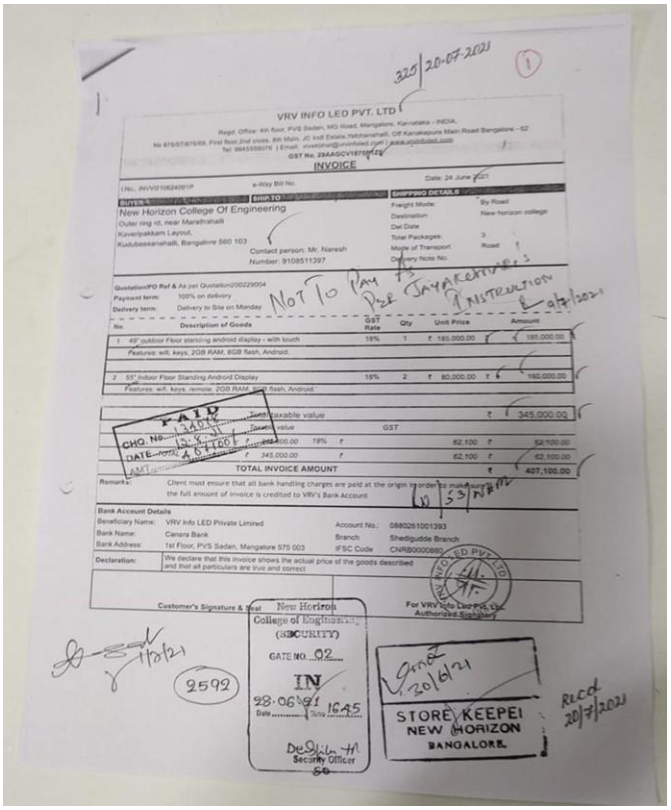


Figure 5-15: VRV Air Conditioning Unit – Purchase Invoice

The cost savings by installation of energy efficient VRV and inverter-based AC Units are given in table 5-7.

S. No.	Description	Unit	Values
1	Rated Tonnage of AC units installed	TR	50
2	SEC of VRV AC units	kW/TR	1.2
3	SEC of Conventional air cooled AC units	kW/TR	1.8
4	Difference in SEC	kW/TR	0.6
5	Savings due to installation of VRV AC units	kW	30
6	Realizable savings @60%	kW	18
7	Working hours per day	hours	2
8	No. of working days per year	days	250
9	Annual electricity savings	kWh	9000
10	Average electricity cost	Rs./kWh	9.73
11	Annual cost savings achieved per year	Rs. lakh/year	0.88
12	CO2 mitigations per year	Tons/year	7.65

Table 5-7: Annual cost savings by installation of LED lights

5.3.4. Installation of Solar Water Heater

Solar water heaters are installed in boys and girls hostel for generating hot water. Sample photo of solar water heater used in the college area are shown in figure 5-16.

Figure 5-16: Use of Solar Water Heater

The cost savings by installation of solar water heater are given in table 5-9.

S. No.	Description	Unit	Values
1	Solar water heater installed	L	5000
2	Total amount of heat produced	kCal/hr	150000
3	Electricity equivalent	kWh	174.4186
4	No. of working days per year	days	250
5	Annual electricity savings	kWh	43604.65
6	Average electricity cost	Rs./kWh	9.73
7	Annual cost savings achieved per year	Rs. lakh/year	4.24
8	CO2 mitigations per year	Tons/year	37.06

Table 5-9: Annual cost savings by installation of LED lights

5.3.5 Procurement of LED/LCD monitors

LED/LCD monitors are used for all the desktop computers in staff rooms and in computer labs. Sample photos of the computer labs are as shown in the figure 5-17.

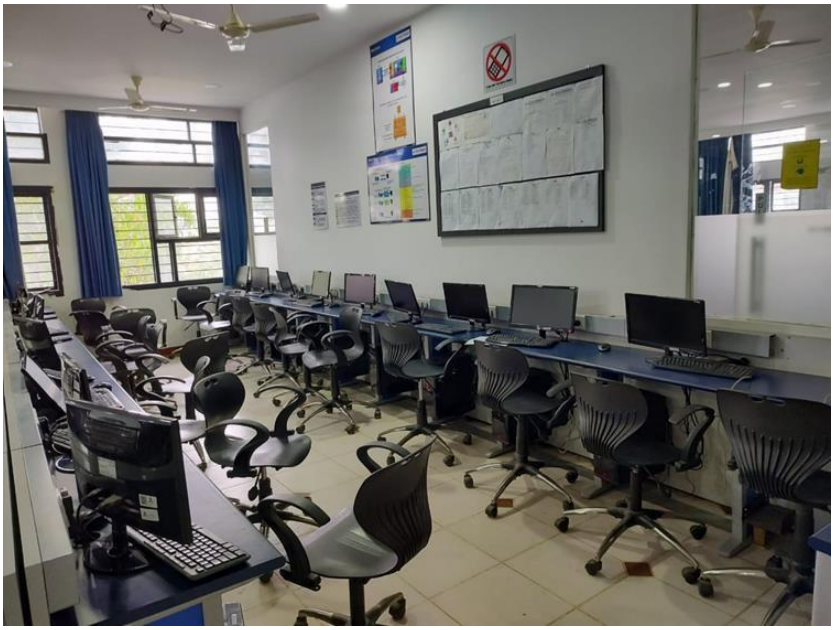
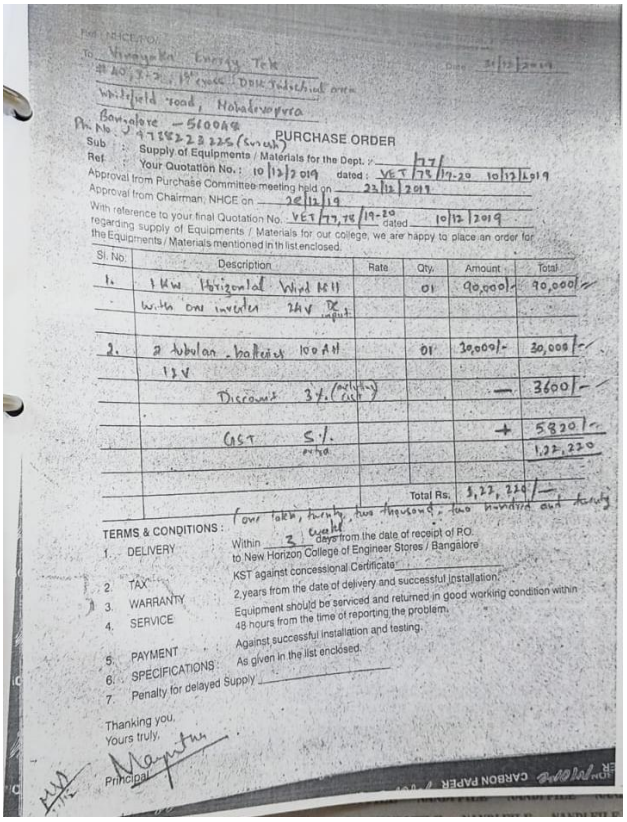


Figure 5-17: Use of LED monitors in the computer labs

5.3.5. Micro wind mill

Micro wind mill was installed in the terrace of SVP block which is of 1 kW. The power generated from this wind mill is used for illuminating the lights in the class rooms and two number of street lights during night time. Figure 5-18 shows the picture of wind mill installed in SVP block. Purchase order of the wind mill is as shown in the figure 5-19.

Figure 5-18: Micro wind mill installed in SVP block



Ref: NHCE/PO/
To Vinayaka Energy Tek
#40, 3-2, 1st cross DDK Industrial area
Whitefield road, Mahadevapura
Bangalore - 560048
Ph. No. 9738223225 (Suresh)

Date 31/12/2019

PURCHASE ORDER

Sub : Supply of Equipments / Materials for the Dept. : /77/
Ref : Your Quotation No. : 10/12/2019 dated : VET/78/19-20 10/12/2019
Approval from Purchase Committee meeting held on 23/12/2019
Approval from Chairman, NHCE on 28/12/19
With reference to your final Quotation No. VET/77,78/19-20 dated 10/12/2019 regarding supply of Equipments / Materials for our college, we are happy to place an order for the Equipments / Materials mentioned in th list enclosed.

Sl. No.	Description	Rate	Qty.	Amount	Total
1.	1 kW Horizontal Wind Mill with one inverter 24V DC input		01	90,000/-	90,000/-
2.	2 tubular batteries 100 AH 12V		01	30,000/-	30,000/-
	Discount 3% (excluding GST)			—	3600/-
	GST 5% extra			+	5820/-
					1,22,220
				Total Rs.	1,22,220/-

(one lakh, twenty, two thousand, two hundred and twenty)

TERMS & CONDITIONS :
1. DELIVERY Within 3 weeks days from the date of receipt of P.O. to New Horizon College of Engineer Stores / Bangalore
2. TAX KST against concessional Certificate
3. WARRANTY 2 years from the date of delivery and successful installation.
4. SERVICE Equipment should be serviced and returned in good working condition within 48 hours from the time of reporting the problem.
5. PAYMENT Against successful installation and testing.
6. SPECIFICATIONS As given in the list enclosed.
7. Penalty for delayed Supply

Thanking you,
Yours truly,
Principal

Figure 5-19: Micro wind – Purchase Order

5.3.6. Usage of Sign boards

There were Sign boards stating ‘Switch off the lights and fans when not in use’ and ‘Save Energy’ posted in class rooms, staff-rooms, labs, libraries hostels and corridors. Sample picture taken during walk through is shown in the figure 5-20.

Figure 5-20: Sign boards to save energy

1.1.1. Complaints and Maintenance Register

There is a systematic process is in place for complaints and maintenance monitoring. The complaints are sent by email and recorded manually in the log register. Once the complaint is attended and fixed, manual sign of completion is obtained from the person raised the complaint and then the complaint gets closed in the register. The pictures of the complaint and maintenance register are shown in figure 5.21.

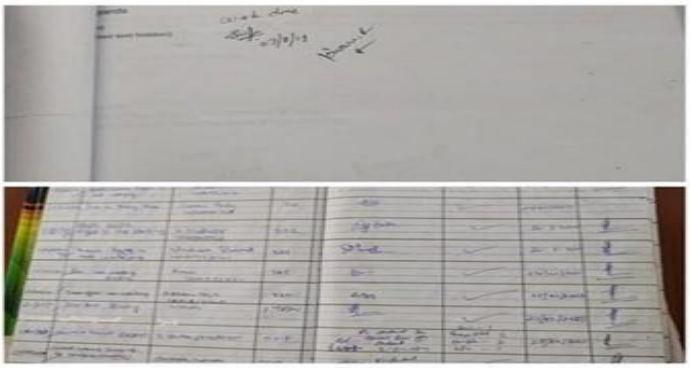


Figure 5-21: Complaints and Maintenance Register

1.2. Recommendations for Energy Audit

- Conduct training and awareness programs on energy conservation
- Demand optimization
- Replacement of conventional FTL lamps with energy efficient LED lamps in phased manner, as part of procurement practice
- Replacement of conventional fans with energy efficient fans in phased manner, as part of procurement practice.
- Installation of SRTPV (Solar Roof Top Photo Voltaic) system

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- Replacement of conventional fans with energy efficient fans in phased manner, as part of procurement practice.
- Installation of SRTPV (Solar Roof Top Photo Voltaic) system

2. WASTE MANAGEMENT AUDIT

2.1. Facility Description

The study involved carrying out various analyses to realistically assess waste generation.

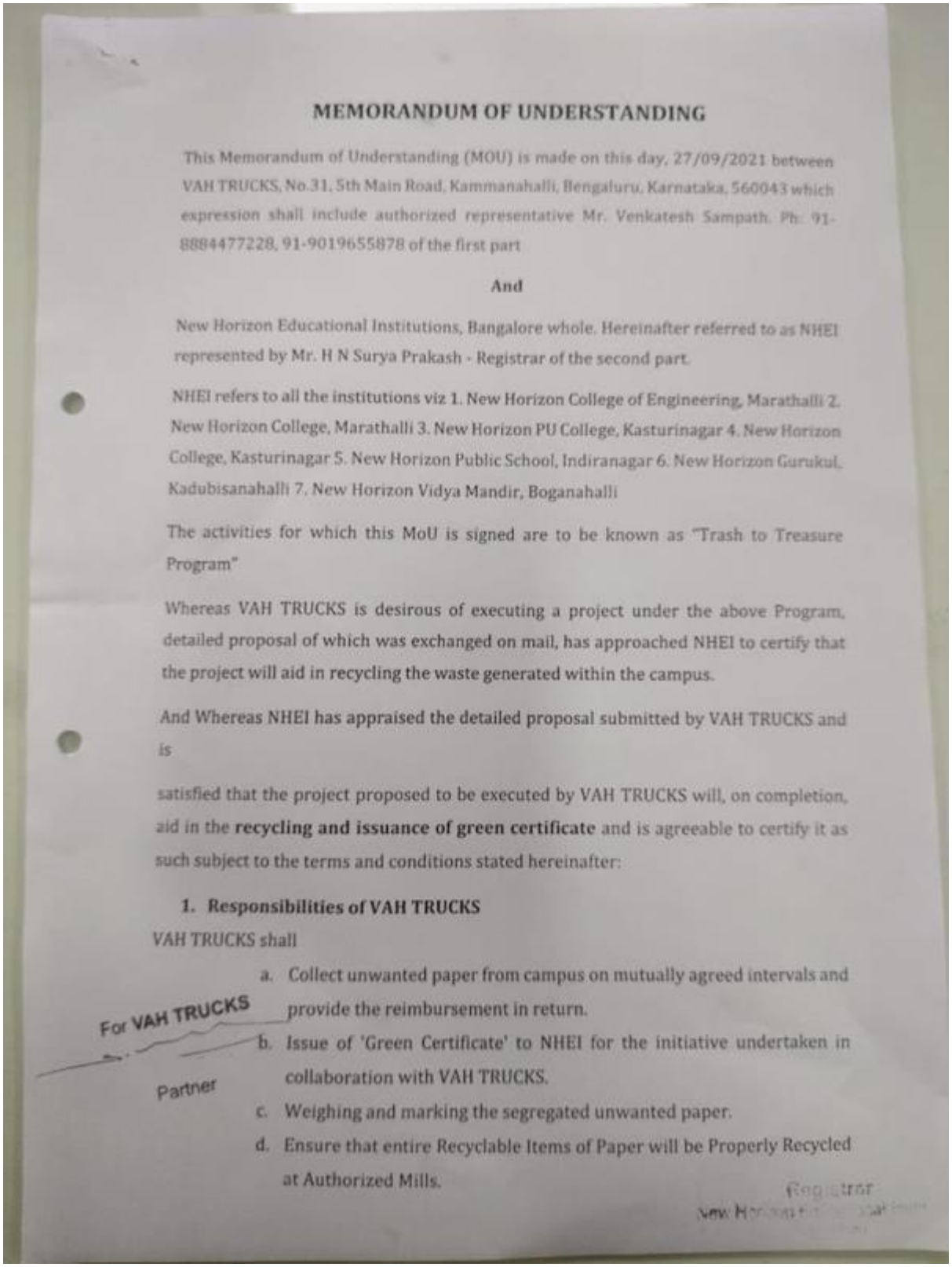
There are different types of waste generated in the college and is tabulated in table 6-1.

S. No.	Description	Yes / No	Details
1	E-Waste	Yes	External Agency
2	Hazardous / Chemical Waste	No	NA
3	Solid Waste	Yes	External Agency
4	Dry Leaves	Yes	Compost Unit
5	Food Waste	Yes	Compost Unit
6	Waste Water	Yes	STP
7	Glass Waste	No	NA
8	Unused Materials	No	External Agency
10	Plastic Waste	Yes	External Agency

Table 6-1: Types of Waste Generated in the college

2.1.1. Dry Waste Management

Separate bins are used across the campus for waste collection. Each room (Staff, class rooms, corridors, office, restrooms, and library) is provided with the separate dustbin to segregate waste. MoU with VAH trucks is signed to manage dry waste in the campus which is as shown in figure 6-1 and figure 6-2.



MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (MOU) is made on this day, 27/09/2021 between VAH TRUCKS, No.31, 5th Main Road, Kammanahalli, Bengaluru, Karnataka, 560043 which expression shall include authorized representative Mr. Venkatesh Sampath. Ph: 91-8884477228, 91-9019655878 of the first part

And

New Horizon Educational Institutions, Bangalore whole. Hereinafter referred to as NHEI represented by Mr. H N Surya Prakash - Registrar of the second part.

NHEI refers to all the institutions viz 1. New Horizon College of Engineering, Marathalli 2. New Horizon College, Marathalli 3. New Horizon PU College, Kasturinagar 4. New Horizon College, Kasturinagar 5. New Horizon Public School, Indiranagar 6. New Horizon Gurukul, Kadubisanahalli 7. New Horizon Vidya Mandir, Boganahalli

The activities for which this MoU is signed are to be known as "Trash to Treasure Program"

Whereas VAH TRUCKS is desirous of executing a project under the above Program, detailed proposal of which was exchanged on mail, has approached NHEI to certify that the project will aid in recycling the waste generated within the campus.

And Whereas NHEI has appraised the detailed proposal submitted by VAH TRUCKS and is

satisfied that the project proposed to be executed by VAH TRUCKS will, on completion, aid in the **recycling and issuance of green certificate** and is agreeable to certify it as such subject to the terms and conditions stated hereinafter:

1. **Responsibilities of VAH TRUCKS**

VAH TRUCKS shall

a. Collect unwanted paper from campus on mutually agreed intervals and provide the reimbursement in return.
b. Issue of 'Green Certificate' to NHEI for the initiative undertaken in collaboration with VAH TRUCKS.
c. Weighing and marking the segregated unwanted paper.
d. Ensure that entire Recyclable Items of Paper will be Properly Recycled at Authorized Mills.

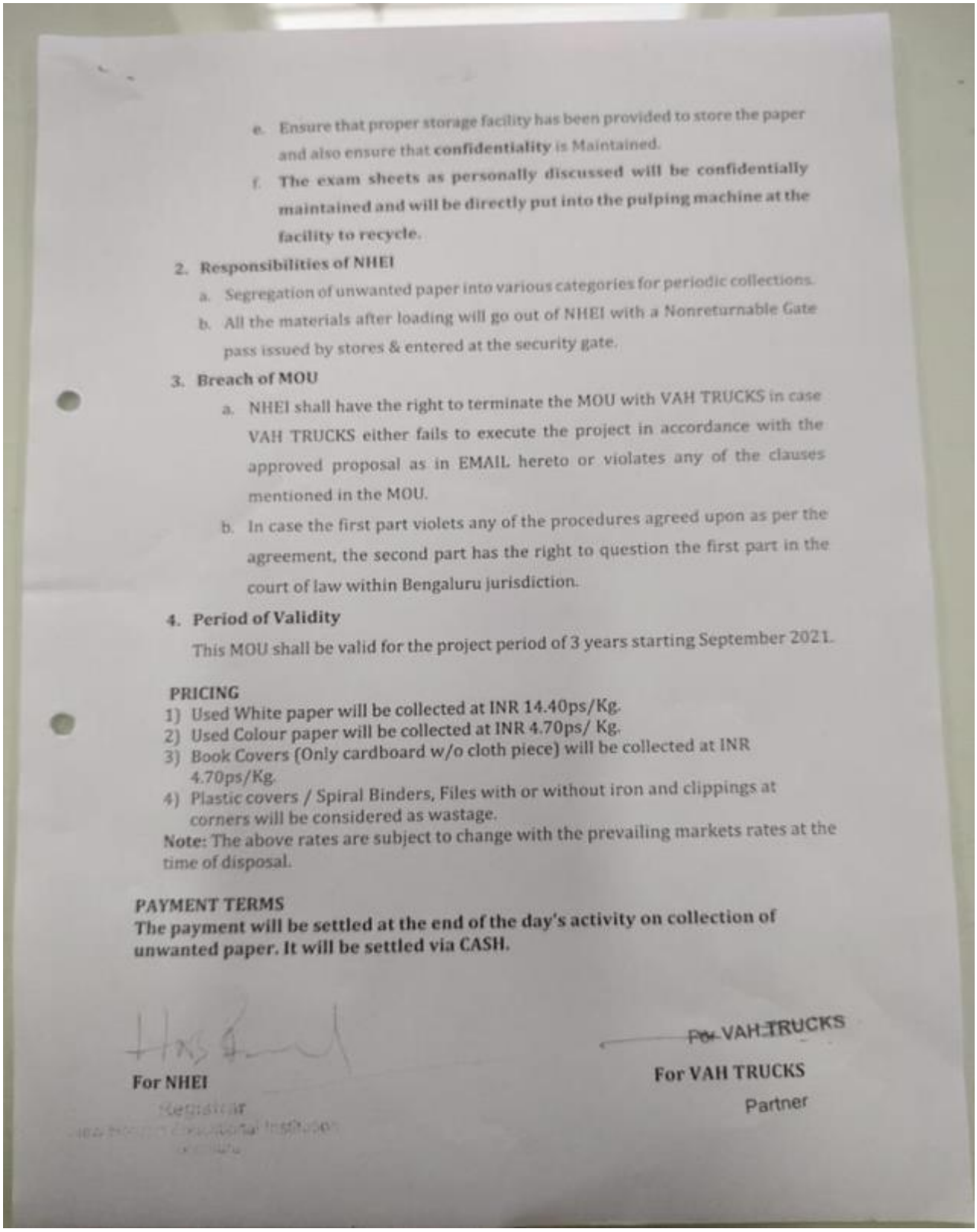
For VAH TRUCKS

Partner

Registrar

New Horizon

Figure 6-1: Image 1 of 2 – MoU for Dry -Waste management



e. Ensure that proper storage facility has been provided to store the paper and also ensure that **confidentiality** is Maintained.

f. **The exam sheets as personally discussed will be confidentially maintained and will be directly put into the pulping machine at the facility to recycle.**

2. **Responsibilities of NHEI**

a. Segregation of unwanted paper into various categories for periodic collections.

b. All the materials after loading will go out of NHEI with a Nonreturnable Gate pass issued by stores & entered at the security gate.

3. **Breach of MOU**

a. NHEI shall have the right to terminate the MOU with VAH TRUCKS in case VAH TRUCKS either fails to execute the project in accordance with the approved proposal as in EMAIL hereto or violates any of the clauses mentioned in the MOU.

b. In case the first part violets any of the procedures agreed upon as per the agreement, the second part has the right to question the first part in the court of law within Bengaluru jurisdiction.

4. **Period of Validity**

This MOU shall be valid for the project period of 3 years starting September 2021.

PRICING

1) Used White paper will be collected at INR 14.40ps/Kg.
2) Used Colour paper will be collected at INR 4.70ps/ Kg.
3) Book Covers (Only cardboard w/o cloth piece) will be collected at INR 4.70ps/Kg.
4) Plastic covers / Spiral Binders, Files with or without iron and clippings at corners will be considered as wastage.

Note: The above rates are subject to change with the prevailing markets rates at the time of disposal.

PAYMENT TERMS

The payment will be settled at the end of the day's activity on collection of unwanted paper. It will be settled via CASH.

For NHEI

Registrar

For VAH TRUCKS

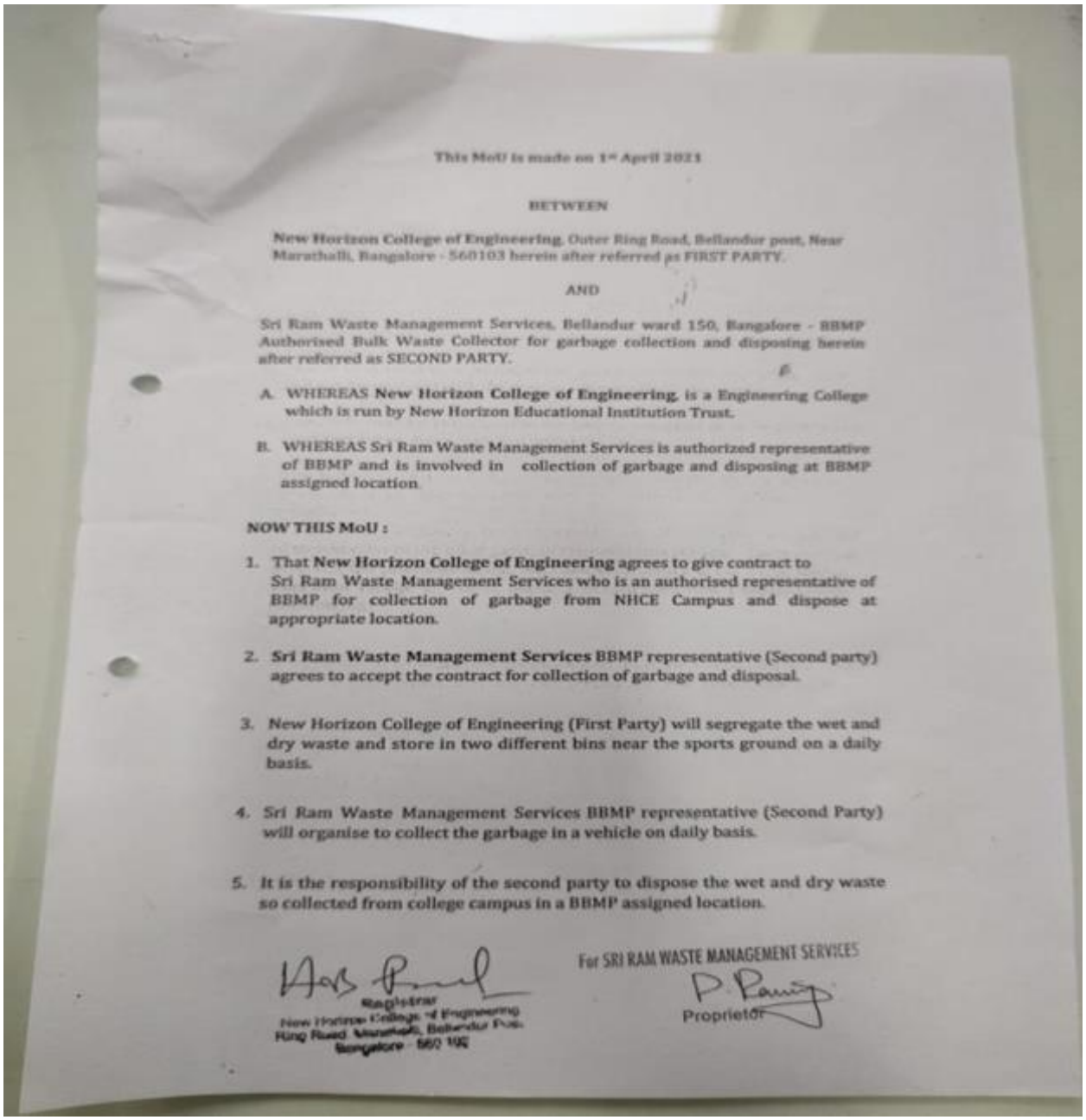
For VAH TRUCKS

Partner

Figure 6-2: Image 2 of 2 – MoU for Dry - Waste management

2.1.2. Wet Waste Management

To manage the wet waste produced in the college, which is produced from kitchens of canteens in the campus, from the remains of the tiffin boxes brought by the students, teachers, & staff of the college, the college management has signed MoU with external agency; the copy of MoU is given in figure 6.3 and 6.4.



This MoU is made on 1st April 2021

BETWEEN

New Horizon College of Engineering, Outer Ring Road, Bellandur post, Near Marathalli, Bangalore - 560103 herein after referred as FIRST PARTY.

AND

Sri Ram Waste Management Services, Bellandur ward 150, Bangalore - BBMP Authorised Bulk Waste Collector for garbage collection and disposing herein after referred as SECOND PARTY.

A. WHEREAS **New Horizon College of Engineering**, is a Engineering College which is run by New Horizon Educational Institution Trust.

B. WHEREAS Sri Ram Waste Management Services is authorized representative of BBMP and is involved in collection of garbage and disposing at BBMP assigned location.

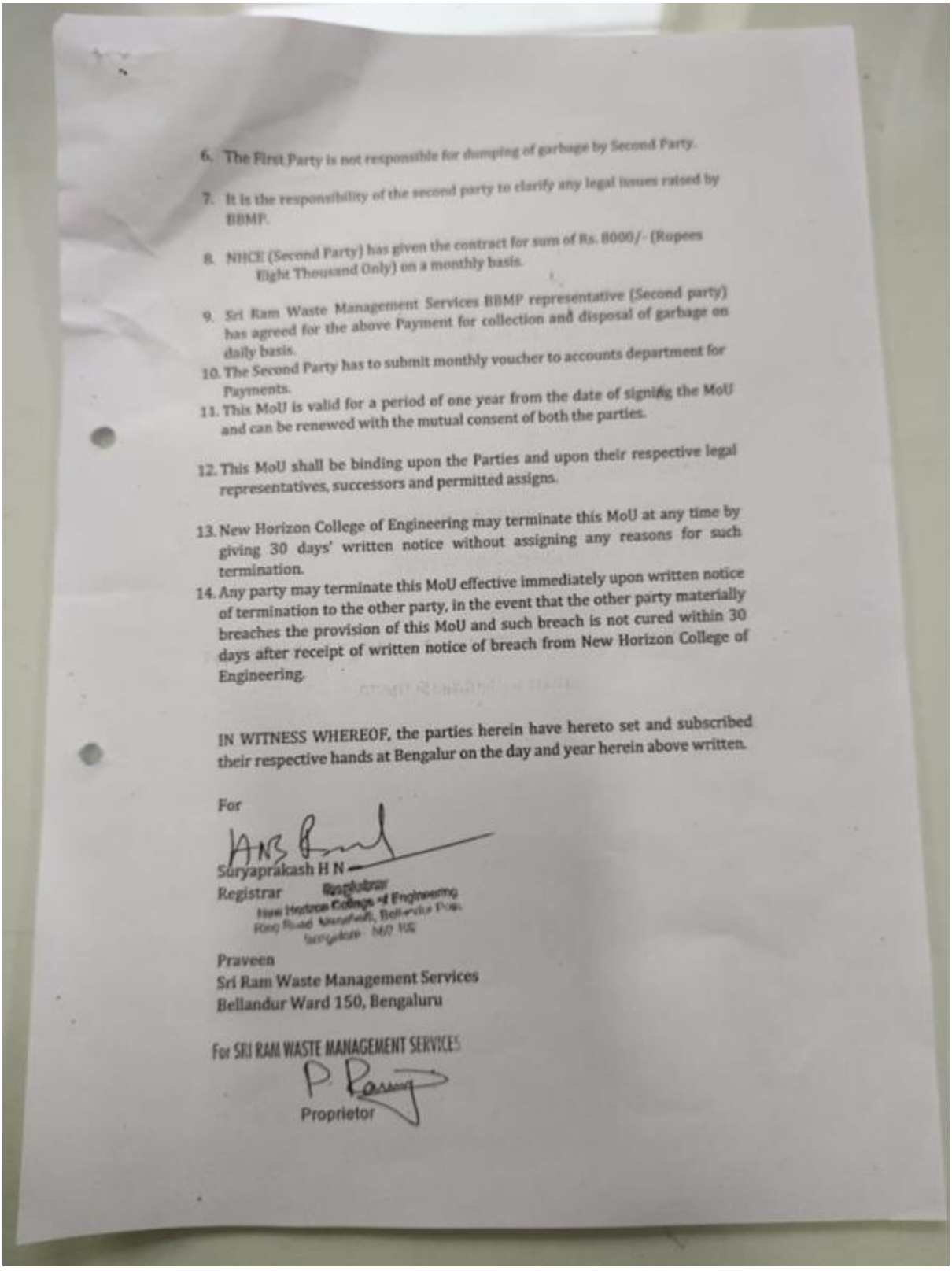
NOW THIS MoU :

1. That **New Horizon College of Engineering** agrees to give contract to Sri Ram Waste Management Services who is an authorised representative of BBMP for collection of garbage from NHCE Campus and dispose at appropriate location.
2. **Sri Ram Waste Management Services** BBMP representative (Second party) agrees to accept the contract for collection of garbage and disposal.
3. New Horizon College of Engineering (First Party) will segregate the wet and dry waste and store in two different bins near the sports ground on a daily basis.
4. Sri Ram Waste Management Services BBMP representative (Second Party) will organise to collect the garbage in a vehicle on daily basis.
5. It is the responsibility of the second party to dispose the wet and dry waste so collected from college campus in a BBMP assigned location.

Registrar
New Horizon College of Engineering
Ring Road Marathalli, Bellandur Post
Bangalore - 560 103

For SRI RAM WASTE MANAGEMENT SERVICES
Proprietor

Figure 6-3: Image 1 of 2 – MoU for Wet - Waste management



6. The First Party is not responsible for dumping of garbage by Second Party.
7. It is the responsibility of the second party to clarify any legal issues raised by BBMP.
8. NHCE (Second Party) has given the contract for sum of Rs. 8000/- (Rupees Eight Thousand Only) on a monthly basis.
9. Sri Ram Waste Management Services BBMP representative (Second party) has agreed for the above Payment for collection and disposal of garbage on daily basis.
10. The Second Party has to submit monthly voucher to accounts department for Payments.
11. This MoU is valid for a period of one year from the date of signing the MoU and can be renewed with the mutual consent of both the parties.
12. This MoU shall be binding upon the Parties and upon their respective legal representatives, successors and permitted assigns.
13. New Horizon College of Engineering may terminate this MoU at any time by giving 30 days' written notice without assigning any reasons for such termination.
14. Any party may terminate this MoU effective immediately upon written notice of termination to the other party, in the event that the other party materially breaches the provision of this MoU and such breach is not cured within 30 days after receipt of written notice of breach from New Horizon College of Engineering.

IN WITNESS WHEREOF, the parties herein have hereto set and subscribed their respective hands at Bengalur on the day and year herein above written.

For

Suryaprakash H N
Registrar

Praveen
Sri Ram Waste Management Services
Bellandur Ward 150, Bengaluru

For SRI RAM WASTE MANAGEMENT SERVICES

Proprietor

Figure 6-4: Image 2 of 2 – MoU for Wet - Waste management

2.1.3. Bio- Waste Management

As part of maintaining hygienic environment for the girl's, the management has provided the sanitary napkin dispenser and sanitary napkin incinerator in the girl's toilet. The pictures of the same are given in figure 6-5.

Figure 6-5: Bio – waste management

2.2. Best Practices Implemented for Waste management

2.2.1. Zero Waste Campus Campaigns

Zero waste campus was one of the major initiatives taken to ban all one time use plastic items. The awareness poster for zero waste campaign is given in figure 6-6.

Figure 6-6: Zero waste campus campaign poster

2.2.2. Color Code Bins

The garbage segregation is done and the garbage is given to external agencies / municipal agencies from time to time in order to maintain the college premises clean & hygiene. Figure 6-7 shows the waste segregation bins at each floor in the college campus.

Figure 6-7: Dry and wet waste collection bins at different places

Waste collection bins of different colours Blue, Green and Red are kept in all the floors in each block. The self explanation poster helps the students/ staffs to dispose the waste according to the category in the relevant waste collection bins. The waste collection bins picture is shown in figure 6.7 and the self explanation poster is show in figure 6.8 respectively.

Figure 6-8: Poster for waste collection bins

2.2.3. Installation of Organic Waste Composting Machine

Food waste management through organic waste composting machine. Any type of food or organic waste which is biodegradable can be converted into soil amendment products like compost. Food waste which has to be disposed of gets treated in the organic waste composting machine which is available at campus. . Figure 6-9 depicts the organic waste composting machine in the campus.

The environment as well as the economic benefits of organic waste composting machine is as follows:

- Composting through a machine makes composting easier and hassle-free.
- Composting helps soil maintain fertility and accelerates plant growth.
- With the help of compost, soil can retain more water
- Composting serves as a natural fertilizer
- Composting helps to manage waste efficiently and reduce transportation costs.

Figure 6-9: Organic Waste Composting Machine

2.2.4. Posters on Plastic Ban

Different Posters on plastic ban has been placed inside the college. Photos are as shown in the figure 6-10.

Figure 6-10: Posters – Single use Plastic Ban

Management have installed digital panels to reduce the marketing waste such as banners and flexes.

2.2.5. Installation of leaf composter:

The dry leaves are collected manually and disposed in the leaf composter. The leaf composter available in the campus is shown in figure 6-11.

Figure 6-11: Leaf composter available in campus

2.2.6. Sewage Treatment Plant for waste water recycling

The procedure for removing contaminants from the wastewater basically from the household sewage is called sewage treatment. It has to undergo the chemical, physical and biological procedure to remove these contaminants and give out an environmentally safe treated effluent. A semi-solid slurry called the sewage sludge is the by-product of the sewage treatment. This sludge is further processed before it is suitable for land application.

The institution has installed STP with capacity of 200 kLPD and the quantity of final treated water is 75% of the total capacity, which is 150 kLPD.

The details of water savings and cost savings due to installation of STP is given in table 6.2.

S. No.	Description	Unit	Values
1	STP capacity	kLPD	200
2	Quantity of final treated water from STP	kLPD	150
3	Quantity of water reused @ 50% utilization factor	kLPD	75
4	No. of working days per year	days	250
5	Annual Quantity of water reused (saved)	kLPD	18750
6	Average water cost	Rs./Litre	0.086
7	Annual cost savings achieved	Rs. lakh/year	16.125

Table 6-2: Annual water and cost savings by installation of STP

2.3. Recommendations on Waste Management Audit

- Conducting waste management (collection) drives

3. GREEN CAMPUS MANAGEMENT AUDIT

3.1. Facility Description

The institute is a green campus, lavish, serene atmosphere with more than 50 variety of plants and trees. The inside garden area of the NHCE campus accounts to 1.5 acres. The students and faculty are encouraged to adopt cleanliness, making the campus garbage and plastic free zone. Tree plantation programs help in encouraging eco-friendly environment, which provides pure oxygen within the institute.

The maintenance team takes care of the up-keeping of the environment and ensures to keep the surroundings clean. They maintain all the plantations by employing the cleanliness and watering regularly.

There are more than 80 trees and well-maintained landscaping of lawns. It was observed different types of herbs, shrubs, species of vegetables & fruits and also, some medicinal plantations in the garden area.

3.1.1. Plantations and Lawn

Photos taken during the audit are shown in the following figures 7.1 to 7.8.

Figure 7-1: Sample photos of Trees around the campus

Figure 7-2: plantations around different blocks

Figure 7-3: plantations beside the compound walls

Figure 7-4: Sample Flower plantations

Figure 7-5: Sample Flower plantations

Figure 7-6: Shrub Plantations

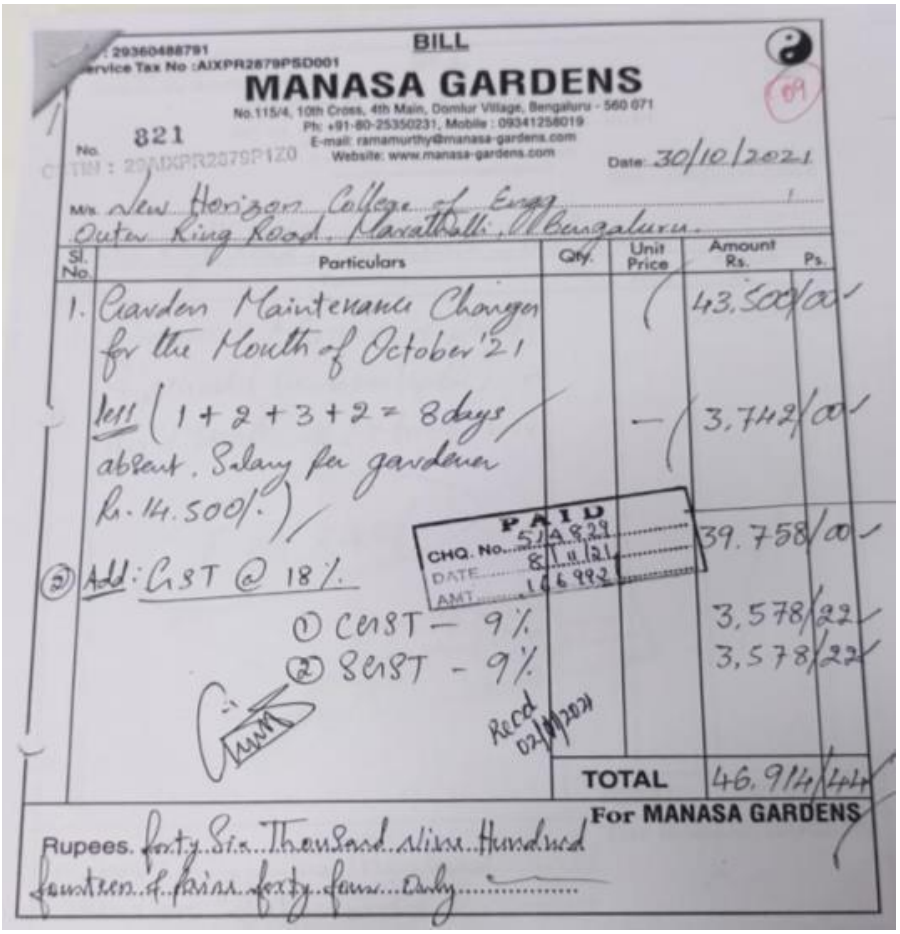
Figure 7-7: lawns maintained inside the campus

Figure 7-8: Pot plantations in between the blocks

3.2. Best Practices Implemented for Green Campus Management

The maintenance staff members do periodic checks and maintain records for the same. Many initiatives are taken by the management to inculcate the eco-friendly culture among the student community. The green campus provides the facilities such as rain water harvesting, well grown plantations and lawn all around the campus.

- Plastic free campus
- Green landscaping with trees, plants like vegetable, fruits and medicinal plants; lawns
- Paperless office: All communication regarding academics and administration are sent as e-mails and messages to faculty members and students that contributes paperless communication
- Apart from above, the maintenance of entire campus gardening and nurseries are outsourced. The sample monthly invoice for the AMC of gardening and nurseries is given in figure 7.9.



BILL

MANASA GARDENS

No.115/4, 10th Cross, 4th Main, Domlur Village, Bengaluru - 560 071
Ph: +91-80-25350231, Mobile : 09341258019
E-mail: ramamurthy@manasa-gardens.com
Website: www.manasa-gardens.com

No. 821 Date: 30/10/2021

M/s New Horizon College of Engg
Outer Ring Road, Marathalli, Bengaluru.

Sl. No.	Particulars	Qty.	Unit Price	Amount Rs.	Ps.
1.	Garden Maintenance Charges for the Month of October'21			43,500	00
	less (1+2+3+2 = 8 days absent. Salary per gardener Rs. 14,500/-)			- 3,742	00
				39,758	00
(2)	Add: CGST @ 18%				
	(1) CGST - 9%			3,578	22
	(2) SGST - 9%			3,578	22
	TOTAL			46,914	44

PAID
CHQ. No. 514829
DATE 8/11/21
AMT. 16,992

For MANASA GARDENS

Rupees. forty Six Thousand nine Hundred fourteen & paise forty four Only

Figure 7-9: Invoice for plantations and nurseries AMC

3.3. Recommendations on Green Campus Management

- Encouraging students to recommend creative ideas for making campus more greenery.
- Conducting competition among departments to promote student's ideas in sustainability initiatives

8. ENVIRONMENT AUDIT (CARBON FOOTPRINT ANALYSIS)

8.1 Facility Description

The carbon footprint is "the total amount of greenhouse gas (GHG) emissions caused by an organization, event or product". Global warming and climate change are the foremost environmental challenges facing the world today. It is our responsibility to minimize the consumption of energy and hence reduce the emissions of greenhouse gases.

To analysis the carbon footprint, transportation details of students and staff are collected as below:

1. Whether college provides transport facility for staff and students (Yes/No)? Yes,
2. Number (or Percentage) of staff using transport services provided by college: 10%
3. Number (or Percentage) of students using transport services provided by college: 5%
4. Number (or Percentage) of Staff using public transport: 40%
5. Number (or Percentage) of Staff using Bike: 40%
6. Number (or Percentage) of Staff using Car: 10%
7. Number (or Percentage) of students using public transport: 60%
8. Number (or Percentage) of students using Car: 2%
9. Number (or Percentage) of students using Bike: 33%

8.2 Best Practices Implemented for Environment Conservation

8.2.1 Awareness campaign on environment conservation

Management has taken steps to create awareness among students and staff regarding:

- Creating awareness campaigns on Environment Conservation
- Awareness campaigns on avoiding use of plastics

Environment awareness drawing competition is been conducted for the students. The competition winner's poster is displayed in the college notice board and recognized by the management. Figure 8.1 depicts the environment awareness competition poster displayed in notice board.

Figure 8-1: Environment Awareness Competition Poster displayed in notice board

8.2.2 Encouraging for usage of electric vehicles

The institution management is recommending and encouraging the staff and students to use the public transport and electric vehicles, to reduce the carbon foot prints.

Some of the students coming to college are Electric bikes. During audit pictures of electric bikes are taken and the same is given in figure 8-2.

Figure 8-2: Students using Electric Bikes

8.2.3 Color Code Bins

Waste collection bins of different colours Blue, Green and Red are kept in all the floors in each block. The self explanation poster helps the students/ staffs to dispose the waste according to the category in the relevant waste collection bins. The waste collection bins picture is shown in figure 8.3 and the self explanation poster is show in figure 8.4 respectively.

Figure 8-3: Waste Collection Bins

Figure 8-4: Poster for waste collection bins

8.2.4 Posters on Plastic Ban

Usage of single use plastic is banned inside the college premises and campus areas. Posters are placed for ban of plastic; the same is given in figure 8.5.

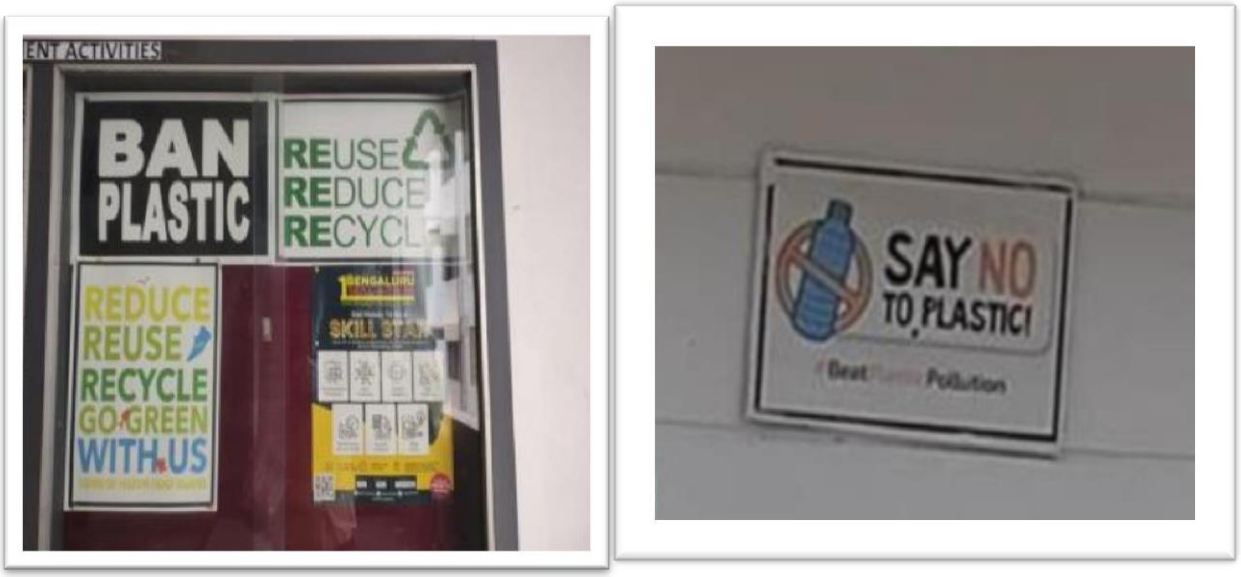


Figure 8-5: Posters for Plastic Ban

Management have installed digital panels to reduce the marketing waste such as banners and flexes.

8.3 Recommendations on Carbon Footprint Analysis

During the study, there was continuous interaction between the audit team, college engineers and staff members to ensure that the suggestions made are realistic, practical and implementable.

- Recommend staff to use car-pooling system
- Recommend students and staff to use public transport system
- Recommend students and staff to use bicycle
- Recommend staff and students to use electric vehicles
- Use of Display Boards to conserve fuel and the use of bicycle.

9 ANNEXURES

9.1 Data Collection Questionnaire

A questionnaire is a checklist used as the primary tool for the collection of data / information in a systematic manner that enables to perform the audit.

9.1.1 General information of the college:

General information of the college needs to be collected to get an overview of the campus for the walk-through purpose. It includes a set of questionnaires as given below.

1. Previous NAAC Grading's:

Previous NAAC Grading's of the college was collected from table 9-1.

S. No.	Phase	Grade	CGPA/Percentage	Year of Acc.	Acc. Period
1	I				
2	II				
3	III				

Table 9-1: NAAC grading's Table

2. Internal Quality Audit Team : 2023-24

Table 9-2 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

Table 9-2: Internal Quality Audit team

3. General Information of the college

General information of the college includes an address of college and head office, contact person details, year of establishment etc., as given in table 9-3.

S. No.	Description	Details
1.	Name of the College and address:	

S. No.	Description	Details
1.a	Head office address :	
2.	Telephone/Fax No	
3.	Co-ordinating officer:	Name: Mob: Email:
4.	Year of Establishment:	
5.	Hostel (Available/Not Available)	
6.	No. of Working days/year	
7.	Brief description of Campus	

Table 9-3: General information of the college

4. College Infrastructure

Infrastructure details of the college were gathered from table 9-4.

S. No.	Description	Details
1	Block Name	Class rooms
		Labs
		Staff rooms
		Wash rooms
2		
3		

Table 9-4: Detail Infrastructure of the college

5. Details of Student clubs
6. Details of cells that support students
7. Tentative Schedule of a working day:

a. No. of working days per year:

b. List of holidays:

8. Total area of the campus

9. Details of List of Departments and Courses (Faculty wise)

The total number of department, laboratories, conference hall, Libraries, Auditorium, and Cafeteria are obtained from table 9-5.

S. No.	Description	Details
1	Department	
2	Laboratories	
3	Conference Hall	
4	Libraries	
5	Auditorium	
6	Cafeteria	

Table 9-5: Details of the departments

10. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 9-6

S. No.	Teaching Staff		Non-teaching Staff		Support Staff (Security, House Keeping)	
	Male	Female	Male	Female	Male	Female

Table 9-6: Details of the Staff

11. Number of Students

Number of students is collected from table 9-7.

S. No.	Boys	Girls
1		

Table 9-7: Details of the Students

12. Additional infrastructure details have been collected from table 9-8.

S. No.	Description	Details	
1.	Number of blocks available for boys hostel	Nos.	
2.	Number of rooms available for boys hostel	Nos.	
3.	Number of blocks available for girls hostel	Nos.	
4.	Number of rooms available for girls hostel	Nos.	
5.	Whether Laundry is available in the hostel	Yes / No	
6.	If Yes List the Electrical Equipment in Laundry Section of the hostel (like Washing machine, Dry Cleaning Machine, Iron)		
7.	Whether gym/ indoor sports hall is available in hostel	Yes / No	
8.	Whether Solar PV based Power Generation is available in campus (academic or hostel block)	Yes / No	
9.	Whether lifts available in academic block	Yes / No	
10.	Whether Kitchen is available in the academic block	Yes / No	
11.	Whether any food counter (outside caterers) available in academic block	Yes / No	
12.	Whether any commercial shops available in academic block	Yes / No	
13.	Any more information or additional details of academic block you would like to share – kindly elaborate here		

Table 9-8: Details of the departments

9.1.2 Water Audit details:

1. General information

General information required for water management analysis is collected from table 9-9.

S. No.	Description	Details
1	Source of water	
2	Types of water	

S. No.	Description	Details
3	No of Wells	
4	No of motors used	
5	No of bore wells	
6	Rating of the motors in HP	
7	Depth of each bore-well	
8	Water level of bore well	
9	Number of water tanks (overhead & underground tanks)	
10	Capacity of overhead tank	
11	Capacity of underground tank	
12	Quantity of water pumped every day	
13	Any water wastage of water /why?	
14	Water usage for gardening	
15	Waste water sources	
16	Use of waste water	
17	Faith of waste water from labs	
18	Whether waste water from labs mixed with ground water?	
19	Any treatment method available for lab water?	
20	Whether any green chemistry method practiced in labs?	
21	Total number of water coolers	
22	Whether Rain water harvesting system available?	
23	Whether Sewage Treatment Plant (STP) is available?	
24	List of equipment installed in STP (If S.No.23 is Yes)	
25	Whether Solar Hot Water System is available in the campus	
26	Number of units and amount of water harvested	
27	Any leaky taps in the campus	
28	Amount of water lost per day	
29	Any water management plan used?	
30	Any water-saving techniques followed?	
31	Are there any signs reminding peoples to turn off the water?	
32	No. of water flow meters available	

S. No.	Description	Details
33	Method of water consumption monitoring	
34	Breakup of daily water consumption	
35	Attach Month wise water bill for last 2 years	
36	Please attach recent water quality test reports for Bore well water, Drinking Water and STP processed water.	
37	What are the sources of hot water	
38	What are the usage areas of hot water	

Table 9-9: Water management details

2. STP information

STP details are collected from table 9-10

S. No.	Description	Details
1.	Number of STP plants installed	
2.	Capacity of STP	
3.	Technology of STP	
4.	Year of Installation	
5.	Schematic / Layout of STP	
6.	Water flow meters installed	
7.	Quantity of Sludge	
8.	Disposal of Sludge	

Table 9-10: Details of STP

3. RO Plant information

RO Plant details are obtained from table 9-11.

S. No.	Location	Quantity	Capacity
1.			
2.			
3.			

Table 9-11: Details of RO Plant

9.1.3 Energy consumption details:

1. Energy consumption details:

The energy consumption details required for the audit is collected, the brief format of the same is given in table 9-12.

S. No.	Type	Units		Value	Cost in Rs.
1	Electricity	kWh	2023		
			2024		
2	LPG	Cylinders			
3	Diesel	Litres (Month wise consumption for the last two years)			
4	Others resources (Please specify)				
5	Total connected load	kW			
6	Contract demand	kVA			
7	Maximum demand recorded	kVA			
8	Average power factor				
9	Energy charges	Rs./kWh			
10	Demand charges	Rs./kVA			
	*** Attach Electricity Bill Copy of last 2 years**				

Table 9-12: Details of Energy consumption

2. Solar Energy details:

The solar energy details required are collected from table 9-13.

S. No.	Building No./ Name	Solar water Heater			Solar PV System		
		Capacity	Working / Not working	Year of Installation	Capacity	Working / Not working	Year of Installation

Table 9-13: Details of Solar Energy

3. Solar Street lights details:

a. Quantity -

b. Capacity -
c. Year of Installation –

4. Electrical Equipment details:

Electrical Equipment like transformers DGs UPS Capacitor Bank, AC, Computers, water coolers, fans, exhaust fans are obtained from the table 9-14.

S. No.	Description	Details	
1.	Number of Transformers Installed	Nos.	
2.	Number of Electrical Panels / Electrical Panel Rooms	Nos.	
3.	Whether Diesel Generator Set Backup Power is Available	Yes / No	
4..	How many number of DG Sets available in the campus (If S.No.3 is Yes)	Nos.	
5.	Whether UPS is available for labs, computers and/or any equipment	Yes / No	
6.	Number of UPS installed with location and capacity (If S.No.5 is Yes)	Nos.	
7.	Whether Capacitor Banks is installed in the electrical panel rooms	Yes / No	
8..	Whether Air Conditioning Units have been installed in the campus	Yes / No	
9.	Type of AC units (split, cassette or packaged) available, capacity and installed location (If S.No.8 is Yes)	Nos.	
10.	Total number of computers available in the campus	Nos.	
11.	Type of computer monitors available (CRT, LCD, LED)	Nos.	
12.	Whether water coolers are installed in the academic blocks	Yes/No	
13.	Type of lamps (Fluorescent Tube Light, CFL, LED, Incandescent, Sodium / Mercury lamps, etc.,) installed in the campus	Nos.	
14.	Type of fans (ceiling, wall mount, standing, exhaust, etc.,) installed in the campus	Nos.	
15.	Whether exhaust fans are installed in hostel / kitchen.(If Yes, share the quantity and installed location)	Yes /No	
16.	Any other electrical equipment's in college		

S. No.	Description	Details	
	buildings.		

Table 9-14: Details of Electrical Equipment

5. List of energy saving initiatives implemented
6. List of energy saving initiatives in plan for future

9.1.4 Waste management details:

Waste management includes the activities and actions required to manage waste from its inception to its final disposal. The various data/ information required for the assessment of waste management is as collected from the following set of questionnaires.

1. Basic information

Basic information for waste management is collected from table 9-15.

S. No.	Description	Yes/ No
1	Whether wet and dry garbage segregation is done inside the campus?	
2	Whether garbage is given to external agencies / municipal agencies?	

Table 9-15: Basic details of waste management

2. Types of Waste generated

Types of waste generated in the college are obtained from table 9-16.

S. No.	Description	Yes / No	Remarks
1	E-Waste (Computers, electrical and electronic parts)		
2	Hazardous / Chemical Waste		
3	Solid Waste (Damaged furniture, paper waste, paper plates)		
4	Dry Leaves		
5	Food Waste		
6	Waste Water (Washing, urinals, bathrooms)		
7	Glass Waste (Broken glass wares from the labs)		
8	Unused Materials		
9	Plastic Waste (Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc.)		

Table 9-16: Types of waste generated

3. Segregation of waste

Segregation of waste information at different locations with quantity is gathered from table 9-17.

S. No.	Location	Bio-degradable	Non-Biodegradable	E-waste	Quantity, kgs/month
1	Office				
2	Labs				
3	Cafeteria / Kitchen				
4	College				

Table 9-17: Segregation of waste

4. Waste generation management

Waste generation management of the college was collected from table 9-18

S. No.	Description	Yes / No	Remarks
1	Composting / Vermicomposting		
2	Recycling		
3	Reusing		
4	Other ways		

Table 9-18: Waste Disposal methods

9.1.5 Green campus management details:

1. Total number of plants and trees

The total number of plantations, garden area, and many more are collected as per the set of questionnaires given in table 9-19

S. No	Description	Details
1	Total number of plant species identified	
2	Total number of plants on the campus	
3	Total number of Trees on the campus	
4	Garden area inside the college –	
5	Total number of medicinal plants /trees on the campus	

6	Total number of vegetables and fruits plantation in the campus	
7	Whether display boards are given to plants and trees for identification	
8	Does Institute celebrate World environment day?	
9	Does Institute celebrate World water day?	
10	Does Institute celebrate World ozone day?	
11	Does Institute celebrate World Earth day?	
12	Total number of aquatic water plants	

Table 9-19: List of plantation details

2. List of plants/ trees

List of plants/ trees with their scientific names obtained from table 9-20.

S. No.	Common/Local Name	Scientific name	No. of Trees/Plants

Table 9-20: List of plants/trees in campus

9.1.6 Carbon footprint management details:

The carbon emission from various activities such as transport, diesel generator usage, LPG consumption, and electricity consumption were collected, as per table 9-21.

S. No	Description	Details
1	Whether college provides transport facility for staff and students (Yes/No)	
2	Number (or Percentage) of staff using transport services provided by college	
3	Number (or Percentage) of students using transport services provided by college	
4	Number (or Percentage) of Staff using public transport	
5	Number (or Percentage) of Staff using Bike	
6	Number (or Percentage) of Staff using Car	
7	Number (or Percentage) of students using Public transport	
8	Number (or Percentage) of students using Car	
9	Number (or Percentage) of students using Bike	
10	Number (or Percentage) of students using Bicycles	
11	Average consumption of diesel per month	
12	Average electricity consumption per month	
13	Average LPG consumption per month	

Table 9-21: Details of Carbon footprint management

9.1.7 Photos required for Audit:

1. General Photos

In various sections, different types of photos are required to validate the existence of things, and hence they are collected from table 9-22.

S. No	Description	Details
1	Photos of student's NSS activities	
2	Photos of Safety policy	
3	Photos of the training program on the use of fire extinguishers	
4	Photos of environmental policies adopted by college	
5	Photos of MoUs for Waste management	

6	Photos of any other policies adopted by college		
7	Photos of water test report	Drinking Water	
		STP processed water	
		Bore-well water	
		Other water Sources (Like Tanker water and any other)	
8	Photos of use of Energy efficient devices like fan, bulbs etc.		
9	Photos of LCD/LED monitors used in Labs		
10	Photos of dry and wet waste collection bins		
11	Photos of celebrating World Environment Day		
12	Photos of celebrating World Water Day		
13	Photos of celebrating World Earth Day		
14	Photos of celebrating World Ozone Day		

Table 9-22: List of photos

9.2 Recommendations for Energy Audit

- Conduct training and awareness programs on energy conservation
- Demand optimization
- Replacement of conventional FTL lamps with energy efficient LED lamps in phased manner, as part of procurement practice
- Replacement of conventional fans with energy efficient fans in phased manner, as part of procurement practice.
- Installation of SRTPV (Solar Roof Top Photo Voltaic) system

10 WASTE MANAGEMENT AUDIT

10.1 Facility Description

The study involved carrying out various analyses to realistically assess waste generation.

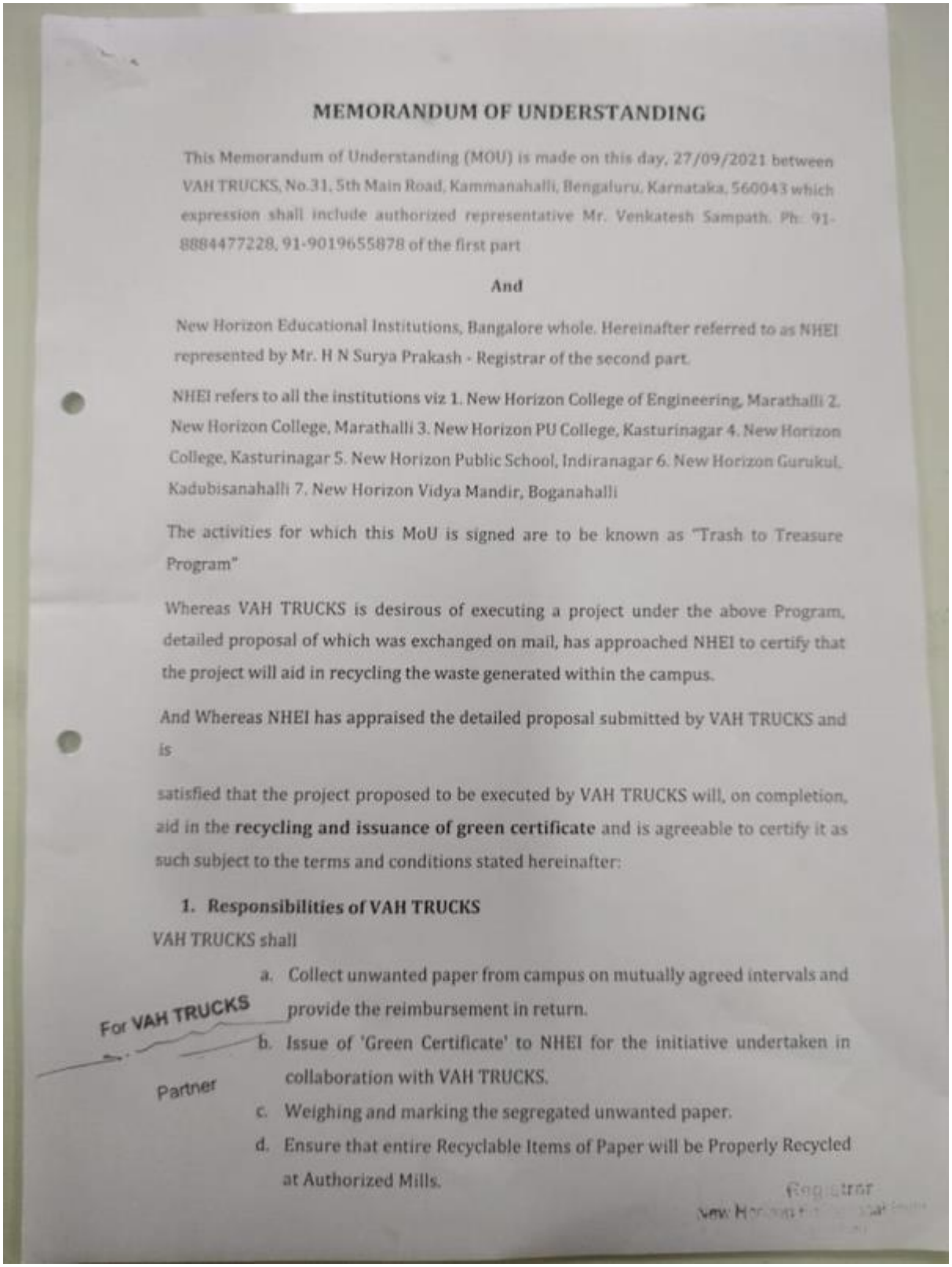
There are different types of waste generated in the college and is tabulated in table 6-1.

S. No.	Description	Yes / No	Details
1	E-Waste	Yes	External Agency
2	Hazardous / Chemical Waste	No	NA
3	Solid Waste	Yes	External Agency
4	Dry Leaves	Yes	Compost Unit
5	Food Waste	Yes	Compost Unit
6	Waste Water	Yes	STP
7	Glass Waste	No	NA
8	Unused Materials	No	External Agency
10	Plastic Waste	Yes	External Agency

Table 6-1: Types of Waste Generated in the college

10.1.1 Dry Waste Management

Separate bins are used across the campus for waste collection. Each room (Staff, class rooms, corridors, office, restrooms, and library) is provided with the separate dustbin to segregate waste. MoU with VAH trucks is signed to manage dry waste in the campus which is as shown in figure 6-1 and figure 6-2.



MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (MOU) is made on this day, 27/09/2021 between VAH TRUCKS, No.31, 5th Main Road, Kammanahalli, Bengaluru, Karnataka, 560043 which expression shall include authorized representative Mr. Venkatesh Sampath. Ph: 91-8884477228, 91-9019655878 of the first part

And

New Horizon Educational Institutions, Bangalore whole. Hereinafter referred to as NHEI represented by Mr. H N Surya Prakash - Registrar of the second part.

NHEI refers to all the institutions viz 1. New Horizon College of Engineering, Marathalli 2. New Horizon College, Marathalli 3. New Horizon PU College, Kasturinagar 4. New Horizon College, Kasturinagar 5. New Horizon Public School, Indiranagar 6. New Horizon Gurukul, Kadubisanahalli 7. New Horizon Vidya Mandir, Boganahalli

The activities for which this MoU is signed are to be known as "Trash to Treasure Program"

Whereas VAH TRUCKS is desirous of executing a project under the above Program, detailed proposal of which was exchanged on mail, has approached NHEI to certify that the project will aid in recycling the waste generated within the campus.

And Whereas NHEI has appraised the detailed proposal submitted by VAH TRUCKS and is

satisfied that the project proposed to be executed by VAH TRUCKS will, on completion, aid in the **recycling and issuance of green certificate** and is agreeable to certify it as such subject to the terms and conditions stated hereinafter:

1. **Responsibilities of VAH TRUCKS**

VAH TRUCKS shall

a. Collect unwanted paper from campus on mutually agreed intervals and provide the reimbursement in return.
b. Issue of 'Green Certificate' to NHEI for the initiative undertaken in collaboration with VAH TRUCKS.
c. Weighing and marking the segregated unwanted paper.
d. Ensure that entire Recyclable Items of Paper will be Properly Recycled at Authorized Mills.

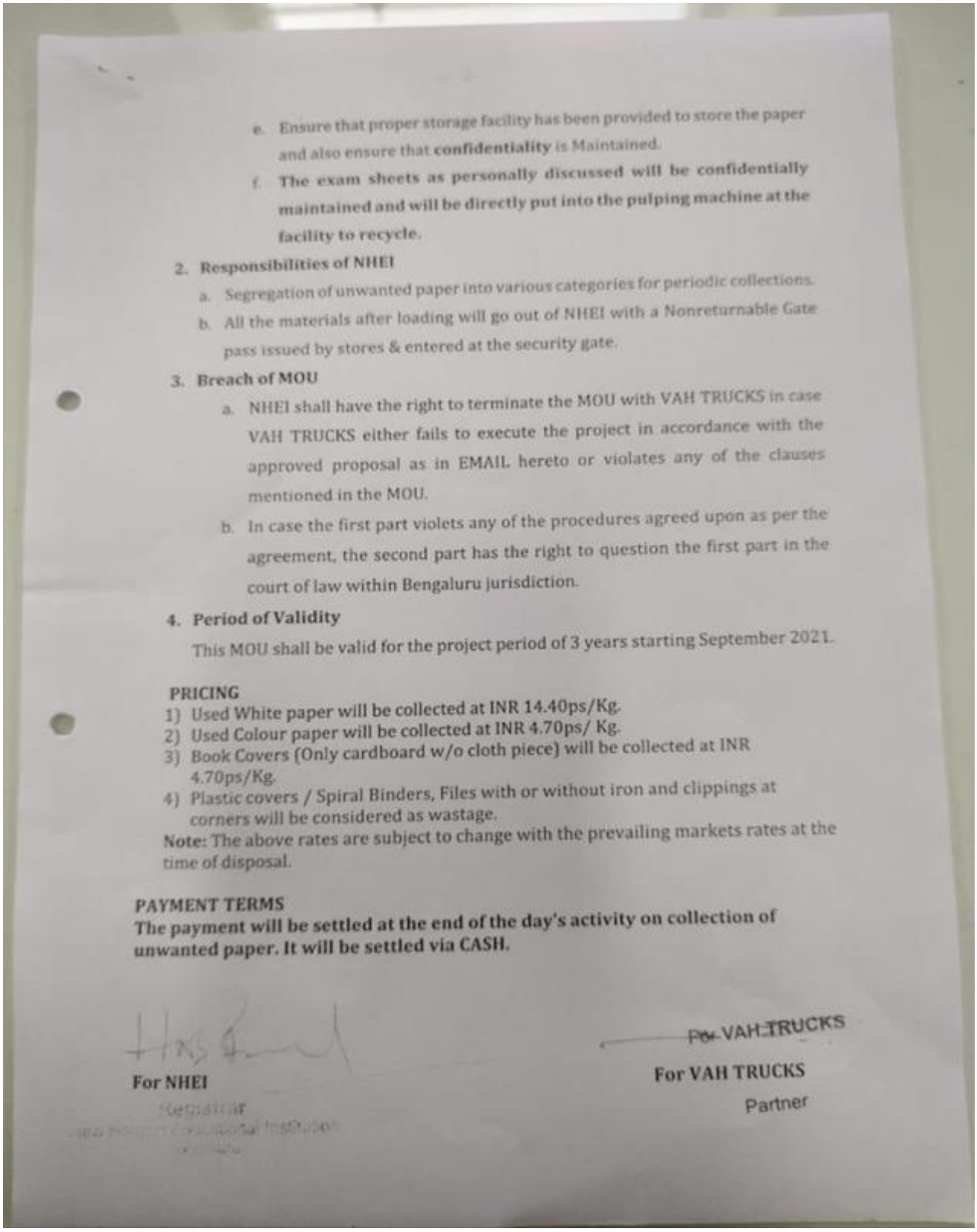
For VAH TRUCKS

Partner

Registrar

New Horizon

Figure 6-1: Image 1 of 2 – MoU for Dry -Waste management



e. Ensure that proper storage facility has been provided to store the paper and also ensure that **confidentiality** is Maintained.

f. **The exam sheets as personally discussed will be confidentially maintained and will be directly put into the pulping machine at the facility to recycle.**

2. **Responsibilities of NHEI**

a. Segregation of unwanted paper into various categories for periodic collections.

b. All the materials after loading will go out of NHEI with a Nonreturnable Gate pass issued by stores & entered at the security gate.

3. **Breach of MOU**

a. NHEI shall have the right to terminate the MOU with VAH TRUCKS in case VAH TRUCKS either fails to execute the project in accordance with the approved proposal as in EMAIL hereto or violates any of the clauses mentioned in the MOU.

b. In case the first part violets any of the procedures agreed upon as per the agreement, the second part has the right to question the first part in the court of law within Bengaluru jurisdiction.

4. **Period of Validity**

This MOU shall be valid for the project period of 3 years starting September 2021.

PRICING

1) Used White paper will be collected at INR 14.40ps/Kg.
2) Used Colour paper will be collected at INR 4.70ps/ Kg.
3) Book Covers (Only cardboard w/o cloth piece) will be collected at INR 4.70ps/Kg.
4) Plastic covers / Spiral Binders, Files with or without iron and clippings at corners will be considered as wastage.

Note: The above rates are subject to change with the prevailing markets rates at the time of disposal.

PAYMENT TERMS

The payment will be settled at the end of the day's activity on collection of unwanted paper. It will be settled via CASH.

For NHEI

Registrar

For VAH TRUCKS

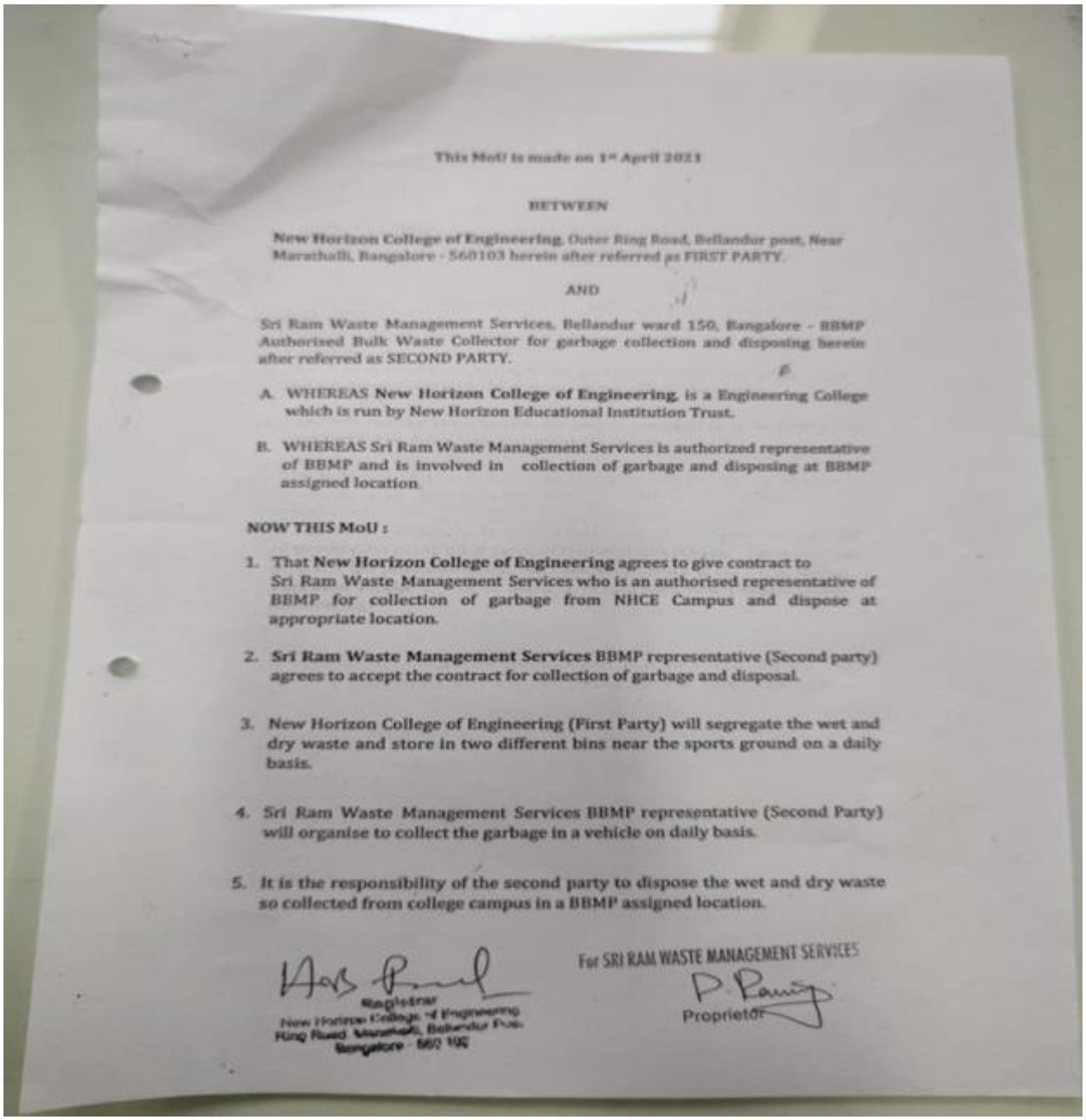
For VAH TRUCKS

Partner

Figure 6-2: Image 2 of 2 – MoU for Dry - Waste management

10.1.2 Wet Waste Management

To manage the wet waste produced in the college, which is produced from kitchens of canteens in the campus, from the remains of the tiffin boxes brought by the students, teachers, & staff of the college, the college management has signed MoU with external agency; the copy of MoU is given in figure 6.3 and 6.4.



This MoU is made on 1st April 2021

BETWEEN

New Horizon College of Engineering, Outer Ring Road, Bellandur post, Near Marathalli, Bangalore - 560103 herein after referred as FIRST PARTY.

AND

Sri Ram Waste Management Services, Bellandur ward 150, Bangalore - BBMP Authorised Bulk Waste Collector for garbage collection and disposing herein after referred as SECOND PARTY.

A. WHEREAS **New Horizon College of Engineering**, is a Engineering College which is run by New Horizon Educational Institution Trust.

B. WHEREAS Sri Ram Waste Management Services is authorized representative of BBMP and is involved in collection of garbage and disposing at BBMP assigned location.

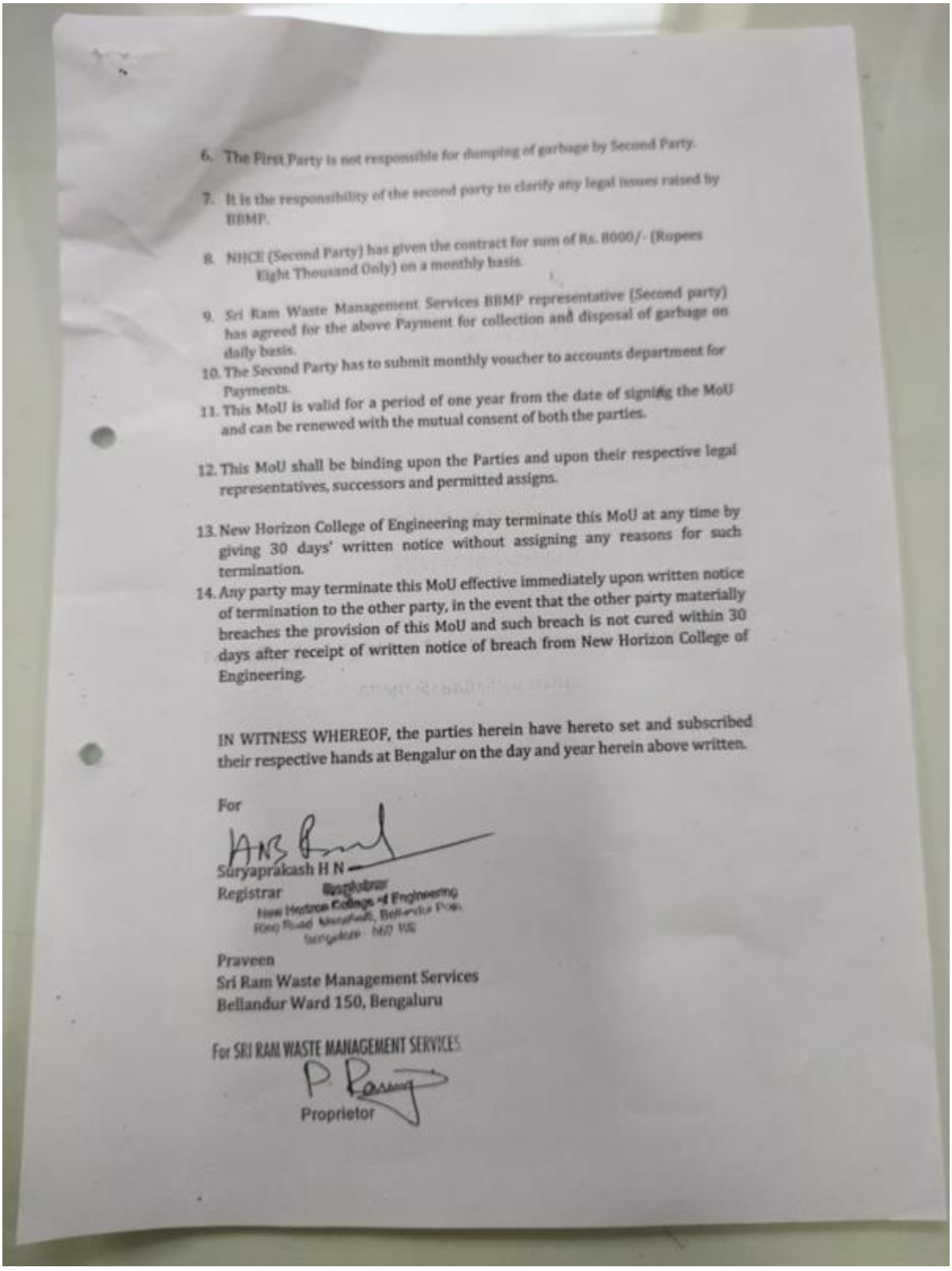
NOW THIS MoU :

1. That **New Horizon College of Engineering** agrees to give contract to Sri Ram Waste Management Services who is an authorised representative of BBMP for collection of garbage from NHCE Campus and dispose at appropriate location.
2. **Sri Ram Waste Management Services** BBMP representative (Second party) agrees to accept the contract for collection of garbage and disposal.
3. New Horizon College of Engineering (First Party) will segregate the wet and dry waste and store in two different bins near the sports ground on a daily basis.
4. Sri Ram Waste Management Services BBMP representative (Second Party) will organise to collect the garbage in a vehicle on daily basis.
5. It is the responsibility of the second party to dispose the wet and dry waste so collected from college campus in a BBMP assigned location.

Registrar
New Horizon College of Engineering
Ring Road, Marathalli, Bellandur Post,
Bangalore - 560 103

For SRI RAM WASTE MANAGEMENT SERVICES
Proprietor

Figure 6-3: Image 1 of 2 – MoU for Wet - Waste management



6. The First Party is not responsible for dumping of garbage by Second Party.
7. It is the responsibility of the second party to clarify any legal issues raised by BBMP.
8. NHCE (Second Party) has given the contract for sum of Rs. 8000/- (Rupees Eight Thousand Only) on a monthly basis.
9. Sri Ram Waste Management Services BBMP representative (Second party) has agreed for the above Payment for collection and disposal of garbage on daily basis.
10. The Second Party has to submit monthly voucher to accounts department for Payments.
11. This MoU is valid for a period of one year from the date of signing the MoU and can be renewed with the mutual consent of both the parties.
12. This MoU shall be binding upon the Parties and upon their respective legal representatives, successors and permitted assigns.
13. New Horizon College of Engineering may terminate this MoU at any time by giving 30 days' written notice without assigning any reasons for such termination.
14. Any party may terminate this MoU effective immediately upon written notice of termination to the other party, in the event that the other party materially breaches the provision of this MoU and such breach is not cured within 30 days after receipt of written notice of breach from New Horizon College of Engineering.

IN WITNESS WHEREOF, the parties herein have hereto set and subscribed their respective hands at Bengalur on the day and year herein above written.

For

Suryaprakash H N
Registrar

Praveen
Sri Ram Waste Management Services
Bellandur Ward 150, Bengaluru

For SRI RAM WASTE MANAGEMENT SERVICES

Proprietor

Figure 6-4: Image 2 of 2 – MoU for Wet - Waste management

10.1.3 Bio- Waste Management

As part of maintaining hygienic environment for the girl's, the management has provided the sanitary napkin dispenser and sanitary napkin incinerator in the girl's toilet. The pictures of the same are given in figure 6-5.

Figure 6-5: Bio – waste management

10.2 Best Practices Implemented for Waste management

10.2.1 Zero Waste Campus Campaigns

Zero waste campus was one of the major initiatives taken to ban all one time use plastic items. The awareness poster for zero waste campaign is given in figure 6-6.

Figure 6-6: Zero waste campus campaign poster

10.2.2 Color Code Bins

The garbage segregation is done and the garbage is given to external agencies / municipal agencies from time to time in order to maintain the college premises clean & hygiene. Figure 6-7 shows the waste segregation bins at each floor in the college campus.

Figure 6-7: Dry and wet waste collection bins at different places

Waste collection bins of different colours Blue, Green and Red are kept in all the floors in each block. The self explanation poster helps the students/ staffs to dispose the waste according to the category in the relevant waste collection bins. The waste collection bins picture is shown in figure 6.7 and the self explanation poster is show in figure 6.8 respectively.

Figure 6-8: Poster for waste collection bins

10.2.3 Installation of Organic Waste Composting Machine

Food waste management through organic waste composting machine. Any type of food or organic waste which is biodegradable can be converted into soil amendment products like compost. Food waste which has to be disposed of gets treated in the organic waste composting machine which is available at campus. . Figure 6-9 depicts the organic waste composting machine in the campus.

The environment as well as the economic benefits of organic waste composting machine is as follows:

- Composting through a machine makes composting easier and hassle-free.
- Composting helps soil maintain fertility and accelerates plant growth.
- With the help of compost, soil can retain more water
- Composting serves as a natural fertilizer
- Composting helps to manage waste efficiently and reduce transportation costs.

Figure 6-9: Organic Waste Composting Machine

10.2.4 Posters on Plastic Ban

Different Posters on plastic ban has been placed inside the college. Photos are as shown in the figure 6-10.

Figure 6-10: Posters – Single use Plastic Ban

Management have installed digital panels to reduce the marketing waste such as banners and flexes.

10.2.5 Installation of leaf composter:

The dry leaves are collected manually and disposed in the leaf composter. The leaf composter available in the campus is shown in figure 6-11.

Figure 6-11: Leaf composter available in campus

10.2.6 Sewage Treatment Plant for waste water recycling

The procedure for removing contaminants from the wastewater basically from the household sewage is called sewage treatment. It has to undergo the chemical, physical and biological procedure to remove these contaminants and give out an environmentally safe treated effluent. A semi-solid slurry called the sewage sludge is the by-product of the sewage treatment. This sludge is further processed before it is suitable for land application.

The institution has installed STP with capacity of 200 kLPD and the quantity of final treated water is 75% of the total capacity, which is 150 kLPD.

The details of water savings and cost savings due to installation of STP is given in table 6.2.

S. No.	Description	Unit	Values
1	STP capacity	kLPD	200
2	Quantity of final treated water from STP	kLPD	150
3	Quantity of water reused @ 50% utilization factor	kLPD	75
4	No. of working days per year	days	250
5	Annual Quantity of water reused (saved)	kLPD	18750
6	Average water cost	Rs./Litre	0.086
7	Annual cost savings achieved	Rs. lakh/year	16.125

Table 6-2: Annual water and cost savings by installation of STP

10.3 Recommendations on Waste Management Audit

- Conducting waste management (collection) drives

11 GREEN CAMPUS MANAGEMENT AUDIT

11.1 Facility Description

The institute is a green campus, lavish, serene atmosphere with more than 50 variety of plants and trees. The inside garden area of the NHCE campus accounts to 1.5 acres. The students and faculty are encouraged to adopt cleanliness, making the campus garbage and plastic free zone. Tree plantation programs help in encouraging eco-friendly environment, which provides pure oxygen within the institute.

The maintenance team takes care of the up-keeping of the environment and ensures to keep the surroundings clean. They maintain all the plantations by employing the cleanliness and watering regularly.

There are more than 80 trees and well-maintained landscaping of lawns. It was observed different types of herbs, shrubs, species of vegetables & fruits and also, some medicinal plantations in the garden area.

11.1.1 Plantations and Lawn

Photos taken during the audit are shown in the following figures 7.1 to 7.8.

Figure 7-1: Sample photos of Trees around the campus

Figure 7-2: plantations around different blocks

Figure 7-3: plantations beside the compound walls

Figure 7-4: Sample Flower plantations

Figure 7-5: Sample Flower plantations

Figure 7-6: Shrub Plantations

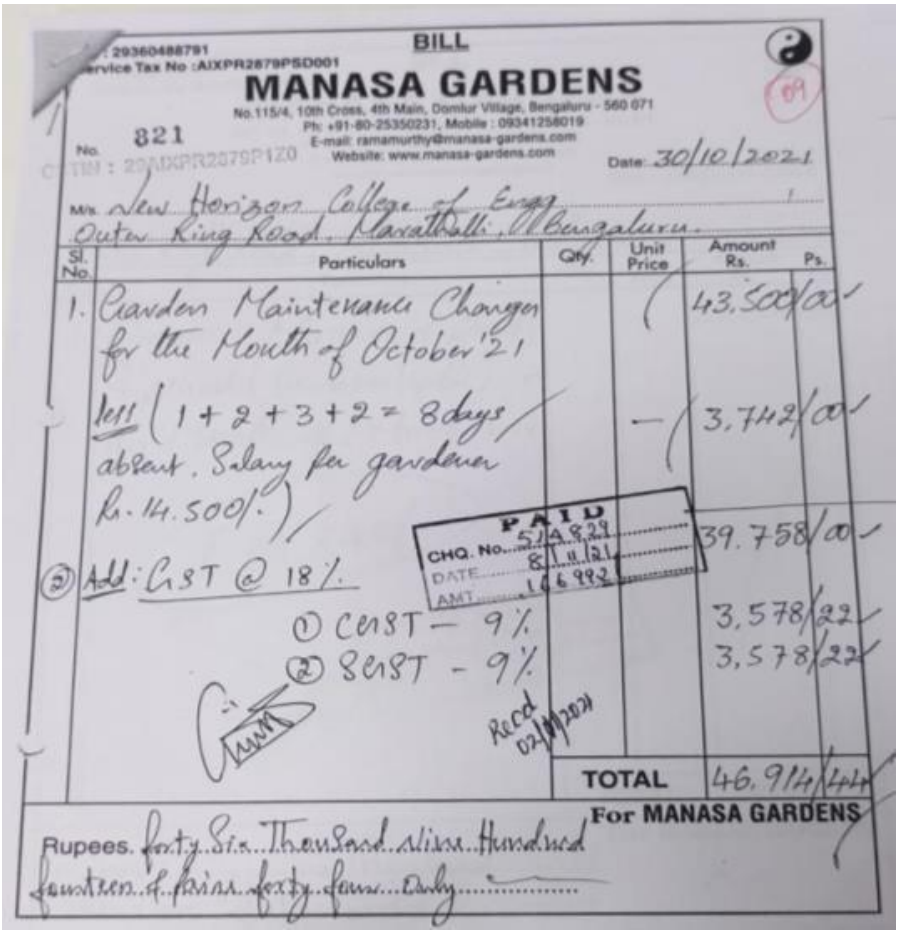
Figure 7-7: lawns maintained inside the campus

Figure 7-8: Pot plantations in between the blocks

11.2 Best Practices Implemented for Green Campus Management

The maintenance staff members do periodic checks and maintain records for the same. Many initiatives are taken by the management to inculcate the eco-friendly culture among the student community. The green campus provides the facilities such as rain water harvesting, well grown plantations and lawn all around the campus.

- Plastic free campus
- Green landscaping with trees, plants like vegetable, fruits and medicinal plants; lawns
- Paperless office: All communication regarding academics and administration are sent as e-mails and messages to faculty members and students that contributes paperless communication
- Apart from above, the maintenance of entire campus gardening and nurseries are outsourced. The sample monthly invoice for the AMC of gardening and nurseries is given in figure 7.9.



BILL

MANASA GARDENS

No.115/4, 10th Cross, 4th Main, Domlur Village, Bengaluru - 560 071
Ph: +91-80-25350231, Mobile : 09341258019
E-mail: ramamurthy@manasa-gardens.com
Website: www.manasa-gardens.com

No. 821 Date: 30/10/2021

M/s New Horizon College of Engg
Outer Ring Road, Marathalli, Bengaluru.

Sl. No.	Particulars	Qty.	Unit Price	Amount Rs.	Ps.
1.	Garden Maintenance Charges for the Month of October'21			43,500	00
	less (1+2+3+2 = 8 days absent. Salary per gardener Rs. 14,500/-)			- 3,742	00
				39,758	00
2.	Add: GST @ 18%				
	① CGST - 9%			3,578	22
	② SGST - 9%			3,578	22
			TOTAL	46,914	44

PAID
CHQ. No. 514829
DATE 8/11/21
AMT. 16,992

Recd 02/11/2021

For MANASA GARDENS

Rupees. forty Six Thousand Nine Hundred fourteen & paise forty four Only

Figure 7-9: Invoice for plantations and nurseries AMC

11.3 Recommendations on Green Campus Management

- Encouraging students to recommend creative ideas for making campus more greenery.
- Conducting competition among departments to promote student's ideas in sustainability initiatives

12 ENVIRONMENT AUDIT (CARBON FOOTPRINT ANALYSIS)

12.1 Facility Description

The carbon footprint is "the total amount of greenhouse gas (GHG) emissions caused by an organization, event or product". Global warming and climate change are the foremost environmental challenges facing the world today. It is our responsibility to minimize the consumption of energy and hence reduce the emissions of greenhouse gases.

To analysis the carbon footprint, transportation details of students and staff are collected as below:

10. Whether college provides transport facility for staff and students (Yes/No)? Yes,
11. Number (or Percentage) of staff using transport services provided by college: 10%
12. Number (or Percentage) of students using transport services provided by college: 5%
13. Number (or Percentage) of Staff using public transport: 40%
14. Number (or Percentage) of Staff using Bike: 40%
15. Number (or Percentage) of Staff using Car: 10%
16. Number (or Percentage) of students using public transport: 60%
17. Number (or Percentage) of students using Car: 2%
18. Number (or Percentage) of students using Bike: 33%

12.2 Best Practices Implemented for Environment Conservation

12.2.1 Awareness campaign on environment conservation

Management has taken steps to create awareness among students and staff regarding:

- Creating awareness campaigns on Environment Conservation
- Awareness campaigns on avoiding use of plastics

Environment awareness drawing competition is been conducted for the students. The competition winner's poster is displayed in the college notice board and recognized by the management. Figure 8.1 depicts the environment awareness competition poster displayed in notice board.

Figure 8-1: Environment Awareness Competition Poster displayed in notice board

12.2.2 Encouraging for usage of electric vehicles

The institution management is recommending and encouraging the staff and students to use the public transport and electric vehicles, to reduce the carbon foot prints.

Some of the students coming to college are Electric bikes. During audit pictures of electric bikes are taken and the same is given in figure 8-2.

Figure 8-2: Students using Electric Bikes

12.2.3 Color Code Bins

Waste collection bins of different colours Blue, Green and Red are kept in all the floors in each block. The self explanation poster helps the students/ staffs to dispose the waste according to the category in the relevant waste collection bins. The waste collection bins picture is shown in figure 8.3 and the self explanation poster is show in figure 8.4 respectively.

Figure 8-3: Waste Collection Bins

Figure 8-4: Poster for waste collection bins

12.2.4 Posters on Plastic Ban

Usage of single use plastic is banned inside the college premises and campus areas. Posters are placed for ban of plastic; the same is given in figure 8.5.

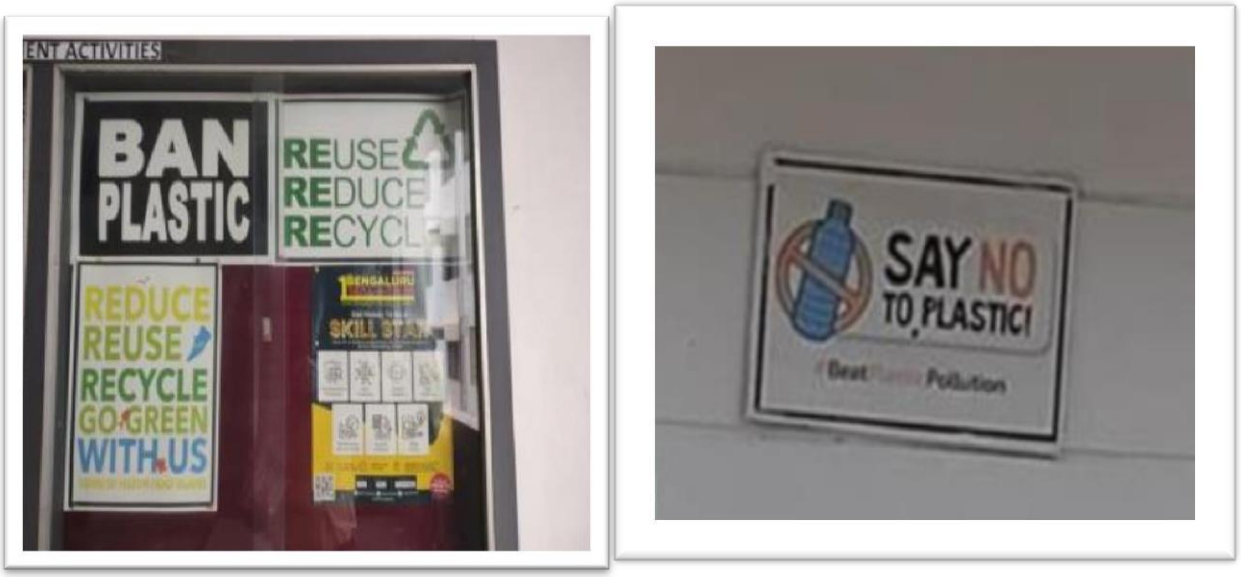


Figure 8-5: Posters for Plastic Ban

Management have installed digital panels to reduce the marketing waste such as banners and flexes.

12.3 Recommendations on Carbon Footprint Analysis

During the study, there was continuous interaction between the audit team, college engineers and staff members to ensure that the suggestions made are realistic, practical and implementable.

- Recommend staff to use car-pooling system
- Recommend students and staff to use public transport system
- Recommend students and staff to use bicycle
- Recommend staff and students to use electric vehicles
- Use of Display Boards to conserve fuel and the use of bicycle.

13 ANNEXURES

13.1 Data Collection Questionnaire

A questionnaire is a checklist used as the primary tool for the collection of data / information in a systematic manner that enables to perform the audit.

13.1.1 General information of the college:

General information of the college needs to be collected to get an overview of the campus for the walk-through purpose. It includes a set of questionnaires as given below.

13. Previous NAAC Grading's:

Previous NAAC Grading's of the college was collected from table 9-1.

S. No.	Phase	Grade	CGPA/Percentage	Year of Acc.	Acc. Period
1	I				
2	II				
3	III				

Table 9-1: NAAC grading's Table

14. Internal Quality Audit Team : 2023-24

Table 9-2 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

Table 9-2: Internal Quality Audit team

15. General Information of the college

General information of the college includes an address of college and head office, contact person details, year of establishment etc., as given in table 9-3.

S. No.	Description	Details
1.	Name of the College and address:	

S. No.	Description	Details
1.a	Head office address :	
2.	Telephone/Fax No	
3.	Co-ordinating officer:	Name: Mob: Email:
4.	Year of Establishment:	
5.	Hostel (Available/Not Available)	
6.	No. of Working days/year	
7.	Brief description of Campus	

Table 9-3: General information of the college

16. College Infrastructure

Infrastructure details of the college were gathered from table 9-4.

S. No.	Description	Details
1	Block Name	Class rooms
		Labs
		Staff rooms
		Wash rooms
2		
3		

Table 9-4: Detail Infrastructure of the college

17. Details of Student clubs
18. Details of cells that support students
19. Tentative Schedule of a working day:

a. No. of working days per year:

b. List of holidays:

20. Total area of the campus

21. Details of List of Departments and Courses (Faculty wise)

The total number of department, laboratories, conference hall, Libraries, Auditorium, and Cafeteria are obtained from table 9-5.

S. No.	Description	Details
1	Department	
2	Laboratories	
3	Conference Hall	
4	Libraries	
5	Auditorium	
6	Cafeteria	

Table 9-5: Details of the departments

22. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 9-6

S. No.	Teaching Staff		Non-teaching Staff		Support Staff (Security, House Keeping)	
	Male	Female	Male	Female	Male	Female

Table 9-6: Details of the Staff

23. Number of Students

Number of students is collected from table 9-7.

S. No.	Boys	Girls
1		

Table 9-7: Details of the Students

24. Additional infrastructure details have been collected from table 9-8.

S. No.	Description	Details	
1.	Number of blocks available for boys hostel	Nos.	
2.	Number of rooms available for boys hostel	Nos.	
3.	Number of blocks available for girls hostel	Nos.	
4.	Number of rooms available for girls hostel	Nos.	
5.	Whether Laundry is available in the hostel	Yes / No	
6.	If Yes List the Electrical Equipment in Laundry Section of the hostel (like Washing machine, Dry Cleaning Machine, Iron)		
7.	Whether gym/ indoor sports hall is available in hostel	Yes / No	
8.	Whether Solar PV based Power Generation is available in campus (academic or hostel block)	Yes / No	
9.	Whether lifts available in academic block	Yes / No	
10.	Whether Kitchen is available in the academic block	Yes / No	
11.	Whether any food counter (outside caterers) available in academic block	Yes / No	
12.	Whether any commercial shops available in academic block	Yes / No	
13.	Any more information or additional details of academic block you would like to share – kindly elaborate here		

Table 9-8: Details of the departments

13.1.2 Water Audit details:

4. General information

General information required for water management analysis is collected from table 9-9.

S. No.	Description	Details
1	Source of water	
2	Types of water	

S. No.	Description	Details
3	No of Wells	
4	No of motors used	
5	No of bore wells	
6	Rating of the motors in HP	
7	Depth of each bore-well	
8	Water level of bore well	
9	Number of water tanks (overhead & underground tanks)	
10	Capacity of overhead tank	
11	Capacity of underground tank	
12	Quantity of water pumped every day	
13	Any water wastage of water /why?	
14	Water usage for gardening	
15	Waste water sources	
16	Use of waste water	
17	Faith of waste water from labs	
18	Whether waste water from labs mixed with ground water?	
19	Any treatment method available for lab water?	
20	Whether any green chemistry method practiced in labs?	
21	Total number of water coolers	
22	Whether Rain water harvesting system available?	
23	Whether Sewage Treatment Plant (STP) is available?	
24	List of equipment installed in STP (If S.No.23 is Yes)	
25	Whether Solar Hot Water System is available in the campus	
26	Number of units and amount of water harvested	
27	Any leaky taps in the campus	
28	Amount of water lost per day	
29	Any water management plan used?	
30	Any water-saving techniques followed?	
31	Are there any signs reminding peoples to turn off the water?	
32	No. of water flow meters available	

S. No.	Description	Details
33	Method of water consumption monitoring	
34	Breakup of daily water consumption	
35	Attach Month wise water bill for last 2 years	
36	Please attach recent water quality test reports for Bore well water, Drinking Water and STP processed water.	
37	What are the sources of hot water	
38	What are the usage areas of hot water	

Table 9-9: Water management details

5. STP information

STP details are collected from table 9-10

S. No.	Description	Details
1.	Number of STP plants installed	
2.	Capacity of STP	
3.	Technology of STP	
4.	Year of Installation	
5.	Schematic / Layout of STP	
6.	Water flow meters installed	
7.	Quantity of Sludge	
8.	Disposal of Sludge	

Table 9-10: Details of STP

6. RO Plant information

RO Plant details are obtained from table 9-11.

S. No.	Location	Quantity	Capacity
1.			
2.			
3.			

Table 9-11: Details of RO Plant

13.1.3 Energy consumption details:

7. Energy consumption details:

The energy consumption details required for the audit is collected, the brief format of the same is given in table 9-12.

S. No.	Type	Units		Value	Cost in Rs.
1	Electricity	kWh	2023		
			2024		
2	LPG	Cylinders			
3	Diesel	Litres (Month wise consumption for the last two years)			
4	Others resources (Please specify)				
5	Total connected load	kW			
6	Contract demand	kVA			
7	Maximum demand recorded	kVA			
8	Average power factor				
9	Energy charges	Rs./kWh			
10	Demand charges	Rs./kVA			
	*** Attach Electricity Bill Copy of last 2 years**				

Table 9-12: Details of Energy consumption

8. Solar Energy details:

The solar energy details required are collected from table 9-13.

S. No.	Building No./ Name	Solar water Heater			Solar PV System		
		Capacity	Working / Not working	Year of Installation	Capacity	Working / Not working	Year of Installation

Table 9-13: Details of Solar Energy

9. Solar Street lights details:

d. Quantity -

e. Capacity -
f. Year of Installation –

10. Electrical Equipment details:

Electrical Equipment like transformers DGs UPS Capacitor Bank, AC, Computers, water coolers, fans, exhaust fans are obtained from the table 9-14.

S. No.	Description	Details	
1.	Number of Transformers Installed	Nos.	
2.	Number of Electrical Panels / Electrical Panel Rooms	Nos.	
3.	Whether Diesel Generator Set Backup Power is Available	Yes / No	
4..	How many number of DG Sets available in the campus (If S.No.3 is Yes)	Nos.	
5.	Whether UPS is available for labs, computers and/or any equipment	Yes / No	
6.	Number of UPS installed with location and capacity (If S.No.5 is Yes)	Nos.	
7.	Whether Capacitor Banks is installed in the electrical panel rooms	Yes / No	
8..	Whether Air Conditioning Units have been installed in the campus	Yes / No	
9.	Type of AC units (split, cassette or packaged) available, capacity and installed location (If S.No.8 is Yes)	Nos.	
10.	Total number of computers available in the campus	Nos.	
11.	Type of computer monitors available (CRT, LCD, LED)	Nos.	
12.	Whether water coolers are installed in the academic blocks	Yes/No	
13.	Type of lamps (Fluorescent Tube Light, CFL, LED, Incandescent, Sodium / Mercury lamps, etc.,) installed in the campus	Nos.	
14.	Type of fans (ceiling, wall mount, standing, exhaust, etc.,) installed in the campus	Nos.	
15.	Whether exhaust fans are installed in hostel / kitchen.(If Yes, share the quantity and installed location)	Yes /No	
16.	Any other electrical equipment's in college		

S. No.	Description	Details	
	buildings.		

Table 9-14: Details of Electrical Equipment

11. List of energy saving initiatives implemented
12. List of energy saving initiatives in plan for future

13.1.4 Waste management details:

Waste management includes the activities and actions required to manage waste from its inception to its final disposal. The various data/ information required for the assessment of waste management is as collected from the following set of questionnaires.

5. Basic information

Basic information for waste management is collected from table 9-15.

S. No.	Description	Yes/ No
1	Whether wet and dry garbage segregation is done inside the campus?	
2	Whether garbage is given to external agencies / municipal agencies?	

Table 9-15: Basic details of waste management

6. Types of Waste generated

Types of waste generated in the college are obtained from table 9-16.

S. No.	Description	Yes / No	Remarks
1	E-Waste (Computers, electrical and electronic parts)		
2	Hazardous / Chemical Waste		
3	Solid Waste (Damaged furniture, paper waste, paper plates)		
4	Dry Leaves		
5	Food Waste		
6	Waste Water (Washing, urinals, bathrooms)		
7	Glass Waste (Broken glass wares from the labs)		
8	Unused Materials		
9	Plastic Waste (Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc.)		

Table 9-16: Types of waste generated

7. Segregation of waste

Segregation of waste information at different locations with quantity is gathered from table 9-17.

S. No.	Location	Bio-degradable	Non-Biodegradable	E-waste	Quantity, kgs/month
1	Office				
2	Labs				
3	Cafeteria / Kitchen				
4	College				

Table 9-17: Segregation of waste

8. Waste generation management

Waste generation management of the college was collected from table 9-18

S. No.	Description	Yes / No	Remarks
1	Composting / Vermicomposting		
2	Recycling		
3	Reusing		
4	Other ways		

Table 9-18: Waste Disposal methods

13.1.5 Green campus management details:

3. Total number of plants and trees

The total number of plantations, garden area, and many more are collected as per the set of questionnaires given in table 9-19

S. No	Description	Details
1	Total number of plant species identified	
2	Total number of plants on the campus	
3	Total number of Trees on the campus	
4	Garden area inside the college –	
5	Total number of medicinal plants /trees on the campus	

6	Total number of vegetables and fruits plantation in the campus	
7	Whether display boards are given to plants and trees for identification	
8	Does Institute celebrate World environment day?	
9	Does Institute celebrate World water day?	
10	Does Institute celebrate World ozone day?	
11	Does Institute celebrate World Earth day?	
12	Total number of aquatic water plants	

Table 9-19: List of plantation details

4. List of plants/ trees

List of plants/ trees with their scientific names obtained from table 9-20.

S. No.	Common/Local Name	Scientific name	No. of Trees/Plants

Table 9-20: List of plants/trees in campus

13.1.6 Carbon footprint management details:

The carbon emission from various activities such as transport, diesel generator usage, LPG consumption, and electricity consumption were collected, as per table 9-21.

S. No	Description	Details
1	Whether college provides transport facility for staff and students (Yes/No)	
2	Number (or Percentage) of staff using transport services provided by college	
3	Number (or Percentage) of students using transport services provided by college	
4	Number (or Percentage) of Staff using public transport	
5	Number (or Percentage) of Staff using Bike	
6	Number (or Percentage) of Staff using Car	
7	Number (or Percentage) of students using Public transport	
8	Number (or Percentage) of students using Car	
9	Number (or Percentage) of students using Bike	
10	Number (or Percentage) of students using Bicycles	
11	Average consumption of diesel per month	
12	Average electricity consumption per month	
13	Average LPG consumption per month	

Table 9-21: Details of Carbon footprint management

13.1.7 Photos required for Audit:

1. General Photos

In various sections, different types of photos are required to validate the existence of things, and hence they are collected from table 9-22.

S. No	Description	Details
1	Photos of student's NSS activities	
2	Photos of Safety policy	
3	Photos of the training program on the use of fire extinguishers	
4	Photos of environmental policies adopted by college	
5	Photos of MoUs for Waste management	

6	Photos of any other policies adopted by college		
7	Photos of water test report	Drinking Water	
		STP processed water	
		Bore-well water	
		Other water Sources (Like Tanker water and any other)	
8	Photos of use of Energy efficient devices like fan, bulbs etc.		
9	Photos of LCD/LED monitors used in Labs		
10	Photos of dry and wet waste collection bins		
11	Photos of celebrating World Environment Day		
12	Photos of celebrating World Water Day		
13	Photos of celebrating World Earth Day		
14	Photos of celebrating World Ozone Day		

Table 9-22: List of photos