

QUALITY AUDIT REPORT
ON
WATER AUDIT, ENERGY AUDIT,
WASTE MANAGEMENT AUDIT,
GREEN CAMPUS MANAGEMENT AUDIT
AND ENVIRONMENT AUDIT
OF
SWAMY VIVEKANANDA RURAL
FIRST GRADE COLLEGE
CHANDAPURA, ANEKAL TALUK,
BANGALORE – 560081.



ECO ENERGIME ENGINEERS LLP

ENHANCING RESOURCE EFFICIENCY

QUALITY AUDIT REPORT
OF
SWAMY VIVEKANANDA RURAL
FIRST GRADE COLLEGE
CHANDAPURA, BANGALORE
2022 – 2023

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FOR MORE INFORMATION

Eco Energime Engineers LLP
14, S-1, 3rd Main, 14th Cross
AECS Layout, B – Block
Singasandra
Bangalore–560 068

Mobile: +91 9449 777 000
+91 8050 387 500
Email: info@eeellp.com
Web: www.eeellp.com



PROJECT TEAM

- Mr A Govindaraj - EA 5212
- Mr A Thangavelu
- Mr M Faizal

PROJECT ADVISOR

- Mr Prabu Das
- Ms Aparna Reddy

ACKNOWLEDGEMENTS

We are thankful to the Management, Administrative Officer, Principal and entire team of Swamy Vivekananda Rural First Grade College, Chandapura, Bangalore, for the support, guidance and, giving us the opportunity to be involved in this very interesting and challenging assignment.

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 principal and staff members of the college. They took key interest and gave valuable inputs during the course of study.



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Certificate

This is to certify that M/s. Eco Energime Engineers LLP, Bengaluru has conducted **Quality Audit** of "Swamy Vivekananda Rural First Grade College, Chandapura, Bangalore" during the February 2023 to March 2023. The Audit includes water audit, energy audit, waste management audit, green campus management audit and aspects of environment audit (Carbon footprint perspective).

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

Authorized Signatory

No.14, S-I, 3rd Main, 14th Cross, AECS Layout, B-Block, Singasandra, Bangalore - 560 068, Karnataka

☎ 80503 87500

🌐 www.eeellp.com

✉ info@eeellp.com

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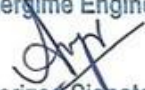
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EEELLP ACKNOWLEDGEMENT

EEELLP team thanks the management of **Swamy Vivekananda Rural First Grade College, Chandapura, Bangalore** for assigning this interesting work to us. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to Principal & their team of colleagues for giving us necessary inputs to carry out this very vital exercise. We would like to thank all the head of the departments and staff members who were actively involved while collecting the data and conducting field measurements.

For Eco Energime Engineers LLP


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No.14, S-I, 3rd Main, 14th Cross, AECS Layout, B-Block, Singasandra, Bangalore - 560 068, Karnataka

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DISCLAIMER

The Audit Team has prepared this report for **Swamy Vivekananda Rural First Grade College, Chandapura, Bangalore**, based on the 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

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No.14, S-I, 3rd Main, 14th Cross, AECS Layout, B-Block, Singasandra, Bangalore - 560 068, Karnataka

☎ 80503 87500

🌐 www.eeellp.com

✉ info@eeellp.com

Quality Audit Report of Swamy Vivekananda Rural First Grade College,
Chandapura, Bangalore.

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ABBREVIATION AND ACRONYMS

1.	A	:	Amperes
2.	BBMP	:	Bruhat Bengaluru Mahanagara Palike
3.	BESCOM	:	Bangalore Electricity Supply Company
4.	BWSSB	:	Bangalore Water Supply and Sewerage Board
5.	CC Camera	:	Closed Circuit Camera
6.	CFL	:	Compact Fluorescent Lamp
7.	CRT	:	Cathode Ray Tube
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.	IQAC	:	Internal Quality Assurance Cell
17.	ISO	:	International Organization for Standardization
18.	kgs	:	Kilograms
19.	kL	:	Kilo Liters
20.	kV	:	kilo volt
21.	kVA	:	kilo volt ampere
22.	kVAr	:	Reactive kilo volt ampere
23.	kW	:	Kilo Watt
24.	kWh	:	kilo Watt hour
25.	kWp	:	kilo Watt peak
26.	Lab	:	Laboratory
27.	LCD	:	Liquid Crystal Display
28.	LED	:	Light Emitting Diode
29.	LT	:	Low Tension
30.	mA	:	Milli Amperes
31.	MoU	:	Memorandum of Understanding
32.	NA	:	Not Applicable
33.	NAAC	:	National Assessment and Accreditation Council
34.	Nos.	:	Numbers
35.	NSS	:	National Service Scheme
36.	Prim/Sec	:	Primary/Secondary
37.	PF	:	Power factor
38.	PV	:	Photo Voltaic
39.	Rs.	:	Rupees
40.	RO	:	Reverse Osmosis

41.	RR. No.	:	Revenue Register Number.
42.	S. No.	:	Serial Number
43.	Sq. Ft.	:	Square Feet
44.	Sq. m.	:	Square Meter
45.	SRTPV	:	Solar Roof Top Photo Voltaic
46.	TL	:	Tube Light
47.	TR	:	Ton of Refrigeration
48.	TV	:	Television
49.	UG	:	Under Graduate
50.	V	:	Volts
51.	W	:	Watts
52.	Wi-Fi	:	Wireless Fidelity
53.	Wp	:	Watt peak
54.	#	:	Number

1. INTRODUCTION

Swamy Vivekananda Rural Education Society is a non-profit organisation run by philanthropic individuals of the farming community from villages around Chandapura. This organisation is established in the year 1963 under Societies Registration Act, Govt. of Karnataka.

It has been serving the society for more than 55 years in the field of education, upliftment of students belonging to labourers, farmers and other economically backward communities. With the blessings of his holiness Sri Sri Sri Shivakumara Swamiji of the Siddaganga Mutt, the first institution viz., Kannada Medium High School, initiated with a section of about 60 students.

Presently, the organisation is spread over 5 acres of land and caters to about 5000 students pursuing kindergarten to under-graduate courses, with institutions like Higher Primary School, English Medium High School, ICSE School, Pre-University College and First Grade College. This is an institution rooted in the tradition and values of our motherland. It aims to empower rural students through a holistic, meaningful, dynamic and disciplined education.

Swamy Vivekananda Rural First Grade College (SVRFGC) was started in the year 2005 with B.Com course subsequently BBM Course was added during 2009.

VISION

To create a platform for the rural student community to enhance and exhibit their intellectual, physical, spiritual, and creative abilities by deriving the benefits of primary, secondary, and higher education.

MISSION

- To provide adequate opportunities for the student community to pursue their education through curricular and extra-curricular activities.
- To provide excellent opportunities for the teaching fraternity to improve their skills and in turn transfer the knowledge of the learner.
- To inspire and train youth to pursue higher education and acquire the necessary skills to lead a happy and productive life in the interest of society and the nation.

Motto

Inspiring Excellence

The vision and mission displayed in the college is shown in figure 1.1.

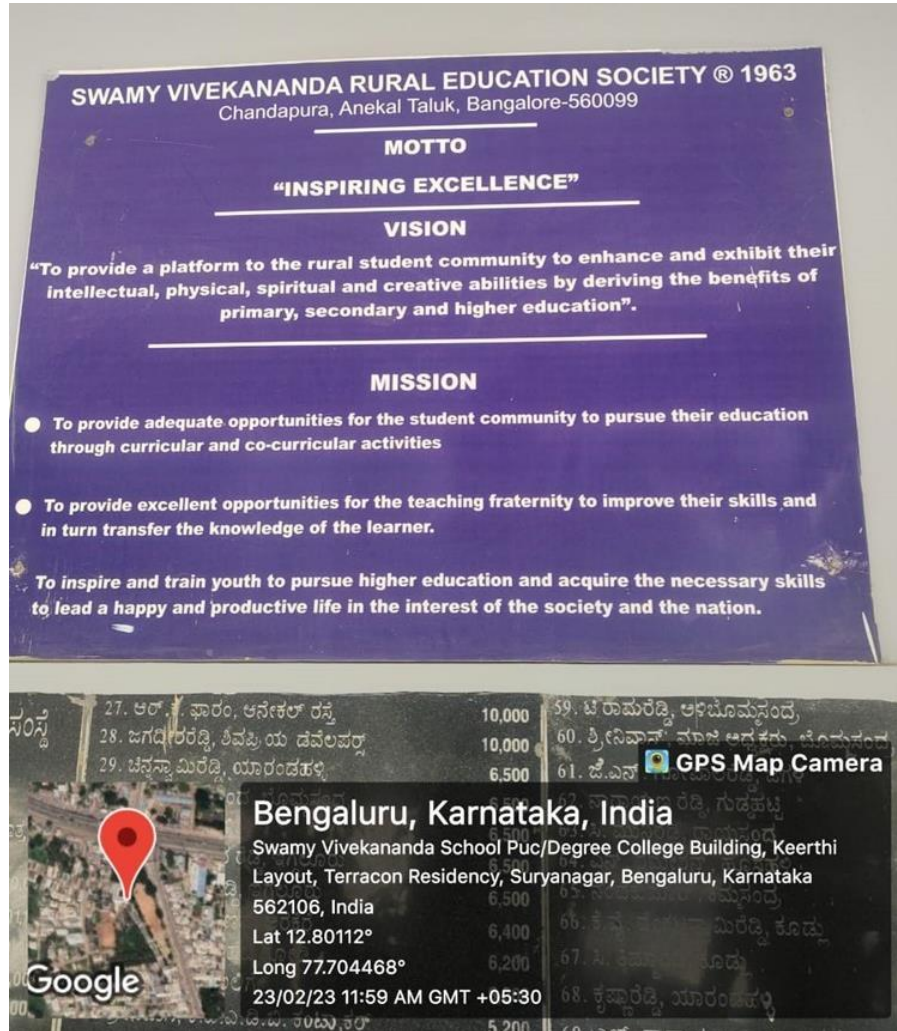


Figure 1-1: Vision and Mission

Committee and Cells:

Internal Quality Assurance Cell (IQAC):

The IQAC has to ensure that whatever is done in the institution for "education" is done efficiently and effectively with high standards. In order to do this, the IQAC will have to first establish procedures and modalities to collect data and information on various aspects of institutional functioning. The coordinator of the IQAC and the secretary will have a major role in implementing these functions. The IQAC may derive major support from the already existing units and mechanisms that contribute to the functions listed above. The operational features and functions discussed so far are broad-based to facilitate

institutions towards academic excellence and institutions may adapt them to their specific needs.

IQAC have worked extensively towards academic excellence which resulted in better performance of students in their UG examination (Odd and Even Semesters).

During pandemic social media presence was through organizing department wise webinars and utilizing social media extensively to extend the reach of webinars and improve engagement in an effort to boost their admission chances. Synchronised online classes as suggested were accepted by students. Performance was improved due to enhanced utility of time.

Various Committees and cells

The College has various committees and cells to address various tasks, which are as follows:

1. Examination committee
2. Sports committee
3. Admission committee
4. Scholarship Committee
5. Cultural Activities Committee
6. Grievance redressal committee
7. Anti-Ragging Anti Sexual Harassment/ Human Rights/ Women Empowerment Cell
8. Discipline Committee
9. Library committee
10. NSS Committee
11. Career Guidance, Placement – Entrepreneurship Development Committee
12. Student Counselling Committee
13. NAAC – IQAC Committee

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	College area	Acres	4.5
2	College Built up area	Sq. Meters	2276.0

Table 1-1: College Campus & Built-up area

Internal Quality Assurance Cell – 2022 – 2023

The college management constitutes the Internal Quality Assurance Cell including management representative, staff and students every year. The details of IQAC members list is given in table 1.2.

S. No.	Name	Designation	Role
1	Prof. Venkatesh Babu TS	Principal	Chairman
2	Mrs. Kusuma H S	Assistant Prof.& Dept. of Commerce and Management	IQAC Co-ordinator
3	Mr. Sanath Kumar H S	Dept. of Kannada	
4	Mrs. Manju B	Assistant Professor. & Dept. of Commerce and Management	Member
5	Mr. Parveez Ulla	Assistant Professor. & Dept. of Commerce and Management	Member
6	Mrs. Jyothi Prabha	Assistant Professor. & Dept. of Commerce and Management	Member
7	Mrs. Vidya R	Assistant Professor. & Dept. of Commerce and Management	Member
8	Mrs. Manjula N	Assistant Professor. & Dept. of Commerce and Management	Member
9	Mr. Kiran Kumar	Management Representative	Member
10	Dr. P. Venkataswamy Reddy	Management Representative	Member
11	Prof. Balakrishna	Principal, Vijaya College, Bangalore	Member
12	Shri. A.N Prabhakar	Corporate General Manager, Micro Bosch (Rtd)	Member

Table 1-2: Internal Quality Audit Team

Overview of Quality Audit:

Quality 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 Swamy Vivekananda Rural First Grade College, Chandapura, Bengaluru in February 2023. 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.

2.1. Audit Schedule

Quality Audit schedule includes the pre-audit phase, on-site / audit phase and post audit phase. Table 2-1 details the complete Quality Audit schedule.

S. No	Description	Timeline
1.	Pre-audit Phase	16 February 23 to 17 February 23
2.	Onsite-audit Phase	22 February 23 to 25 February 23
3.	Post-audit Phase	27 February 23 to 03 March 23
4.	Presentation	06 March 23

Table 2-1: Audit Schedule

3. ON-SITE AUDIT PHASE

3.1. Scope / Target Areas of Quality Auditing

3.1.1. Water Audit

Water Audit addresses water sources, water consumption, 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:

The institution's safety policy is recognized to protect the health and safety of the staff and students as well as the surrounding community. Staff have been given the training to use fire extinguishers in emergency situations of fire and explosion. Fire extinguishing cylinders have been installed in accessible locations for approach and use; sample picture of Fire extinguisher is as shown in the figure 3-1.



Figure 3-1: Fire Extinguisher inside the campus

B. Blood Donation:

The college actively participates in blood donation for well-being of society. The copy of the appreciation certificate issued by Rashtrottana Blood centre is given in Figure 3-2.



Figure 3-2: ISO Certificate

C. Anti-Ragging policy:

Objective: Anti-Ragging Committee will be the supervisory and advisory committee in preserving a culture of Ragging Free Environment in the college campus.

Functions:

- To make the students aware of de-humanizing effect of ragging inherent in its perversity
- To keep a continuous watch and vigil over ragging so as to prevent its occurrence and recurrence.
- To promptly and stringently deal with the incidents of ragging brought to our notice.
- To generate an atmosphere of discipline by sending a clear message that no act of ragging shall be tolerated and any act of ragging shall not go unnoticed and unpunished.
- As per the order of Supreme Court of India and subsequent Notification from University Grants Commission (UGC), ragging constitutes one or more of any intention by any student or group of students of the following:
 - Any act of Indiscipline, Teasing or Handling with Rudeness.
 - Any act that Prevents, Disrupts the Regular Academic Activity.
 - Any activity which is likely to cause Annoyance, hardship, Psychological Harm or creates fear or apprehension.
 - Any act of financial extortion or forceful expenditure.
 - Any act of physical abuse causing assault, harm or danger to health.
 - Any Act of abuse by spoken words, emails, SMS or public insult etc
 - Any act of injury or infringement of the fundamental right to the human dignity.
 - Any act of Wrongful Confinement, Kidnapping, molesting or committing unnatural offences, use of criminal forces, trespass or intimidation.
 - Any unlawful assembly or conspiracy to ragging

Punishment to those found guilty :

Any student or group of students found guilty of ragging in the campus or even outside the campus shall be liable to one or more of the following punishments:

- Debarring from appearing in any session's test / university examination
- Suspension from attending classes and academic privileges
- Withdrawing scholarships and other benefits
- Suspension from the college

D. Environment policy:

The college has environment policy to create awareness and guide the students, faculties and staffs, towards environment conservation. The picture of environment policy is given in figure 3.3.

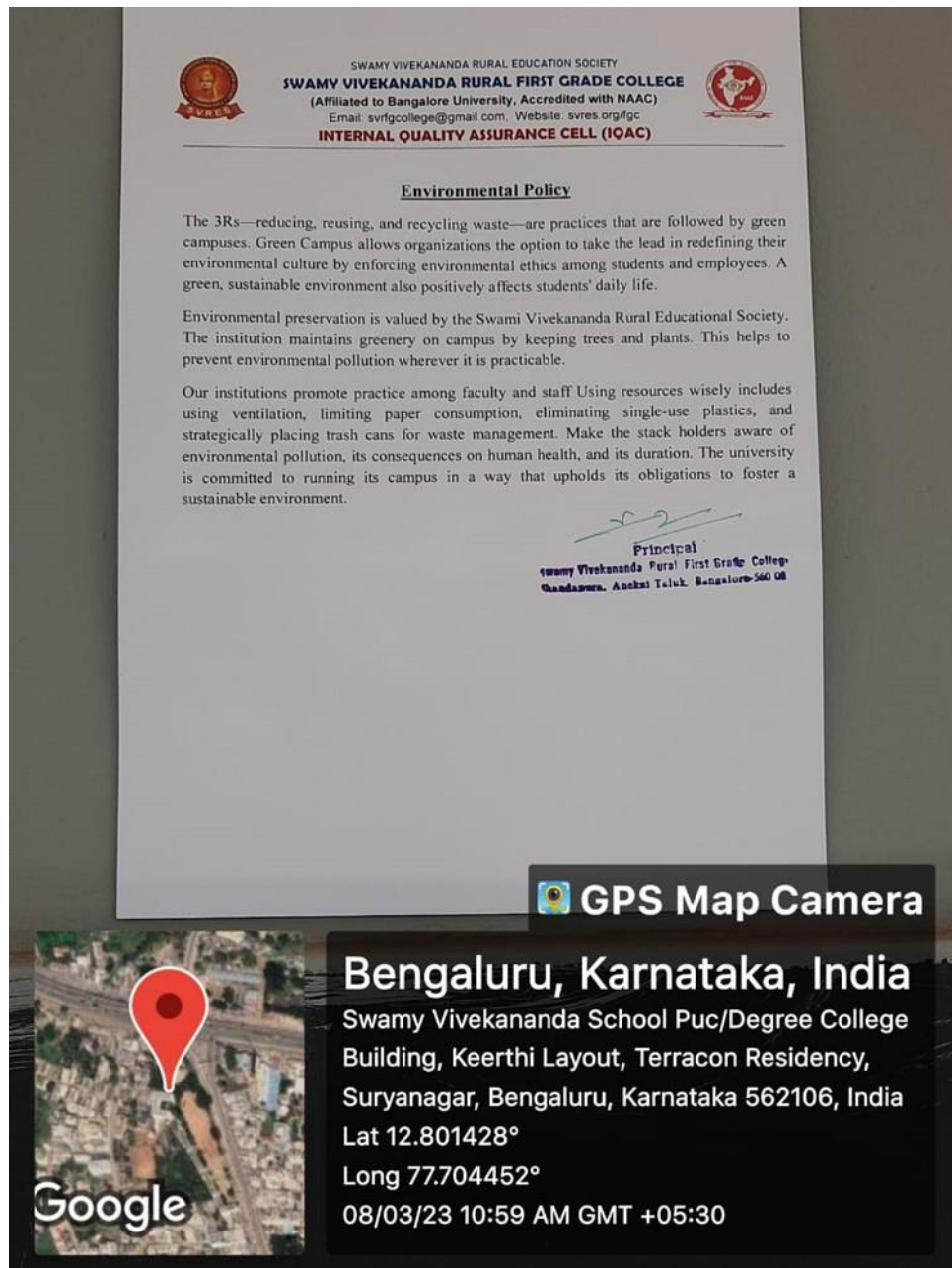


Figure 3-3: Environment Policy

E. Water conservation policy:

The college has water conservation policy to create awareness and guide the students, faculties and staffs, towards water conservation. The photo of water conservation policy is given in figure 3.4.

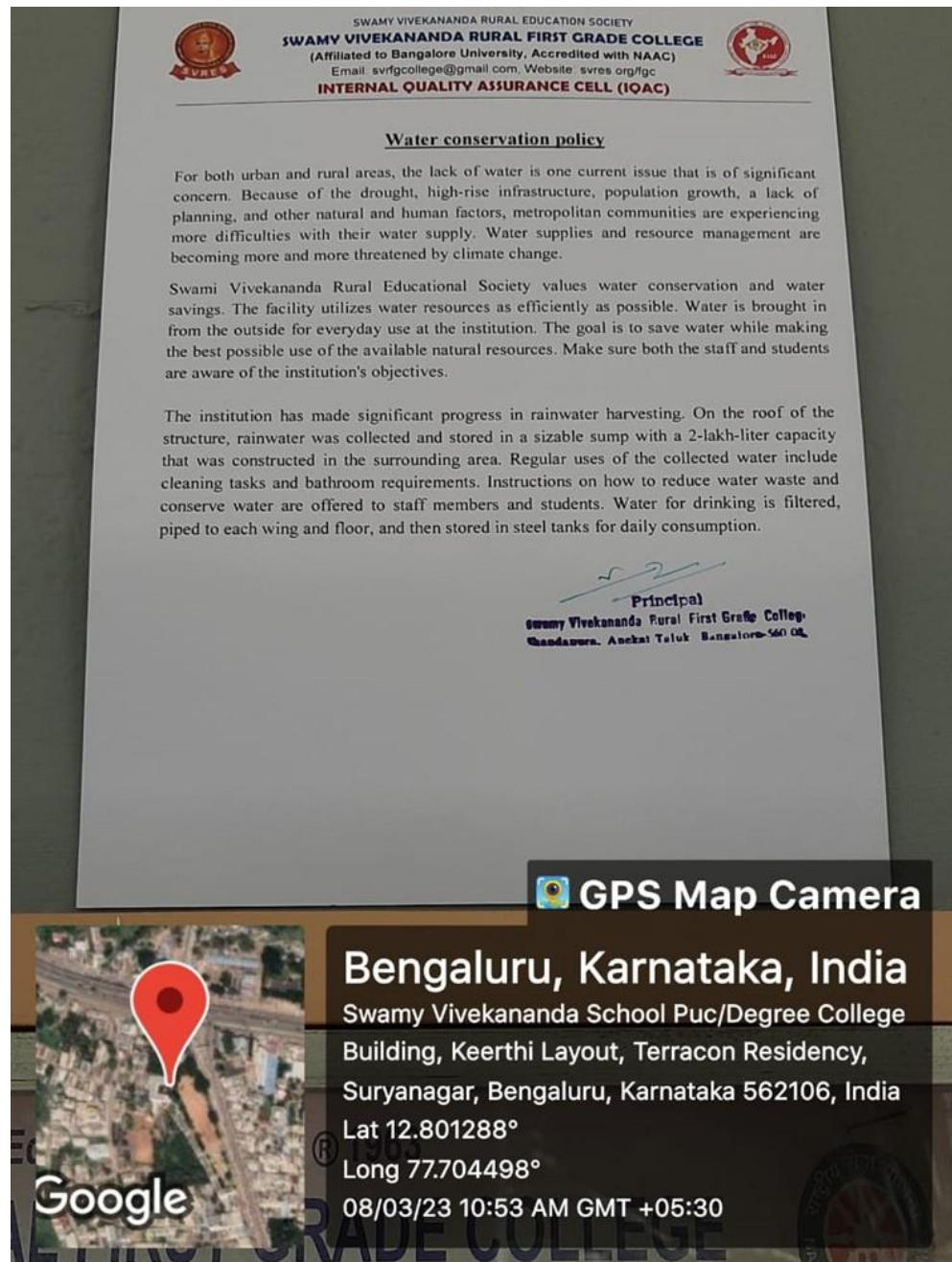


Figure 3-4: Water Conservation Policy

F. Energy conservation policy:

The college has energy conservation policy to create awareness and guide the students, faculties and staffs, towards energy savings. The photo of energy conservation policy is given in figure 3.5.

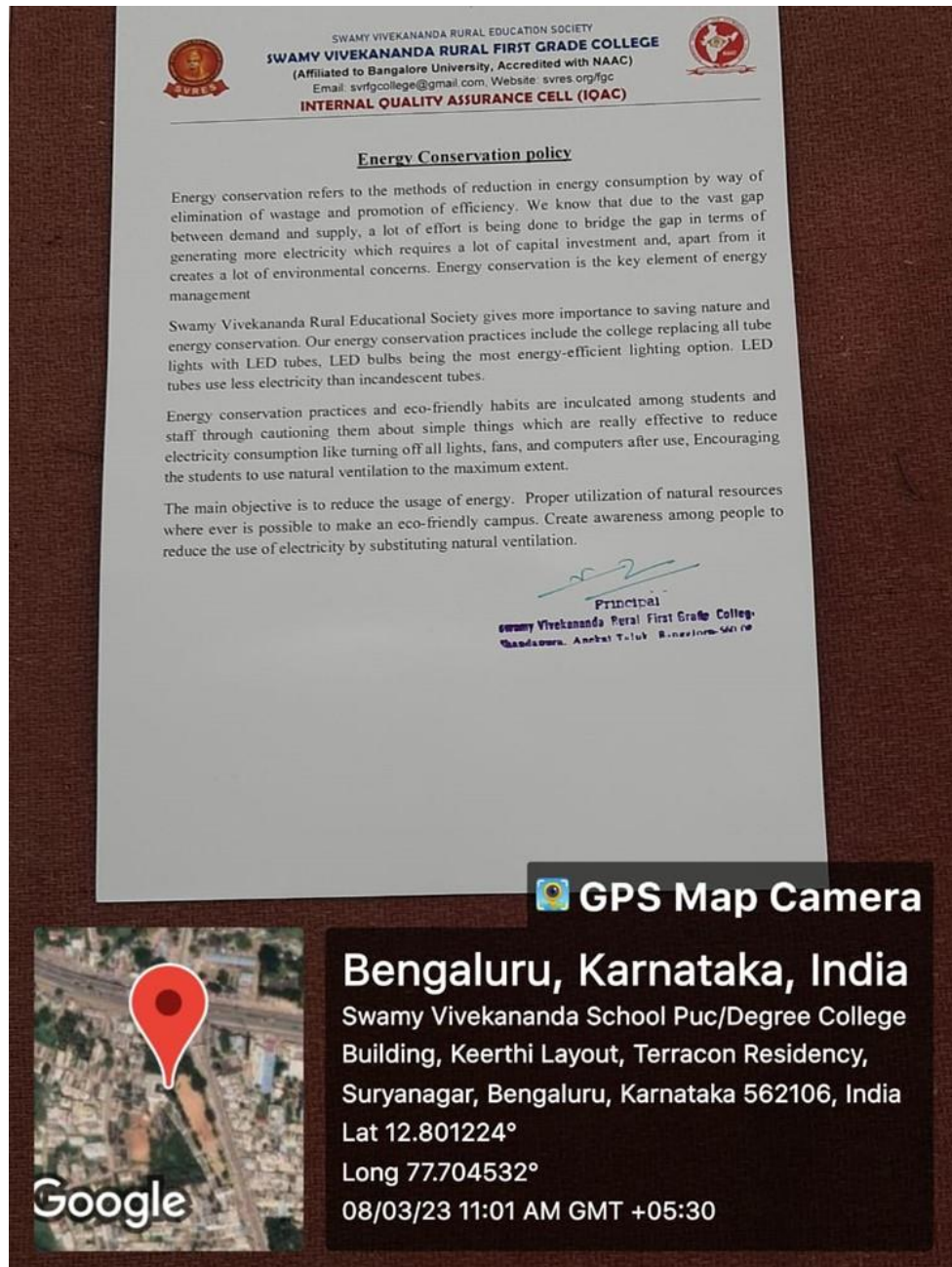


Figure 3-5: Energy Conservation Policy

3.2.3. Review of Best practices implemented

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

- Rain water storage system is adopted
- RO reject water reuse system is adopted
- Installation of LED tube lights to reduce electricity consumption
- Usage of LED/LCD monitors in all the computer labs.
- Switching OFF lights and fans whenever not in use to save electricity
- Integration of Daylight in class rooms to reduce the need for energy

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.

3.2.4.1. College Infrastructure

SVRFGC campus has different floors and 2 departments. Each floor has well-sophisticated class rooms, staff rooms, one lab and one library and many more. Details of classrooms, laboratories, library, auditorium, and cafeteria are given in the table 3-1.

S. No.	Description	Details
1	Classrooms are equipped with an ICT facility	12 Classrooms
2	Lab	1 Computer Lab
3	Library	1 with a seating capacity of 60 students
4	Auditorium	1 With a seating capacity of 300 students
5	Open Stage in the Quadrangle	1
6	Administrative Office	1
7	Sports Room	1
8	Staff Room	2
9	Vehicles Parking Area	Accommodate around 100 two-wheelers
10	Garden Area, Filtered Drinking water facility, CCTV, etc.	Availed
11	Rest Rooms	On every floor, it is made available

Table 3-1: College infrastructure details

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, computers, printers. The consolidated list of inventories is given in table 3-2.

S. No	Room	FTL	LED	FANS	Overhead projector	Xerox machines	printers
01	Meeting room	-	4	2	1	-	1
02	Final BBA	2	2	2	1	-	-
03	I BBA	2	2	2	1	-	-
04	Principal room	-	2	1	-	-	-
05	Office room	-	4	1	-	1	1
06	Staff room		4	2	-	-	-
07	107	2	2	2	1	-	-
08	106	-	4	2	1	-	-
09	105	2	2	2	1	-	-
10	104	1	3	2	1	-	-
11	103	2	2	2	1	-	-
12	102	2	2	2	1	-	-
12	Staff room-2	1	1	1	-	-	-
13	Sports room	1	1	1	-	-	-
14	208	3	1	2	1	-	-
15	207	1	3	2	1	-	-
16	206	2	2	2	1	-	-
17	205	3	1	2	1	-	-
18	Computer lab	1	3	2	-	-	-
19	Library	4	18	9	-	1	1
20	Auditorium	15	13	6	1	-	-
	Total	44	76	49	13	2	3

Table 3-2: 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-section

3.2.6.1. Tentative Schedule of College:

1. The tentative schedule of the college:
 - a. Monday to Friday : 08.45 AM to 3:00 PM
 - b. Saturday: 8:45 AM to 03.00 PM
2. Every 3rd Saturday is holiday

3.2.6.2. 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 both boys and girls are given in table 3.4.

S. No.	Teaching		Non-teaching		Support (Security, House Keeping)	
	Male	Female	Male	Female	Male	Female
1	10	12	02	02	01	02

Table 3-3: Number of staff and students

S. No.	Boys	Girls
1	313	337

Table 3-4: Number of staff and students

4. WATER AUDIT

The study involved carrying out various data collections, observations, analysis to realistically assess water wastage and potential for water conservation.

4.1. Facility description

Tanker water is the only source of water, for facilitating the water requirement of the entire campus. BWSSB water supply connection and borewell is not available in the college campus. Five number of PVC over-head tanks (OHT) have been installed inside the college terrace for the water distribution system. The list of tanks, location, capacity and quantity are given in table 4-1

S. No.	Location	Capacity, Litres	Quantity	Source of water
1	Terrace - Sintex Overhead tank (Right Wing)	1000	3	Tanker
2	Terrace - Sintex Overhead tank (Left Wing)	2000	2	Tanker

Table 4-1: Details of Over-head tanks

The overhead tanks are shown in figure 4-1 and figure 4-2.

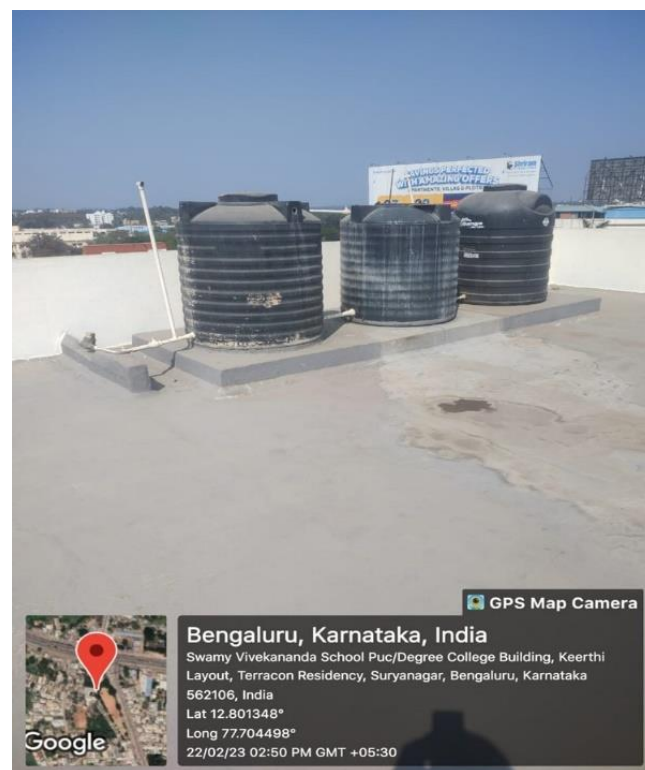


Figure 4-1: Sintex overhead tanks in right wing



Figure 4-2: Sintex Overhead tanks in left wing

The water to the overhead tanks is pumped from the sumps. The sumps are classified as follows:

1. Main Raw Water Sump:

The raw water from the tankers is unloaded into this sump. RO reject water is also collected in this sump. From this sump, the water is distributed to the various sumps/overhead tanks in the campus.

2. Drinking Water Sump:

The source of drinking water is also from the tanker water supply only. The quantity of water purchased for drinking purpose is monitored separately. The raw water used only for drinking purpose is stored in this sump.

3. Raw Water Sump for College:

The source of water for this sump is from main raw water sump. The water is collected in this sump and pumped to the overhead tanks. The rain water from the college building terrace area is also collected into this sump and used, during the rainy seasons.

The sumps details with location and capacity are given in table 4-2

S. No.	Description	Location	Type of water stored
1	Main Raw water sump	Near the RO plant	Raw Water for general use and Rain water from the various buildings terrace
2	Drinking water	Near Raw water sump	Raw water for RO plant
3	Raw water sump for college building	Inside the college building, opposite to accounts section	Raw water for general use and Rain water from the college building terrace

Table 4-2: Details of Sumps

The sumps available in the Campus are shown in figure 4-3 to figure 4-4.

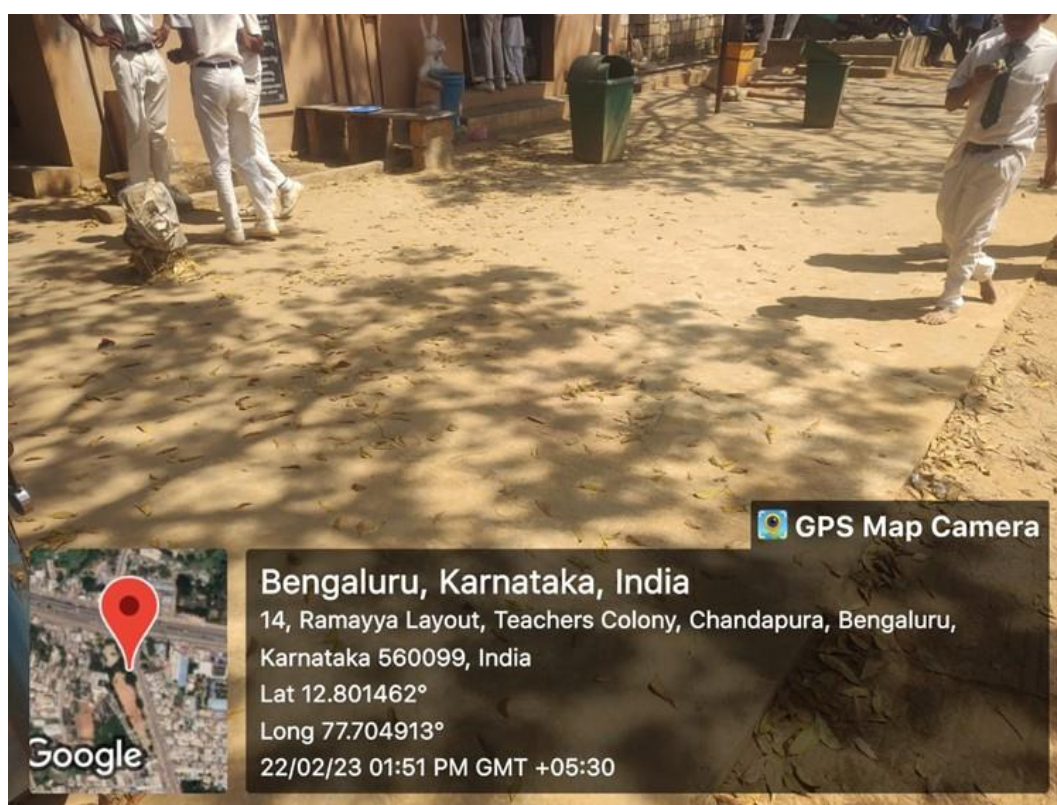


Figure 4-3: 200 kL Raw water storage sump

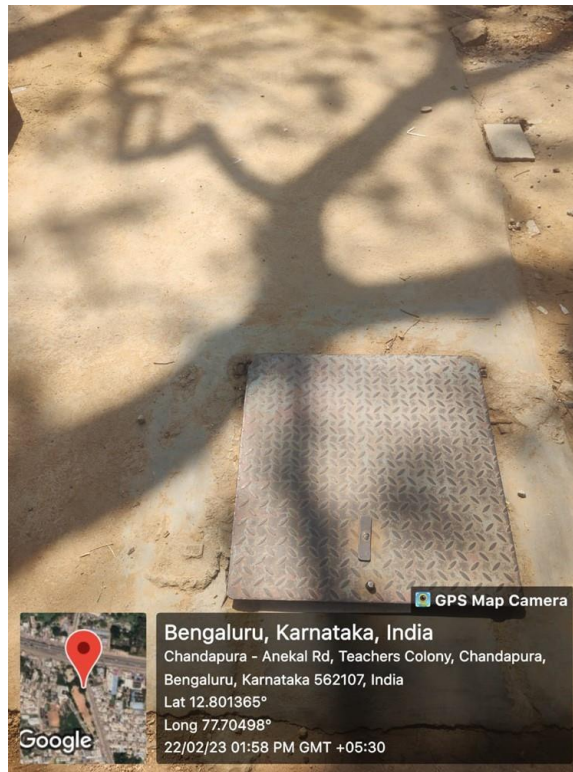


Figure 4-4: 12 kL drinking water storage sump

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

- Raw Water
- Drinking Water
- Rain Water
- Sewage Water
- 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:

- Toilets
- Handwash
- Cleaning
- Gardening

The schematic of water distribution system of the campus is given in figure 4-5.

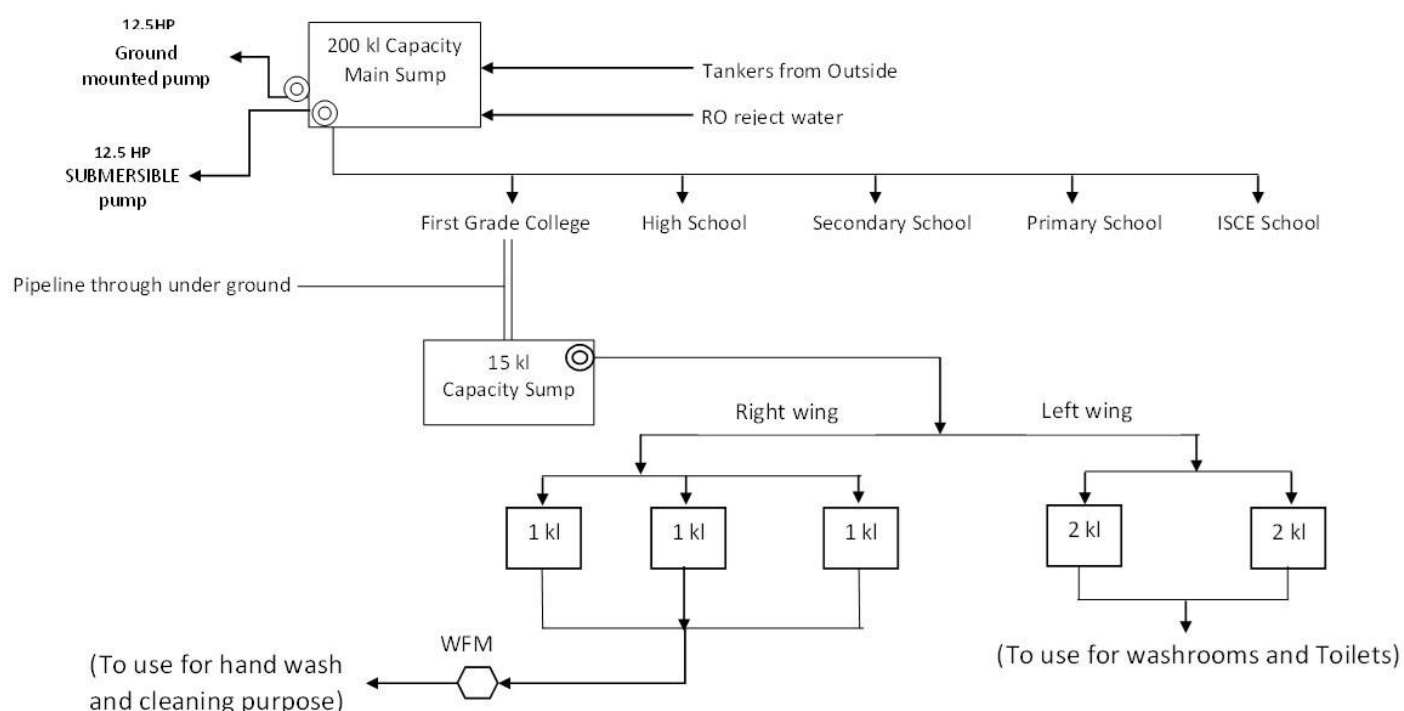


Figure 4-5: Schematic of Raw Water Distribution System

Water from borewell is pumped to overhead PVC tanks using 4 HP submersible pump. The BWSSB water collected in BWSSB sump (near PU college entrance) is also pumped to overhead tanks using 3 HP submersible pump.

The raw water from the tankers is unloaded into the main raw water sump. RO reject water is also collected in this sump. From this sump, submersible pump is used to pump the water to the various sumps/ overhead tanks in the campus. One of the users is First Grade College. The raw water from the main sump is received at the 15-kL sump in the college. From the 15 kL sump, the water is pumped to overhead tanks (right wing and left wing) with help of submersible pump. From the overhead tanks (2 kL-2 No & 1 kL-3 No.) the raw water is distributed to consumption points i.e., toilets, handwash, cleaning and etc.

4.1.2. Drinking Water System

The schematic of drinking water system of the college is shown in figure 4-6.

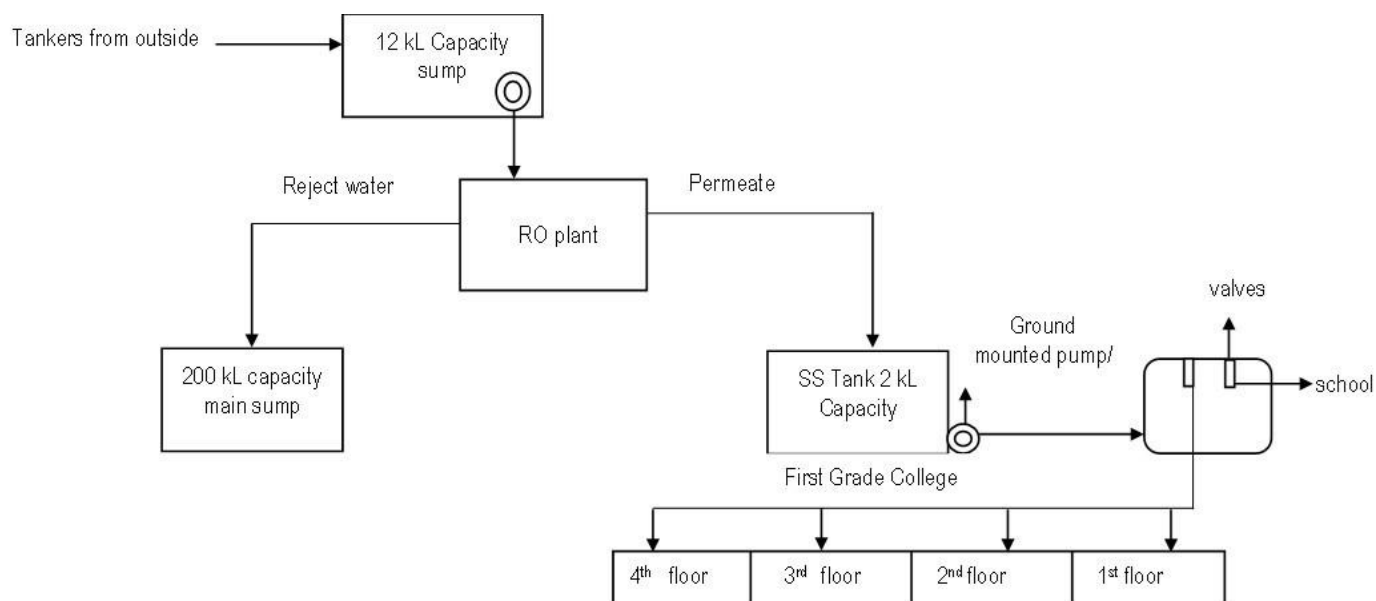


Figure 4-6: Schematic of Drinking water system

To provide drinking water facility, RO plant is installed in the college premises near to the canteen. The water from tankers (drinking water tankers ONLY) is unloaded in the 12 kL drinking water sump. Input for RO plant is provided from the 15 kL drinking water sump. The RO purified water is stored at 2000 litre Stainless Steel (SS) tank. Then, the RO purified water is distributed to all floors through dedicated pipeline with help of ground mounted motor in the RO plant room.

In each floor, drinking water tap provision is available. From tap, drinking water is filled in water canes and kept in appropriate locations for consumption.

The RO plant installed is shown in figure 4-7.



Figure 4-7: RO plant installed in the campus

The sample image of drinking water distribution in each floor is shown in figure 4-8.

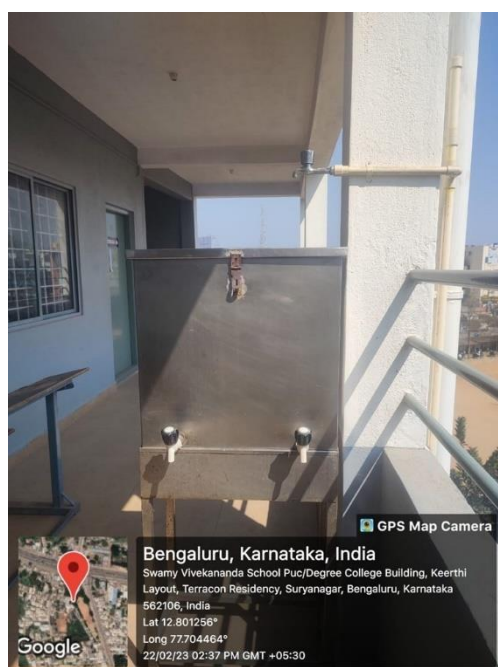


Figure 4-8: RO drinking water distribution point

The Water Can's used for drinking purpose in college is shown in figure 4-9.



Figure 4-9: Sample photo of RO drinking water cans

RO Plant Maintenance:

The RO plant is checked on a regular basis to maintain the output water quality parameters. The RO plant service bills were reviewed during the study. The sample image of RO plant maintenance bill is shown in figure 4-10.

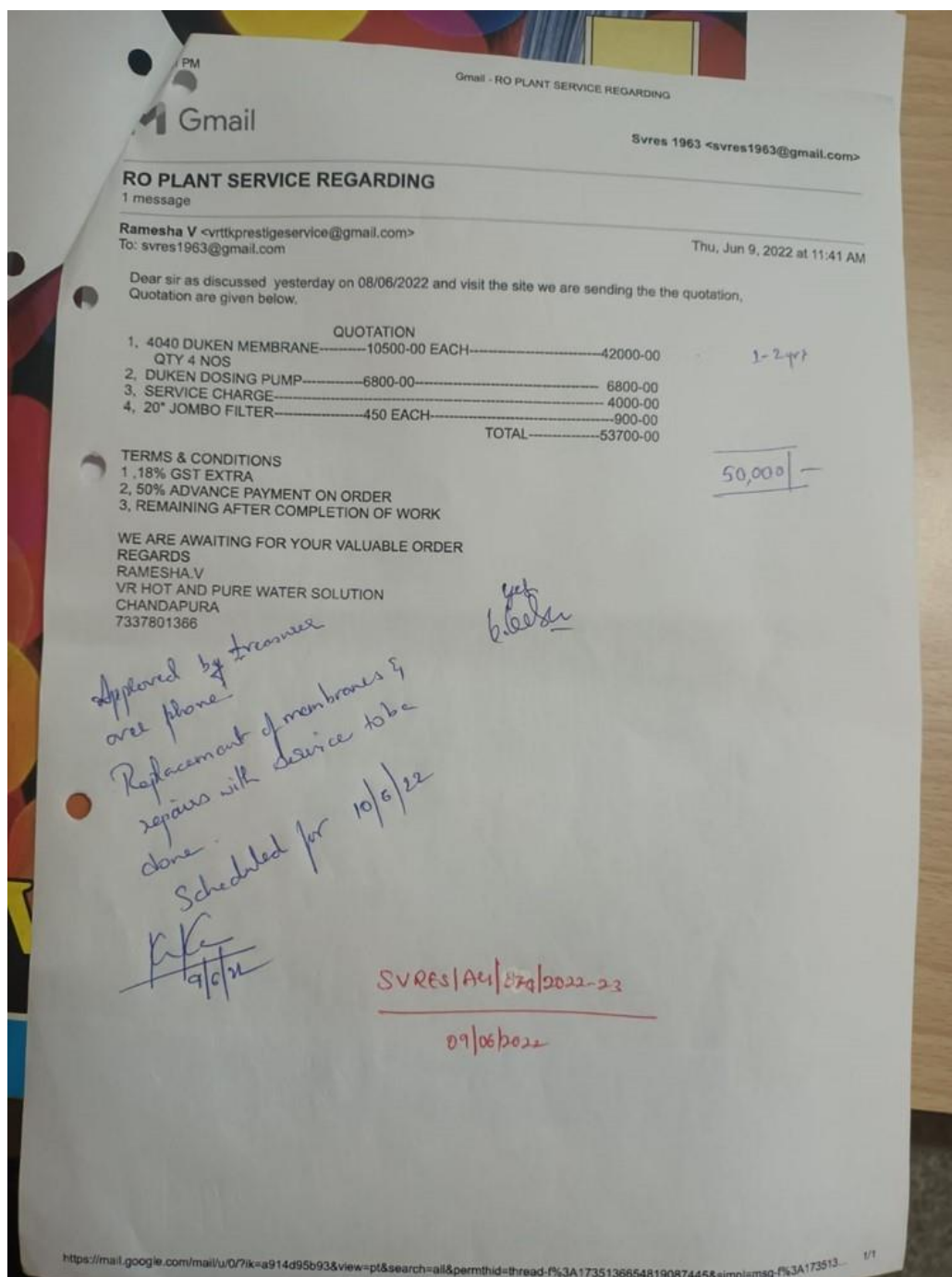


Figure 4-10: Sample photo of RO plant service bill

4.1.3. Rain Water System

The rain water storage system is available in the campus. The rain water from terrace is brought to ground level using a dedicated pipeline. The rain water is filtered and stored in rain water sump. Then, rain water from sump is used for watering the plants. The rain water pipeline from terrace is shown in figure 4-11.



Figure 4-11: Rain water pipeline system

The rain water sump is shown in figure 4-12.



Figure 4-12: Rain water storage sump

4.1.4. Sewage Water System

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

- Washrooms
- Toilets
- Handwash

Waste water from the wash rooms, toilets, and handwash are connected to the waste water chamber. Then, from waste water chamber it is sent out to the BWSSB drainage.

The waste water chamber is shown in figure 4-13.



Figure 4-13: Waste water chamber

4.2. Best Practices Implemented for Water Conservation

4.2.1. Water quality checking with TDS meter

During the study it was observed that the RO plant output water (permeate) is checked on a regular basis for the water quality parameters. This was carried out using TDS meter. Based on the TDS level, the performance of the RO plant is monitored. The picture of TDS meter available in the college is given in figure 4-14.



Figure 4-14: TDS meter for water quality checking

4.2.2. Water Flow Meter

One number of water flow meter is installed in the terrace to monitor the water consumption. The picture of water flow meter is shown in figure 4-15.



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

4.2.3. Rain Water Storage System

The rain water storage system is available in the campus. The rain water from terrace is brought to ground level using a dedicated pipeline. The rain water is filtered and stored in rain water sump. Then, rain water from sump is used for watering the plants. The rain water pipeline from terrace is shown in figure 4-16.



Figure 4-16: Rain water pipeline system

The rain water sump is shown in figure 4-17.



Figure 4-17: Rain water storage sump

4.2.4. 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 water and how to use it. Sample photos of water testing report of borewell is given in figure 4-18 and RO output water is given in figure 4-19.

3/7/23, 10:25 AM 1578164834058.jpg

AES TESTING LABORATORY
(ISO 9001:2005/ISO45001:2018 Certified Laboratory)
44, 45, 1st Main Road, Vinayaka Nagar, Bagalurpet, Nagavandra Post, Bangalore - 560 073
Mob: 9538555792, 9538555283, 9000565208, Email: aetestinglaboratory@gmail.com Web: www.aestlab.co.in

TEST REPORT Page: 1 of 1

Report No: AESTL23030002
Issued To: M/s Swamy Vivekananda School Puc / Degree College Building, Keerthi Layout, Terracon Residency, New Airport, Bengaluru, Karnataka 562106.
Sample Collected By: Customer

Report Date: 07/03/2023
Customer Reference: Verbal
Date of Receipt: 01/03/2023
Date of test Start: 01/03/2023
Date of Completion of test: 07/03/2023
Sample Particulars: Borewell Water

Analytical Result

Sl. No	Tests	Results	Maximum Acceptable Limits (in mg/L)	Maximum Permissible Limits (in mg/L)	Protocol
01	Colour, Hazen Units	<5.0	5	15	APHA 2120 B
02	Odour	Agreeable	Agreeable	Agreeable	APHA 2150 C
03	Turbidity, NTU	1.6	1	5	APHA 2130 B
04	pH Value	8.3	6.5 - 8.5	No Relaxation	APHA 4500 H+ B
05	Electrical conductivity, µs/cm	1803			APHA 2510B
06	Total Hardness as CaCO ₃ , mg/L	665	200	600	APHA 2340 C
07	Calcium as Ca, mg/L	173.1	75	200	APHA 3500 Ca
08	Magnesium as Mg, mg/L	56.4	30	100	APHA 3500 Mg - B
09	Chloride as Cl, mg/L	420	250	1000	APHA 4500 Cl
10	Total Dissolved Solids, mg/L	1150	500	2000	APHA 2540 C
11	Sulphate as SO ₄ , mg/L	46.0	200	400	APHA 4500 SO ₄ - E
12	Nitrate as NO ₃ , mg/L	18.0	45	No Relaxation	IS 3025 Part 34
13	Fluoride as F, mg/L	1.2	1.0	1.5	APHA 4500 F- D
14	Iron as Fe, mg/L	0.12	0.3	No Relaxation	APHA 3500 Fe
15	Total Alkalinity as CaCO ₃ , mg/L	355	200	600	APHA 2320 B
16	Total Coliform MPN/100ml	12MPN	Shall Not be Detectable Any 100ml Of Water		IS :1622-1981
17	E.Coli MPN/100ml	06MPN	Shall Not be Detectable Any 100ml Of Water		IS :1622-1981

Remarks: The given water sample Cross maximum Permissible limits as per IS 10500 : 2012 for above physical, chemical test but Microbiologically Contaminated.

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

Tested by: [Signature]
[Stamp: AES TESTING LAB]

Note: 1. This Report issued perfectly only to meet customer and customer's requirements. 2. Samples will be destroyed after 15 days from the date of issue of test certificate unless it is otherwise specified. 3. This Report can be reproduced either wholly or in part and not to be used for reference in the court of law and should not be used without prior written permission. 4. Sampling not done by us, unless specified.

s://mail.google.com/mail/u/0/?tab=rm&ogbl=inbox?projector=1

Figure 4-18: Sample water test report of Borewell



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TEST REPORT

Page 1 of 1

Report No: AESTL23030003

Issued To: M/s Swamy Vivekananda School Puc/Degree
College Building, Keerthi Layout, Terracon Residency,
Suryanagar, Bengaluru, Karnataka 562106.

Report Date : 07/03/2023

Customer Reference: Verbal

Date of Receipt : 01/03/2023

Date of test Start : 01/03/2023

Date of Completion of test: 07/03/2023

Sample Particulars : R O Water

Sample Collected By: Customer

Analytical Result

Sl. No	Tests	Results	Maximum Acceptable Limits (in mg/L)	Maximum Permissible Limits (in mg/L)	Protocol
(As per IS 10500:2012)					
01	Colour, Hazen Units	<5.0	5	15	APHA 2120 B
02	Odour	Agreeable	Agreeable	Agreeable	APHA 2150 C
03	Turbidity, NTU	<1.0	1	5	APHA 2130 B
04	pH Value	6.6	6.5 - 8.5	No Relaxation	APHA 4500 H+ B
05	Electrical conductivity, $\mu\text{S}/\text{cm}$	68.0			APHA 2510B
06	Total Hardness as CaCO_3 , mg/L	20.0	200	600	APHA 2340 C
07	Calcium as Ca, mg/L	4.0	75	200	APHA 3500 Ca
08	Magnesium as Mg, mg/L	2.0	30	100	APHA 3500 Mg - B
09	Chloride as Cl, mg/L	18.0	250	1000	APHA 4500 Cl
10	Total Dissolved Solids, mg/L	46.0	500	2000	APHA 2540 C
11	Sulphate as SO_4 , mg/L	8.6	200	400	APHA 4500 SO_4 - E
12	Nitrate as NO_3 , mg/L	<1.0	45	No Relaxation	IS 3025 Part 34
13	Fluoride as F, mg/L	0.3	1.0	1.5	APHA 4500 F- D
14	Iron as Fe, mg/L	<0.05	0.3	No Relaxation	APHA 3500 Fe
15	Total Alkalinity as CaCO_3 , mg/L	16.0	200	600	APHA 2320 B
16	Total Coliform MPN/100ml	<1MPN	Shall Not be Detectable Any 100ml Of Water		IS :1622-1981
17	E.Coli MPN/100ml	<1MPN	Shall Not be Detectable Any 100ml Of Water		IS :1622-1981

Remarks: The given water sample meets to maximum Acceptable limits as per IS 10500 : 2012 for above physical , chemical And Microbiological test

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



Tested By: [Signature]

Note: 1. The Report valid only for tested samples and applicable parameters. 2. Samples will be destroyed after 15 days from the date of issue of test certificate unless it otherwise Specified. 3. This Report is not to be reproduced either wholly or in part and can not be used in evidence in the court of law and should not any advertising media without prior written permission. 4. Sampling not done by us, unless specified.

Figure 4-19: Sample water test report of RO Output Water

4.2.5. Poster to Save Water

Sign boards have been placed in the wash rooms and hand wash areas to create awareness for water conservation, sample photo is shown in figure 4-20.

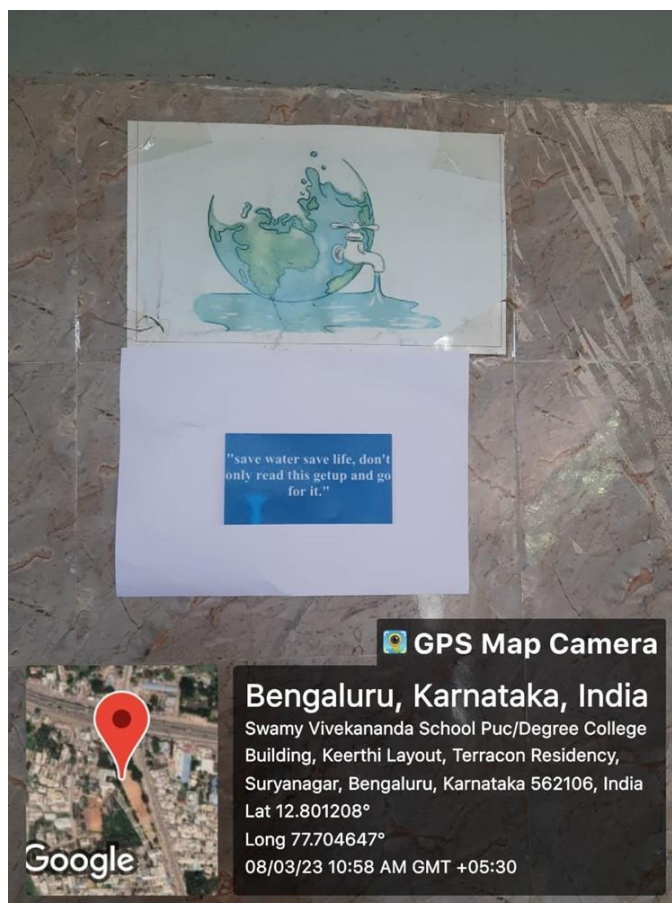


Figure 4-20: Water conservation awareness poster

4.2.6. RO Reject Water Usage

The RO reject water from RO plant is collected in the main raw water sump (200 kL). The RO reject water gets mixed with the raw water and pumped to various raw water user areas of the campus.

4.2.7. Other measures implemented

- Regular checking of taps and valves is done to avoid leaks and water wastage.

4.3. Recommendations

4.3.1. Aerators for taps

The aerator is a small attachment that either fits onto the end of the tap or can be inserted inside of the existing spout. These water saving devices will control the amount of water that flows through the tap without affecting the water pressure as they mix the water with air which will save water and money.

The aerators will separate a single flow of water into many tiny streams which introduces the air in to the water flow. Also, as there is less space for the water to flow through, the water flow is reduced, resulting in water savings. As the water pressure is maintained, most people don't notice a difference in the amount of water coming out of an aerated faucet yet benefit from the water efficiency.

Tap aerators are of most use to those with older taps which run on average around 15 Litres of water per minute. Adding an aerator to an older tap can reduce this to as little as 6 Litres of water per minute.

The biggest water saving benefit is achieved in the hand wash / kitchen sinks where you are often turning the taps on and off to wash your hands and for other uses.

The aerator tap is shown in figure 4-18.



Figure 4-21: Sample photo - Aerators for taps

Tap aerators can save as much as up to half your water usage through this way. When you are using aerated water, you are unlikely to notice the difference except for saving water resulting in lower bills.

4.3.2. Sewage Treatment Plant

The waste water sources are washrooms, toilets and labs. The waste water from both blocks is sent to waste water chamber and then to municipal drainage through underground pipe.

Cost effective and advanced water purification technologies are available to recycle and reuse the waste (sewage) water. Integration of recycled water use in the existing system will result in reduced raw water usage. An STP plant will treat the waste water to make it fit for safe disposal.

At present, raw water is used for toilet flushing, floor cleaning and watering the garden. If STP is established, the treated water can be used for floor cleaning and watering the garden. Also, it can be used in dual piping system for toilet flushing.

Hence, it is advised to establish a Sewage Treatment Plant.

4.3.3. Water flow meters

In college campus, water from tankers is the only source of water. Water is pumped daily from the main raw water sump and distributed to overhead tanks available in various block for usage.

However, data regarding the quantity of water used per day is not accounted. With the presence of flow meters, it is possible to measure quantity of water used per day. Installing water flow meters at main raw water sump outlet pipe, raw water outlet pipe, and at each block overhead tank outlet lines, will quantify the water used in individual blocks. Whereas, installing flow meters at main raw water sump and the RO water storage tank outlet will help in quantifying overall water consumption.

Measurement is the first step towards conservation of water. Hence, water usage has to be measured by installing proper metering and monitoring systems.

4.3.4. Awareness posters and campaigns

In order to create awareness regarding water conservation, sign boards / posters indicating not to waste water can be made available at appropriate locations like handwash area, drinking water tap points.

Similarly, posters indicating the importance of water can be made available throughout the campus.

To create awareness about the water conservation among new students and staff, awareness programs/campaigns need to be conducted inside the campus on a periodic basis.

4.3.5. Other Recommendations

- Conducting awareness and training program on water conservation and rain water harvesting

5. ENERGY AUDIT

5.1. Facility Description

Swamy Vivekananda Rural First Grade College (SVRGFC), Chandapura, receives power supply from the state electricity board (BESCOM - Bangalore Electricity Supply Company) as LT supply. The incoming power supply is received at metering panel. Then, it is distributed to the college.

The BESCOM energy meter and electrical panel board is shown in figure 5-1.



Figure 5-1: Energy meter and electrical panel board

DG set (Diesel Generator set) is used as standby source of power supply, during power failure from BESCOM. The capacity of DG set is 30 kVA and is shown in figure 5-2.

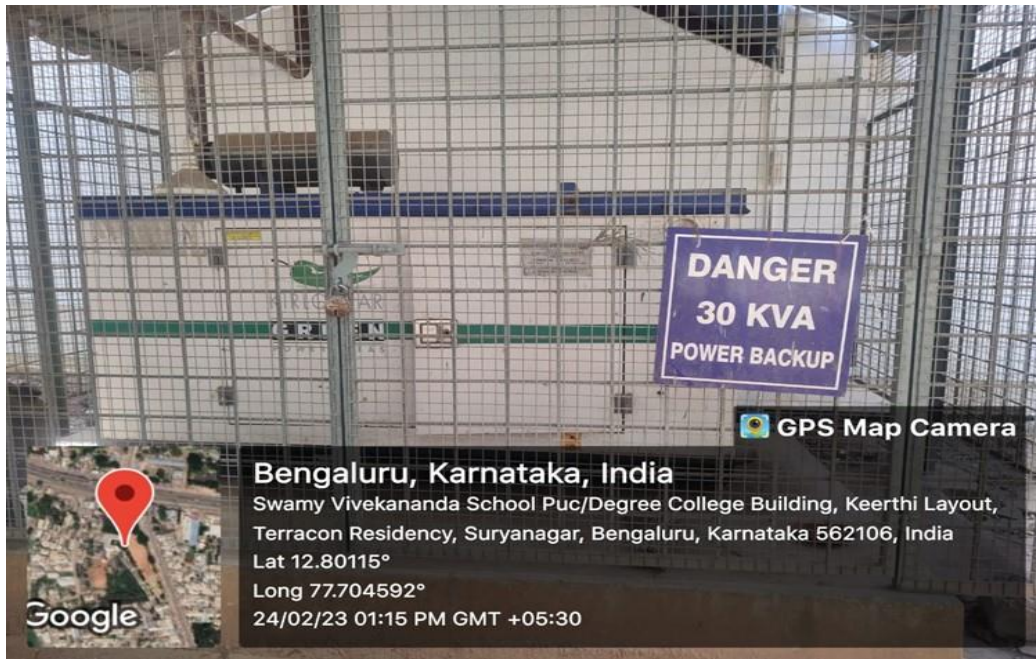


Figure 5-2: Diesel Generator (DG) Set

Auto Mains Failure (AMF) panel is provided for switchover between BESCOM supply and DG supply. AMF panel is shown in figure 5-3.



Figure 5-3: AMF panel

The nameplate specifications of DG set are given in table 5-1

S. No.	Description	Unit	Details
1	Engine serial number	-	50615004
2	Alternator serial number	-	05060726
3	Rated kW	kW	25
4	Rated kVA	kVA	30
5	Rated voltage	V	415
6	Frequency	Hz	50
7	Rated RPM	RPM	1500
8	Battery voltage, DC	V	12
9	Maximum weight	kg	620
10	Make	-	Cummins

Table 5-1: Name plate Details of 30 kVA DG set

UPS System:

UPS system is made available for the critical loads like computer labs, library and office rooms. A sample photo of the UPS in lab is shown in figure 5-4.

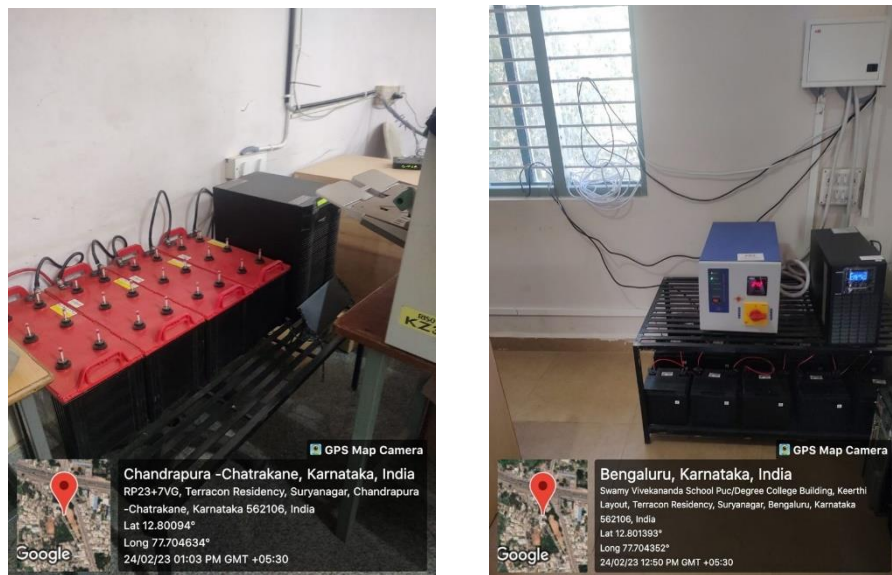


Figure 5-4: Sample photos of UPS

List of UPS available in the college is given in table 5-2

S. No.	Description	Capacity, kVA	Quantity
1	Online UPS	5	1
2	Online UPS	2	1
3	Online UPS	2	1

Table 5-2: UPS details

5.1.1. Tariff Structure

The sanctioned load of the campus is **10 kW**. Electricity supply from BESCOM is billed under 1LT2B1 schedule of tariffs. The tariff includes fixed charges of Rs. 120 per kW and energy charges of Rs. 7.35 per unit for the first 200 units and Rs. 8.60 per unit for above 200 units.

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 5-1.

S. No.	Description	Unit	Details
1	Sanctioned Load	kW	10.00
2	Demand Charges	Rs./kW	120
3	Maximum Monthly Energy Consumption during the analysis period	kW	1697
4	Average Monthly Energy Consumption during analysis period	kWh	1072
6	Average Energy Charges considered for savings calculations	Rs./ kWh	10.5

Table 5-3: Electricity Bill Parameters

The energy consumption profile of the college for the year 2022 is shown in figure 5-8 and for the year 2021 is shown in figure 5-5.

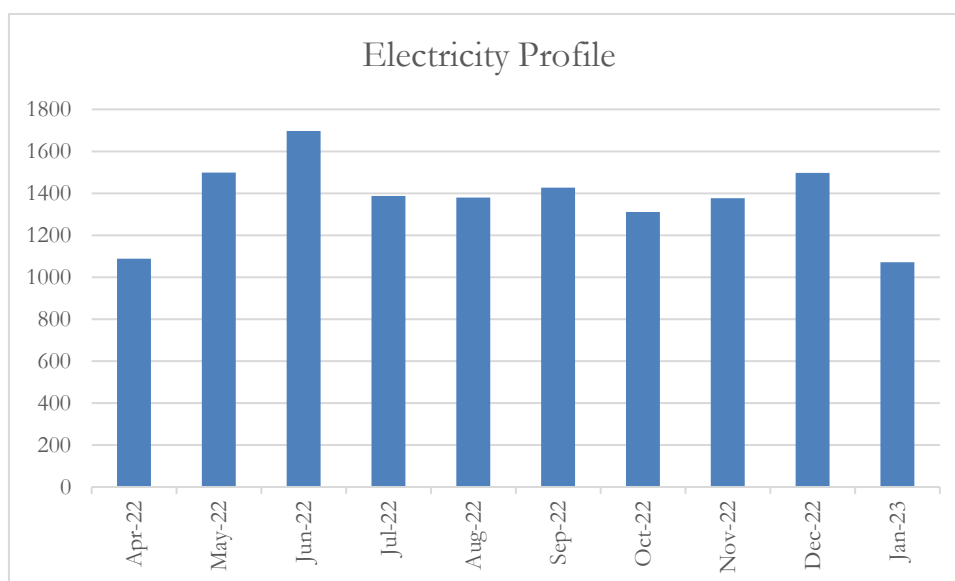


Figure 5-5: Monthly Energy consumption profile – 2022

5.2. Best Practices for Conservation of Energy

5.2.1. Day light integration

During the audit phase classrooms, staff-rooms, computer lab, seminar hall, indoor auditorium 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 of daylight integrated and ventilated areas are shown in figure 5-6.

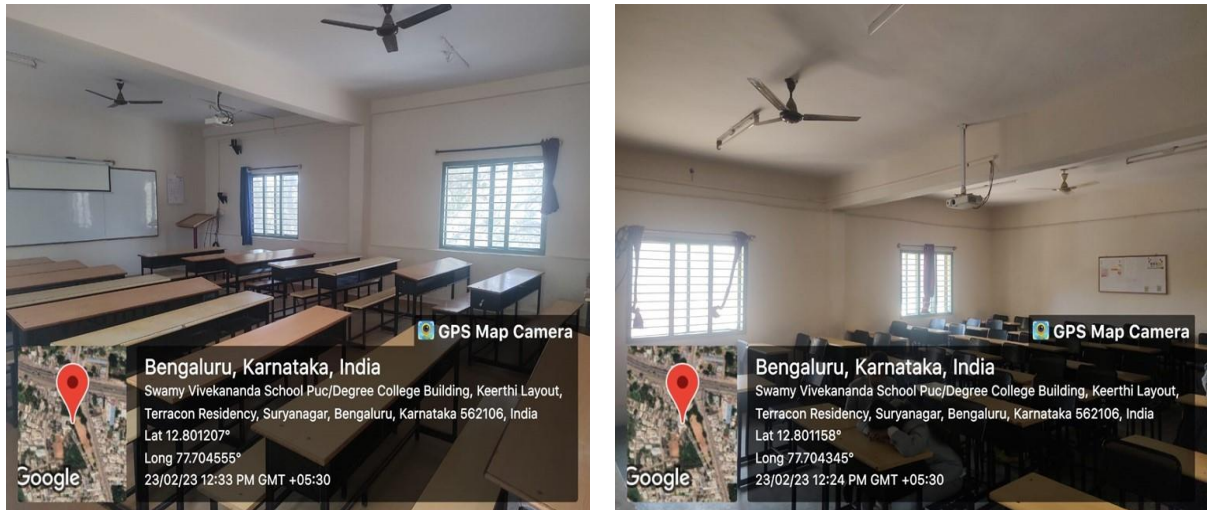


Figure 5-6: Well-ventilated and day-light integrated class room

5.2.2. Usage of LED tube lights and lamps

In order to save the electricity various measures have been adopted in the college. Usage of energy saving LED fixtures are used within the campus at various locations. Sample photos of LED fixtures used in the staff room is shown in figure 5-8.



Figure 5-7: Use of LED tube lights

LED fixtures purchase bill (sample copy) is shown in figure 5-9.

QUOTAION Cell : 98455 52478
99013 34697

BHAGWAN ELECTRONICS
Dealers in : LED Ts, Washing Machine, Refrigerator, Mixer Grinder, DTH,
Home Theater, Car Stereo Speakers, Tx Remote & Electronic Spares
No 228/1, Ground Floor, Aekataswamy Reddy Building, Opp. Swamy Vivekananda School,
Anekal Main Road, Chandapura - 560 099

No. : M/s. : SURF Date 10/11/22

Sl. No.	Description	Qty	Rate	Rs. Amount	Ps.
①	Buy LED TUBE set	7	280	1960 -	2
To Whom It May Concern					
✓					
TOTAL :					
CGST @					
SGST @					
GRAND TOTAL :				1960 -	5

Terms & Conditions
1. Goods Once Scold Cannot Be Taken Back
or Replaced.

For BHAGWAN ELECTRONICS
FG
Authorised Signatory

Figure 5-8: LED fixtures purchase bill copy

Energy savings due to LED fixtures:

The practice of using LED fixtures is incorporated in the campus to conserve energy. The LED helps to reduce the energy consumption and leads to cost saving. The calculations for annual cost savings due to the usage of LED fixtures and CO₂ mitigations per year are given below in table 5-4

S. No.	Description	Unit	Values
1	Total number of FTLs installed	No.	76
2	Operating Hours/day	hours	5
3	Working days / year	days/year	220
4	Rated wattage of FTLs	Watt	60
5	Total capacity of FTLs	kW	4.56
6	Total electricity consumption of FTLs	kWh/day	22.8
7	Annual electricity consumption of FTLs	kWh/year	5016
8	Rated wattage of LED	Watt	20
9	Proposed capacity of LED	kW	1.52
10	Proposed electricity consumption of LED	kWh/day	7.6
11	Annual electricity consumption of LED	kWh/year	1672
12	Proposed annual electricity savings	kWh	3344
13	Average electricity cost	Rs/kWh	10.5
14	Proposed annual cost savings	Rs.	35112
15	Investment cost	Rs.	38000
16	Simple Payback Period	Years	1.082
17	CO2 Mitigations per year	Tons/year	2.842

Table 5-4: Cost savings achieved per year due to 20 W LED tube lights

5.2.3. Usage of LED/LCD monitors:

LED/LCD monitors are used instead of all the desktop computers in staff rooms and in computer labs. Sample photos of the computers with LED/LCD screen are as shown in the figure 5-9.

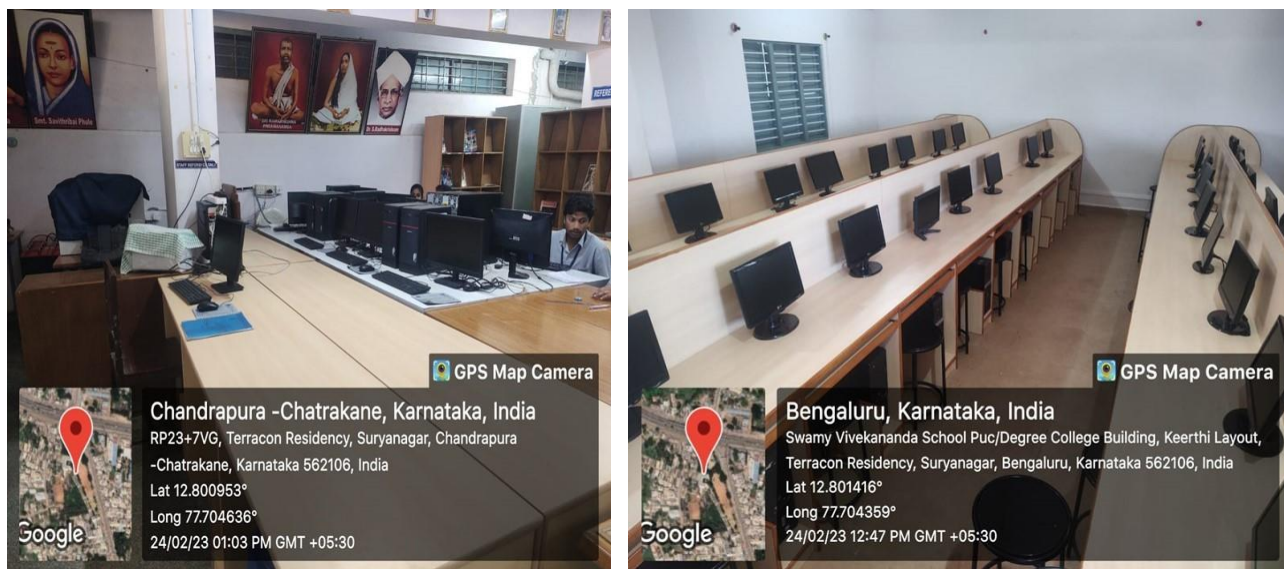


Figure 5-9: Sample Photo of LED monitors in the computer lab and library

5.2.4. UPS – AMC report

UPS system are all serviced and maintained through Annual Maintenance Contract (AMC) basis yearly. The sample UPS purchase bill with AMC for one year is shown in the figure 5-10.

Tech Sync Solutions Inc
107/1 24th Main Road
Sector 1 HSR Layout
Bangalore 560102
Email: Techsync@gmail.com
PIN: 560102
GSTIN/UIN: 29A22PAA477M1ZG
State Name: Karnataka
E-Mail: techsync@gmail.com
Karnataka Code: 29

Consignee (Ship to)
SVRFGC
Chandapura
Bangalore
State Name: Karnataka, Code: 29

Buyer (Bill to)
SVRFGC
Chandapura
Bangalore
State Name: Karnataka, Code: 29

Tax Invoice (ORIGINAL FOR RECIPIENT)

Invoice No: 1907
Delivery Note
Reference No. & Date
Buyer's Order No.
Dispatch Doc No.
Dispatched through
Terms of Delivery

Dated: 28-Sep-22
Mode/Terms of Payment
Other References
Dated
Delivery Note Date
Destination

Sl No	Description of Goods	HSN/SAC	Quantity	Rate	per	Amount
1	Livguard-UPS 5 KVA 48 V S/n: EZZYCALSA01055B10	85044010	1 No	27,500.00	No	27,500.00
2	Livguard-100AH Battery IT1048ST S/n: GR2EAGTF47472BL GR2EAGTF4757BL GR2EAGTF47465BL GR2EAGTF47478BL	85072000	4 No	7,875.00	No	31,500.00
3	UPS Trolley	3923				4,500.00
						63,500.00
	Output CGST @ 9 %				9 %	2,880.00
	Output SGST @ 9 %				9 %	2,880.00
	Output CGST @ 14 %				14 %	4,410.00
	Output SGST @ 14 %				14 %	4,410.00
	Total		5 No			₹ 78,080.00

Amount Chargeable (in words): **INR Seventy Eight Thousand Eighty Only**

HSN/SAC	Taxable Value	Central Tax Rate	Central Tax Amount	State Tax Rate	State Tax Amount	Total Tax Amount
85044010	27,500.00	9%	2,475.00	9%	2,475.00	4,950.00
85072000	31,500.00	14%	4,410.00	14%	4,410.00	8,820.00
3923	4,500.00	9%	405.00	9%	405.00	810.00
Total	63,500.00		7,290.00		7,290.00	14,580.00

Tax Amount (in words): **INR Fourteen Thousand Five Hundred Eighty Only**

Company's PAN: AFZPA477M
Declaration: We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct.

Company's Bank Details:
Bank Name: Icici Bank Ltd
A/c No: 035705004641
Branch & IFS Code: HSR Layout & ICICI0000157
for Tech Sync Solutions Inc

This is a Computer Generated Invoice

10-10-22

Figure 5-10: Sample Photo of UPS – Purchase bill including AMC

5.2.5. Electrical Maintenance

The electrical system is taken care with high priority. Regular checking and maintenance of wiring, switch boards are followed and if any fault is observed, it is fixed immediately. The sample electrical maintenance materials purchase bill is shown in the figure 5-11.

Tech Syne Solutions Inc		Invoice No		Dated	
B-10/11, 1st Floor, Main Road, Chandapura, Bangalore-560022		1400		9-Aug-2022	
Buyer		Delivery Note		Mode/Terms of Payment	
SVRFGC		Supplier's Ref		Other Reference(s)	
Chandapura		1400			
Bangalore		Buyer's Order No		Dated	
State Name Karnataka Code 29		Despatch Document No		Delivery Note Date	
		Despatched through		Destination	
		Terms of Delivery			

Sr	Description of Goods	HSN/SAC	Quantity	Rate	per	Amount	
1	4 Sq mm Wire	8544	30 Mtrs	45 00	Mtrs	1,350.00	
2	2.5 Sq mm Wire	8544	40 Mtrs	32 00	Mtrs	1,280.00	
3	1.5 Sq mm Wire	8544	40 Mtrs	20 00	Mtrs	800.00	
4	D Link-16 Port Switch S/N: QSSP214001506	85176290	1 No	2,850 00	No	2,850.00	
5	D Link-Rj 45 Jack	85366990	18 No	10 00	No	180.00	
6	Digisol-Cat 6 Cable	85444992	40 Mtrs	35 00	Mtrs	1,400.00	
7	6 Mod Box	8538	9 No	75 00	No	675.00	
8	6M Plate	8538	9 No	100 00	No	900.00	
9	6A Switch	8560	8 No	45 00	No	360.00	
10	5A Socket	8560	27 No	95 00	No	2,565.00	
11	Blank Plate	8538	9 No	12 00	No	108.00	
12	16A Socket	8560	2 No	130 00	No	260.00	
13	Service Charges For Networking	998713				1,250.00	
14	Service Charges For Electrical	998713				2,500.00	
15	Service Charges For 3 Desktops	998713				1,500.00	
16	Zebronics-Smps 450 W	8504	1 No	600 00	No	600.00	
						18,578.00	
Output CGST @ 9 %						9 %	1,672.02
Output SGST @ 9 %						9 %	1,672.02
Round Off							(-0.04)
Total						₹ 21,922.00	
Amount Chargeable (in words)						E & O E	
INR Twenty One Thousand Nine Hundred Twenty Two Only							
Company's PAN AFZPA5477M		Company's Bank Details					
Declaration		Bank Name		Icici Bank Ltd			
We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct		A/c No		035705004641			
		Branch & IFS Code		HSR Layout & ICIC0000367			
				for Tech Syne Solutions Inc			
				Authorized Signature			
This is a Computer Generated Invoice							

Figure 5-11: Sample maintenance materials purchase bill

5.2.6. Energy Conservation Posters

Awareness posters have been placed near the electrical switch boards to create awareness among students, faculties and staffs to save electricity. Figure 5.12 shows the sample picture of poster on energy conservation.

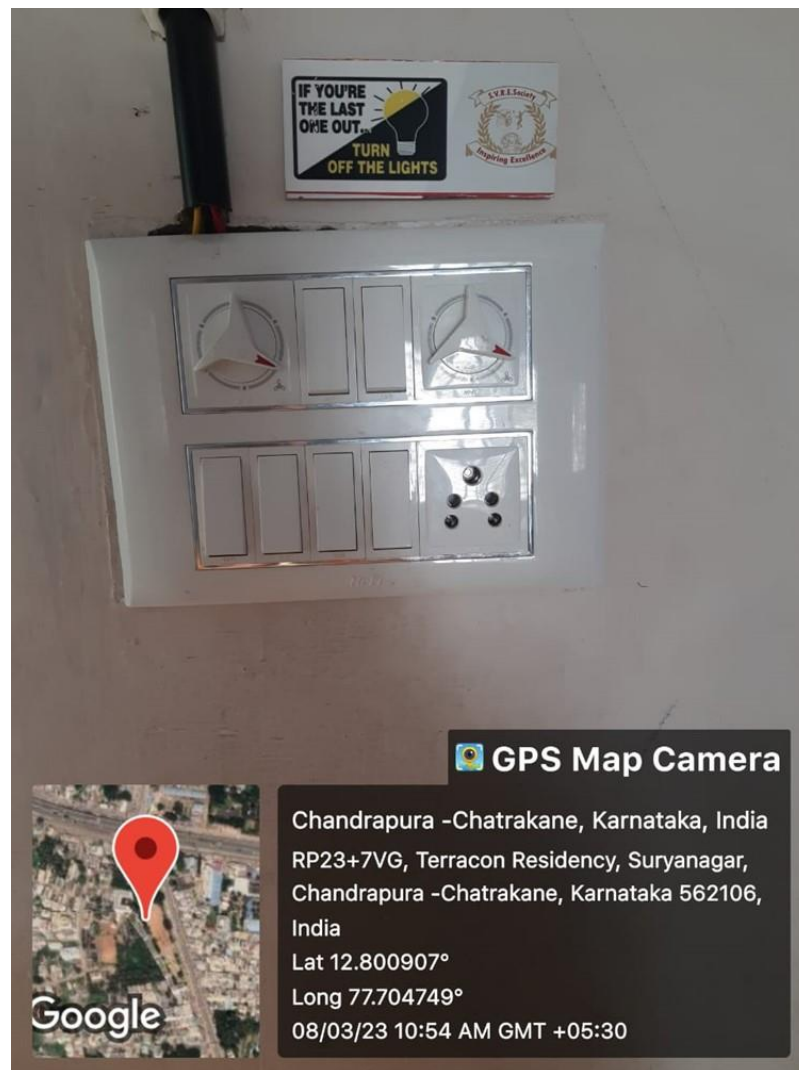


Figure 5-12: Energy conservation awareness poster

5.3. Recommendations

5.3.1. Replacing existing FTL by LED Fixtures

The existing FTL fixtures can be replaced with LED fixtures to reduce the energy consumption. The cost savings, investment cost and payback are given in the table 5-5.

S. No.	Description	Unit	Values
1	Total number of FTLs installed	No.	44
2	Operating Hours/day	hours	5
3	Working days / year	days/year	220
4	Rated wattage of FTLs	Watt	60
5	Total capacity of FTLs	kW	2.64
6	Total electricity consumption of FTLs	kWh/day	13.2
7	Annual electricity consumption of FTLs	kWh/year	2904
8	Rated wattage of LED	Watt	20
9	Proposed capacity of LED	kW	0.88
10	Proposed electricity consumption of LED	kWh/day	4.4
11	Annual electricity consumption of LED	kWh/year	968
12	Proposed annual electricity savings	kWh	1936
13	Average electricity cost	Rs/kWh	10.5
14	Proposed annual cost savings	Rs.	20328
15	Investment cost	Rs.	22000
16	Simple Payback Period	Years	1.1
17	CO2 Mitigations per year	Tons/year	1.6

Table 5-5: Calculations for replacement of FTL with LED fixtures

5.3.2. Replacing existing Conventional Fans by Energy Efficient (EE) Fans:

The existing conventional fans can be replaced with energy efficient fans to reduce the energy consumption. The cost savings, investment cost and payback are given in the table 5-6.

S. No.	Description	Unit	Values
1	Total number of Conventional fans installed	No.	49
2	Operating Hours/day	hours	5
3	Working days / year	days/year	220
4	Rated wattage of conventional fans	Watt	65
5	Total capacity of conventional fans	kW	3.2
6	Total electricity consumption of conventional fans	kWh/day	15.9
7	Annual electricity consumption of conventional fans	kWh/year	3503.5
8	Rated wattage of EE fans	Watt	35
9	Proposed capacity of EE fans	kW	1.7
10	Proposed electricity consumption of EE fans	kWh/day	8.6
11	Annual electricity consumption of EE fans	kWh/year	1886.5
12	Proposed annual electricity savings	kWh	1617
13	Average electricity cost	Rs/kWh	10.5
14	Proposed annual cost savings	Rs.	16978.5
15	Investment cost	Rs.	122500
16	Simple Payback Period	Years	7.2
17	CO2 Mitigations per year	Tons/year	1.4

Table 5-6: Calculations for replacement of Conventional Fans with EE Fans

5.3.3. Installation of Solar Roof Top PV (SRTPV) system

At present grid power supply and stand-by DG set power supply are the sources of electricity for the college. Installation of SRTPV (Solar Roof Top Photo Voltaic) system will result in renewable energy generation inside the campus and also reduces the electricity bill.

Estimation of SRTPV installation for the campus is given in table 5-7.

S. No.	Description	Unit	Values
1	Rated Capacity of SRTPV system	kWp	100
2	Average units generated per day	kWh /day / kWp	3
3	No. of working days per annum	days	220
4	Annual energy generation from SRTPV	kWh / annum	66,000
5	Average energy cost	Rs./kWh	10.5
6	Annual cost savings due to installation of SRTPV	Rs. Lakh / annum	6.93
7	Investment cost for 100 kWp SRTPV system	Rs. Lakh	75
8	Simple payback period (7 / 6)	Years	10.8
9	CO2 Mitigations per year	Tons/year	56.1

Table 5-7: Estimation of proposed SRTPV system

5.3.4. Other Recommendations

- Replacement of conventional fans with energy efficient fans in phased manner, as part of procurement practice
- Replacement of existing FTL fixtures with LED fixtures can be done in a phased manner, as part of procurement practice
- Installation of Solar Roof Top PV (SRTPV) system can be considered
- Conduct training and awareness programs on energy conservation
- Conduct Seminars and workshops on a regular basis among all the staffs and students to create awareness about Energy conservation and proper usage.

6. WASTE MANAGEMENT AUDIT

6.1. 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	Vendors
2	Hazardous / Chemical Waste	No	NA
3	Solid Waste	Yes	Vendor
4	Dry Leaves	Yes	BBMP
5	Food Waste	Yes	BBMP
6	Waste Water	Yes	BWSSB Drainage
7	Glass Waste	No	NA
8	Unused Materials	No	-
10	Plastic Waste	Yes	Vendor

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

6.1.1. Dry Waste Management

Waste collection bins are used across the campus for waste collection. Each room (Staff, class rooms, office, restrooms, labs and library) is provided with the dustbin to collect the waste. The housekeeping staffs cleans and collect the wastes generated inside the campus.

Sample photos of dry waste collection bins are shown in the figure 6-1. Segregation of Waste at source level sample photos collected during audit are shown in the figure 6-2.

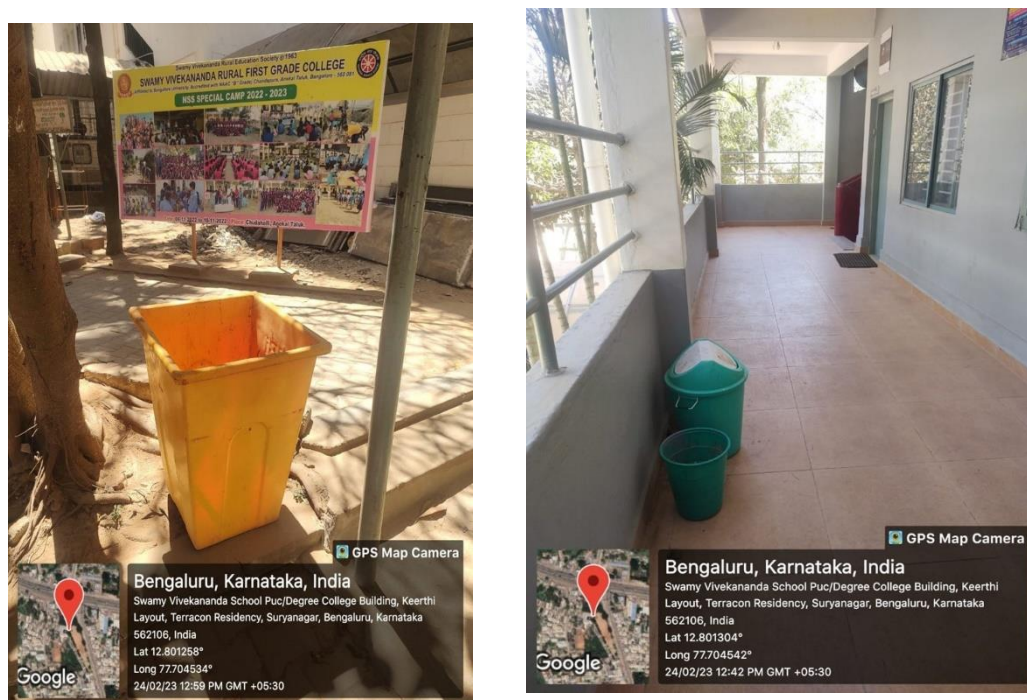


Figure 6-1: Sample photos of dry-waste collection bins

6.1.2. Wet Waste Management

To manage the wet waste in the college (very less in quantity), which is produced from the remains of the tiffin boxes brought by the students, teachers & non-teaching staff of the college, are separately collected and disposed to BBMP garbage collection vehicle.

6.1.3. E- Waste Management

E- Waste is being disposed through vendors or given to vendors via buy back policy.

6.1.4. Liquid-waste Management

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

- Washrooms
- Toilets
- Labs

Waste water from the wash rooms, toilets, and labs are connected to the waste water chamber. Then, from waste water chamber it is sent out to the BWSSB drainage.

The waste water chamber is shown in figure 6-2.



Figure 6-2: Waste water chamber

6.1.5. 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 6-3.

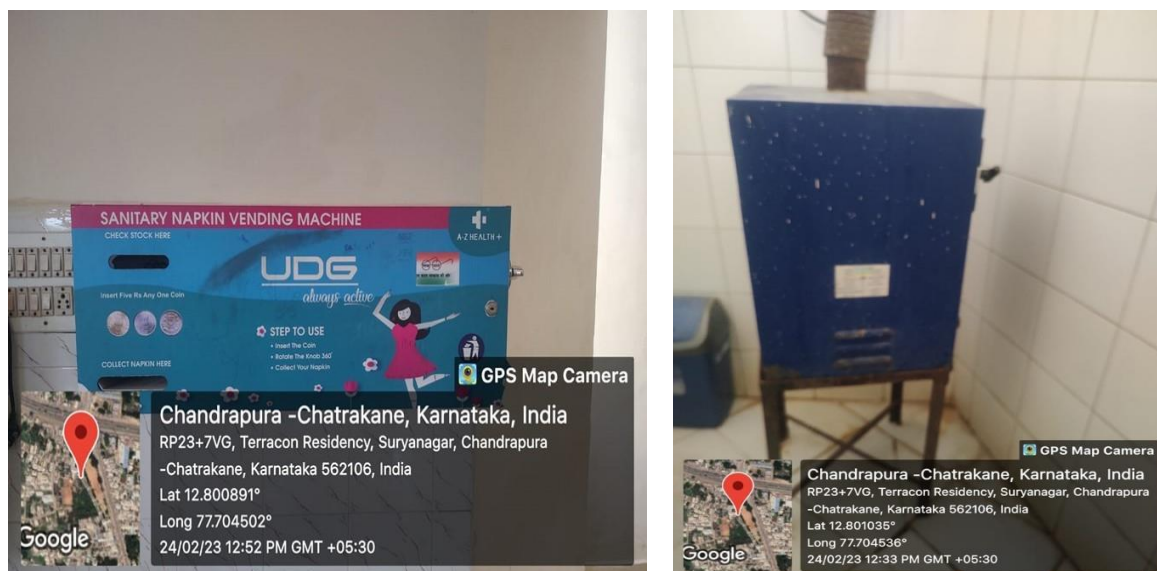


Figure 6-3: Bio – waste management

6.2. Best Practices for Waste management

6.2.1. Waste Collection Bins

Waste collection is done from all the facilities of the campus and so the bins are kept at appropriate locations of the campus. This helps to maintain the college premises clean & hygiene. Figure 6-4 shows the waste collection bins.

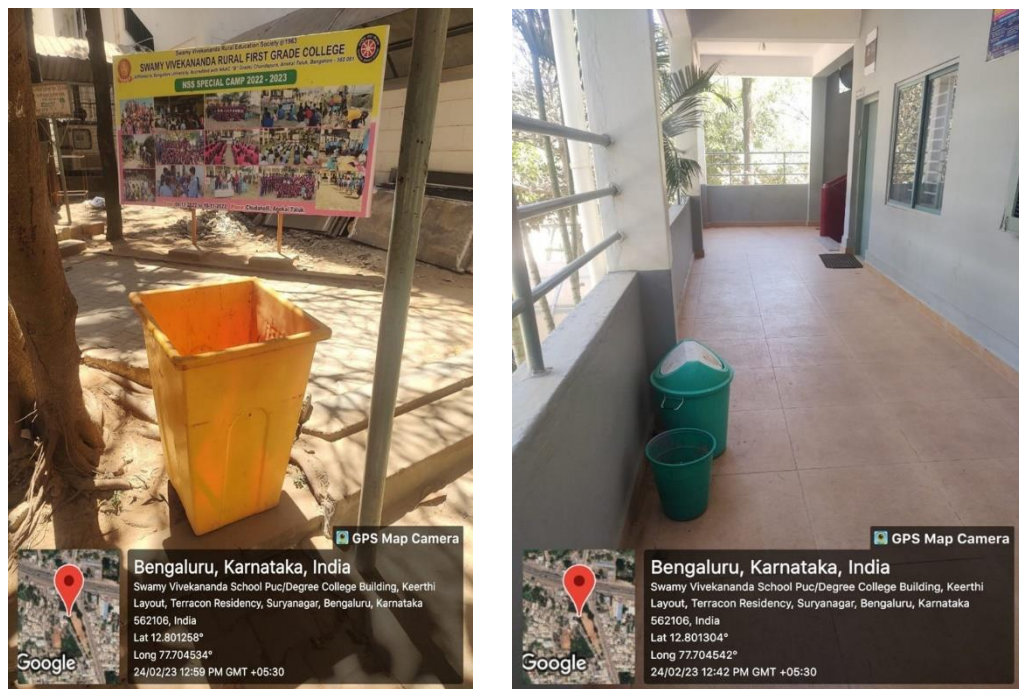


Figure 6-4: Sample photos of Waste collection bins

6.2.2. Cleaning Materials

The class rooms, office rooms, corridors, wash rooms and toilets are cleaned regularly. Sample photos of cleaning materials and its purchase bills are shown in figure 6-5 and figure 6-6.

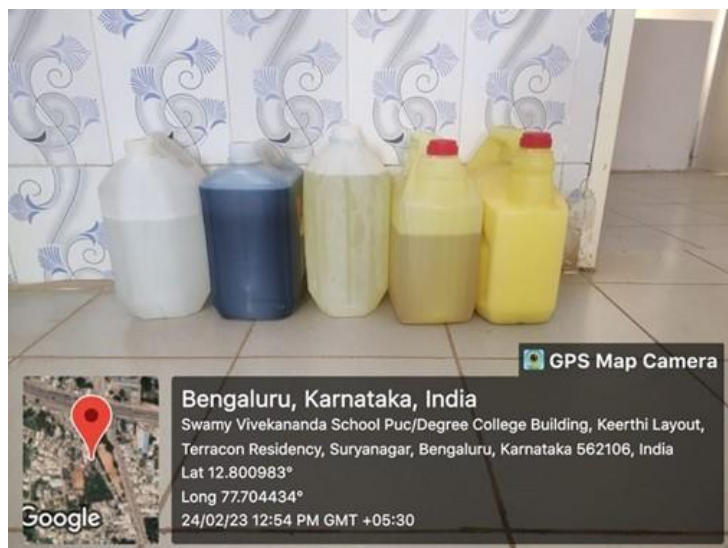


Figure 6-5: Sample photos of cleaning materials

GSTIN : 29BETPR0167M1ZL
TIN : 29980655290

TAX INVOICE Off. : 080-27834429

Hindusthan Papers
Dealers in : All kinds of Paper, Boards & Stationeries
No 1, Sri Gowri Complex, Banahalli Road, Chandapura,
Anekal Taluk, Bangalore -560 099.

To M/s SVRFG College No. : **324**
Date : 19/07/22

Sl. No.	PARTICULARS	HSN/SAC CODE	QTY.	RATE	AMOUNT Rs.	Tax
1.	Monkey Ink		10✓	84	840	00
2.	Red Oil Voucher		15✓	85	1275	00
3.	computer Clavish		24✓	25	600	00
4.	cutter small		5✓	8	40	00
5.	BIS cotton		2✓	45	90	00
6.	mead 208 size flour		15✓	320	4800	00
7.	everyday cell		20✓	11.5	2300	00
8.	single punch		3✓	74	222	00
9.	Sketch pen		30✓	20	600	00
10.	stamped		80✓	24	1920	00
11.	stapler		2✓	65	130	00
12.	staple		2✓	20	40	00
13.	Big stapler		3✓	60	180	00
14.			1✓	280	280	00
Total					9987	00
SGST@ 9%					898	80
CGST@ 9%					898	80
IGST@ 0%					-	-
Grand Total					11,784	00

Words in words : Eleven thousand seven hundred eighty four

h.no. 068038 dt: 27/7/22
Amt ₹ 18547
Receiver's Signature with Seal

For HINDUSTHAN PAPERS
Authorized Signatory

Figure 6-6: Sample photo of cleaning materials – purchase bill

The paper waste such as used papers, newspapers, etc., are sold to vendors, the sample sale voucher for disposal of paper waste is shown in figure 6.7.

SWAMY VIVEKANANDA RURAL EDUCATION SOCIETY
SWAMY VIVEKANANDA RURAL FIRST GRADE COLLEGE
CHANDAPURA, ANEKAL TK, BANGALORE - 99

No: **Receipt** **VOUCHER** Date: 01.07.22

Head of Account Old News Paper & Answer Paper Sales

Paid to SVREG College the sum of Rupees Twenty Eight thousand only

by Cash / Cheque No. Cash

on account of Sale of Old News paper & Answer paper & others

Received Payment

Signature

Rs. 28,000/-

Prepared by

Convener

Amount - deposit to Bank on 04.07.2022

Figure 6-7: Bill for disposal of paper waste

6.2.4. Disposal of bio waste

The sanitary napkins incinerator is provided in the girl's toilet to dispose the used napkins in a safe manner. The purchase bill of the napkin incinerator is shown in figure 6.8.

JONATHAN HEALTHCARE

Tax invoice

ADDRESS :-
HIG 49, X PHASE,
RAYAKOTTA HUDCO,
HOSUR, TAMILNADU-635109.
PH: 04344 226013.
Mob :- 9698459333/555.
GST IN :-33BAEPS6794N1ZV.
EMAIL:-jonathanhealthcare@gmail.com
WEBSITE:- www.jonathanhealthcare.in

Date 01.09.18
Invoice. No 18074
Payment 100%Advance.
Delivery immediate

CUSTOMER ADDRESS:-
SVR First grade college,
Chandapura,Anekal Taluk
Bengaluru-560099.
Ph:-080-27832363.

S.No	Description	HSN	Qty	UOM	Unit Rate	Total amount
1	EAE-300 Napkin Burning machine	8417	1	No	Rs. 19,000.00	Rs. 19,000.00
					Sub Total	Rs. 19,000.00
					SGST	
					CGST	
					IGST 18%	Rs. 3,420.00
					Total GST	Rs. 3,420.00
					GRAND TOTAL	Rs. 22,420.00

Warranty:-
Electrical warranty:-6 Months
Service warranty:- 1 Year

BANK DETAILS:-
Name :- JONATHAN HEALTHCARE.
A/C :- 1612595403.
IFSC :- KKBK0008771.
Bank :- KOTAK MAHINDRA BANK.
Branch :- HOSUR.

ch.no. 057201, Dt- 05-09-2018
Rn. 22,420/-

RECEIVER SIGNATURE

AUTHORISED SIGNATURE




Figure 6-8: Sanitary napkin incinerator purchase bill

6.2.5. Posters to Maintain cleanliness

The college campus - inside and outside was neat and clean. Sample photo of the poster is shown in figure 6-9.



Figure 6-9: Sample poster to maintain cleanliness

6.2.6. Use of reusable plastic cutlery

Cutlery bank of reusable plastic plates and glasses were created to substitute the usage of paper plates and cups. Sample pictures are given in figure 6-10.

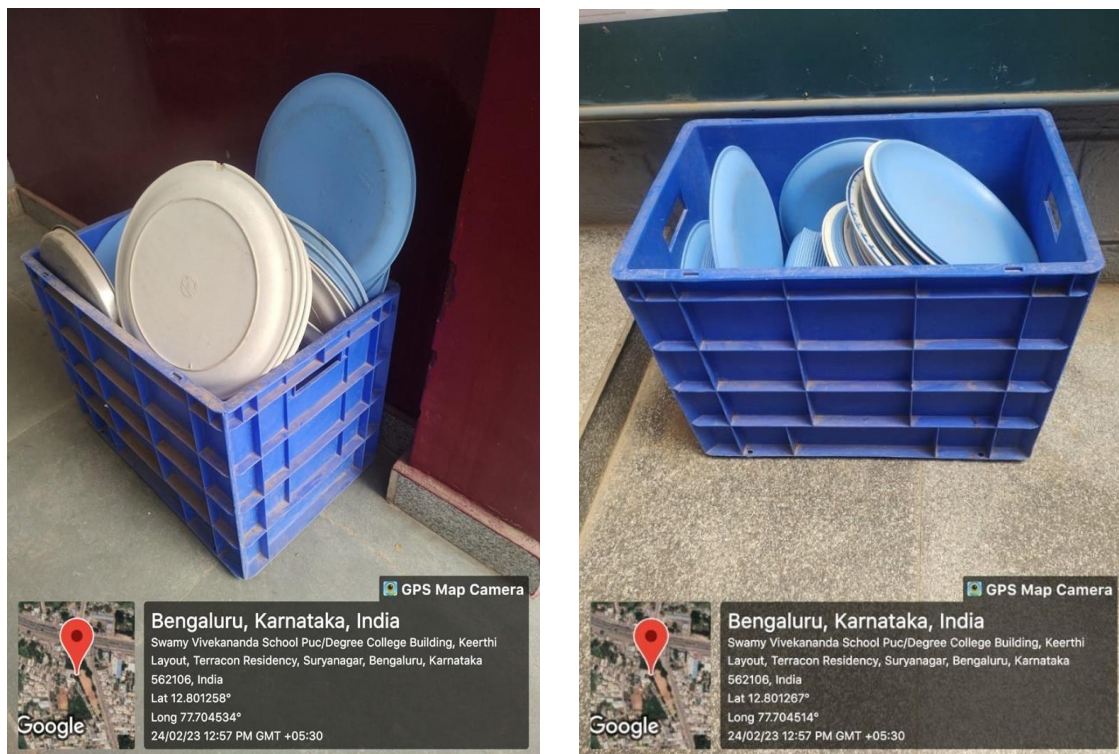


Figure 6-10: Use of steel cutleries

6.3. Recommendations

6.3.1. Waste Segregation

Dry waste such as paper, plastic, and dry leaves shall be segregated at the source level in the college. Segregation of waste at source will help in handling and disposal of waste in safe and proper manner. It is recommended to practice the waste segregation.

6.3.2. Dry leaves compost pit

Composting dry leaves make a dark, rich, earthy, organic matter that can be used as soil. It adds nutrients to the garden soil and the larger particle size helps enhance the tilth and then loosen compacted earth. The composting process retains moisture and repels weeds when used as a top dressing or mulch. Hence, it is recommended to install dry leaves compost pit.

6.3.3. 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 treated water shall be reused for flushing in toilet, gardening and floor cleaning purposes. It is recommended to install sewage treatment plant for waste water recycling.

6.3.4. Training for house keeping staffs

It was observed the dry waste is collected and dumped in the open space near the gate. Dry waste such as paper, plastic, and dry leaves shall be segregated at the source level in the college. Segregation of waste at source will help in handling and disposal of waste in safe and proper manner. Creating awareness and training the house keeping staff will help them to segregate the waste during the collection point and dispose the waste accordingly. Hence, it is recommended to train the house keeping staff in waste segregation and disposal.

6.3.5. Conducting waste management (collection) drives & awareness programs

Keeping the environment clean is not a one-man job, it is the responsibility of every person inside the society/campus. Hence, it is necessary to create awareness programs and waste

management drives often and often for the institutions to keep the environment clean, green and hygiene.

Use of posters stating 'Proper usage of dustbins' to create awareness among students and staff regarding waste management.

6.3.6. Usage of awareness signboards

Use of more sign boards to create awareness for better waste management like 'Plastic ban', 'Do not litter', 'Think clean and use dustbin' etc., shall be placed at appropriate locations.

7. GREEN CAMPUS MANAGEMENT AUDIT

7.1. Facility Description

The college maintains clean and green pot plantations within the campus. The maintenance team takes care of the environment and ensures to keep the surroundings clean. They maintain all the plantations by employing the cleanliness and watering regularly. The rain water stored in sumps are used for watering the plants. About 90 species of plantations were maintained inside the campus.

The total number of plantations is around 515 numbers, The number of trees is ~ 180, plants is ~133 and pots is ~202. The details of list of plantations are given in table 7.1.

S. No.	Description / Name	Quantity, Nos.
1	Grafted nispero	1
2	Aglaonema	11
3	song of India plant	2
4	Areca palm	73
5	Chamaecostus cuspidatus	20
6	Arrowhead plant	10
7	Indian spot	9
8	curcuma caesia	1
9	Spider plant	4
10	Anthurium hookeri	1
11	Moses in - the - crad le	20
12	Green vichitra tree	3
13	australia umbrella tree	3
14	Centella asiatica	2
15	Feather fern	2
16	Senna tora	16
17	Artemisia princeps	1
18	Striped barbados lily	4
19	Meotea coleus	1
20	Bay laurd	1
21	Queen of the night	5
22	Drecaena song of India	15
23	Selenicereus hamatus	1
24	Cavendish banana	3
25	Taro leaf	1
26	Triangle cactus	2
27	Seramuzaffer	1
28	Orchid cactus	1
29	Euonymus Crenulatus wall	1
30	Phyllanthus acidus	5

S. No.	Description / Name	Quantity, Nos.
31	Citrus cavaleriei	6
32	Alovera	8
33	Dypsis lutescens	79
34	Madagascar periwinkle	4
35	Hibiscus	9
36	Holy Basil	1
37	Tropical plants	1
38	Albizia cecbeek	3
39	Decoration rectangular ribbon	2
40	Veld grape	1
41	Beef steak plant	8
42	Inga ilta plant	1
43	Jasmine	1
44	Guava	4
45	Calotropis gigantea	1
46	Curry tree	1
47	Neem	4
48	Africaue plant	2
49	Baby rubber plant	1
50	Schizostachyum	2
51	Duranta erecta	13
52	Yucca	1
53	Pseuderanthemum	19
54	Hamelia	6
55	Pongame oil tree	14
56	Grevillea robusta	5
57	Ashoka pandola	10
58	Madagascar Almond	7
59	Ficus Retusa	3
60	Weeping fig	1
61	Ficus elastica	2
62	Golden trumpet tree	2
63	Lagerstroemia speciosa	4
64	Muntingia calabura	5
65	Encrypted	6
66	Thespesia populnea	1
67	Argentine mesquite	6
68	Lannea coromandelica	3
69	Chinese pistache	2
70	Madras thorn	2
71	Dodonaea viscosa	1
72	Virginia tech	2
73	Swietenia	5
74	Malabar neem	3

S. No.	Description / Name	Quantity, Nos.
75	Artocarpus lamellosus	1
76	Artocarpus heterophyllus lam	1
77	Papaya	1
78	Solanum paniculatum	4
79	Black locust	1
80	Cook strait kowhai	1
81	Nerium oleander	1
82	Polyscias	1
83	Florida gardening	1
84	Syzygium luehmannii	5
85	Bauhinia foficata	6
86	Behad tree	1
87	Subabul acacias	3
88	Coconut tree	1
89	Kiggelaria Africana	1
90	Mango tree	4

Table 7-1: List of Plantations

7.1.1. Plantations and Lawn

The images of various plants and trees taken during the audit are shown in the following figures.

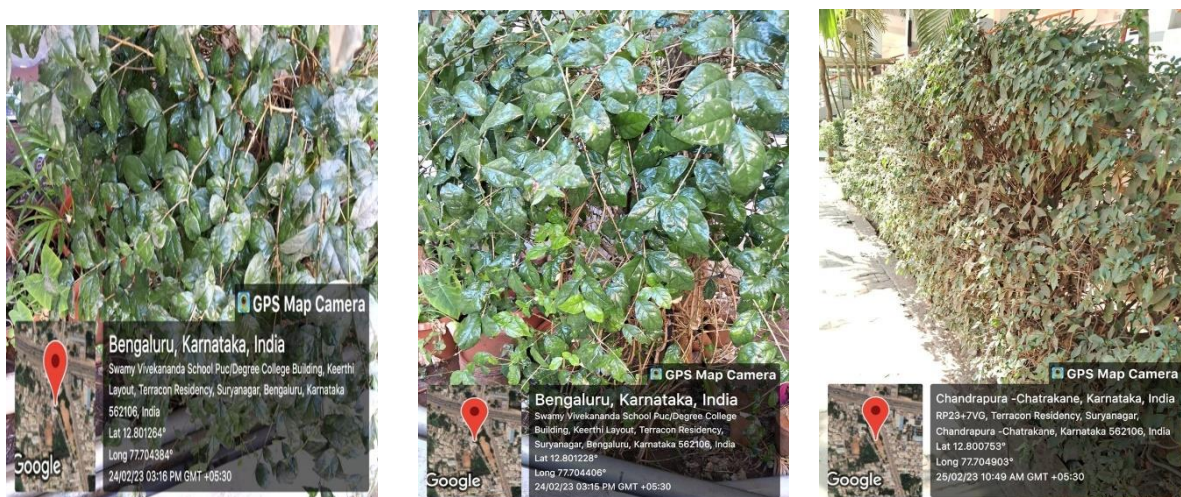


Figure 7-1: Sample photos of plants and trees



Figure 7-2: Sample photos of plantations

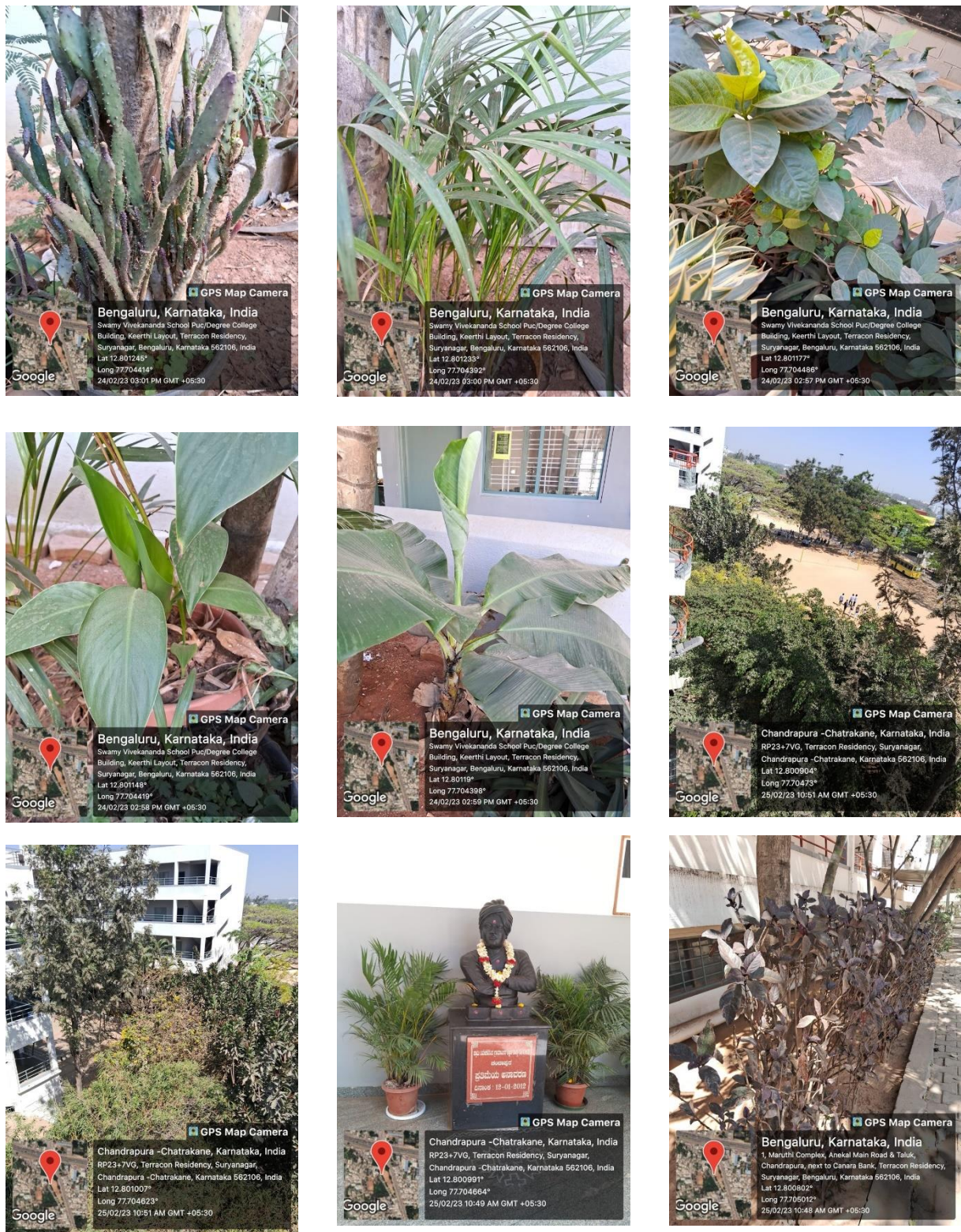


Figure 7-3: Sample photos of plants and trees

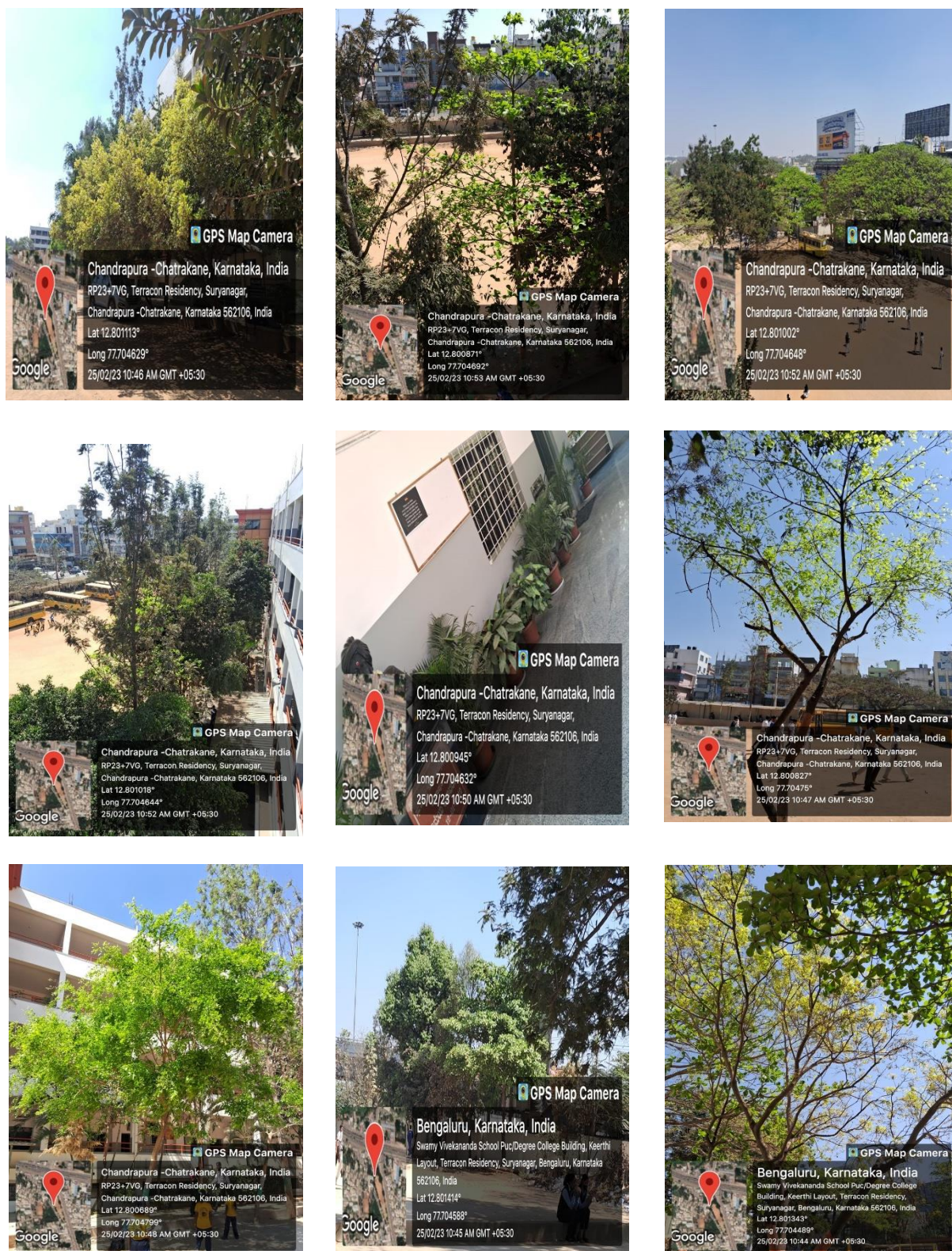


Figure 7-4: Sample photos of plants and trees

7.2. Best practices for Green Campus Management

The maintenance team do periodic checks and maintain the plantations. 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 and well grown pot plantations all around the campus.

7.2.1. Regular maintenance of greeneries

The greeneries within the campus are maintained properly with dedicated garden maintenance staff. They do proper maintenance like weeding, lawn care and watering etc., The picture of garden maintenance tools is shown in figure 7-5.

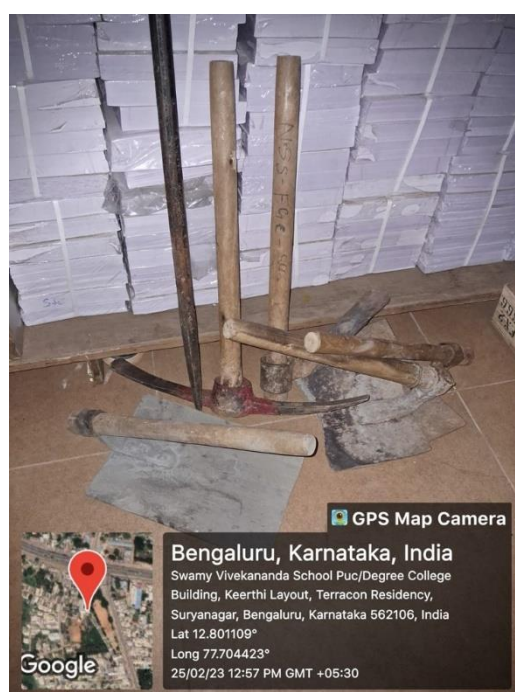


Figure 7-5: Garden maintenance tools available in college

7.2.2. World Environment Day

The college has celebrated world environment day, students were reminded to celebrate safety and this is the time in which nature is sending us a message to take care of ourselves and care for nature. Staff and students planted saplings with a belief that one small step goes a long way to protect nature and reverse its degradation. Sample photo of World Environment day celebration is shown in figure 7-4



Figure 7-6: Sample photo of planting a sapling – Environment Day

7.3. Recommendations

- Paperless office can be adopted.
- Encouraging students to recommend creative ideas for making campus more greenery.
- Conducting competition among departments to promote student's ideas in sustainability initiatives
- More number of Indoor plantations and pot plantations in the corridors are recommended
- More number of medicinal plantations shall be planted inside the campus.

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. Around 95 % of the students and staff are coming by public transport to the college. Some students are coming by bicycle and few (very negligible numbers) of the staffs and students come by bike.

8.2. Best Practices for Environment Conservation

Management has taken steps to create awareness among students and staff regarding environment conservation.

- Regular plantation of saplings is done to maintain greenery and to induce carbon neutrality.
- Most of College staff come by public transport, thereby decreasing carbon footprints.
- RO reject water for toilet flushing system has been adopted
- Use of LED tube lights, lamps for lighting system
- Use of LED/LCD monitors for the computes to reduce energy consumption
- All the classrooms are well ventilated and day light integration is also done

8.2.1. Posters on Clean campus

Posters on maintaining the campus clean, has been placed inside the college. Photos are as shown in the figure 8-1



Figure 8-1: Awareness Posters – Plastic Ban

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

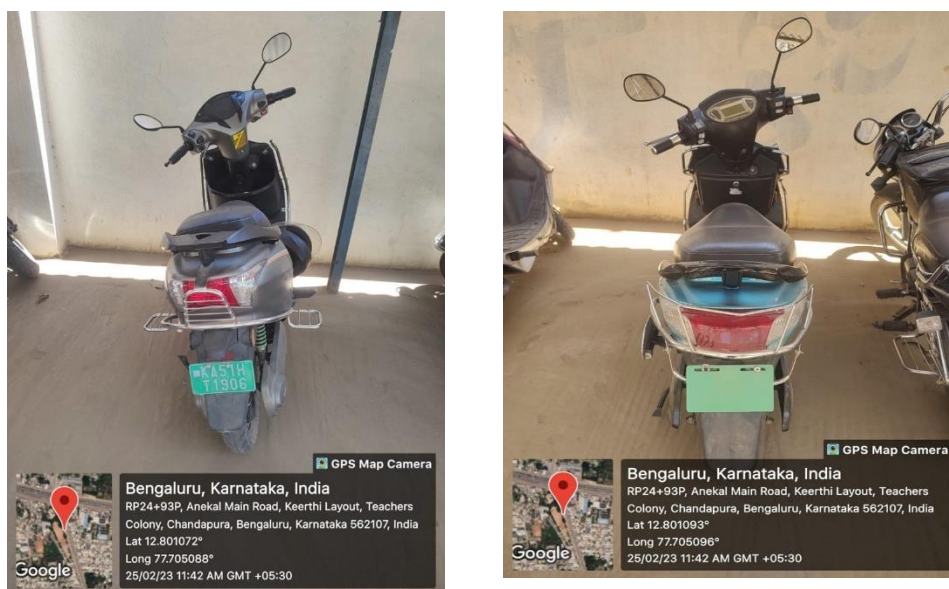


Figure 8-2: Sample photos of electric vehicles

8.2.3. Encouraging for usage of bicycles

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

Some of the staff & students coming to college are bicycles. During audit pictures of bicycles are taken and the same is given in figure 8-3.

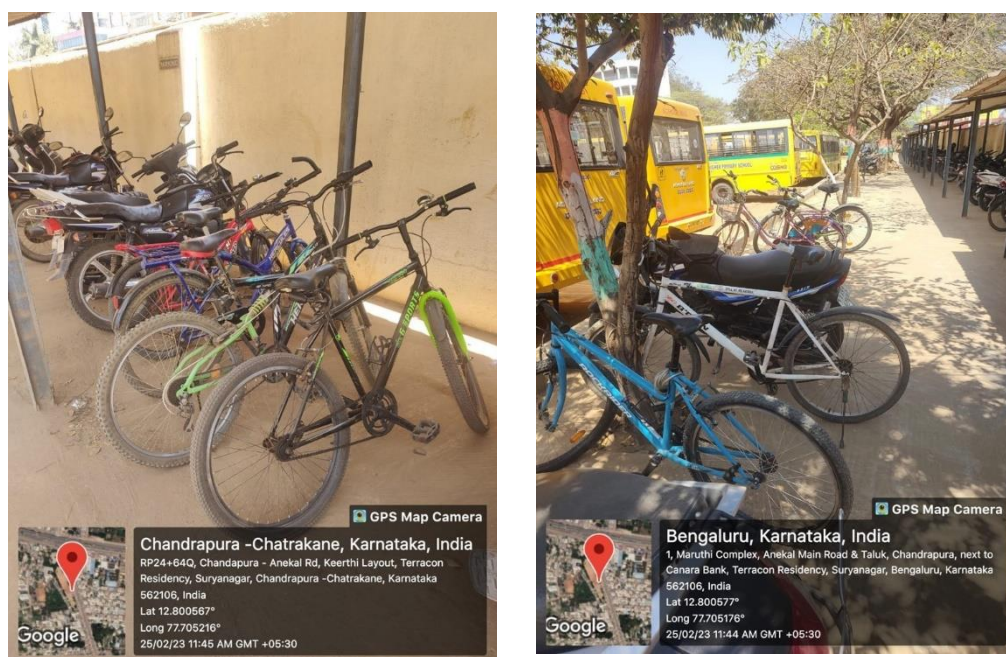


Figure 8-3: Sample photos of bicycles

8.3. Recommendations

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

- 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. Internal Quality Audit Team: 2020 – 2021

Table 9-1 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

Table 9-1: Internal Quality Audit team

2. 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 9-2.

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

S. No.	Description	Details
7.	Brief description of Campus	

Table 9-2: General information of the college

3. College Infrastructure

Infrastructure details of the college were gathered from table 9-3.

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

Table 9-3: Detail Infrastructure of the college

4. Details of Student clubs
5. Details of cells that support students
6. Tentative Schedule of a working day:
 - a. No. of working days per year:
 - b. List of holidays:
7. Total area of the campus
8. Details of List of Departments and Courses (Faculty wise)

The total number of departments, 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 9-4: Details of the departments

9. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 9-5

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

Table 9-5: Details of the Staff

10. Number of Students

Number of students is collected from table 9-6.

S. No.	Boys	Girls
1		

Table 9-6: Details of the Students

11. Additional infrastructure details have been collected from table 9-7.

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 9-7: Details of the departments

9.1.2. Water Audit details:

1. General information

General information required for water management analysis is collected from table 9-8.

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

S. No.	Description	Details
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	
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 9-8: Water management details

2. STP information

STP details are collected from table 9-9

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 9-9: Details of STP

3. RO Plant information

RO Plant details are obtained from table 9-10

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

Table 9-10: 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 9-11.

S. No.	Type	Units		Value	Cost in Rs.
1	Electricity	kWh	2019		
			2020		
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 9-11: Details of Energy consumption

2. Solar Energy details:

The solar energy details required are collected from table 9-12.

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 9-12: Details of Solar Energy

3. Solar Street lights details:

- Quantity -
- Capacity -
- 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	

S. No.	Description	Details	
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 buildings.		

Table 9-13: 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:

G. 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 9-14.

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 9-14: Basic details of waste management

2. Types of Waste generated

Types of waste generated in the college are obtained from table 9-15.

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 9-15: 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 9-16: 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 9-17: Waste Disposal methods

9.1.5. Green campus management details:

1. Total number of plants and trees

H. 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 9-18: List of plantation details

2. List of plants/ trees

- I. 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 9-19: List of plants/trees in campus

9.1.6. Carbon footprint management details:

J. 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 9-20: 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 9-21.

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 9-21: List of photos