

ASPECTS OF ENVIRONMENT AUDIT

&

GREEN CAMPUS MANAGEMENT AUDIT

REPORT

OF

ADICHUNCHANAGIRI UNIVERSITY

BENGALURU – HASSAN NATIONAL HIGHWAY (NH-75),

NAGAMANGALA TALUK, BG NAGARA – 571 448,

MANDYA DISTRICT, KARNATAKA

JANUARY 2024

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ECO ENERGIME ENGINEERS LLP

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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 University. They took key interest and gave valuable inputs during the course of study.



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Sustainable Tomorrow

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Our special thanks are due to

Dr. M A SHEKAR : Vice Chancellor

Dr. C.K. Subbaraya : Registrar

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Aspects of Environment Audit and Green Campus Management Audit Report
of Adichunchanagiri University, B G Nagara, Bellur Cross



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DISCLAIMER

The audit team has prepared this report for **Adichunchanagiri University, B G Nagara, Bellur Cross** 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.

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ABBREVIATION AND ACRONYMS

1.	A	:	Amperes
2.	AC	:	Air Conditioner
3.	APFC	:	Automatic Power Factor Controller
4.	DG	:	Diesel Generators
5.	EE	:	Energy Efficient
6.	etc.	:	Etcetera
7.	GHG	:	Green House Gas
8.	Hz	:	Hertz
9.	HP	:	Horse Power
10.	HT	:	High Tension
11.	I	:	Current
12.	kL	:	Kilo Liters
13.	kV	:	kilo volt
14.	kVA	:	kilo volt ampere
15.	kVA _r	:	Reactive kilo volt ampere
16.	kW	:	Kilo Watt
17.	kWh	:	kilo Watt hour
18.	kW _p	:	kilo Watt peak
19.	LCD	:	Liquid Crystal Display
20.	LED	:	Light Emitting Diode
21.	LT	:	Low Tension
22.	NAAC	:	National Assessment and Accreditation Council
23.	S. No.	:	Serial Number
24.	Sq. m.	:	Square Meter
25.	S RTPV	:	Solar Roof Top Photo Voltaic
26.	STP	:	Sewage Treatment Plant
27.	TR	:	Ton of Refrigeration
28.	V	:	Volts
29.	W	:	Watts
30.	#	:	Number

EXECUTIVE SUMMARY

The Aspects of Environment Audit and Green Campus Management Audit Study of Adichunchanagiri University was conducted during **January 2024**, the data considered for the audit was on **January 2023 to December 2023**, and some of the previous year data also reviewed. Conducting this study helps to increase the awareness levels of stakeholders, staffs and students, to understand its advantages towards impact on sustainable future.

The Adichunchanagiri University 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 Medical College, Hospital, Engineering College, etc., 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 flushing / gardening purposes, biogas plant 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 the study, 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 study, it was observed the management has taken various initiatives and implemented best practices in conserving natural resources that include:

A. Best Practices Implemented for Energy Conservation

- Day light integration in class rooms, staff rooms, hostels and common areas
- Use of LED lights for interior (class rooms, office rooms, hostels, common areas, etc.,) and external applications (street lights)
- Grid tied Solar Roof Top Photo Voltaic (SRTPV) system for power generation
- Use of Solar LED Street light fixtures
- Use of Sensor Based Lighting Control systems
- Use of energy efficient air conditioning systems such as VRV and inverter AC units
- Use of Biogas plant
- Use of Solar water heaters and heat pumps for hot water generation

- Use of LED/ LCD monitors
- Use of sign boards and posters for awareness creation

Energy Audit will be a valuable tool in the management and monitoring of environmental and sustainable development programs of the university campus. The consolidated savings of the above initiatives are given in table below.

S. No.	Institutional Initiatives Implemented	Details	Cost Savings, Rs. Lakh	Investment Cost, Rs. Lakh	CO ₂ emission reduction, Tonnes
1	Solar Roof Top Photovoltaic System	600 kWp	50.4	270.0	497.7
2	Biogas Plant	300 kg	0.6	8.0	5.7
3	Solar Water Heater	176 Nos.	61.4	132.0	606.3
4	LED Fixtures	18477 Nos.	62.9	110.9	621.2
5	LED Street Light Fixtures	100 Nos.	1.0	4.2	9.9
6	Solar LED Street Light	300 Nos.	2.4	21.0	23.2
7	Energy Efficient Air Conditioning Units	300 TR	80.6	270.0	796.3
8	Heat Pumps	4 Nos.	4.5	9.0	44.1
	Total		263.7	825.2	2604.4

The various initiatives implemented have resulted in **Rs. 263.7 lakh** of cost savings per year and **2600 MT of CO₂** emission reduction per year, which is **substantial achievement**.

B Best Practices Implemented for Water Conservation

- Installation of Sewage Treatment Plant for waste water treatment and reuse
- Installation of low flow taps
- Installation of ground water recharge pits
- Installation of Rain water harvesting systems
- Installation of Lake Rejuvenation with storm water drainage system
- Regular testing of water quality
- Posters for water conservation

C Best Practices Implemented for Waste Management

- Installation of Dust bins
- Regular cleaning of campus
- Installation of dispenser and incinerators for personnel hygiene
- Installation of STP for waste water management
- Installation of Biogas for wet waste (food waste) management

Apart from the above the campus has around 4600+ trees and plants, which contributes in absorbing of **100 tonnes of CO₂ per year.**

1. INTRODUCTION

Nestled amidst the verdant landscapes of Karnataka, India, **Adichunchanagiri University (ACU)** stands as a luminous beacon of knowledge. Established in 2017, ACU transcends the boundaries of a mere academic institution; it embodies a spirit of transformation and continuous progress.

This multidisciplinary private university owes its genesis to the profound vision of the revered Jagadguru Sri Sri Sri Dr. Balagangadharanatha Mahaswamiji, the 71st Pontiff of Sri Adichunchanagiri Mahasamsthana Math. Inspired by a noble dream, he envisioned a dynamic learning hub that fosters not only intellectual growth but also equips students with valuable skills. Equally important, ACU strives to preserve India's rich cultural and spiritual heritage, ensuring a holistic educational experience.

This visionary dream found its beginnings in 1973 with the establishment of schools and colleges, particularly in rural areas. This pioneering effort ensured that education became accessible to all, regardless of their social or economic background. This commitment to educational equity continues to be a cornerstone of ACU's philosophy, with the current leader, the Honourable Chancellor Jagadguru Sri Sri Sri Dr. Nirmalanandanatha Mahaswamiji, the 72nd Pontiff, playing a pivotal role in uplifting underserved communities. ACU aspires to be a torchbearer for accessible, high-quality education, empowering every student with the potential to excel and reach their full potential.

The sprawling 67-acre campus at BG Nagara exemplifies ACU's dedication to fostering holistic learning and personal development. Situated just outside the bustling city of Bangalore on National Highway No. 75, the campus beautifully blends state-of-the-art infrastructure with a landscape teeming with lush greenery. This unique environment fosters a vibrant academic community where students can not only excel in their chosen fields but also forge lasting connections with peers and faculty.

Vision mission and values of the Adichunchanagiri University (ACU) are given below.

VISION

Envisioning a Future of Excellence and Impact

- Education for all with Value Systems of Empathy, Enrichment, Equity, Excellence, Empowerment, Entrepreneurship, and Enlightenment to Serve the Society.

MISSION

Empowering Change through Education, Research, and Community Involvement

- Education to all for Self Reliance, Socio-Economic Change to develop an Inclusive Society with Shared Opportunities & Responsibilities
- Empathy towards the Less Fortunate, the Sick, the Suffering & the Disabled
- Enrichment to acquire Abundant Knowledge, Requisite Skills & Appropriate Attitude
- Excellence for Quality Assurance, Enhancement & Sustenance in Academics and research to produce Graduates of Global Standards
- Equity for Fairness & Social Justice by providing Equal Opportunities
- Empowerment of Graduates to become Intuitive, Innovative & Inventive
- Entrepreneurship is a concept or idea involving the product or service to be delivered or a new technology to be developed
- Enlightenment to attain Wisdom & Virtues in Life to think beyond Self

PRINCIPLE

Integrity: Academic honesty, ethical conduct, and a strong moral compass are fundamental to our educational philosophy. We believe that integrity is essential for building trust within the learning community and fostering responsible leaders.

Inclusivity: ACU welcomes students from diverse backgrounds and experiences. We create an inclusive learning environment that respects and celebrates differences.

Innovation: We encourage critical thinking, creativity, and a relentless pursuit of new ideas. ACU provides a platform for students and faculty to explore new frontiers of knowledge and contribute meaningfully to society.

Infrastructure

Infrastructure and Learning Resources		
Sl no	Institution Name	Built up Area in Sqm
1	Faculty of Medical & Allied Health Sciences (AIMS)	137695.15
	Hospital and research centre (AHRC)	
2	Faculty of Pharmacy (SACCP)	11,131.00
3	Faculty of Nursing (ACN)	9,404.00
4	Faculty of Engineering, Management & Technology (BGSIT)	32,825.32
5	Faculty of Humanities and Social Sciences (BGSCE)	8735.37
	Faculty of Humanities and Social Sciences (BGS FGC)	
6	Faculty of Natural Sciences (ASNS)	1,015.52
7	Others	75,395.09
Total built-up area in Sqm		2,76,272.22
Average Area Per Student		55.54 Sq m

3

EXECUTIVE HIGHLIGHTS					
Sl no	Particulars	Remarks	Sl no	Particulars	Remarks
1	University Campus Area	67.3 Acres	13	Gymnasium	04
2	Total built-up area in Sqm	2,76,272 Sqm	14	Central Library	5057 Sq m
3	Number of faculty (Institutions)	06	15	Books	87,978
4	Class Rooms	86	16	Outdoor sports area	40,470 Sqm
5	Seminar Halls	20	17	Residential Quarters	360
6	Demo Rooms	40	18	Solar Power Plant	700 KW
7	Laboratories	156	19	Biogas Plant	300 Kg
8	Auditoriums	02	20	STP	750 KLD
9	Amphitheatre	01	21	Rain Water Harvesting	25 Units
10	Hostels	10	22	Water purification plants	17
11	Computers	1212	23	Guest house Rooms	56

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Consolidated list of ICT Enabled Class Rooms, Seminar Halls and Demonstration Rooms



Sl. No	Institutions	No. of Classrooms	No. of Seminar Halls	No. of Demonstration Rooms
01	Faculty of Medical & Allied Health Sciences (AIMS)	08	08	40
02	Faculty of Pharmacy (SACCP)	10	02	-
03	Faculty of Nursing (ACN)	08	02	-
04	Faculty of Engineering, Management & Technology (BGSIT)	37	04	-
05	Faculty of Humanities and Social Sciences (BGS FGC)	06	01	-
06	Faculty of Humanities and Social Sciences (BGSCE)	10	02	-
07	Faculty of Natural Sciences (ASNS)	07	01	-
Total		86	20	40

IT Infrastructure

Sl. No	Types	Quantity
1	High configuration Computers	1212
2	Student Computers Ratio	4:1 (4974:1212)
3	Dedicated(Prisac Aviation Technologies Private Limited)	2000Mbps(2Gbps)
4	Wi-Fi access points	600
5	CCTV cameras	750
6	University libraries Computers	202
7	Digital libraries Computers	130
8	Hospital Computers	90
9	ERP software	dhi

Physical Facilities

Class Rooms: 86

Demo Rooms:40

Seminar Halls:20

Laboratories: 156

Skill Centres: 10



Physical & Recreational Facilities

- **Outdoor facilities:** Sports facilities spread over an approximately **40,470 Sqm** area providing facilities for **Cricket, Athletic (400m track), Football, Hockey, Volleyball, Throw ball, Handball, Kabaddi, Kho-Kho, Ball Badminton, Tennis & Basketball** courts with synthetic floor and flood lights.
- Physical Education Cell is supported by **3 Physical Directors**.
- **Gymnasium:** University features **4** modern gymnasium well equipped with **Weight lifting, Stretching, Cardiac machines and other equipment**.
- There are **2** auditoriums with a capacity of **2000** and **500** respectively and an **Amphitheater** for cultural extravagance.
- Cultural activities such as **Prajwalana, Kalatharanga** and **Deekshamaithri** were celebrated annually.
- University has procured musical instruments such as **Harmonium, Kanjira, Drums, Guitar** etc..

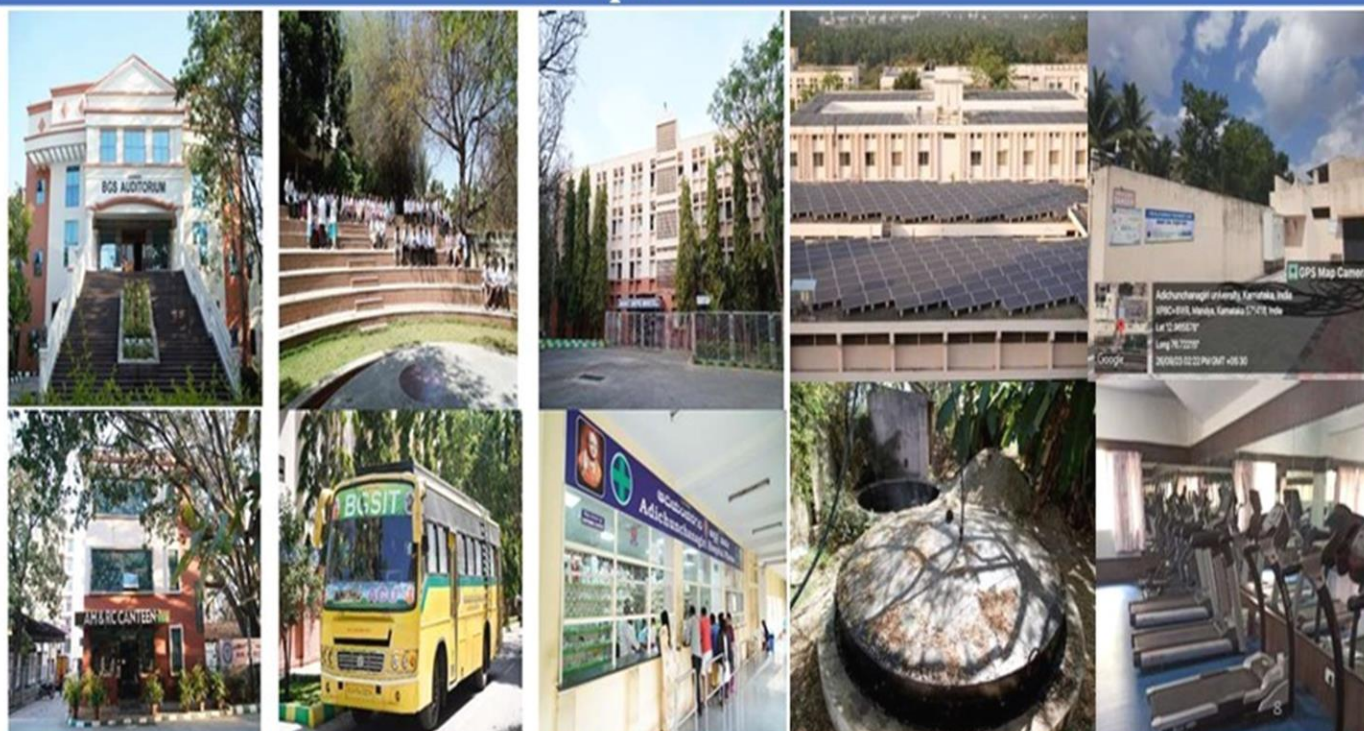
Physical & Recreational Facilities



Campus Amenities

Hostels	10 Blocks, 1219 Rooms	Residential Quarters	360
Canteens	4	Solar Power Plant	700 KW
Mess	9	Biogas Plant	300 Kg capacity
Banks	2	STP	750 KLD
Post Office	1	Rain Water Harvesting	25 Units
ATM	3	Water purification plants	17 RO Plants of 500 lph
		Guest house	56 rooms
		Auditorium	2 (2000 & 500 Capacity)
Transportations Facilities	Buses-16, Cars-04, TT-02 Van-01, EV Buggies-02	Amphitheatre	1

Campus Amenities



Clinical Equipments & Laboratory Learning Resources

- 1150 Bed capacity hospital
- Approved animal house.
- Well equipped Operation theatres: Major- 09, Minor-18
- **Central laboratory:**
 - Automated haematology analyser, ABG analyzer, Automated hormone analyser, electrolyte auto analysers, cartridge based nucleic acid amplification testing (CBNAAT), fluorescent microscopy for TB
- **Super specialty services:**
 - Neurology, Cardiology, Reconstructive & Plastic surgery, Urology, Nephrology, Oncology, Paediatrics Surgery and IVF Centre.
- **Central Research Laboratory:**
 - Refrigerated centrifuge, PCR, High throughput liquid handler, Bio Safety Cabinet, Carbon dioxide Incubator, Immuno fluorescence microscope
- **Surgery:**
 - Laparoscopy Surgery, Endoscopy, Onco-Surgery, Paediatric Surgery, Plastic Surgery, Maxillofacial surgery, Special clinic for Cleft Lip & Palate, laparoscopic Uro Surgeries.

Clinical Equipments & Laboratory Learning Resources

- **Cardiology:**
 - Cath lab with the facility of ECG, TMT and ECHO, Angiography & angioplasty
- **Plastic Surgery:**
 - Reconstructive and cosmetic surgeries, skin grafting, burns, cleft lip and cleft palate, facial deformities, reconstruction surgeries.
- **Neurosurgery:**
 - Intracranial Tumour Surgeries, Clipping of aneurysm, Spine surgeries, Traumatic Intracranial Surgeries.
- **Rheumatology:**
 - Treatment of musculoskeletal and joint deformities
- **Urology & Nephrology:**
 - TURP, PCNL, URS, Lithotripsy, Laparoscopic nephrectomy and partial nephrectomy, Haemodialysis, Laparoscopic Pyeloplasty, Radical Prostatectomy.
- **Respiratory Medicine:**
 - ICU for respiratory diseases, PFT and facility of bronchoscopy.
- **Paediatrics:**
 - Special clinics for epilepsy, thalassemia and sickle cell anaemia.

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Clinical Equipments & Laboratory Learning Resources

- **Orthopaedics:**
 - Trauma and spine surgeries, deformity correction, knee, hip and shoulder joint replacements, arthroscopy and arthroplasty surgery.
- **NICU/PICU:**
 - Neonatal ventilator, baby warmers and Incubators, phototherapy units, infusion pump, Bubble CPAP, T-piece resuscitator and phototherapy.
- **Obstetrics & Gynaecology:**
 - IVF Centre, Advance OBS clinic with laparoscope, foetal monitor, Foetal Doppler and Colposcopy.
- **Radiology:**
 - Digital x-ray, interventional radiology procedures, CT scan, MRI, colour doppler, ultrasound, image intensifier TV with facility of contrast imaging, OPG, mammography and DSA.
- **Dentistry:**
 - Dental chairs and OPG facilities

Clinical Equipments & Laboratory Learning Resources

- **Otorhinolaryngology:**
 - Brainstem evoked response audiometry (BERA), Advanced ENT surgical care with latest microscopes, audiometry evaluation and speech therapy centre along with Endoscope unit in ENT.
- **Ophthalmology:**
 - Automated refract meter, cataract surgery with phacoemulsification machine, ND YAG Laser, B-scan, A-Scan, OCT, Diode Laser for Retina, Synoptophore, rebound Tonometer, applanation tonometer. Slit lamps, complete field automated perimetry, Keratometer, Fundoscope, retinoscope, direct and indirect ophthalmoscope, Vitrectomy apparatus in Ophthalmology.
- **Dermatology:**
 - Cosmetic surgery with facility of dermabrasion, derma peeling & grafting and photo therapy, YAG-Laser, micro needling radio frz, micro dermal abrasion and hair removal LASER.
- **Psychiatry:**
 - Advanced psychiatric OP and IP facility with ECT and EEG facility and De- addiction centre, Counselling Centre.
- **Blood bank:**
 - Cryoprecipitate bath, Platelet incubator, Ultra low freezer, Plasma extractor.

Library Infrastructure - Learning Materials

Libraries in different domains across the campus - Libraries are fully automated using the **KOHA**

• ACU Learning Resource Centre (Central Library)	5057 Sq. m
• Books	87,978
• Digital Library Computers	130
• Seating Capacity	250
• IEEE Journals	192
• E-journals	14203
• E-Books	32,644
• Print Journals	256
• Total No of Volumes	16,654
• Titles	3944



Library Infrastructure - Learning Materials

SL. No.	Year	Number of Titles added	Number of textbooks added	Number of reference books	Total Number of Volumes	
1	2018-2019	627	2037	708	2745	
2	2019-2020	770	2129	640	2769	
3	2020-2021	1335	5437	469	5906	
4	2021-2022	428	1066	460	1526	
5	2022-2023	784	3297	411	3708	
<i>e-Library with membership</i>		3944	13966	2688	16654	
1. e – journals/e-books consortia		<i>E-content resources used by teachers/students</i> ❖ NMEICT/NPTEL ❖ Other MOOCs platforms ❖ SWAYAM ❖ Institutional LMS			Year	Amount (Lakhs)
2. Shodhganga					2022-23	106
3. SWAYAM					2021-22	73
4. Discipline-specific databases					2020-21	79
					2019-20	94
				2018-19	89	

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Systems and processes for maintaining physical and academic support facilities

- There are various sections for maintenance of civil, plumbing, sanitary, carpentry, electrical, Air conditioning, welding, drainage, water supply, RO water plant maintenance, painting, sweeping, gardening etc.
- **Electrical maintenance:** There are 15 Electricians supervised by an Electrical engineer to maintain 24x7 power supply
- **Campus maintenance services :** There are supporting staff for maintenance of garden, cleaning etc
- **Equipments maintenance :** Maintenance of all medical equipment in the hospital and institutes are taken care by the Bio-Medical Department
- **Library maintenance:** Chief Librarian and their staff take care of Shelving and re-shelving, Supervising the collections, Conservation and preservation of materials including repairs and binding.
- **ICT facilities maintenance :** ICT related facilities are maintained by the technically skilled experts

Systems and processes for maintaining physical and academic support facilities

- **Sports:** The Director of Physical Education supervises the sports amenities, sports equipment, fitness equipment and ground on regular basis for indoor and outdoor game
- **Classrooms and other academic facilities:** Housekeeping staff are available for sweeping and mopping
- **Laboratories:** Qualified Lab technicians are available in all the laboratories for maintenance of equipments.
- **Security:** 24x7 Security personnel for watch and ward.
- **Transportation:** Mechanics are available for regular maintenance of vehicles.

2. 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

2.1.1. 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.

2.1.2. Review of Policies

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

2.1.3. 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.

2.1.4. 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. ASPECTS OF ENVIRONMENT AUDIT

An environmental audit is a systematic, documented, periodic, and objective process to assess an organization's environmental performance and compliance with environmental regulations, policies, and standards. The primary purpose of an environmental audit is to ensure that environmental management practices are effective, identify areas for improvement, and help organizations reduce their environmental impact.

The following section highlights the activities implemented by the university for environmental conservation

1. Energy Conservation
2. Water Conservation
3. Waste Management
4. Disable friendly movement

3.1. Energy Conservation

3.1.1. Facility Description

Electrical sub-Details of ACU AH&RC B G Nagara (ESS-1):

Meter RR No: NHT-2

Incoming voltage: 11000 Volts

Outgoing voltage: 440 Volts

11kV incoming feeder Name: F7-AIMS

Contract Demand (CD):1250 kVA

Maximum Recorded MD: 798 kVA

Total Transformer capacity Available: 2x1000 kVA and 2x500 kVA = 3000 kVA

Total Diesel Generator capacity Available: 2x750 kVA, 2x500 kVA, 1X200 kVA =2700 kVA

Total roof top solar generation ON GRID capacity: 400 kWp

Total UPS capacity: 1064 kVA

Total monthly Raw power consumption : 3,69,600 kWH

Total monthly solar energy consumption : 42,810 kWh

Total Diesel generator power energy consumption: 5,063 kWh

Total power consumption of substation: 4,17,473 kWh

Outgoing feeders: AH&RC campus, AIMS campus, SAC Pharmacy college campus, Nursing College.

AH&RC campus: Admin Block, OPD Block, OT Block, Ward Block, ICU Block, Special ward Block, OBG Block, Casualty Block, Neuro Block, Staff quarters, Canteen,

AIMS campus: Admin Block New, Old college Block, AIMS Learning center, BGS Auditorium, Vijnatham Bhavana, Principal quarters, Boys Hostel, AIMS UG Hostel for women, AIMS PG Hostel, AIMS Launch, Forensic Block.

Nursing college: B. Sc Nursing Block, General Nursing Block, Hostel.

Pharmacy college: Old Block, New Block, Auditorium.

Staff details: 10 No's ITI Electrician

Shift duties: 3 shift per day

Service: 24X7

Electrical sub-Details of ACU BGSIT:

Incoming voltage: 11000 Volts

Outgoing voltage: 440 Volts

Contract Demand (CD):200 kVA

Maximum Recorded MD: 125 kVA

Total Transformer capacity Available: 1x250 kVA = 250 kVA

Total Diesel Generator Capacity Available: 2x100 kVA, 1x62.5 kVA =262.5 kVA

Total roof top solar generation ON GRID capacity: 200 kWp

Total UPS capacity: 375 kVA

Total monthly Raw power consumption: 47,300 kWh

Total monthly solar energy consumption: 21,230 kWh

Total power consumption of substation: 68,500 kWh

3.2. Water Conservation

3.2.1. Facility Description

River water and borewell water are the sources of water for the university campus

Total number of sumps available 14 Nos.

Total number of over head tanks available 41 Nos.

Total number of borewells available in the campus 15 Nos.

Total number of RO plants available 22 Nos.

Total number of heat pumps available for hot water generation 4 Nos.

Capacity of sewage treatment plant (STP) installed is 750 kLD

Capacity of effluent treatment plant (ETP) installed is 100 kLD

Treated STP water is used for flushing and gardening

Rainwater recharging is implemented in the campus

Ground water recharging is implemented in the campus

Lake rejuvenation by making use of storm water is practiced

Use of low flow taps in wash rooms

Schematic of water distribution is given in figure 3.1.

The details of the institutional initiatives implemented are described in the sections below.

ADICHUNCHANAGIRI UNIVERSITY WATER DISTRIBUTION SYSTEM - FLOW CHART

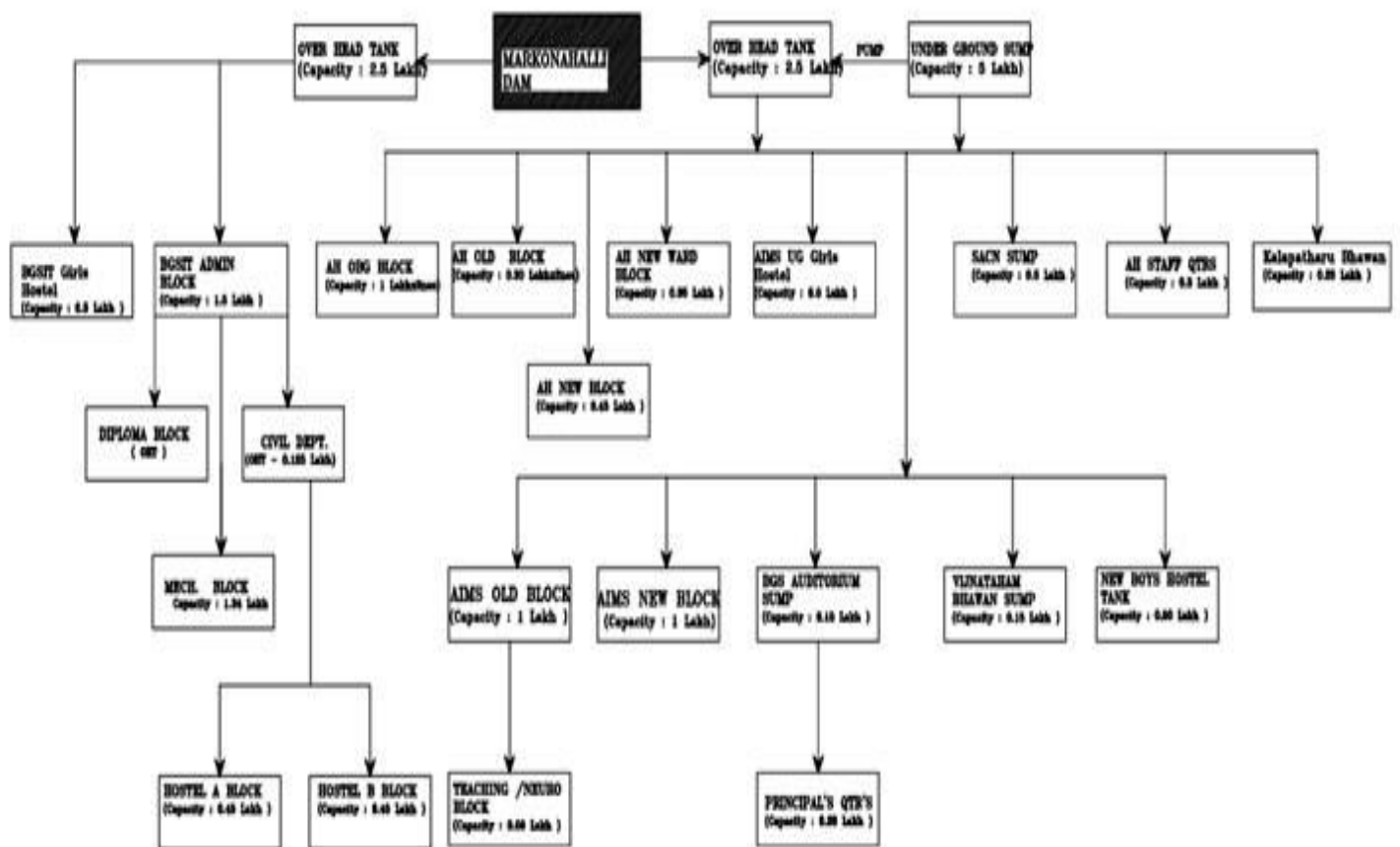


Figure 3-1: Water Distribution Schematic

3.3. Waste Management

3.3.1. Facility Description

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

There are different types of waste generated in the campus 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 for trees
5	Food Waste	Yes	Biogas Plant
6	Waste Water	Yes	STP
7	Glass Waste	No	NA
8	Unused Materials	No	External Agency
9	Hospital / Medical Waste	Yes	External Agency
10	Plastic Waste	Yes	External Agency

Table 3-1: Types of Waste Generated in the college

3.3.2. 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.

3.3.3. 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 wet waste is collected and used in biogas plant.

3.3.4. 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 3-2.



Figure 3-2: Bio – waste management

3.4. Disable Friendly Movement

3.4.1. Facility Description

3.5. Institutional Initiatives 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).

3.5.1. 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 3-3.



Figure 3-3: Well-ventilated and day-light integrated premises

3.5.2. Installation of LED lights for interior applications

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 and in the library area. Sample photo of LED lamp used in the some of the locations of the college area are shown in figure 3-4.



Figure 3-4: LED lights

The cost savings by installation of LED lights in class room, office area, library and other areas are given in table 3-2.

S. No.	Description	Unit	9W Fixture	12W Fixture	36W Fixture	20W Fixture
1	Rated Wattage of LED lamps installed	W	9.0	12.0	36.0	20.0
2	Quantity of LED lamps installed	Nos	3420.0	3983.0	3900.0	7174.0
3	Rated wattage of lamps used earlier	W	20.0	30.0	72.0	40.0
4	Savings per lamp by installation of LED lamps	W	11.0	18.0	36.0	20.0
5	Total savings	kW	37.6	71.7	140.4	143.5
6	Working hours per day	hours	8.0	8.0	8.0	8.0
7	No. of working days per year	days	250.0	250.0	250.0	250.0
8	Annual electricity savings	kWh	75240.0	143388.0	280800.0	286960.0
9	Average electricity cost	Rs./kWh	8.0	8.0	8.0	8.0
10	Annual cost savings achieved per year	Rs. lakh/year	6.0	11.5	22.5	23.0
11	CO2 mitigations per year	Tons/year	64.0	121.9	238.7	243.9
12	Investment Cost	Rs. Lakh	3.4	6.0	58.5	43.0

Table 3-2: Annual cost savings by installation of LED light fixtures

3.5.3. Installation of Grid Tied – SRTPV (Solar Roof Top Photo Voltaic) system

Solar PV system installed in the campus for the power generation accounts to 600 kWp. Sample photo of a solar PV panel installed in the campus is shown in figure 3-5. PV modules are made of multi crystalline.



Figure 3-5: Sample photo – SRTPV system

The SRTPV system has net metering (Bi-directional meter) system. Power Purchase Agreement (PPA) made between the management trust and with CESCO with net metering arrangements has been reviewed.

Energy generation and cost savings of the SRTPV system of the campus is estimated and the same is given in the table 3-3.

S. No.	Description	Unit	Values
1	Rated Capacity of SRTPV system	kWp	600
2	Average units generated per day	kWh/day/kWp	3
3	No. of working hours per annum	days	350
4	Annual energy generation from SRTPV	kWh/ annum	6,30,000
5	Average energy cost	Rs./kWh	8
6	Annual cost savings due to installation of SRTPV	Rs. Lakh / annum	50.4
7	Total CO2 emission reduction	tCO2	497.7
8	Total investment cost (approximate)	Rs. Lakh	270

Table 3-3: Cost savings from SRTPV system

3.5.4. Installation of Sensor based street light installation

Sensor based street light have been installed in the campus. The sensor-based street light operates based on the day light level. Sample photo of sensor based street lighting fixture installed in the campus is shown in figure 3-6.



Figure 3-6: Sensor based lighting system

3.5.5. Installation of Solar LED Street Lights

Solar street lights have been installed inside the college. Sample photo of the solar street lights are shown in figure 3-7.



Figure 3-7: Solar LED Street lights

The cost savings by installation of solar LED street lights are given in table 3-4.

S. No.	Description	Unit	15W Solar LED
1	Rated Wattage of LED lamps installed	W	15.0
2	Quantity of LED lamps installed	Nos	300.0
3	Rated wattage of lamps used earlier	W	50.0
4	Savings per lamp by installation of LED lamps	W	35.0
5	Total savings	kW	10.5
6	Working hours per day	hours	8.0
7	No. of working days per year	days	350.0
8	Annual electricity savings	kWh	29400.0
9	Average electricity cost	Rs./kWh	8.0
10	Annual cost savings achieved per year	Rs. lakh/year	2.4
11	CO2 mitigations per year	Tons/year	23.2
12	Investment Cost	Rs. Lakh	21.0

Table 3-4: Annual cost savings by installation of LED street lights

3.5.6. Installation of LED Lights for street light applications

LED fixtures have been installed for street lights inside the college. Sample photo of the LED street light fixtures are shown in figure 3-8.



Figure 3-8: LED Street light Fixture

The cost savings by installation of LED street light fixtures are given in table 3-5.

S. No.	Description	Unit	200W Fixture	100W Fixture	50W Fixture	40W Fixture	30W Fixture	20W Fixture	10W Fixture
1	Rated Wattage of LED lamps installed	W	200	100	50	40	30	20	10
2	Quantity of LED lamps installed	Nos	12	6	10	18	20	20	8
3	Rated wattage of lamps used earlier	W	400	200	100	100	75	50	30
4	Savings per lamp by installation of LED lamps	W	200	100	50	60	45	30	20
5	Total savings	kW	2.4	0.6	0.5	1.08	0.9	0.6	0.16
6	Working hours per day	hours	8	8	8	8	8	8	8
7	No. of working days per year	days	250	250	250	250	250	250	250
8	Annual electricity savings	kWh	4800	1200	1000	2160	1800	1200	320
9	Average electricity cost	Rs./kWh	8	8	8	8	8	8	8
10	Annual cost savings achieved per year	Rs. lakh/year	0.38	0.10	0.08	0.17	0.14	0.10	0.03
11	CO2 mitigations per year	Tons/year	4.08	1.02	0.85	1.84	1.53	1.02	0.27
12	Investment Cost	Rs. Lakh	1.2	0.45	0.5	0.9	0.7	0.4	0.08

Table 3-5: Annual cost savings by installation of LED street light fixtures

3.5.7. 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 3-9.



Figure 3-9: Use of Solar Water Heater

The cost savings by installation of solar water heater are given in table 3-6.

S. No.	Description	Unit	Values
1	Solar water heater installed	Litres	88000
2	Total amount of heat produced	kCal/hr	2640000
3	Electricity equivalent	kWh	3069.767
4	No. of working days per year	days	250
5	Annual electricity savings	kWh	767441.9
6	Average electricity cost	Rs./kWh	8
7	Annual cost savings achieved per year	Rs. lakh/year	61.40
8	CO2 mitigations per year	Tons/year	606.28
9	Investment Cost	Rs. Lakh	132

Table 3-6: Annual cost savings by installation of Solar Water Heater

3.5.8. Installation of Heat Pump for hot water generation

Heat pump based hot water generator have been installed in the medical college campus. Sample photo of heat pump is shown in figure 3-10.



Figure 3-10: Use of heat pump

The cost savings by installation of heat pump are given in table 5-7.

S. No.	Description	Unit	Values
1	Heat Pump Capacity	L	2000
2	Total amount of heat produced	kCal/hr	60000
3	Electricity equivalent	kW	70
4	Input Power required for heat pump	kW	23
5	Difference in electrical power	kW	47
6	Energy savings per heat pump per day	kWh	47
7	Total number of heat pumps installed	no.	4
8	Total energy savings from 4 numbers of heat pumps	kWh	186
9	No. of working days per year	days	300
10	Annual electricity savings	kWh	55814
11	Average electricity cost	Rs./kWh	8
12	Annual cost savings achieved per year	Rs. lakh/year	4
13	CO2 mitigations per year	Tons/year	44
14	Investment Cost	Rs. Lakh	9

Table 3-7: Annual cost savings by installation of heat pump

3.5.9. Installation of Energy Efficient Air Conditioning Units

The air conditioning units installed in the university campus are of energy efficient type. The conventional air cooled AC units are replaced with energy efficient VRV and Inverter type AC units. The sample picture of air conditioning units installed in the university campus, is shown in figure 3-11.



Figure 3-11: Energy Efficient Air Conditioner

The cost savings by installation of energy efficient (EE) air conditioning (AC) units are given in table 3-8.

S. No.	Description	Unit	Values
1	Rated Tonnage of EE AC units installed	TR	600
2	SEC of EE AC units	kW/TR	1
3	SEC of Conventional AC units	kW/TR	1.5
4	Difference in SEC	kW/TR	0.5
5	Savings due to installation of EE AC units	kW	300
6	Realizable savings @80%	kW	240
7	Working hours per day	hours	12
8	No. of working days per year	days	350
9	Annual electricity savings	kWh	1008000
10	Average electricity cost	Rs./kWh	8
11	Annual cost savings achieved per year	Rs. lakh/year	80.64
12	CO2 mitigations per year	Tons/year	796.32
13	Investment Cost	Rs. lakh/year	270

Table 3-8: Annual cost savings by installation of EE – AC Units

3.5.10. Installation of Bio gas plant

A biogas plant is a facility that converts organic waste materials into biogas and biofertilizer through the process of anaerobic digestion. 300 kg capacity of biogas plant have been installed in the campus. The picture of biogas plant installed in the university campus, is shown in figure 3-12.



Figure 3-12: Biogas Plant

The cost savings by installation of biogas plant are given in table 3-9.

S. No.	Description	Unit	Values
1	Bio gas plant capacity	kg	300
2	Equivalent energy generation per month	kWh/month	600
3	Annual energy savings	kWh/year	7200
4	Average cost saved per year	Rs. Lakh/year	0.58
5	Investment cost	Rs. Lakh	8.00
6	CO2 mitigations per year	Tons/year	5.69

Table 3-9: Annual cost savings by installation of Biogas plant

3.5.11. Procurement of LED/LCD monitors

LED/LCD monitors are used for all the desktop computers. Sample photo monitors used in server room as shown in the figure 3-13.



Figure 3-13: Use of LED monitors in server room

3.5.12. Awareness posters on Energy conservation

To create awareness on energy conservation among staff and students, awareness posters on energy conservation in made available in the university premises. The sample image of energy awareness poster is shown in figure 3-14.



Figure 3-14: Posters on Energy Conservation

3.6. Institutional Initiatives for Water Conservation

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.

During the study, observations were carried out on the usage of water in the university building premises. In the intension of conserving water, various measures are implemented in the university campus. Use of STP treated for flushing and gardening, rain water harvesting and ground water recharge systems.

3.6.1. Sewage Treatment Plant

750 kLD capacity Sewage Treatment Plant (STP) have been installed in the university campus. The STP treated water is used for flushing in toilets and for gardening purposes. The picture of STP plant installed is given in figure 3.15.

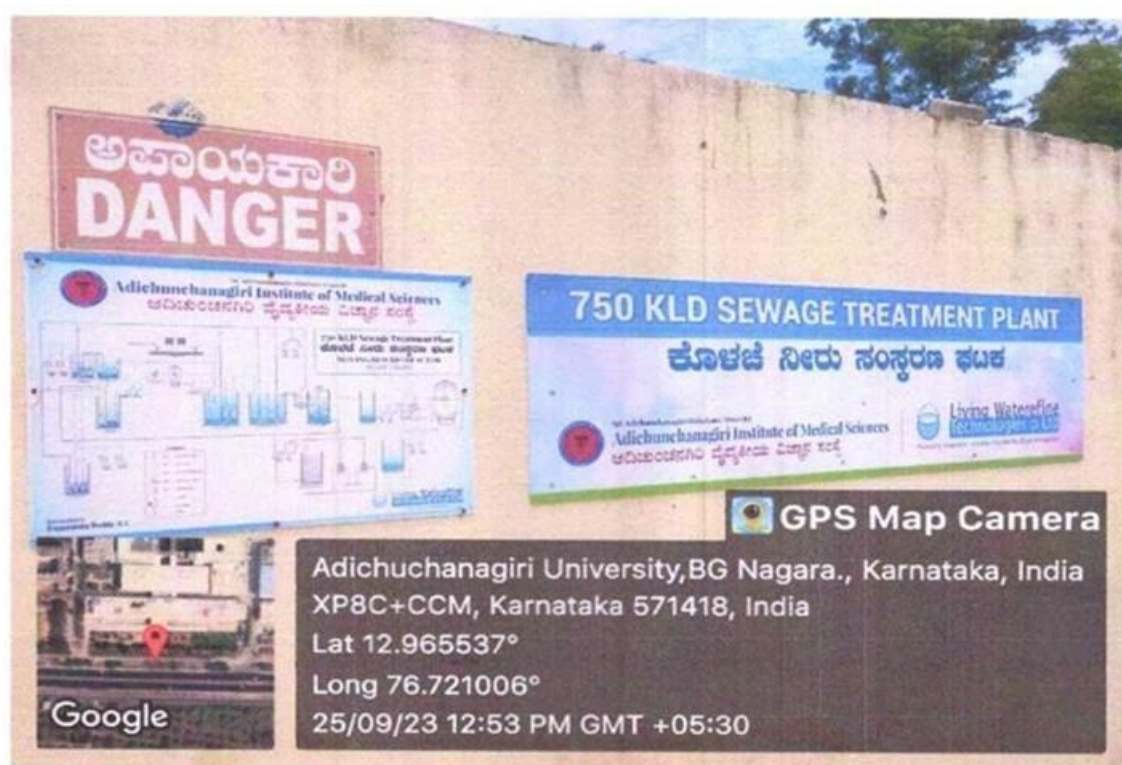


Figure 3-15: 750 kLD Sewage Treatment Plant

The estimated cost savings benefits for installing STP plant is given in table 3.10.

S. No.	Description	Unit	Values
1	STP capacity	kLPD	750
2	Quantity of final treated water from STP	kLPD	562.5
3	Quantity of water reused @ 50% utilization factor	kLPD	281.25
4	No. of working days per year	days	250
5	Annual Quantity of water reused (saved)	kLPD	70312.5
6	Average water cost	Rs./L	0.086
7	Annual cost savings achieved	Rs. lakh/year	60.46875
8	Investment Cost	Rs. Lakh	300

Table 3-10: Annual cost savings by installation of STP plant

3.6.2. 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 3.16.



Figure 3-16: Low flow taps installed in the college

3.6.3. 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 university campus has a fully integrated rain water harvesting system for each blocks and to storm water chambers. The pictures of rain water harvesting is given in figure 3.17.

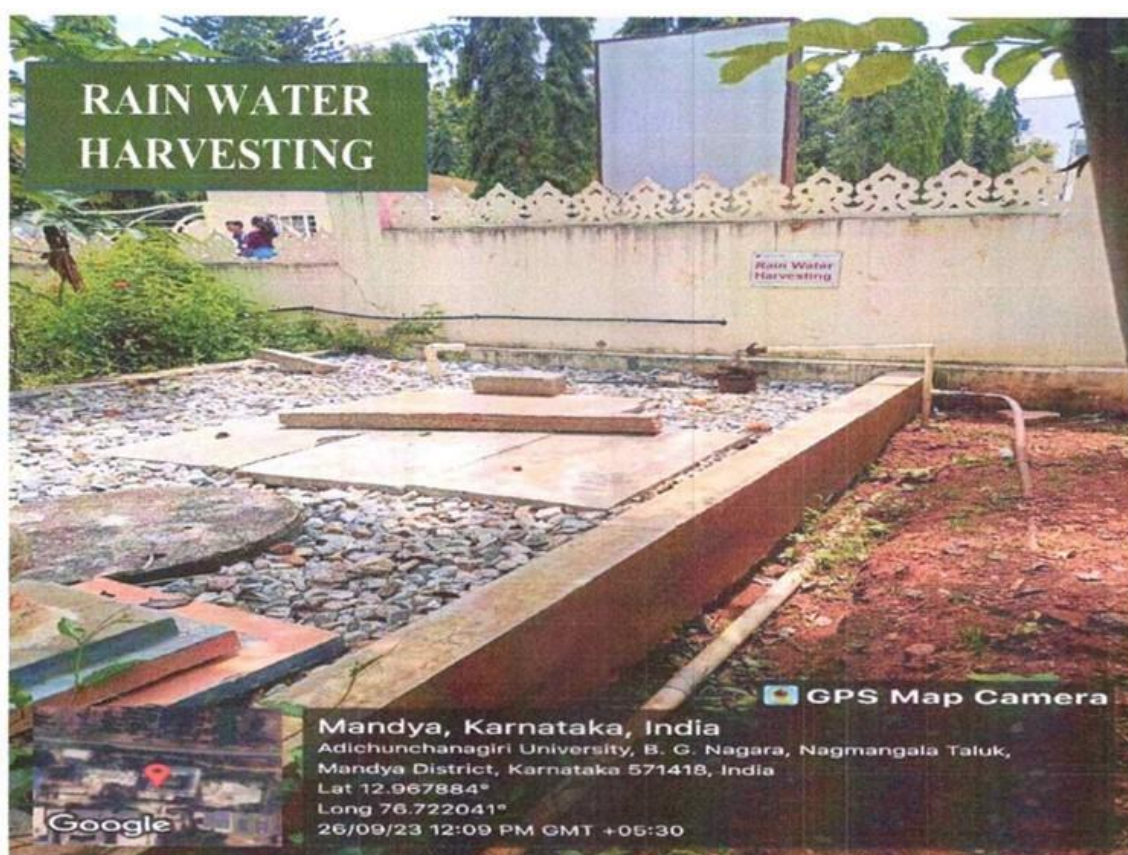


Figure 3-17: Rain water harvesting system

3.6.4. Ground Water Recharge

Rainwater harvesting is the simple process or technology used to conserve rainwater by collecting, conveying, purifying, storing and utilizing. The process of recharging the ground water by utilizing rain water harvested, is practiced by ground water recharge pits.

The picture of ground water recharge pit is shown in figure 3-18.

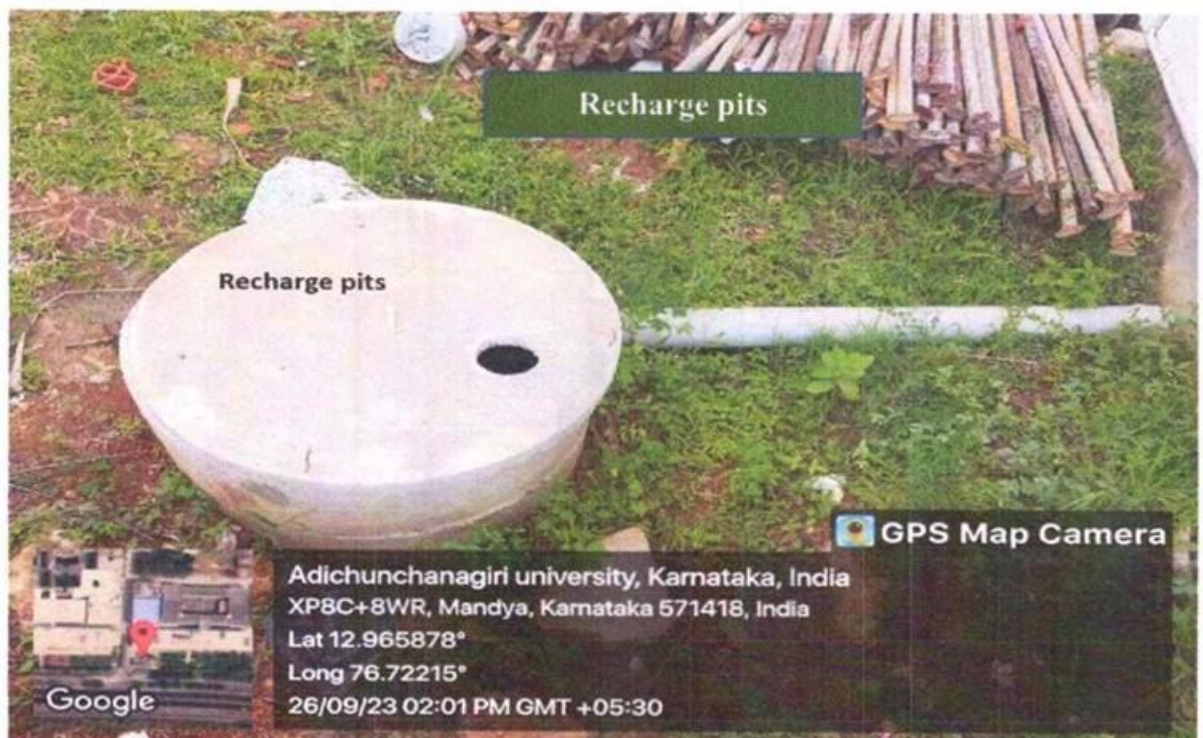


Figure 3-18: Ground water recharge pit

3.6.5. Lake Rejuvenation

Rainwater harvesting is the simple process or technology used to conserve rainwater by collecting, conveying, purifying, storing and utilizing. The process of recharging the ground water by utilizing rain water harvested, is practiced by ground water recharge pits. The rain water which is not collected on the surface run offs, flows through the storm water chambers, from here the storm water is sent to the near by lake for lake rejuvenation. The picture of the same is given in figure 3-19.

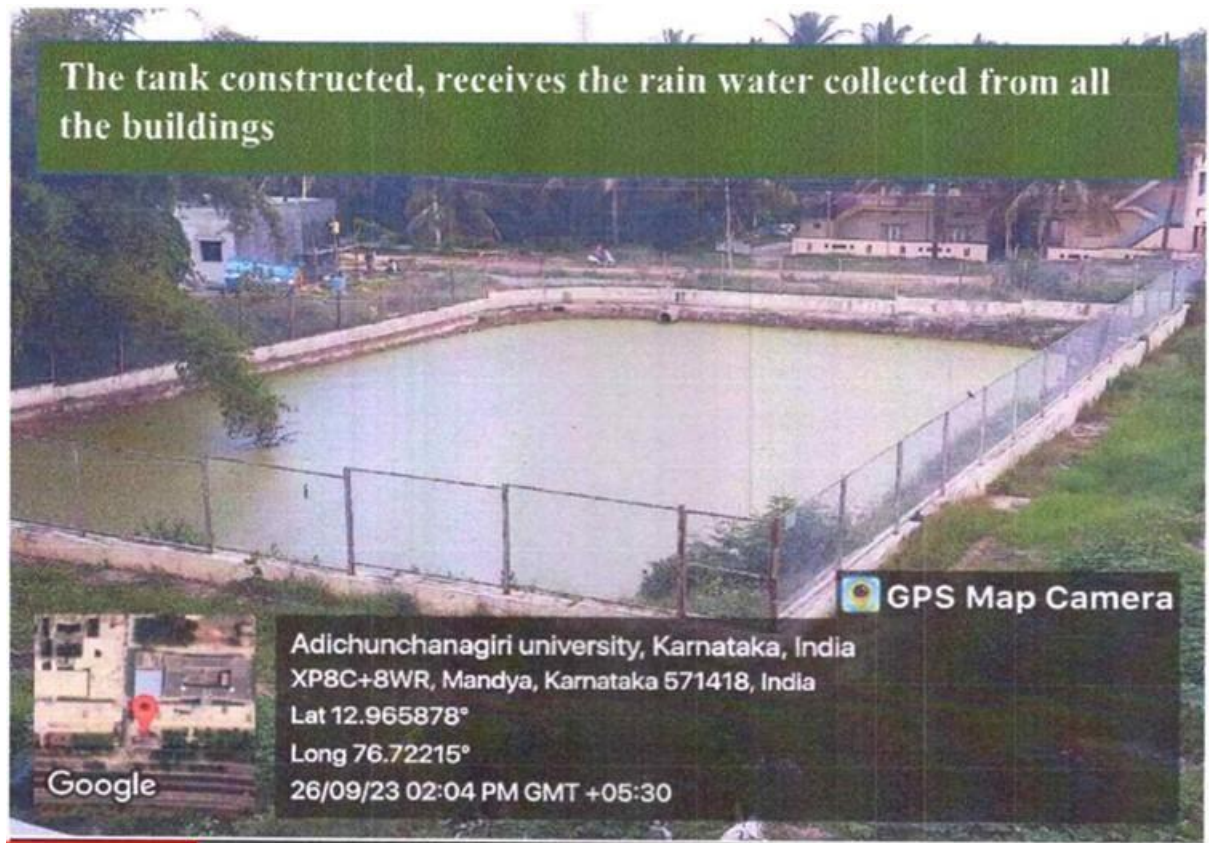


Figure 3-19: Lake rejuvenation

3.6.6. 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.

The sample water test report is given in figure 3.20. 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

Faculty of Engineering, Management & Technology
BGS Institute of Technology
Department of Civil Engineering

ADICHUNCHANAGIRI
UNIVERSITY
(Encl. under Karnataka Act No. 18 of 2013)
B.G. Nagara - 571448

Date: 24.01.2023

WATER QUALITY ANALYSIS REPORT

Subject	Testing of RO Water Quality, ACU Campus.		
Sample source	RO plant, ground floor, Administrative block, Adichunchanagiri University.		
Sample received date	17/1/2023		

Sl. No	Parameters Analyzed	As per BIS 10500-2012 Desirable range	Analysis Result
1	pH	6.5-8.5	Inlet 7.0
2	Odour	Agreeable	Odourless
3	Taste	Agreeable	Tasteless
4	Total Dissolved Solids, mg/l	500-2000	25
5	Total Hardness (as CaCO ₃) mg/l	200-600	45
6	Chloride (as Cl) mg/l	250-1000	17
7	Calcium (as Ca) mg/l	75-200	12
8	Magnesium (as Mg), mg/L	30-100	4
9	Fluoride (as F) mg/l	1-1.5	0.6
10	Free residual chlorine mg/l	0.1- 0.2	0
11	Total Coliform (MPN/100ml)	0	0

Remarks: It is certified that as per the results obtained from Physico – Chemical analysis, the supplied water sample is potable and safely used for drinking purpose. The results only to the sampled parameters tested at the time analysis.

(Dr Shruthi R)
Staff In charge
Department of Civil Engineering
BGS Institute of Technology

(Dr T Mahadevaiah)
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Figure 3-20: Sample water testing report

3.6.7. Posters for water conservation

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 3-21.



Figure 3-21: Posters to conserve water

3.7. Institutional Initiatives for Waste Management

3.7.1. Dust Collection Bins

Dust collection bins are placed at the university campus premises. The dust collection bins are used to make the segregation easier.

The sample image of dust collection bins is shown in figure 3-22.



Figure 3-22: Dust collection bins

3.7.2. Regular cleaning of campus

Regular cleaning of campus is done to maintain overall hygiene. The sample image of campus is shown in figure 3-23.



Figure 3-23: Sample picture of Campus area

3.7.3. 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 3-24.



Figure 3-24: Bio – waste management

3.7.4. Sewage Treatment Plant

750 kLD capacity Sewage Treatment Plant (STP) have been installed in the university campus. The STP treated water is used for flushing in toilets and for gardening purposes. The picture of STP plant installed is given in figure 3.25.



Figure 3-25: 750 kLD Sewage Treatment Plant

The estimated cost savings benefits for installing STP plant is given in table 3.11.

S. No.	Description	Unit	Values
1	STP capacity	kLPD	750
2	Quantity of final treated water from STP	kLPD	562.5
3	Quantity of water reused @ 50% utilization factor	kLPD	281.25
4	No. of working days per year	days	250
5	Annual Quantity of water reused (saved)	kLPD	70312.5
6	Average water cost	Rs./L	0.086
7	Annual cost savings achieved	Rs. lakh/year	60.46875
8	Investment Cost	Rs. Lakh	300

Table 3-11: Annual cost savings by installation of STP plant

3.7.5. Installation of Bio gas plant

A biogas plant is a facility that converts organic waste materials into biogas and biofertilizer through the process of anaerobic digestion. 300 kg capacity of biogas plant have been installed in the campus. The picture of biogas plant installed in the university campus, is shown in figure 3-26.



Figure 3-26: Biogas Plant

The cost savings by installation of biogas plant are given in table 3-12.

S. No.	Description	Unit	Values
1	Bio gas plant capacity	kg	300
2	Equivalent energy generation per month	kWh/month	600
3	Annual energy savings	kWh/year	7200
4	Average cost saved per year	Rs. Lakh/year	0.58
5	Investment cost	Rs. Lakh	8.00
6	CO2 mitigations per year	Tons/year	5.69

Table 3-12: Annual cost savings by installation of Biogas plant

3.7.1. Posters on waste management

Posters on waste management have been placed at various locations to create awareness among the students and staffs. The sample image of poster on waste segregation and management is shown in figure 3.27.



Figure 3-27: Poster on Waste Management

3.8. Institutional Initiatives for Barrier Friendly Movement

3.8.1. Facility for barrier friendly movement

Ramps have been installed in all the buildings for barrier friendly movement in the campus.

The sample image of ramps is shown in figure 3-28.



Figure 3-28: Ramps available in the university campus

3.8.2. Facility for barrier friendly movement

Wheel chairs have been provided in the university campus for barrier friendly movement in the campus.

The sample image of wheel chairs available in the university campus is shown in figure 3-29.



Figure 3-29: Wheel chair facility available in the university campus

3.8.3. Disable Friendly Washroom Facility

Disable friendly washroom facility is provided in the building to assist the differently abled persons and senior citizens.

The sample image of disable friendly and senior citizens friendly washroom is shown in figure 3-30.

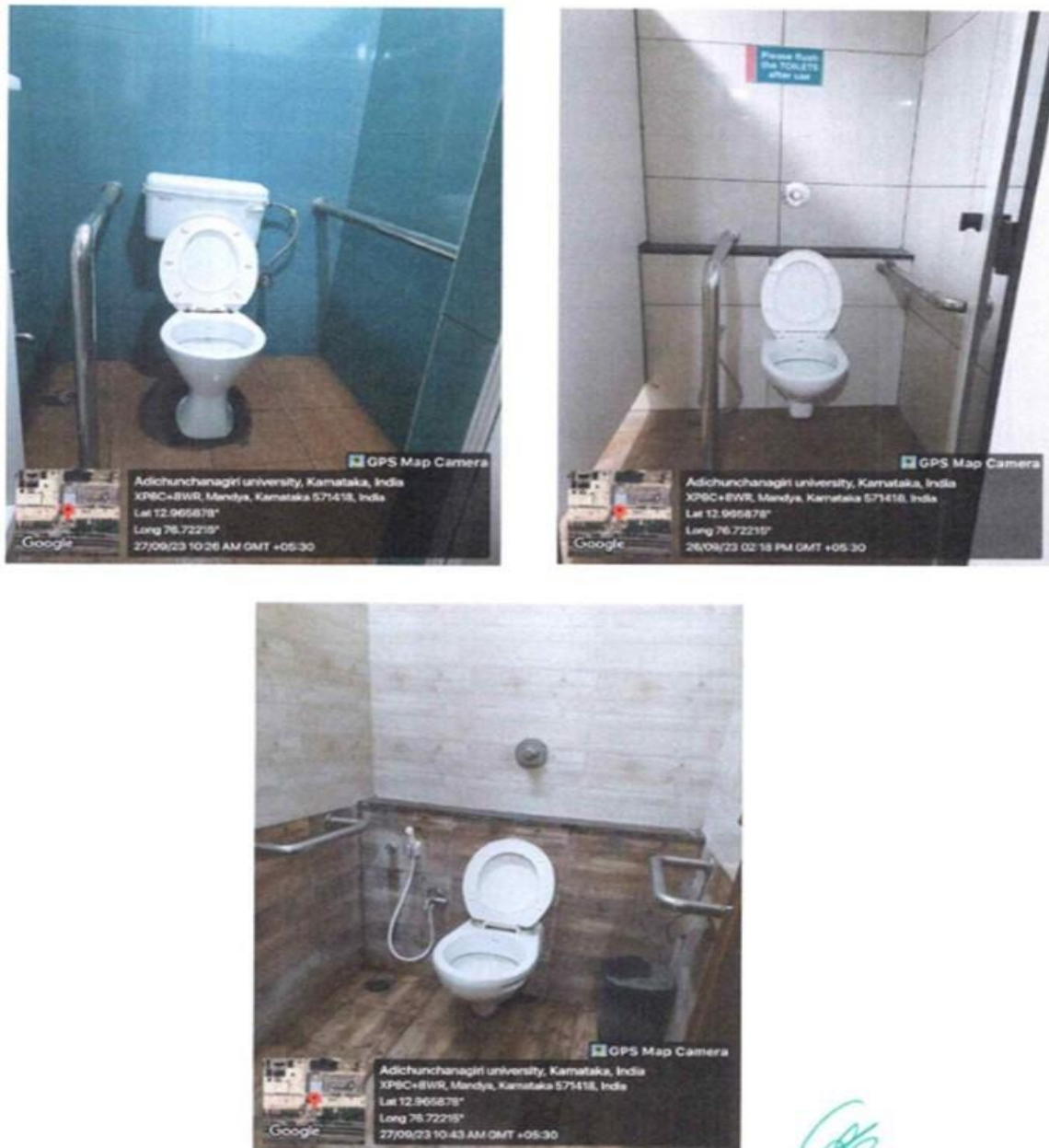


Figure 3-30: Disable friendly washroom facility available in the university campus

3.8.4. Electric vehicle for movement inside the university campus

Electric vehicle / battery operated vehicle facility is available in the university campus to assist the senior citizens and the needy people for the movement inside the university campus.

The sample image of electric vehicle / battery operated vehicle is shown in figure 3-31.



Figure 3-31: Disable friendly washroom facility available in the university campus

4. GREEN CAMPUS MANAGEMENT

4.1. Facility Description

The ACU university has a separate team to maintain clean and green 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 also used for watering the plants.

The institution promotes green education by involving faculties, staffs, students, local communities and other stakeholders to increase awareness levels and encourage implementation of eco-friendly practices through various awareness programs, and celebrating Environment Day, Water Day, Earth Day, etc., in the institution on regular basis.

There are more than 2000+ trees and well-maintained landscaping of lawns and plants. It was observed different types of herbs, shrubs, species of vegetables & fruits and also, some medicinal plantations in the garden area of the University Campus.

The following are the activities implemented in the University Campus:

- Signages have been well maintained at all applicable places inside the university campus
- Dust collection bins/containers are placed at appropriate locations. Separate color-coded bins are kept for different types of wastes. Waste quantity is monitored
- E-waste is returned to suppliers for disposal
- Used Lead-acid batteries are returned to manufacturers or their agents during replacement
- Saplings are planted as a part of NSS and other activity in and around the university campus area
- Fire-extinguishers are periodically refilled in all the locations of the
- Mock fire drills are carried out for fire emergencies
- First aid kits are available in all buildings inside the campus on each floor at convenient places and monitored for availability of all the items

4.2. Plantations in the campus

A scientific survey of flora and fauna of the campus is carried out by university staffs covering rainy, winter and summer seasons. This survey has revealed more than 1500 trees, various species of Mammals, Aves, Arthropods and Annelids were also recorded. This indicated excellent composition of Flora and Fauna. Many birds are reported in the campus seasonally. Institution has started naming the trees and plants with their botanical name and numbering. The details of different species spotted in the campus is shared by the university staffs and the same is given below

S.No	Scientific Name	Local Name
1	Grevillea robusta	Silver oak
2	Millettia pinnata	Honge
3	Saraca asoca	Ashoka tree
4	Artocarpus Heterophyllus	Jack fruit
5	Rose wood	Beetae
6	Peepal(bodhi)	Arali
7	Phyllanthus	Nelli
8	Mangifera indica	Mango
9	Azadirachta indica	Bevu
10	Melia dubia	Hebevu
11	Swieteniamacrophylla	Mahogany
12	Rubiaceae	Tega
13	Magnolia Champaca	Sampige
14	Citrus x sinensis	Ketale
15	Indian almond	Kadu badami
16	Mulberry	Neralae
17	Ficus drupacea	Goni mara
18	Peltophorum pterocarpum	Copperpod Tree
19	Delonix regia	Royal Poinciana Tree
20	Pithecellobium dulce	Manila Tamarind Tree
21	Azadirachta indica	Neem Tree
22	Moringa oleifera	Drumstick Tree
23	Eucalyptus globulus	Eucalyptus Tree
24	Millingtonia hortensis	Indian Cork Tree
25	Emblica officinalis	Indian Gooseberry Tree (Amla)
26	Dalbergia sissoo	Indian Rosewood Tree
27	Tamarindus indica	Tamarind Tree
28	Tectona grandis	Teakwood Tree

S.No	Scientific Name	Local Name
29	Ficus recemosa	Cluster Fig Tree
30	Ficus religiosa	Peepal Tree
31	Ficus benghalensis	Banyan Tree
32	Samanea saman	Rain Tree

The pictures of the plantations in the campus are given below



4.3. Institutional Initiatives for Green campus Management

4.3.1. World No Tobacco Day

ACU- NSS unit, department of pharmacy practice in association with IPA observed WORLD NO TOBACCO DAY on 30 May 2023 by preparing and circulating digital awareness booklet both in Kannada and English to reach the public. The pictures of the posters are given in figure 4.1.

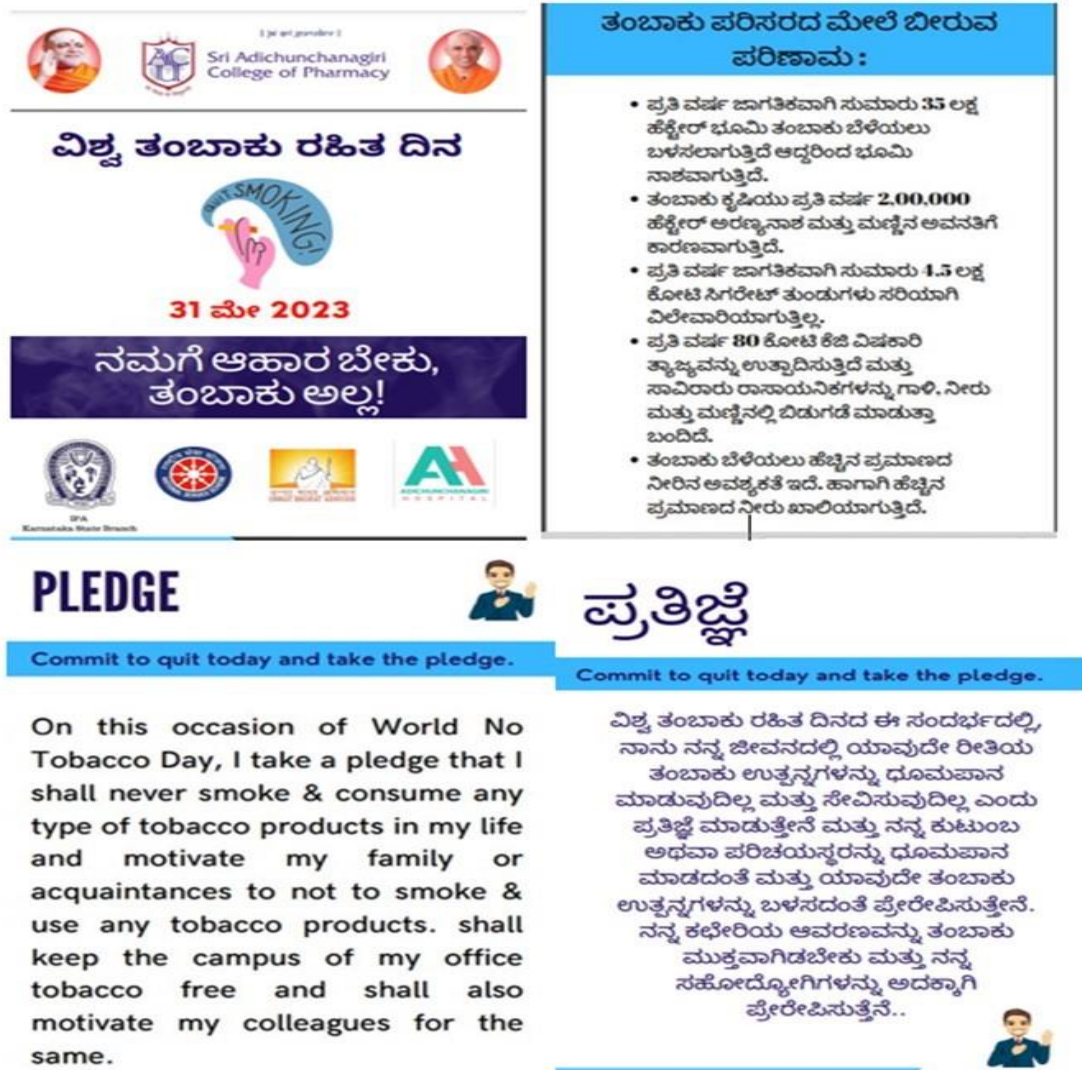


Figure 4-1: World No Tobacco Day Celebration

4.3.2. World Environmental Day

ACU-Sri Adichunchanagiri College of Pharmacy. NSS Volunteer of the college participated in the celebration of World Environmental Day on 5th June 2023 at Nagathihalli village organized by ACU- NSS unit in association with Government Primary School, Nagathihalli.

During the program planting of 100 sapling was done in the school premises. Around 60 NSS volunteer of ACU and 120 school students actively participated in the program. The pictures of the world environmental day celebration is given in figure 4.2.



Figure 4-2: World Environmental Day Celebration

4.3.3. Cleanliness Campaign

ACU-Sri Adichunchanagiri College of Pharmacy. The NSS units of the College organised a cleanliness campaign at B G Nagara Railway Station on 17.07.2023 as part of the Swachh Bharat Mission of Govt. of India.

Around 30 NSS volunteers participated in the work relating to the cleaning of the platforms and pathways of the railway station. The picture of cleanliness campaign is given in figure 4.3.



Figure 4-3: Cleanliness Drive Celebration

4.3.4. Presentation on Beat Plastic Pollution

On the eve of “WORLD ENVIRONMENT DAY” BGSIT NSS Unit and Pre – Engineering department organized Speech Presentation on “BEAT PLASTIC POLLUTION”. The picture of the program is given in figure 4.4.



Figure 4-4: Presentation on Beat Plastic Pollution

4.3.5. Organization of Swachh Bharath Abhiyaan in nearby school

Adichunchanagiri University, BGS Institute of Technology, NSS Unit-1 organized “Swachh Bharath Abhiyaan” on 26th October 2023 at School Premises of Moodala Mellahalli, Nagamangala(T) Mandya(D). The picture of the program is given in figure 4.5.



Figure 4-5: Swachh Bharath Abhiyaan

4.3.6. Use of Battery Powered Vehicles

Electric vehicles / battery operated vehicles are available in the University campus for shuttle movement inside the campus and assist the senior citizens and the needy people for the movement inside the university campus. The picture of the battery powered electric vehicles is given in figure 4.6.

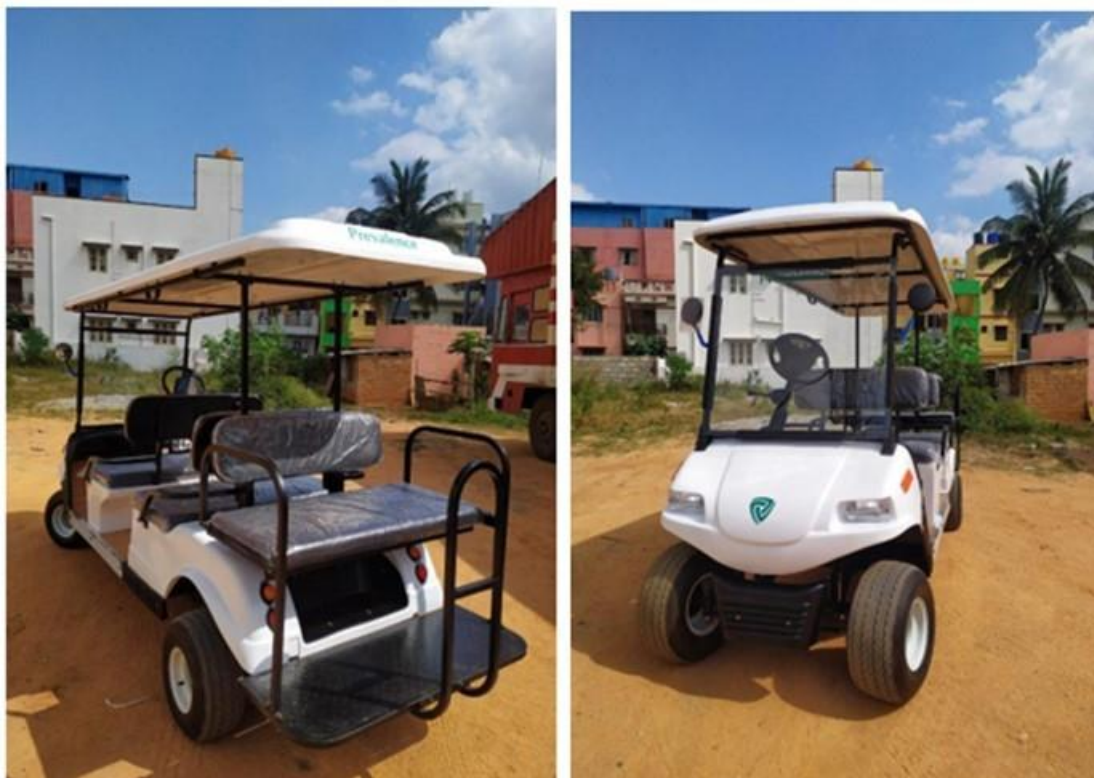


Figure 4-6: Battery Powered Vehicles

4.3.7. Ban on Use of Plastic

Usage of single use plastic is banned inside the university campus areas. Posters are placed for ban of plastic; the same is given in figure 4.7.



Figure 4-7: Ban of Use of Plastic Poster

4.3.8. Pedestrian Friendly Pathways

For the movement of the pedestrians inside the college area and campus area, pedestrian friendly pathways have been provided all around the campus, which enables the pedestrians to move around freely. Sample image of the pedestrian friendly pathway is given in figure 4.7.



Figure 4-8: Pedestrian Friendly Pathways

5. ANNEXURES

5.1. 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.

5.1.1. General information of the college/university:

General information of the college/university 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 5-1.

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

Table 5-1: NAAC grading's Table

2. Internal Quality Audit Team : 2020 – 2021

Table 5-2 depicts the format for the collection of Internal Quality Audit team.

S. No.	Name	Designation	Role
1			
2			
3			

Table 5-2: Internal Quality Audit team

3. General Information of the college

General information of the college/university includes an address of college and head office, contact person details, year of establishment etc., as given in table 5-3.

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

Table 5-3: General information of the college

4. College / University Infrastructure

Infrastructure details of the college were gathered from table 5-4.

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

Table 5-4: 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 5-5.

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

Table 5-5: Details of the departments

10. Number of staff

Teaching, non-teaching, supporting staff with a male and female breakup is obtained from table 5-6

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

Table 5-6: Details of the Staff

11. Number of Students

Number of students is collected from table 5-7.

S. No.	Boys	Girls
1		

Table 5-7: Details of the Students

12. Additional infrastructure details have been collected from table 5-8.

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 5-8: Details of the departments

5.1.2. Water Audit details:

1. General information

General information required for water management analysis is collected from table 5-9.

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	
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	

S. No.	Description	Details
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 5-9: Water management details

2. STP information

STP details are collected from table 5-10

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 5-10: Details of STP

3. RO Plant information

RO Plant details are obtained from table 5-11.

S. No.	Location	Quantity	Capacity
--------	----------	----------	----------

1.			
2.			
3.			

Table 5-11: Details of RO Plant

5.1.3. 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 5-12.

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 5-12: Details of Energy consumption

2. Solar Energy details:

The solar energy details required are collected from table 5-13.

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 5-13: 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 5-14.

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	

S. No.	Description	Details	
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 5-14: Details of Electrical Equipment

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

5.1.4. 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 5-15.

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 5-15: Basic details of waste management

2. Types of Waste generated

Types of waste generated in the college are obtained from table 5-16.

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 5-16: Types of waste generated

3. Segregation of waste

Segregation of waste information at different locations with quantity is gathered from table 5-17.

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

Table 5-17: Segregation of waste

4. Waste generation management

Waste generation management of the college was collected from table 5-18

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

Table 5-18: Waste Disposal methods

5.1.5. 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 5-19

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 5-19: List of plantation details

2. List of plants/ trees

List of plants/ trees with their scientific names obtained from table 5-20.

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

Table 5-20: List of plants/trees in campus

5.1.6. 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 5-21.

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 5-21: Details of Carbon footprint management

5.1.7. 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 5-22.

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 5-22: List of photos