GREEN AUDIT REPORT

For

GITAM UNIVERSITY

Nagadinahalli, Bengaluru

By

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Document number	Rev.	Date	Done by	Checked by	Approved by
CCPL/Cx/GITAM-BLR/Green Aud	00	16.02.22	RKA	KGB	SVK

ACKNOWLEDGEMENT

Conserve Consultants Private Limited wishes to thank all the staff, Management & Technical Team of **GITAM UNIVERSITY, Bengaluru** for the kind co-operation and assistance extended to our Auditor during the course of the Green audit.

Energy Consultants

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1. EXECUTIVE SUMMARY

Green Audit of GITAM University, Bengaluru was carried out by Conserve Consultants during February 2022.

The approach taken in this facility included different tools such as preparation of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and associated systems & equipment, The study covered the following areas to summarize the present status of environment management in the campus:

- Water management
- Waste management
- Green area management

The report compiles a list of possible actions to conserve and efficiently access the available scarce resources and their saving potential was also identified.

On an overall note, there is no Waste record in the site to monitor the Waste Generation, it is recommended to monitor all type of Wastes like Solid Wastes, E-Wastes, Paper Wastes and Food Wastes etc. on daily basis.

In GITAM University all the Food wastes are sent to Pigsty for feeding Pigs with Third party agreement. It is also recommended to install Biogas production system. Garden wastes are sent to Vermi composting. Vermi compost is a nutrient rich organic fertilizer and soil conditioner used in Gardening and Organic farming (University's Nursery). Solid wastes are sent to municipal landfilling (outside of the University Campus) by the Tractor. It is recommended to send the waste to Recyclers to reduce landfill dump yard.

For continuous improvement, every identified Performance Improvement Measure, a detailed M&V Plan shall be established for continuous monitoring & evaluation of the effect of the system over which PIM will be implemented.

2. Performance Improvement Measure at GITAM University, Bengaluru

S No.	WCM Description	Annual Water savings, kL	Annual savings, Lakhs.	Cost of Measure, Lakhs.	Payback Months
	Water saving through the efficient water faucets	1,00,000	9.5	2.0	3
Total			**9.5**	**2.0**	**3**

3. Project Background

GITAM Bengaluru campus was established in 2012, with modern infrastructure supported by dedicated faculty and administrative staff. The campus is located in an ideal environment in Nagadenahalli on the highway, close to Bengaluru International Airport and at a distance of 3.5 km from Doddaballapur Railway Station. The campus is provided with smart classrooms, laboratories, auditoria, seminar halls, play fields, student hostels and other student support services.

Bengaluru campus consists of three schools: GITAM School of Technology, GITAM School of Business - Bengaluru and GITAM School of Science to impart high quality training in the fields of Technology and Management in the silicon valley of India.

The campus is located near the IT hub of the city. The campus has two academic blocks, one spacious library building, an administrative block and two hostels. All the academic departments have adequate number of smart classrooms, staff rooms, seminar halls well- equipped laboratories, central library, and other facilities.

4. GREEN AUDIT

The main objective of the green audit is to promote the Environment Management and Conservation in the GITAM University Campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards.

The main objectives of carrying out Green Audit are:

- To introduce and aware students to real concerns of environment and its sustainability
- To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus.
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost.

Green Audit also includes the preliminary analysis and more detailed energy calculations-financial analysis of proposed Performance Improvement Measures (PIM). The financial analysis provides the facility team the understanding of the financial benefits in implementing specific Performance Improvement Measures. Utility bills were collected for three months period to allow the auditor to evaluate the facility's energy/demand rate structures and energy usage profiles. A detailed financial analysis is performed for each measure based on implementation cost estimates; site-specific operating cost savings, and the customer's investment criteria. Sufficient detail is provided to justify project implementation.

5. WATER

Drinking Water for the entire college is by tanker water (purchased from outside) & RO water. For RO, flushing and cleaning purpose, water is taken from the bore wells. STP Water is used for Irrigation purpose. Bore well water is pumped to the raw water sump then the OHT at terrace levels. There are totally 10 nos. RO plants and 7 nos. bore wells.

6. Performance Analysis of Water Faucets

Water flow is measured in faucets of College toilets wash basin,

S. No.	Description	NBC Baseline (LPM)	Actual (LPM)
1	Boys Hostel Wash basin	1.5	7.4
2	Girls Hostel Wash basin	1.5	7.1
3	Admin block 1 Rest room Wash basin	1.5	6.8
4	Admin Block 2 Rest room Wash Basin	1.5	7.6
5	Canteen Wash Basin	1.5	17.2
6	Boys Hostel Toilet Tap	3	2.8
7	Girls Hostel Toilet Tap	3	2.8

Comments: *Water flow in the faucets and tap are high in above highlighted area compared to the NBC standard. The baseline standards are as per the NBC 2016 part no: 9 section 1 table – 2.*

7. WATER NEUTRALITY

Presently fresh water i.e., bore well and tanker waters are used for the entire building. Sewage Treated water is used only for the Gardening.

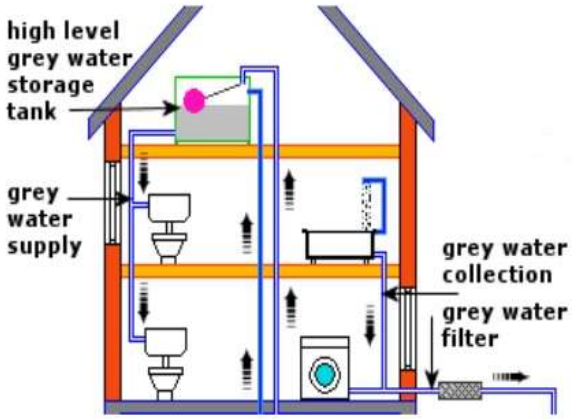
Strategies for Water Neutrality:-

a. Low flow aerators.

To reduce the fresh water consumption by installing the aerators for faucets in all guest rooms, common area restrooms, kitchen etc., this reduces the 40% of water consumption from the baseline of LEED.

b. Dual Plumbing System.

To reduce the freshwater consumption by installing the dual flush system. This reduces the fresh water consumption and using the STP treated water & the fresh water consumption is zero.

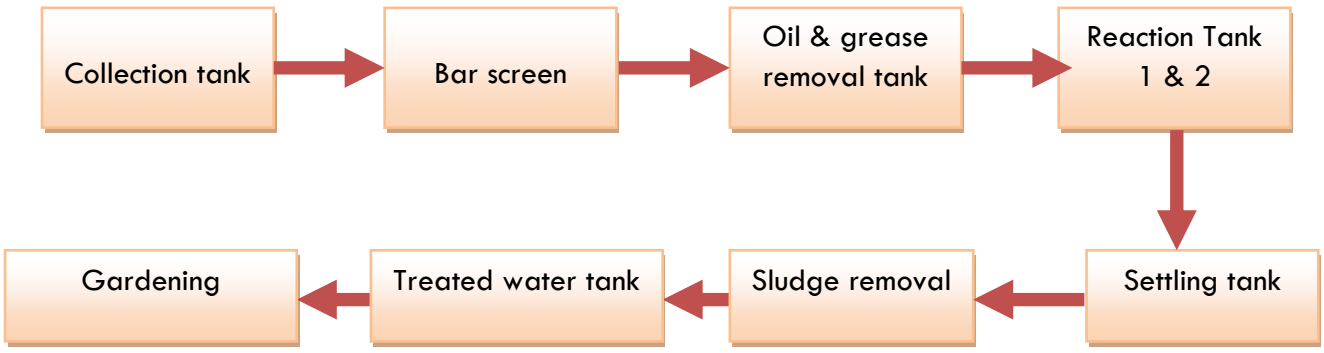


c. Native Plant Species.

For landscape STP treated water is used for irrigation. In landscape so many non-native species like cynodon dactylon (Grass) is high water consumption. To reduce the water consumption by replacing the drought tolerant/xeriscape species.

8. SEWAGE TREATMENT PLANT

In GITAM campus 450 KLD capacity of sewage water treatment is installed. Sewage treatment is done by Fluidized Bed Aeration by blower aeration method, and the treated water is used for the gardening. Equipment's studied are air blower, transfer pump & treated water pump.



9. WASTE MANAGEMENT SYSTEM

In GITAM University campus, Food wastes are collected and separate dry waste and wet waste type of waste collection bins are provided for collection of waste. All waste generated from the building operation was analyzed. A waste audit was performed on 10/02/2022 at GITAM University Campus, Bengaluru to identify opportunities to divert waste streams from landfills and to determine further source reduction opportunities.

Waste Treatment:

Food waste is collected from the canteen and sent to Pigsty for feeding Pigs on contract basis with Third party Agreement. Garden Wastes are collected and sent to University's Nursey for Vermi Compost, Vermi compost is a nutrient rich organic fertilizer and soil conditioner used in Gardening and Organic farming (University's Nursery). Solid Wastes are sent to municipal landfilling (outside of the University Campus) by the Tractor. It is recommended to send the waste to Recyclers to reduce landfill dump yard. Common solid waste management center for segregation and effective management of waste generated in the University premises shall be implemented.

Waste Audit Procedure:

- Waste auditing was carried out by sorting and measuring the building's waste over a given time period, i.e. 24 hours' time. And Audit team selected a time period of 10th Feb 2022.
- The Audit Team was equipped with all necessary safety and personal protective devices including safety glasses, respirator masks, coveralls and gloves.
- The Audit team has taken the waste audit form and marked the following types:
    - Papers
    - Tissue paper
    - Pet bottles
    - Plastic covers
    - Printed hard paper
    - Food waste

- Each waste type was separated and measured for the weight through a weighing scale. The values were entered in the waste audit form and compared against the total weight of all wastes.

10. Site Observation Report

Site Observation Report (SOR)			
Report No.	C&A/SOR/02	**Date**	10.02.2022
Location	At University's Nursery		
Observation Images			

Description
University Garden's waste and Nursery plant wastes are segregated and sent to Vermi compost.
Potential Sustainability Measures
Nil.

Site Observation Report (SOR)			
Report No.	C&A/SOR/05	**Date**	10.02.2022
Location	Outside of the Campus		

Observation Images

Description

Centralized dust bins are not provided for the collection of whole campus waste.

Potential Sustainability Measures

Except food waste all the solid wastes are sent to municipal landfilling (outside of the University Campus) by the Tractor. It is recommended to send the waste to recyclers to reduce landfill dump yard/avoid incineration. 1. Multiple type waste bins (paper/glass/metal/plastic/e-waste) shall be kept in many places to facilitate the segregation wastes at the sources itself and then 2. Centralized waste collection area for multiple waste types so that wastes can be accumulated for period of time, which in turn will make the waste recycling economically feasible for the recycling vendors.

Site Observation Report (SOR)			
Report No.	C&A/SOR/07	**Date**	10.02.2022
Location	Admin 1 & 2 Blocks, Staff Quarters Roof Top (498 kW Solar PV Panels)		

Observation Images

Description

Dusts on Solar PV panels were observed.

Potential Sustainability Measures

It is highly recommended to clean the Solar PV Panel at manufacturer recommended intervals better power generation efficiency.

Site Observation Report (SOR)			
Report No.	C&A/SOR/08	**Date**	10.02.2022
Location	STP Plant		

Observation Images

Description

Installed water meter for STP Plant is not working. STP Water is used for Gardening.

Potential Sustainability Measures

It is advised to install new digital water flow meter for regularly monitoring the STP water consumption as well the STP performance.

Site Observation Report (SOR)			
Report No.	C&A/SOR/09	**Date**	10.02.2022
Location	Canteen, Admin Block rest room, Boys and Girls Hostel Wash basin.		

Observation Images

Description

Openable metal water taps are installed without any aerators. So there is no control in the flow of water. Observed much higher water flow especially in the canteen (Vinay Sadan).

Potential Sustainability Measures

It is advised to install aerators for all the water taps, which reduce the wastage of Water.

Site Observation Report (SOR)			
Report No.	C&A/SOR/10	**Date**	10.02.2022
Location	Admin Blocks, Boys & Girls Hostels - Rest Rooms		

Observation Images

Description

It is observed that western toilets are not with dual type Flush.

Potential Sustainability Measures

It is advised to install dual type flush, which reduce the water consumption. Reduction in water consumptions also leads to power saving, it saves the operating duration of the water pumps directly. And it is appreciated that metal taps in the bath rooms are installed with Aerators.

Site Observation Report (SOR)			
Report No.	C&A/SOR/12	**Date**	10.02.2022
Location	Admin Block 1& 2 – UPS Battery Rooms		

Observation Images

Description

It is observed that conditioned UPS battery rooms are accumulated with more waste items, dust and debris.

Potential Sustainability Measures

It is advised to keep the conditioned UPS battery rooms clean. And install exhaust fans and Hydrogen sensors in the battery rooms.

Site Observation Report (SOR)			
Report No.	C&A/SOR/14	**Date**	10.02.2022
Location	Pathways and Garden Area		

Observation Images

Description

Regular cleaning inside the campus pathways and gardening area.

Potential Sustainability Measures

Nil

Site Observation Report (SOR)			
Report No.	C&A/SOR/15	**Date**	10.02.2022
Location	Outside the Campus near Labour shed & New Hostel		

Observation Images

Description

Bore well pump motor is not working and it is malfunctioning. Panel maintenance can be improved.

Potential Sustainability Measures

Replace the old pump motor with new efficient IE4/5 motor. And maintenance of the panels shall be done regularly as per the preventive maintenance schedule.

Site Observation Report (SOR)			
Report No.	C&A/SOR/17	**Date**	10.02.2022
Location	Canteen		

Observation Images

Description

In the canteen area, Pest O Flash (Flying insect electric control system) are installed, Hand washer at Wash basins and Drinking Water slogan pasted near Drinking Water Area. It is highly encouraged. But Food waste slogan label is not pasted in the Food waste Bin.

Potential Sustainability Measures

It is recommended to Paste the Food Waste slogan in the Food waste Bin. So it will easy to segregate from the different source of Wastes. Also paste the Waste slogan wherever necessary.

Site Observation Report (SOR)			
Report No.	C&A/SOR/18	**Date**	10.02.2022
Location	Landscape		

Observation Images

Description

In maximum area, landscape is being done as grass, which has higher water demand.

Potential Sustainability Measures

This type of grass shall be replaced with Druva grass or other native species of xeriscape plants. Also a mix native shrubs shall be planned at various spots.

Site Observation Report (SOR)			
Report No.	C&A/SOR/19	**Date**	10.02.2022
Location	Canteen & Hostels		

Observation Images

Description

There are different posters for Energy, Water and Food Conservation and they are displayed in the respected Areas.

Potential Sustainability Measures

It is highly encouraged. This type of practice need to be followed in the University Campus, which creates awareness to future generations about savings of energy, water and food, the natural resources.

Site Observation Report (SOR)			
Report No.	C&A/SOR/20	**Date**	10.02.2022
Location	In Chemistry Laboratory		

Observation Images

Description

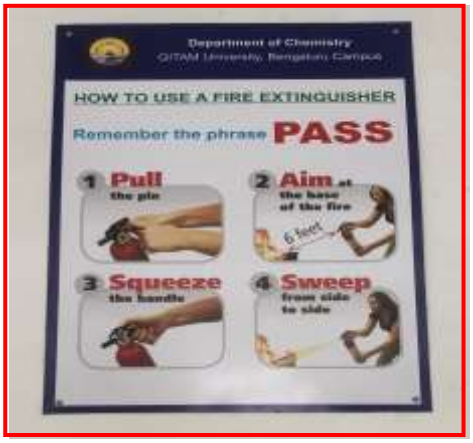
It is observed that water is leaking in water taps in Chemistry laboratory.

Potential Sustainability Measures

It is recommended to replace any leaking water taps immediately along with aerators retrofit, which not only controls the flow and but also conserves water.

Site Observation Report (SOR)			
Report No.	C&A/SOR/21	**Date**	10.02.2022
Location	In all the Laboratories		

Observation Images



Description

It is observed that in all the Laboratories Safety Practices, How to use Fire Extinguisher, Do's and Don't's, List of Experiments banners are displayed on the wall.

Potential Sustainability Measures

It is highly encouraged practices in the Laboratories, which creates awareness and safety measures on how to handle the experiments among the students.

11. PERFORMANCE IMPROVEMENT MEASURES (PIM'S)

PIM 1: Water saving through the efficient water faucets

Annual Water Savings	1,05,120 KL/annum
Recurring Annual Savings Potential	Rs. 9.5 Lakhs
One-time Cost of Implementation	Rs.2.0 Lakhs
Payback period	3 Months

Present System:

Presently average water flow in the faucets is 8 LPM it is much higher compared to the Green/Sustainable Buildings' Standards. This can lead to water wastage and higher consumption.

Proposed System:

It is recommended to install low flow aerator-based faucets to maintain max. 2 LPM as per the standards in common/lavatory rooms. This saves huge amount of water consumption.

Description	Value	Units	Formula
Average measured flow	8	LPM	A
Average usage per day	60	min/day	B
No of taps	2000	Nos.	C
Annual water consumption	350,400	KL/yr	D =(AxBxCx365)/1000
Water consumption cost	9	Rs/KL	E
Present Water Consumption cost	31,53,600	Rs/Yr	F=ExD
After installing aerators 70% water reduction is feasible. Even if we consider 30% reduction	5.6	LPM	G
Annual water Savings	105,120	KL/yr	H =((A-G)xBxCx365))/1000
Annual Saving, Rs	9.5	Lakhs	I=HxE
Investment, Rs	2.0	Lakhs	J
Payback period	3	Months	K=J/Ix12

12. GOOD PRACTICES AT GITAM UNIVERSITY CAMPUS

During Conserve Consultant's Audit, it is observed that M/s GITAM University, Bengaluru Campus has already adopted the following Performance Improvement Measures in its facility;

1.1 Safety Measures for COVID-19 precautions

COVID -19 safety measure protocol is followed very strictly inside the University Campus, which creates awareness among students and staff to maintain the social distance and wear the mask.

1.2 Composting

Garden Wastes are being converted to Vermi Composting, which is used for Gardening and University's Nursery. It is a good example of waste to Energy. It enriches nutrients to the fertilizer.