

GREEN AUDIT REPORT



(Academic Session 2019-20)



KARMASHREE HITESWAR SAIKIA COLLEGE

{Affiliated to Gauhati University and Recognized by UGC under Sec 2F and 12B UGC Act 1956}

Six Mile, Panjabari Road, Guwahati - 781022

GREEN AUDIT REPORT

- Green Audit
- Carbon Footprint
- Waste Management
- Water Management
- Energy Management

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ACKNOWLEDGEMENT

Karmashree Hiteswar Saikia College conducts an internal audit for the campus environment whereby it aims to maintain the greenery and pollution-free environment. The initiative is still young and several other measures are still to be taken to ensure the concept of environmental sustainability. The academic session of 2020- 2021 has seen a worldwide pandemic (which we are still fighting) that restricted our mobility which in turn had an impact on the green environment initiative of the campus. Due to the restriction and lockdown on the educational institutions, the managerial paperwork took some time. The field work of the audit had however been carried out sincerely before the pandemic stroked our country and report are submitted within the stipulated period. Sincere thanks to all for providing us necessary amenities and co-operation during the audit that helped in making the audit, a success.

The Audit Team

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2. Dr. Ranjan Kumar Bhatta, Asst Prof. English. - Member
3. Dr. Saswoti Baruah Bhuyan, Asst Prof. Education - Member
4. Dr. Kashmiree Gogoi Baruah, Asst Prof. History - Member
5. Dr. Daisy Nath Choudhury, Asst Prof. Education - Member
6. Dr. Anup Kumar Deka, Asst Prof. English - Member
7. Dr. Mowsumee Bardoloi Hazarika (Convener), Vice Principal.

External Audit Team

8. Amit Choudhury, Ph.D., Prof. & Dean SBUS, Director, CIIE, University of Science & Technology Meghalaya (USTM)
9. Dr. Palme Borthakur, Asst Prof. Earth Science, USTM
10. Dr. Moutushi Das, Asst. Prof. Botany, USTM
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12. Mr. Kitboklang Sun, Asst Prof Earth Science, USTM

1.0 Executive Summary

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment. Waste minimization plans for the educational institute are now mandatory to maintain the cleanliness of the campus. To find out the environmental performance of the educational institutions and to analyze the possible solutions for converting the educational campus as eco-campus the conduction of Green Auditing of institution is essential. The green auditing of 'KHSC' College, Guwahati, enables to assess the life style, action and its impact on the environment. This is the first attempt to conduct green auditing of this college campus. This audit was mainly focused on greening indicators like consumption of energy in terms of electricity and fossil fuel, quality of soil and water, vegetation, waste management practices and carbon foot print of the campus etc. Initially a questionnaire survey was conducted to know about the existing resources of the campus and resource consumption pattern of the students and staffs in the college. In order to assess the quality of water and soil, water and soil samples were collected from different locations of the college campus and analysed for its parameters. Collected data was grouped, tabulated and analyzed. Finally a report pertaining environmental management plan with strength, weakness and suggestion on the environmental issue of campus are documented.

1.01 Objectives of Green Audit

The main aim objectives of this green audit are to assess the environmental quality and the management strategies being implemented in KarmashreeHiteswarSaikia College. The specific objectives are:

1. To assess the quality of the water and soil in the KHS college campus
2. To monitor the energy consumption pattern of the college
3. To quantify the liquid and solid waste generation and management plans in the campus.
4. To assess the carbon foot print of the college

5. To assess whether the measures implemented by the College have helped to reduce the Carbon Footprint.
6. To impart environment management plans to the college.
7. Providing a database for corrective actions and future plans.
8. To assess whether extracurricular activities of the Institution support the collection, recovery, reuse and recycling of solid wastes.
9. To identify the gap areas and suggest recommendations to improve the Green Campus status of the College.

1.02 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy and water; Minimize waste generation or pollution and also economic efficiency. All these indicators are assessed in the process of "Green Auditing of this educational institute". Eco-campus focuses on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, promotes personal action, reduce the institute's energy and water consumption, reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint. Auditing for Water Management Water is a natural resource; all living organisms depend on water. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. Groundwater depletion and water contamination are taking place at an alarming rate. Hence it is essential to examine the quality and usage of water in the college. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water. Auditing for Energy Management Energy conservation is an important aspect of campus sustainability

which is also linked with carbon foot print of the campus. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

1.03 Auditing for Waste Management

Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed of, which can pose risks to the environment and to public health. Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities which can cause health problems. Solid waste can be divided into three categories: bio-degradable, non-biodegradable and hazardous waste. Bio-degradable wastes includes food wastes, canteen waste, wastes from toilets etc. Non-biodegradable wastes include what is usually thrown away in homes and schools such as plastic, tins and glass bottles etc. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals, acids and petrol. Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated in the college. Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems. Auditing for Green Campus Management Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen released by the trees of the campus is good for the people in the campus. So while you are busy studying and working on earning those good grades, all the trees in campus are also working hard to make the air cleaner for you. Auditing for Carbon

Footprint Burning of fossil fuels (such as petrol) has an impact on the environment through the emission of greenhouse gases into the atmosphere. The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions. Vehicular emission is the main source of carbon emission in the campus, hence to assess the method of transportation that is practiced in the college is important.

1.04 Methodology Adopted

The methodology adopted to conduct the Green Audit of the Institution had the following components Onsite Visit. Three day field visit was conducted by the Green Audit Team. The key focus of the visit was on assessing the status of the green cover of the Institution, their waste management practices and energy conservation strategies etc. The sample collection (water, soil) was carried out during the visits. The water samples from two sources, reservoir and tap sources were taken. The sample collection, preservation, and analysis were done in the scientific manner as prescribed by the standard procedures.

1.04.01 Focus Group Discussion

The Focus Group discussions were held with staff members and the management focusing various aspects of Green Audit. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional and local level.

1.05 Energy, Waste Management and Carbon Footprint Analysis

Survey With the help of teachers and students, the audit team has assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college.



2.0 Short History & Profile of The College

Karmashree Hiteswar Saikia College is one of the premier colleges located at Panjabari Road, Sixmile, Guwahati, Kamrup Metro District of Assam. With the shifting of the capital of Assam from Shillong to Dispur in 1973, the city of Guwahati witnessed tremendous growth of population and expansion. But the facilities for higher education still remained virtually limited as the existing colleges in the city failed to cater the need to accommodate a proportionately large number of students and as a result, many students found their doors closed to their aspirations of getting higher education.

The realization of this fact and the deep understanding of the situation convinced some prominent educationists and social activists about the prospects of founding a college in the South-Eastern part of the Guwahati city which is adjacent to the Assam-Meghalaya inter-state border. And subsequently, the college was established as City College in 19th September, 1988 at the O.B.C. Complex Dispur with the bold and zealous initiative of Late TholokGogoi, with the purpose of facilitating higher education for the downtrodden and the have-nots of the society. Late TholokGogoi, who was the founder secretary of the college, was the General Secretary of the All Assam Other

Backward Classes Association, the Mantri of the The Assam Rastrabhasha Prachar Samiti and a devoted social worker all through his life.

But Tholok Gogoi's dream-child, the City College was having hard times due to dire financial crisis and constrains. It somehow moved along and could make its bare existence till 1992 without the basic infrastructure of land and building. Then like a savior a man behind the scene appeared, and he was none other than Late Hiteswar Saikia, the then Chief-Minister of Assam. A man of the masses, Late Saikia was a versatile person and being an educationist himself in his early career as the Vice-Principal of Gargaon college, could realize the necessity of establishing a college in the south-eastern part of Guwahati city. So, he promptly allotted the present plot of land to the college at Sixmile, Panjabari Road, during his tenure as the Chief-Minister of Assam; and the college was shifted to this location on 29th Feb.1996

Subsequently a new Governing body was formed under the Presidentship of Dr.Hemo Prava Saikia, an educationist and former Cabinet Minister of Assam. Under her able guidance and leadership, the college has been progressing fast. And as a mark of gratitude to Late Karmashree Hiteswar Saikia for the landmark contribution towards the growth of the college, the City College was renamed as Karmashree Hiteswar Saikia College in a public meeting held on 4th Jan, 2004 in presence of eminent members of civil society, educationists, social-workers, teachers, and students.

The college had been running both Higher Secondary and B.A. classes. However, in the year 2000 the Karmashree Hiteswar Saikia College was bifurcated and the Higher Secondary section was separated and the classes are being conducted in the Karmashree Hiteswar Saikia Senior Secondary School with its own staff and buildings since then.

While the college has been marching with glory and pride, the family of Late Uma Charan Bania, Former Joint Commissioner, Sales Tax & Member APSC, came forward with the proposal of building a state-of-art Library in his memory. On 8th Jan. 2011, the college had a well-equipped modern library i.e. Uma Charan Bania Memorial Library and Education Centre named after him.

The college got its Centrally Air Conditioned Auditorium with about Four hundred fifty seat capacity on 6th May, 2016 from Planning and Development Department, Govt. of Assam

Also, on 9th Feb. 2019, the family members of Late Kumud Ch. Deka, who was a retired police officer, donated a Memorial Open Stage to the college in his fond memory.

The college has been dedicatedly rendering service in imparting higher education at UG level. Due to the active part in disseminating knowledge Gauhati University extended permanent affiliation in the year 2010 for the ongoing Arts courses. The college obtained recognition under Section 2(f) & 12(B) of the UGC Act, 1956 in 22nd February, 2013. The Arts Stream of the college was provincialized in 3rd June, 2014 under the Provincialization Act by Govt. of Assam (w.e.f. 14th August, 2013). The Commerce Stream of the college is run by the management in a self-financed mode, which was started from August, 2013, after a huge demand from the public. The college is thus a fast growing Co-educational institution with Arts and Commerce Streams, located at an ideal place near Sixmile on the Panjabari Road, Guwahati-22. The atmosphere here is quiet, presenting a serene educational environment.

2.01 Mission

To Empower Society with Knowledge, Skill and Expertise.

2.02 Motto

To Strive, to Seek, to Find and not to Yield

2.03 Objectives

- ➔ To encourage all the people of the society to strive for the maximum development of their potential.
- ➔ To provide quality education to enhance human values amongst the students.
- ➔ To develop self determination amongst students to secure self employment.

The college is, thus a fast growing co-educational institution located at an ideal place near Sixmile on the Panjabari Road, Guwahati-22. The atmosphere here is quiet and presents a serene educational environment.

2.04 Committee Members: Green Audit Committee

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2. Dr. Ranjan Kumar Bhatta, (Asst Prof. English), Member
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7. Dr. Mowsumee Bardoloi Hazarika (Convener), Vice Principal.

3.0 Audit Framework and Detailed Findings:

The following section provides the audit framework adopted for conducting Green Audit in 2019. The framework also lists the findings and observations for every criterion-

GREEN AUDIT

3.01 Green Audit

Category	Queries	Observations
GREEN CAMPUS	Is there any Botanical Garden or green belt plantation in the College Campus?	Yes, the college campus avails a number of various flora species. Green belt plantation has already started within the campus.
	How often plantation and monitoring of the plants are done in a year?	A gardener at daily basis takes care of the plants, nurturing done once in every month and plantation done in April and September months every year. A hobby club of Gardening is also active among students.
	Approximately how many numbers and species of plants (Trees, Shrubs & Herbs) can be found in the campus?	So far, 150 plants are labelled. There are 60 varieties of flora species available in the campus.
	Do you face any kind of Noise or Air pollution in the campus? If Yes, what are the steps taken to reduce the level of pollution in the campus?	Noise and Air: Plantation and maintaining of Green belt is done to acts as buffer for noise from the busy highway and also to regulate the air quality in the campus Water: For drinking water RO& UV water purifiers are installed in the building. Two layered water filter system installed in main water tank of the building.
	What kind of waste disposal mechanisms do you follow?	The institute follows a very simple yet effective waste disposal mechanism – they segregate the wastes at source by providing segregated dustbins (Biodegradable & non-biodegradable). Then dry wastes are taken by GMC workers and organic wastes used in the college campus by creating compost soil.
	Regarding energy conservation, what kind of activities is being undertaken by the authority.	Solar panels are installed in campus lights. In near future planning to use more sustainable energy sources.
	What is the college built up area (land-use/land cover)plan ?	The college has prepared a nice landuse/landcover map which shows the college built up area in a scientific way.



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Dated 18th March, 2020

CARBON FOOTPRINT

3.02 Carbon Footprint

Category	Queries	Observations
CARBON FOOTPRINT	What is the major mode of transportation for faculties, staff and students of the college?	Private transportation mainly two wheelers and four wheelers and public transportation are used by faculties, staff and students. Similarly cycling is encouraged for both the students and staff.
	Do you undertake awareness campaign to encourage carbon footprint reduction?	The following are the steps adopted by the college to help in carbon footprint reduction: Using reusable drinking water bottle and not single use plastic water bottle A two layering water filtration method of RO water purifier and UV water purifier was installed to provide safe and clean drinking water in the campus to helps reduce the single use water bottle. Waste segregation is done in the campus and solid waste are send to GMC for treatment and recycle as college does not have a waste treatment plant in the campus. The college library is arranged in such a way that natural light is sufficient for reading purposes which in reducing energy consumption.
	Is there any extraction of natural resources in the campus? What measures is/are taken to reduce dependence on the extracted resources.	Boring well is used for supplying water in the college. Numerous steps have been done to helps conservation. Regular plantation for holding and recharging ground water Rain water harvesting
	Do you display banner, poster or labeling to help highlighting the awareness on conservation and sustainability in your campus?	Yes. Banner and proper display board are placed to help bringing environmental consciousness to the students and encouraging environmental friendly gestures.
	Does your campus follow green building code?	The college library is arranged in such a way that natural light is sufficient for reading purposes which in reducing energy consumption.

Category	Queries	Observations
	What kind of disposable items are generated from college campus? How much quantity is generated per day.	Maximum waste is generated from the college canteen. The non-degradable waste generated are send for recycling and treatment to GMC and the degradable waste are used for composting.
	Any special undertaking from the management to reduce carbon footprint?	To encourage the students to plant and care for the trees, the college in the good spirit implement the "Plant a sapling and study for free" scheme by the Education Department, Assam Government in which free admission are given to students for planting tree. In order to continue the free admission in the next session the students have to show photographic evidence for the survival and maintaining of the sapling.

3.02.01 Observations on Carbon Footprint:

- College encourages its student and staff to use public transport system and does not run any bus/ transportation of its own.
- Few of the faculties, staff and students reach the campus by private vehicle including four wheelers and two wheelers, and here the college encourages to 'Pool' together and share.
- Although no direct awareness or campaign is taken to encourage carbon footprint reduction, however few steps adopted by the college point will surely help in carbon footprint reduction.
- Encouraging students to carry reuse water bottle and not single use water bottle.
- A two layering water filtration method of RO water purifier and UV water purifier was installed to provide safe and clean drinking water in the campus to helps reduce the single use water bottle.
- Waste segregation is done in the campus and solid waste are send to GMC for treatment and recycle as college does not have a waste treatment plant in the campus.

- The college library is arranged in such a way that natural light is sufficient for reading purposes which in reducing energy consumption.
- To encourage the students to plant and care for the trees, the college in the good spirit implement the "Plant a sapling and study for free" scheme by the Education Department, Assam Government in which free admission are given to students for planting tree. In order to continue the free admission in the next session the students have to show photographic proof for the survival and maintaining of the sapling.

3.02.02 Recommendation:

- It is encouraging to install solar power lighting system especially in the outdoor areas.
- Initiate dialogue with APDCL, Govt of Assam to implement the 'RODALEE' scheme for Grid Connected Roof Top Solar Power Generation within the college campus.
- Displaying of cardboard and poster or banner at strategic places for carbon footprint awareness.
- Encouraging the use of cycle and formation of Cycling Club.


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Dated 18th March, 2020

WASTE MANAGEMENT

3.03 Waste Management

Category	Queries	Observations
WASTE MANAGE- MENT	Do you have any process to treat organic wastes generated in your campus?	The campus practices traditional method of treating organic wastes generated within the campus with the help of segregated compost pit. The institute practices Permaculture for falling natural leaves etc. on the ground and allowing the same to naturally decay to regenerate soil.
	How do you manage all dry wastes (paper, metal, glass, other dry waste, e-waste, etc.) ?	Dry wastes are collected by GMC workers for recycling. The campus practices a 'Plastic free zone.'
	Do you follow any process of wastes segregation and recycling?	Yes. For organic wastes management segregated compost pit method is practiced. Dry organic wastes are packaged for selling purpose at minimal cost which is a best practice to convert 'Wastes to wealth.'
	Do you organise any awareness programme to make students and Faculty members conscious about reduced waste, recycle and reuse?	Yes, awareness programmes are organised by College NSS group every year in the campus as well as outreach events also.
	How do you recycle and reuse kitchen wastes from the canteen?	With the help of segregated organic compost pit in the campus.

3.03.01 Best Practices/Initiatives for the Environment:

- Emphases more on using bicycles for eco-friendly transportation

- Save energy
- Save water
- Green movement by more plantation and vertical gardening to reduce air pollution
- Rain water harvesting
- Awareness programmes
- No plastic moto
- Cleanliness drive




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WATER MANAGEMENT

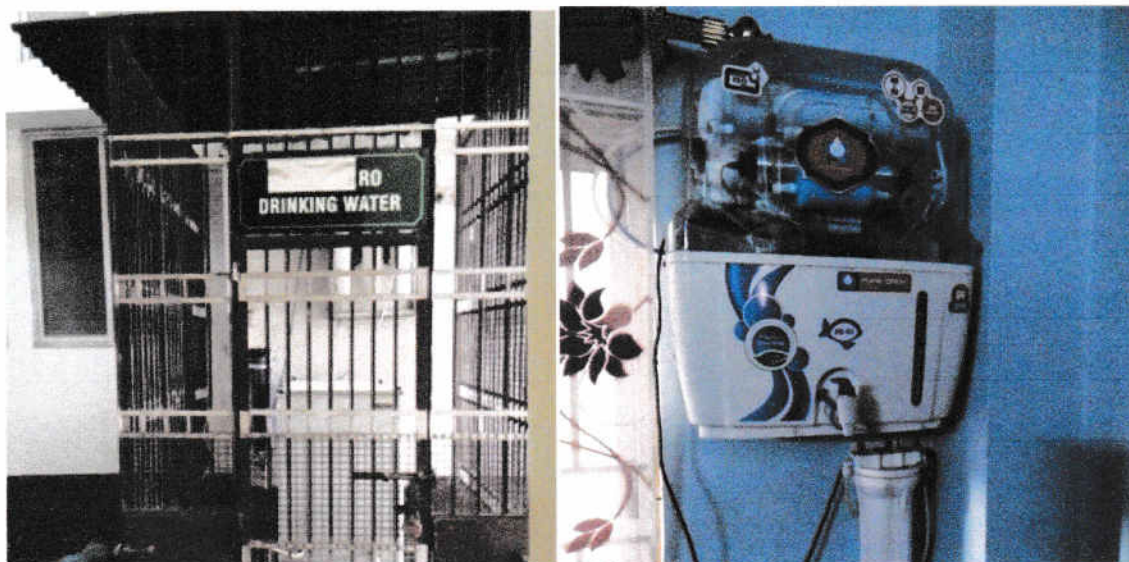
3.04 Water Management

Water Quality assessment Water samples from two different locations were collected and analyzed for its quality parameters. The samples includes reservoir water which are the main water source of the college campus and tap water samples which is used for canteen and drinking water cum cooler systems. The samples were collected, preserved and transported to USTM and analyzed for various physio-chemical parameters. The major parameters analyzed include dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids. The results are presented in the Table 1 The results are comparable with the values of drinking water standards prescribed by different agencies.

Table 1. Results of Water Quality

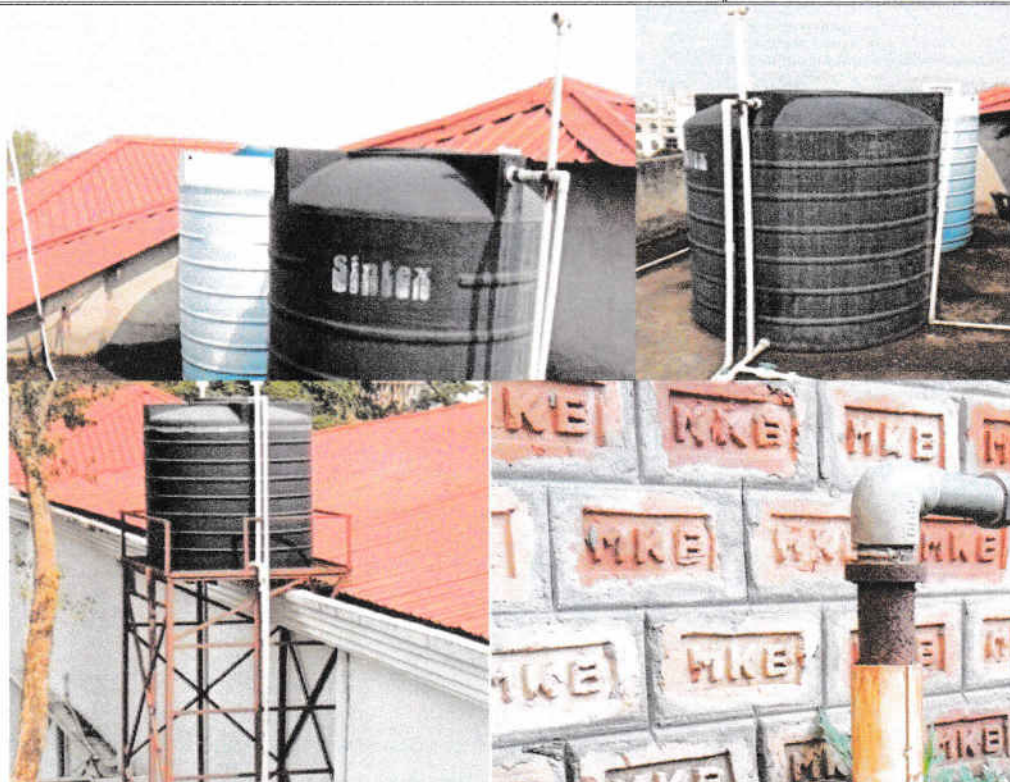
Parameters	Reservoir water	Tap water
Dissolved Oxygen (mg/l)	6.72	8
Acidity (mg/l)	12	10
Alkalinity (mg/l)	162	80
Chloride (mg/l)	27.22	13.11
Hardness (mg/l)	120	115
Conductivity (μ s)	12	8
Total Dissolved Solids (ppm)	12	10
pH	8	7.2

The source of water used in the College is a Ground Water with Deep Well Boring present in the campus to a depth of 150ft. A total of 6000lt of water is pumped out from the boring every day (Table 2). There is no wastage of water as the college is presently running courses and programs on Humanities, Social Sciences, Commerce etc and has no laboratories.



Parameters	Response
Source of water	Boring
No of boring	1
No of motors used	1
Horse power – Motor	1.5
Depth of well	150ft
Water level	75ft
Number of water tanks	3
Capacity of tank	2000lt
Quantity of water pumped every day	6000lt
Any water wastage/why?	Nil
Water usage for gardening	500lt
Waste water sources Lab	No lab facility
Rain water harvest available? yes	Yes
No of units and amount of water harvested	6000lt
Any leaky taps	No
Amount of water lost per day	Negligible

Parameters	Response
Any water management plan used?	Water management audit conducted
Are there any signs reminding peoples to turn off the water?	Yes
Any water saving techniques followed	Rain water harvesting



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ENERGY MANGEMENT

3.05 Energy Management:

Energy management and audit process involved Inspection, Survey & Analysis of energy flows for energy conservation in a building. Also a process or a system to reduce the amount of energy input into the system without negatively affecting the output (s) plugged is being discussed and recommended.

3.05.01 Observations:

➤ College campus uses electricity through various Electric Appliances such as

- LED bulbs (250 nos.)
- CFL bulbs (140 nos.)
- TUBELIGHTs(113 nos.)
- FAN (191 nos.)
- AC (1 nos.)
- Central AC (2 Nos)
- PROJECTOR(3 nos.)
- Smart Class Room (1 Nos)
- TV (1 nos)
- WATER PURIFIER (3 nos.)
- WATER PUMP (1 nos)
- PRINTER (9nos)



- There are ample of scope to reduce the energy bill of the college. For example college library is containing CFL lights which could be replaced by LED lights.
- There are also age old Incandescent light in administrative block, which should be replaced by LED lights as soon as possible.
- The GENERATOR used in the campus is eco-friendly green generator, which is appreciable but there are still room to improve upon it.
- Monthly average energy consumption of the month is Approx. 2500 units and Energy charges per month are Approx. RS. 32,000/- .Which could be reduced significantly by proper measures

3.05.02 Recommendations:

Types of lamp	Power consumption in watts	Output lumens	Efficiency lumens/watt
Incandescent 100 watts	100	1200	12.0
Tube lights 40 watts	52.48	2460	46.87
CFL 15 watt	19.6	900	45.91
LED 9 watt	9	900	100

- LIGHTING: LED has the highest efficiency of 100 lumens/watt. So replacing all lights with LED will make the lighting of the college most energy efficient.
- FANS: Replacing Low Cost Fan (LCF) with High Cost Fan (HCF) is recommended. Extra cost payback period is 2.3 years.
- WATER PUMP: Installing a water level controller in the water tank can stop 10 minutes of average daily overflow. Extra cost payback period is 3.6 years.
- GENERATOR: Installing a HYBRID GENERATOR with solar panel installed

SOME OTHER ACTIVITIES:

- Energy awareness campaign should be organized in WORLD ENERGY CONSERVATION DAY on 14th December every year
- Facts and Figures about energy waste should be displayed in the campus
- Installation of solar panel such that some part of the energy comes from renewable source

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