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# ENVIRONMENT AUDIT REPORT ON WATER CONSERVATION BY RECOGNISED AGENCY ABOR VINCIT



# **REPORT OF ENVIRONMENT AUDIT**

Submitted to

### ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS) Cuddalore - 607001, Tamil Nadu, India.

Date of Audit: 21/09/2024 (Saturday)



Submitted by

Dr. Helen Roselene CQI-IRCA Certified EMS ISO 14001:2015 Lead Auditor

#### **ENVIRONMENT AUDIT**

#### 1. Preamble

Environment (Eco) audit is nothing but the snapshot of a facility's status with regards to environmental, health and safety rules and regulations adopted in a campus. This audit is a systematic, documented, periodic and objective review by a regulated entity of facility operations and practices related to meeting the environmental requirements. This audit should be undertaken by observing, measuring, recording the data and collecting and analyzing the various components in an organization related to environment. To be effective, it must be done systematically and thoroughly together with full management support. In general, environmental audit is designed to achieve a maximum resource optimization and improved process performance in the audit site. It is a 'Common Sense Approach' to identify the problems and solve those problems eco-friendly. Environmental audit enables a comprehensive look at the audit site to facilitate our understanding of material flows and to focus our attention on areas where waste reduction and therefore cost saving is possible (Gowri and Harikrishnan, 2014).

The important goal of an Environment audit is to promote the environment management and conservation to the public through Educational Institutions and Industrial sectors. The reason for the environmental audit is to perceive, quantify, describe and prioritize the framework of environment sustainability in compliance with the applicable rules, regulations and requirements. In general, environment audit can be achieved by creating awareness among students, faculties and staff members. There are some outreach programmes in which a large number of rural people may be undergone the awareness of environment and conservation. The outreach programmes may be useful to safeguard the environment and reduce the threats posed to human health which in turn is useful to control the spread of various disease outbreaks.

The predominant goals of sporting out environment audit are:

- To create awareness among the stakeholders about the environment and its sustainability.
- > To safeguard the environment and reduce the threats posed to human health.
- To establish a baseline information to evaluate future sustainability via averting the Interruptions in the environment which might be harder to deal with and their corrections calls for high value.

- To convey a status file on environmental compliance as per the Environment Management Systems (it may be followed an ISO standard of 14001:2015).
- To review the usage of water for various purposes in the company and identify the sources of waste generation and possibilities of mitigation.
- To evaluate the waste disposal system and to document the status report with regards to environmental compliance.

#### 2. Environment Audit Observations

#### 2.1 Solid Waste Management

- Solid waste Management system includes segregation (wet waste, dry waste and hazardous waste) collection from the source, transportation, treatment, assessment and eradication. Awareness towards this issue with education and practice of waste management and control will save our environment and protect us from any kind of health risks.
- Vermicomposting is one of the best practices adapted in the campus for the management of decomposable organic waste. There are two big vermicomposting sites in the campus. One is in front of the Micro-biology department with the size of 20 X 15 X 3 (feet). Another one is on the western side of Library Block with the size of 40 X 30 X 4 (feet). The bio-degradable wastes such as food wastes, garden wastes and yard wastes are utilized for vermicomposting.

In addition with the above two vermicomposting units, the Enviro Club of the college inaugurated two more vermicomposting units with the species *Eudrilus eugeniae* near the department of Zoology named "Extension Hut".



Vermicomposting Tank in Extension Hut



### Students Training on Vermicomposting

Harvesting of Vermicompost

- Waste Category Constituent Parameter Method of Disposal: This is the method of disposing solid wastes by categorizing or segregating it.
- Different types of waste generated in the college and their disposal are.

TYPES OF WASTE	PARTICULARS	DISPOSAL METHOD
E-Waste	Computers, electrical and electronic parts.	E-wastes are properly handed over to E-waste handling agencies approved by the Tamil Nadu Pollution Control Board.
Paper Waste	Exam papers	Direct selling to vendors.
Plastic waste	Damaged furniture, Pens, Refills, other plastic containers and wrappers etc.	Direct selling to vendors.
Food wastes and garden wastes	All decomposable	Vermicomposting
Glass waste	Broken glass wares from the labs	Send with municipal waste
Sanitary Napkin	Used Napkins	Napkin Incinerators
Canteen waste	Coffee cups and packing's	Send with municipal waste
Hostel wastes	Food wastes and vegetable wastes.	Vermicomposting
Yard Waste	Solid waste from tree droppings	Vermicomposting
Lawn Waste	Solid waste from lawn	Vermicomposting



Segregation of Solid Waste at Source



**Incinerator in Ladies Toilet to Dispose Sanitary Wastes** 

#### 2.2. E-Waste Management

E-wastes are being stored properly and handed over to E-waste handling agencies approved by the **Tamil Nadu Pollution Control Board.** 

S. No	E-Waste Products	Quantity	
1.	Hard disk	35	
2.	RAM	32	
3.	Motherboard	35	
4.	CD-Drives	5	
5.	Bus cable	58	
6.	SMPS	43	
7.	Floppy drive	13	
8.	FAN	22	
9.	16-port –Ethernet repeater	3	
10.	Cabinet	36	
11.	Monitor	50	
12.	Cartridge	1	
13.	Printer	1	
14.	Floppy drive	13	
15.	Mouse	23	
16.	D-link Ethernet switch	1	
17.	Adapter card (Ethernet hub)	18	
18.	Adapter	1	

#### The following are the list of E-Waste products:

Most of the E waste is sent to Virogreen India Pvt.Ltd., Thiruvallur, Tamil Nadu -601201.

#### **E-waste sold Bills**



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#### 3. Accounting of more oxygen producing and CO<sub>2</sub> absorbing plants in the Campus

There are some plants which are being considered highly efficient in oxygen production and carbon-di-oxide absorption which in turn reflected the quality of the green campus. If more oxygen is made available in the campus naturally, the stakeholders may be free from various cardiovascular and pulmonary problems and breathing troubles. The snake plant (*Sansevieria zeylanica*) otherwise known as the mother-in-law's tongue plant are unique for its night time oxygen production, and ability to purify air through the removal of various toxic gases in the atmosphere. Although there are options available for increasing oxygen by reducing  $CO_2$  through means such as oxygenators and air purifiers, there are a variety of natural alternatives for increasing air quality that are beneficial for both body and mind. The campus is having a maximum number of more oxygen producing and  $CO_2$  absorbing plants such as Spider plant, Areca palm, Mango, Coconut etc.

In view of reducing noise pollution and air pollution, the college is maintaining a big canopy of trees in and around the campus. Trees are the very good absorbents of noise. Leaves, twigs, and branches on trees, shrubs, and herbaceous growth absorb and deflect sound energy. Refraction of sound waves occurs when sound passes through vegetative barriers and bends around plant structures. Vegetation generates masking sounds, as leaves rustle, branches sway, and stems creak.



#### TARBUS BLOCK

#### VENMANI BLOCK



#### Greeneries in the campus

#### 4. Rainwater harvesting System and Percolation Pond

Rainwater harvesting system is a traditional old practice not only in drought prone areas and also in areas having seasonal rainfall. The Indian traditional rainwater harvesting is being practiced in various parts of the country to improve the ground water status. Now the threatening features of the lower ground level of water has created a revamp of newly featured rainwater harvesting systems. Indian traditional rainwater harvesting systems are constructed based on three modes either direct pumped, indirect pumped or by gravity alone in the campus. In addition, lakes, ponds, water channels and any other water reservoir methods are considered as the rain water harvesting system. The green campus should have adopted any of the above said modes of rainwater harvesting or any new methods that has the benefit of conserving the water resource as well. • The college campus has two rainwater harvesting tanks each of approximately 1500 liters' capacity. One is installed near the Department of Microbiology and the other one is near the old hostel. Approximately, 3000 liters of water can be saved during rainy season and this water is diverted for underground recharge.



**Rain Water Harvesting Tank** 



**Percolation Pits and Bore Wells** 

- Groundwater recharge or deep drainage or deep percolation is a hydrologic process, where water moves downward from surface water to ground water. To sustain and to recharge the underground water level the waste water from RO plant situated near the Arul Ilam block is diverted to percolation pit through a channel.
- Quantity of water recharged per day in RO Plant near Arul Ilam = 4000 Litres
- Potable water segregated from it = 1000 Litres
- Remaining non potable water send for percolation pit is = 3000 Litres
  There are three bore wells present in the campus. A total of 7000 L of water is
  pumped out from the bore wells every day. An average of 1,40,000 L of water is used
  by the college per month.

S. NO	PARAMETERS	RESPONSE
1.	Source of water	Bore wells
2.	Number of Bore Wells	3
3.	Number of Horse Power motors used	3
4.	Depth of well –Total	Bore well1
		200 feet
		Bore well 2
		150 feet
		Bore well 3
		100 feet
5.	Number of water tanks	15
6.	Total Capacity of tanks	32000 L
7.	Quantity of water pumped every day	7000 L
8.	Number of units and amount of Rain	2 units - each with 1500 L
	water harvested	
9.	The usage of water on every working	7000 L
	day(approximately)	
10.	The consumption of drinking water	2,500 L (approx.)
11.	For Gardening	1,500 L/Day
12.	Cleaning purposes	2,000 L
13.	Laboratory purposes	1,000 L
1		I

#### Water Audit

#### **Drinking Water Quality Measurements**



#### **Drinking Water Samples Collected for Analysis**



Sources of Treated RO water in the campus

No 1: Hostel

No 2 : Venmani block

No 3 Tarbus block

- No 4: Computer science block
- No 5: Arul illum block

#### Source: Treated Reverse Osmosis water

Paramotors						Drinking water standard
I al anetel s	1	2	3	4	5	IS 10500 : 2012
рН	7.9	8.0	8.3	8.2	8.1	6.5-8.5
T DS (ppm)	130	60	60	30	80	500
Chloride (mg/L)	60	62	50	52	60	250
Hardness(Calcium	66	76	70	78	80	300
and magnesium						
mg/L)						
Fecal coliform	NIL	NIL	NIL	NIL	NIL	<100
MPN/100ml						
Fluoride mg/L	NIL	NIL	NIL	NIL	NIL	1.5

**Interpretation:** The above samples are free from contamination such as E coli. This shows that the water is treated efficiently. The other parameters such as TDS, hardness, chloride and fluoride are **within the permissible limit and safe to drink.** 

#### Water Quality Measurements

#### Source: Bore well

Parameters	Venmani Block	Arul Illam	Drinking water standard IS 10500 : 2012
рН	8.5	8.5	6.5-8.5
Total Dissolved Solids (ppm)	1003	1003	500
Chloride (mg/L)	400	390	250
Hardness(Calcium and magnesium Mg/L)	200	330	300
Fluoride mg/L	Nil	Nil	1.5

#### Interpretation:

The above ground water analysis report results shows that total dissolved solids is above the limit of 500 mg/L. Further detailed analysis shows that, the water sample shows high amount of chloride that is beyond the permissible limit of 250 mg/L. The source of high amount of chloride could be due to infiltration of sea water. The total hardness of water is below the permissible limit and also there is absence of fluoride. However the water can be used for other domestic purposes.

This ground water is further treated by reverse osmosis for drinking. The campus has installed five RO Units (4 in the campus and 1 in the hostel) to provide clean and safe drinking water for the stake holders.

#### 5. Soil analysis



Soil Sample Collected by the Students for Soil Analysis

Organic matter in soil comes from the remains of the plants and animals. Organic matter is of great importance in agricultural soil because it serves as a storehouse for essential plant nutrient and especially nitrogen and carbon matter, which are required by plants in relative abundance for their satisfactory growth.

Soil	analysis	report
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Soil sample parameters	Hostel	library
рН	8.0	7.9
Organic Content	3.2	3.6
Organic Carbon	2.1	2.25

**Interpretation:** Most cultivable soils contain 1-5% organic matter, which is mostly the top 25cm of the soil. Generally the organic content of 3-8% or higher in the soil which improve plant growth.

The observed result shows that the organic content is around 3.6 in library and 3.2 in hostel thus the soil facilitate good plant growth.

Soil pH affects the amount of nutrients and chemicals that are soluble in soil water, and therefore the amount of nutrients available to plants. Some nutrients are more available under acid conditions while others are more available under alkaline conditions. The observed result shows that the pH content is around 7.9 in library and 8.0 in hostel which in more closer to the optimum level. Alkaline soils may have problems with deficiencies of nutrients such as zinc, copper, boron and manganese. Soils with an extremely alkaline pH (greater than 9), the soil pH can be lowered by adding organic compost.

#### 6. Hazardous waste category

#### 6.1. Fire risk assessment

Emergencies like a fire breaking out happen when least expected. The only way to successfully deal with this is to be ready. A critical part of the preparation is fire risk assessment



**Fire Extinguisher in Laboratory** 

A gas extinguishing system is a fire extinguishing system that extinguishes fire with the help of a gaseous extinguishing agent either through oxygen displacement (reduction of oxygen content). **Carbon Dioxide** (CO<sub>2</sub>) extinguishers are most effective on Class B and C (liquids and electrical) fires. Since the gas disperses quickly, these extinguishers are only effective from 3 to 8 feet. The carbon dioxide is stored as a compressed liquid in the extinguisher; as it expands, it cools the surrounding air. **Fire extinguishers are fitted in all the blocks and laboratories in the college.** 

#### 7. Practices followed in the Organization

- Water saving methodologies adopted in the college campus such as lab waste water per day is 500 liters, periodically used for gardening, waste water from RO is 3000 liters /day, utilized for gardening and percolation pit whereas stored rain water approximately, 2000-3000 liters per year depending upon the seasonal rainfall.
- The college campus has two rainwater harvesting tanks each of approximately 1500 liters capacity. One is installed near the Department of Microbiology and the other one is near the old hostel. Approximately, 3000 liters of water can be saved during rainy season and the remaining is diverted for underground recharge.
- There are two sumps in the campus for collecting laboratory liquid waste. One is near the chemistry block and another is near the Microbiology block. Approximately 480 litres of laboratory liquid waste generated every day in both the sumps. The liquid waste collected in these sumps are kept for sedimentation and dilution by adding water and then it is utilized for gardening operations and other non-potable usages.
- There are four RO units in the college and one in hostel. Each is recharged with 1000 litres of water every day on all working days. Totally 4000 litres of water is being purified every day from the four RO units in the college campus. Approximately, 300 to 350 litres of water may be spilled per day and is diverted to garden through proper channel.
- Waste minimization is in practice since the beginning. Well established vermicompost facility is available to produce high quality of organic manure is made available within the college campus using vegetable waste from hostel and leaf litter as raw materials.
- The students, teaching and non-teaching staff are being educated periodically on proper waste management practices through awareness programs, giving hand notices, displaying slogan boards in the campus etc.
- Wastes are collected on daily basis from various sources and segregated as degradable and non-degradable waste.
- Colour-coded dustbins are used such as blue for degradable and red for nondegradable wastes.
- Waste Category Constituent Parameter Method of Disposal was introduced.
- Paper wastes and plastic wastes such as pen, refills, plastic water bottles, other plastic containers, wrappers etc. are send for direct selling for the favour of recycling.

- Restricted entry of automobiles and separate parking area for vehicles outside is provided.
- Serving food in plantain leaf on all college celebrations which enhances the degradation of solid waste.
- Conducting campaign for plastic free campus regularly.
- Availability of RO drinking water facility for students is appreciated which is completely devoid of contamination.
- Availability of rain water harvesting tanks and water saving techniques are much appreciated.

#### 8. Best practices

As one walks through the campus one can see the sprawling green campus with ample oxygen and clean environment .the class rooms and the surrounding is clean and neat with sign boards to preserve the environment.

Following are the best practices seen

- Conscious effort to establish rain water harvesting is done.
- The management has maintained the drinking water unit such as reverse osmosis, This is manifested in the drinking water quality analysis.
- Sincere efforts are made to divert the reject water for recharging the ground water table and gardening.
- Use of plantain leaf in serving large gathering to enhance biodegradation of solid waste
- There is segregation of solid waste at source.
- Biomedical waste such as sanitary pads is incinerated.
- Good initiative to bring about awareness on conservation, recycling, composting and fish culture is provided to the students.
- Noise level and carbon dioxide is very less this could be attributed to the green cover.
- Continuous internal auditing is done by the environmental Auditing team from IQAC.
- There is a custom of honouring the invited guests for various programmes with saplings of tree

#### 9. Recommendation

- As the soil pH is slightly alkaline due to the college is located near seashore, so we need to add more organic compost to the soil
- Water meters could be used at the point of supply of drinking water so that the water consumption can be audited easily.

#### **10.** Conclusion

Environmental performance of a campus enables Long-term efficacy. Performance and sustainability have common support. To be Performing or to be able to support sustainable development implies the concern for simultaneous achievement of three categories of objectives: Economic-financial, social and environmental. Thus, the present audit demonstrates the major objective of determining the campus performance, by environmental indicators that are mainly used to assess the sustainability. The quality of the environment in the campus was assessed with the help of various environmental indicators for air quality such as carbon dioxide level which is low, noise level is low and drinking water such as absence of Escherichia coli, TDS and fluoride are absent. The extension activities taken up by the student shows the students social responsibility in bringing about environmental consciousness.

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### Appendix Instruments used

Carbon dioxide analyzer- Carbon dioxide level is low in the class room



Sound Level Meter showing the Sound Level in the Classroom



Sign Boards to Preserve the Environment



Chloride Analysis – Argentometric method



Organic Content in soil by WalkeyBlack Method



pH Meter



**TDS Meter** 



## Lux Meter-Intensity of Light



Absence of E coli in Drinking Water Treated by RO





#### NIMMA BHOOMI SOLUTIONS

#### CERTIFICATION

This is to certify that the Environment audit was conducted at St. Joseph's College of Arts & Science (Autonomous),Cuddalore - 607001, Tamil Nadu, India, on 21.09.2024, Saturday.

I assure that the data collected and documented is authentic.

Dr.Helen Roselene PhD, MEHH M. **P**G diploma in pollution analysis CQI-IRCA Certified EMS ISO 14001:2015

Lead Auditor





QMS/6567/0824

EMS/658D/0824

#5,JHBHS,Gubblala Main road ,Subramanyapura police station ,Bengaluru -560061 Registered with MSME, Government of India-UDYAM-KR-02-0063611



# **Certificate of Achievement**

This is to certify that

# Helen Roselene Thomas

has attended and successfully completed the course assessment and examination for the

PR315: EMS ISO 14001:2015 Lead Auditor Training Course

Course No. 17912 certified by the CQI and IRCA. This course satisfies the training requirements for the CQI and IRCA EMS Auditor Certification Scheme.

Held on:

July 22 – 26, 2019

at: Bengaluru, India

Signed:

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Date: July 10, 2020

Anantha Prabhu General Manager, Technical, SAR, ICC (Global Schemes) & Global Accreditation, Training

Certificate Serial No: 19/IN/1020306/4801

Unique Delegate No: 195371



CERTIFIED COURSE

The Certificate is valid for 5 years for the purpose of Auditor Certification by CQI and IRCA