

ENVIRONMENT AUDIT REPORT

2022-2023



HOLY CROSS COLLEGE (AUTONOMOUS)

**Nagercoil
Tamilnadu 629 004,
INDIA**

**TJ Solutions
4/101, Raja Sir
Muthiah Nagar,
Bye-pass road,
EllisNagar,
Madurai-625 016.**

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ACKNOWLEDGEMENT

We at TJ Solutions, Madurai are thankful to the Principal for giving us the opportunity to carry out the Environment audit of HOLY CROSS COLLEGE, Nagercoil -629004, Tamilnadu, India. TJ Solutions team is also thankful to all other supporting Officers / Staffs of the above institute for their wholehearted support, hospitality and the courtesy extended to the Audit team during the course of the visit.

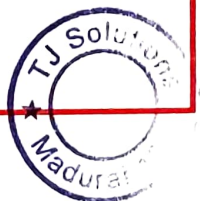
The following officers from TJ Solutions under the guidance of Mr. S.Balraj M.E.,Ph.D., have carried out the Environment Audit.

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Summary of Environment Audit

Environment audit of HOLY CROSS COLLEGE and its HOSTEL was carried by TJ solutions. Audit team has gone through the data related to Water and Electrical Energy, Waste generation, Waste Management, Waste Recycling and Reuse, Green Belt Development of the Institution both inside and outside the campus. The team also carried out the study of Renewable energy utilization, Pollution abatement measures, Rainwater harvesting, Water and Energy Conservation measures taken to reduce the pollution, noise level, Greenhouse emission and maintain Ambient Air quality.

During the visit it is observed that cleanliness in the campus is well maintained through proper disposal of wastes, utilization of eco-friendly supplies and effective recycling program. The concept of eco-friendly culture is disseminated among the students through various seminars/workshops and community-oriented programs. The Institution strictly follows the reduce, reuse and recycle method to limit energy usage and replace non-renewable energy sources with renewable energy resources.

The environment audit report is a very powerful and valuable communications tool to use while working with various stakeholders who need to be convinced that systems and procedures in place are suited to cope with natural changes and modifications.

It is hoped that the results presented in the environment audit report will serve as a guide for educating the college community on the existing environment related practices and resource usage at the college as well as spawn new activities and innovative practices.

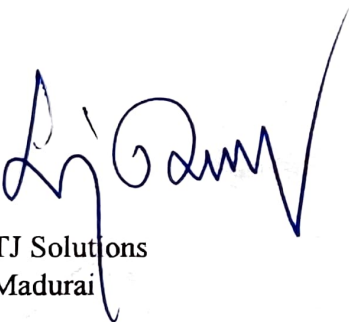
The audit outputs and recommendations are summarized as follows:

- Total water consumption for HOLY CROSS COLLEGE and Hostel – 78.9 KL/Day
- Electrical Energy consumption from TNEB GRID alone – 132952 units
- Total Electrical Energy consumption -140239 units
- Renewable energy from Solar PV power plants- 9387 units
- GreenHouse Gas Emission -226.9 t CO₂e



- Air pollution impact on Ambient Air quality is negligible since the quantity of fuel used for combustion in the institution is very less
- Noise levels inside the campus are within the prescribed limit.
- Wastewater treatment plants can be constructed in future plans.
- Biogas plants and other degradable bio- waste are converted into bio-compost and bio-fertilizer.
- Rainwater collection system is covered for 146.37 sqft area.
- Flow meters are to be provided for better water management.
- Waste water management has to be improved to reduce the water consumption.
- Steps to be taken for maximizing the solar power harvesting.

We are happy to submit this detailed environment audit report to the HOLY CROSS COLLEGE.




TJ Solutions
Madurai



CERTIFICATE

Environmental Audit –July -2023

This is to certify that **Holy Cross College, Kurusady Nagercoil** has conducted a detailed **Environmental Audit** of their campus and has submitted the necessary data and credentials for scrutiny. The activities and measures carried out by the College have been verified based on the field visit and reports submitted and were found to be **excellent**. The efforts taken by the faculty and students towards environment and sustainability are highly appreciated and commendable.


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1. Introduction

1.1 Environmental Policy

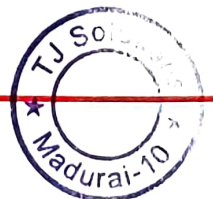
HOLY CROSS COLLEGE has well formulated Environmental Policy to guide all its activities.

The main objectives are as follows:

- ❖ To Reduce, Reuse, and Recycle the resources consumed by our institute
- ❖ To achieve sound environmental practices across our entire operation.
- ❖ To minimize our waste and reduce our water consumption wherever possible.
- ❖ To invite our stakeholders to participate in our efforts to protect the environment.
- ❖ To create awareness among our employees and train them to meet our objectives
- ❖ To review our actions on the environment on a regular basis and compare our performance with our policies, objectives and targets.

The Institution vouchsafes:

- ❖ Identifying the environmental impacts and aspects of our operations and ensuring that we meet our compliance obligations.
- ❖ Establishing environment programs that are consistent with our commitment to the continual improvement of the environment management system.
- ❖ Compliance with applicable environmental policies and prevention of pollution by applying the best available practices



2. WATER

2.1 Water usage at Holy Cross College for Women

Total number of students studied during the academic year 2022-23- 2474

Teaching & non-Teaching staff in the institution during the academic year 2022-23 -208

Total number of stakeholders: 2682

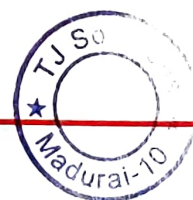
Number of college working days: 180

Sl. No	Place	Water usage Quantity Litres / Day
1	Laboratories	1,000
2	Drinking	2500
3	Garden	30,000
4	Rest room	10,000
5	Construction	3500
6	Canteen	4000
	Total	51,000

Water usage in the College- 51 KL / Day.

Water usage per day per stakeholder in the college -19 litres.

Waste water generation in the college - 15 KL/day.



2.2 Water usage at Hostel :

Number of students and staff residing in the hostel during the academic year 2022 -23

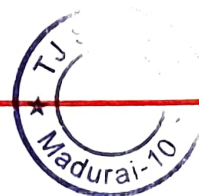
Number of day's hostel was occupied with the students and staffs- 220.

Sl. No	Place	Water usage Quantity Litres / Day
1	Cooking	900
2	Drinking	500
3	Garden	5000
4	Toilet ,Bath room and clothes washing	20,000
5	Vessel Cleaning	1500
	Total	27,900

Water usage at Hostel - 27.9 KL / Day.

Water consumption per day per stakeholder in the hostel - 126.8 litres.

Waste water generation in the Hostel - 22.4 KL /day.



3. Electrical Energy :

3.1 TNEB Grid Electrical Energy Consumption: 2022-2023

TNEB ENERGY CONSUMPTION -COLLEGE				
Sl. No	SERVICE NO	TARIFF	Units Consumed	Bill Amount -Rs
1	7123014167	LM2B1	42292	459148
2	7123014181	LM2B1	53290	489002
3	7123014166	LM51	1780	21012
4	7123014335	LM61	40	6555
5	7123014180	LM51	470	12335
6	7123014321	LM51	5160	68664
7	7123010534	LM51	2210	27722
	Total		105242	1084438

TNEB ENERGY CONSUMPTION -HOSTEL				
Sl. No	SERVICE NO	TARIFF	Units Consumed	Bill Amount -Rs
1	7123014168	LM51	300	8731
2	7123014169	LM51	2520	27066
3	7123014170	LM51	12260	133909
4	7123014171	LM51	12630	130555
	Total		27710	300261

3.2 Diesel Generator Electrical Energy Consumption: 900 Units.



Total electrical energy consumption :

ELECTRICAL ENERGY CONSUMED	UNITS
Diesel Generator (Based on diesel consumption)	900
College and Hostel	132952
Total electrical energy	133852

3.3 Solar power Electric energy consumption:2022-2023

Sl. No	Solar Capacity KW	Solar Power Generation Units
1	5	6387



Total Electrical Energy consumption in the College & Hostel -1,42,39 units.

Electrical Energy consumption per stakeholder per year - 52.28 units.

4. FUEL CONSUMPTION

4.1 LPG

For cooking and LAB, LPG gas is used in the hostel, College and canteen

LP GAS usage in the year 2022-2023-

Hostel 420

College 6

Canteen 188

Total 614*19= 11,666 Kg (1 Commercial cylinder= 19Kg).

5. Waste Generations and Management

Waste Generation

Liquid waste

Waste water generation in the college -15 KL /day

Waste water generation in the Hostel - 27 KL /day

Solid Waste

Food waste- 10 Kg /day

Plastic Waste-20 Kg

Paper waste- 5.3 Kg/ day

Waste Management

5.1 Liquid waste Management

- Laboratory wastewater is being sent through the public sewer drainage system after proper dilution as per Material Safety Data Sheet norms.
- Waste water generated from washing, urinals, and bathrooms are sent through the public sewer drainage system.



5.2 Solid waste Management

Each Class Room is provided with colour coded bins with instructions to drop paper waste and non -bio degradable waste.



Bio-degradable Waste Management

- ❖ Separate dustbins are kept to collect the waste food and used plates.
- ❖ Biodegradable and non-biodegradable waste are collected in separate bins provided.
- ❖ Vegetable waste from Hostel & canteen are sent to the bio composing unit.
- ❖ Withered dry leaves are collected and converted into Bio-manure.

Plastic Waste Management

- Sale of plastic files, folders and other plastic stationery items in the college store is banned.
- All the stakeholders and the faculty are motivated to use stainless steel water bottles and lunch boxes.
- Plastic utensils in the stores, canteen and hostel kitchen are replaced with stainless steel plates, tumblers etc.
- Use of polythene bags is avoided.

Other Solid Waste Management :

- ❖ Solid wastes generated from damaged furniture are sent to waste wood collectors.
- ❖ Glass wastes are disposed of periodically through the municipal waste collection system.
- ❖ Napkins are burnt in the incinerators.



5.3 Used Battery Management

- Used batteries are disposed as waste to the local vendor.

5.4 E-Waste Management

- E-waste is not properly collected and kept in the E-waste collection point for disposal through authorized e-waste recyclers.



5.5 Hazardous Waste Management

- Green Chemistry is followed in the lab.

6. Pollution abatement measures

6.1 Waste Reduction

- ❖ Micro scale laboratory is implemented in the Chemistry Department to reduce the usage of chemicals.
- ❖ Students are instructed not to waste paper while writing examinations.
- ❖ In order to reduce the use of paper the following initiative were taken.
 - Online Admission Process – Printing of applications reduced & submission of applications through admission portal.
 - Online voting system in Students Forum Election.
 - Printing in both sides of paper
 - Examination seating arrangements intimated to students through SMS
 - Online exams are conducted to reduce paper usage.
 - All purchase orders are scanned and sent through mail instead of sending hard copies by courier.
 - Vendors are asked to forward their catalogues and pamphlets through mail.
 - Sending soft copies of the documents/letters, when hard copies are not necessary
 - Promoting paper pencils instead of wooden pencils.

6.2 Waste Reuse

- Reuse one sided paper
- Reuse Envelopes

6.3 Waste to wealth

Inside the campus

- Dry leaves are converted into bio fertilizer.



6.4 Water Conservation initiatives

- Water purifiers are provided in hostels and colleges for safe drinking water.
- No showers in the bathroom.
- Installed water efficient bathroom fittings.

6.5 Energy conservation

- The fans, lights, air-conditioners and other electronic and electrical equipment are switched off when not in use.
- Computers are switched to sleep mode or hibernate mode automatically when not in use.
- At the end of every practical session, Computer monitors and UPS are switched off.

7. Greenbelt Development :

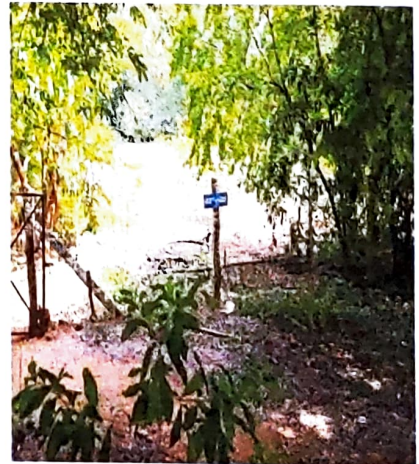
- The campus is lush green with gardens, lawns and plants wherever there is open space.
- The eco-friendly ambience of the campus is a noteworthy feature of Holy Cross College.
- Green belt was developed in 19870sqft. Area.
- The list of trees and the arrival of new saplings are recorded every year.
- All the plant specimens are identified and documented.





Routine Green Practices :

- The Green campus drive is an initiative of the College to protect the environment.
- The campus protects age-old trees in addition to several new trees and plants planted.



7.1 Greenbelt development on the campus inside

Involvement of students in the Green activities

- Vermi compost and mushroom cultivation preparation is practiced by the student.
- Students are involved in tree sapling plantation, watering, donating saplings, potting weeding and other maintenance.
- Students are given training in environmental related issues in addition to awareness programs.
- Green buildings are constructed on the campus.



8. Renewable Energy

8.1 Solar PV Power Plants

Solar Power Plant Details		
Holy Cross College		
Name	Solar Panel Capacity	Grid Type
Holy Cross	5	OFF GRID

8.2 Solar Water Heater

Solar water heater capacity of 200 LPD installed.

8.3 Renewable Energy Generation :

Renewable Energy- Solar PV Power plants

Holy Cross College

Solar Power plant installed at college -5 KW.

Renewable Energy- Solar Thermal Water Heaters

Solar water heater installed capacity at the hostel - 200 LPD

Grid electrical energy (equivalent) saved due to Solar water heaters is 3000 units/year.

Renewable Energy usage :

Sl. No.	Renewable Energy	Electrical Energy/Equivalent Electrical Energy
1	Solar Photovoltaic	6387 units- Electrical Energy
2	Solar Thermal	3000 units- Equivalent Electrical Energy
	Total	9387ts

9. Rainwater Harvesting

The college has taken maximum steps to harvest rainwater inside the college campus.

Total rainwater harvest area covered- 146.37 sqft



10. AMBIENT AIR

10.1 GreenHouse Gas Emission

Holy Cross college provides convenient and flexible transport facilities for the students.

- Diesel consumption by college buses per year-21780 L.
- Diesel consumption by DG sets in the college/hostel – 300 L.
- Total Diesel Consumption- 22080 L.
- Radius of Nagercoil town-4 KM.
- Average distance travelled by staff and students per day from home to College and back to home -43 KM.
- No of four wheelers being used by students and staff -16.
- No of two wheelers being used by students and staff -187.

- College working days during the year 2022-2023: 180 days
 - Average Fuel efficiency of four wheelers – 20 KM/ L
 - Average Fuel efficiency of two wheelers -60 KM/ L
 - Average Petrol consumption by four wheelers -2160 L
 - Average Petrol consumption by two wheelers-8415 L
 - Total Petrol consumption-10575 L
 - Total LPG consumption(Hostel & canteen & College) per year- 11666 Kg
 - Total electrical power consumed from Grid- 1,32,952 units
 - GreenHouse Gas emission due to diesel 58953.6 Kg CO₂ e
 - GreenHouse Gas emission due to petrol 24957 Kg CO₂ e
 - GreenHouse Gas emission due to LPG 35347.9 Kg CO₂ e
 - GreenHouse Gas emission due to Grid power 107691.1 Kg CO₂ e
 - Total GHG emission 226949.6 Kg CO₂ e
- 226.9 t CO₂ e

10.2 GreenHouse Gas-Reduction

- Total Solar power generation 6387 units
- Total capacity of solar water heater installed 200 LPD
- Total paper waste 1000 kg
- GreenHouse Gas reduction due to solar power plant 3.83 t CO₂ e
- GreenHouse Gas reduction due to solar water heater 2.1 t CO₂ e
- GreenHouse Gas Reduction due to paper waste 4.3 t CO₂ e
- Total GreenHouse gas reduction 10.23 t CO₂ e
- Net GreenHouse Gas emission (226.9-10.23) 216.67 t CO₂ e

10.3 Ambient Air Quality

Flue gas emission sources

- LPG combustion at hostel, canteen and labs.
- Diesel generator at College and Hostel.

Fuel consumption per year

- LPG – 11666 Kg
- Diesel at Hostel/college-22080 litres
- LPG consumption per day-65 Kg
- Diesel generators are not running on a daily basis.

The quantity of flue gas emission and the impact on ambient air quality from the above combustion are negligible.

Air Quality Monitoring

- To monitor the Ambient Air Quality, one Continuous Ambient Air Quality Monitoring Station (CAAQMS) is placed at TNPCB (Tamil Nadu Pollution Control Board) office Nagercoil.
- The results are tabulated,

Sl.no	District (location)	So2	No2	PM2.5	PM10	AQI Index
1	Nagercoil	9	22	21	40	43

10.4 Noise level

Noise level inside the campus

Sl. No	Location	Max value in dB	Average Value in dB
1	Near Office	68.1	58.2
2	Golden Jubilee Hall	62.9	57.6
3	Hostel	76.8	63.0
4	Near Auditorium	63.4	56.0
5	Near Main Entrance	79.1	65.2
6	Near Generator Room	66.0	59.2

- Diesel Generators (DG) sets do not run on a continuous basis. Only during power failure, DG sets are operated during the working hours of the College.
- Generally Power failure occurs for a very short time period.
- During planned shutdown hours, DGs run continuously based on the load.
- Noise disturbance due to DG set is negligible.
- All buildings are far away from the National Highway. Noise disturbance from the national highway is not appreciable.

11. Audit Findings & Recommendations Findings

- ❖ Total water consumption for Holy Cross College and Hostel is 78. KL/Day.
- ❖ Water usage per day per stakeholder in the college-19 litres.
- ❖ Water consumption per day per stakeholder in the hostel -126.8 litres
- ❖ Electrical Energy consumption from TNEB GRID alone is 132952 units.
- ❖ Total Electrical Energy consumption is 140239 units.
- ❖ Renewable energy from Solar PV power plants- 6387 units.
- ❖ GreenHouse Gas Emission -226.9 t CO2 e.
- ❖ Air pollution impact on Ambient Air quality is negligible since the quantity of fuel used for combustion in the institution is very less.
- ❖ Noise levels inside the campus are well within the limit.
- ❖ Food waste and other degradable Bio- waste are converted into Bio compost and Bio fertilizer
- ❖ Rainwater collection system is covered in many areas.



Recommendations

- Flow meters are to be provided at source to know the water consumption and for better water management.
- Waste water management has to be improved to reduce the water consumption.
- Flow meter for biogas plant to be provided to know the exact quantity of biogas generation and to utilize the plant maximum.
- ETP(Chemistry Lab – waste water) plant may be constructed for further wastewater treatment.
- More green buildings can be constructed.
- More capacity of solar power plant may be installed to reduce energy drawn from TNEB Grid
- Lightning Arrester must be installed in the college campus
- Sensor based switch to be fixed for street lights and required places
- E-Waste corner to be provided for collection of E-Waste materials
- Every six month E-Waste to be disposed as per E-Waste Management Rules.
- Energy saving fans to be fixed for reduce the energy consumption
- Press type water tape to be fixed for water conservation.
- Biogas plant for Hostel and canteen vegetables and food waste shall be planned in future
- Conduct exhibition for recyclable waste products
- Conduct more awareness programs on importance of energy saving for students
- UV light to be fixed at the outlet of RO unit for disinfection

