



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



GREEN AUDIT REPORT



TIKA RAM PG GIRLS COLLEGE, SONEPAT

(Affiliated to M.D. University, Rohtak)

Mission Road, Sonapat-131001

Haryana

www.trgc.edu.in

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, OM Apartment, 214 Indrapuri Colony,

Bhawarkuan, Indore – 452 001 (M. P.), India

0731-4948831, 7869327256

Email ID: eempirical18@gmail.com

www.eeplgroups.com

(2021-22)



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



CONTENTS

Sr. No.	Items	Page No
I	Acknowledgement	3
II	Certification of Accreditation	4
III	Green Monitoring Committee	5
IV	The Audit Team	6
V	Executive Summary	7
Chapter-1	Introduction	9
1.1	About College	9
1.2	About Green Auditing	14
1.3	Objectives Of Green Auditing	14
Chapter- 2	Green Campus & Sustainable Development	15
2.1	Green Audit	15
2.2	List of Plants in College	16
Chapter- 3	Carbon Foot Print Anlysis	17
3.1	About Carbon Foot Print	17
3.2	Methodology And Scope	18
3.3	Carbon Emission from Electricity	18
3.4	Carbon Emission from Vehicles	19
3.5	Carbon Emission from DG Sets	21
3.6	Biomass Calculation of Trees	22
3.7	Other Emissions Excluded	23
Chapter- 4	Waste Management	27
4.1	About Waste	27
4.2	Waste Management Practices Adopted by College	28
Chapter- 5	Air Quality Measurement	30
5.1	Air Quality Measurement	30
Chapter- 6	Recommendation and Suggestions	32
6.1	QR Code System	32
6.2	Other Suggestion	33



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Tika Ram PG Girls College Sonapat, Haryana** for allowing us to conduct the green audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation during the study.

Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), Ph.D. (Research Scholar)

Accredited Energy Auditor [AEA-0284]

Certified Energy Auditor [CEA-7271]

(BEE, Ministry of Power, Govt. of India)

Empanelled Energy Auditor with MPUVN, Bhopal M.P.

Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi

Certified Water Auditor (NPC, Govt of India)


Chartered Engineer [M-1699118], The Institution of Engineers (India)

Member of ISHRAE [58150]




Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



 **BUREAU OF ENERGY EFFICIENCY**

Examination Registration No.: **EA-7271**

Accreditation Registration No.: **AEA-284**



Certificate of Accreditation

This is to certify that Mr./Ms. **Shri. Rajesh Kumar Singadiya** having its trade/registered office at has been given accreditation as accredited energy auditor. The certificate shall be effective from **9th** day of **May, 2018**


The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **284** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **5th** day of **October, 2018**



Secretary,
Bureau of Energy Efficiency
New Delhi



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



Green Monitoring Committee

**Tika Ram Girls College**
Affiliated to MDU, Rohtak
Mission Road, Sonapat (Haryana)

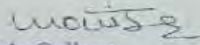
DR. MONIKA VERMA
Principal

Ref. No. TRG/ 2243 Dated 11/04/2023

Constitution of Committee for Energy / Environment/ Green

In view of Environmental impact assessment & procedure for situation requiring urgent action regarding regular assessment of pollution, soil degradation & waste management following Committee are required to be constituted for saving the Environment w.e.f. date of issue, for the period of three years.

Name of the Committee	Proposed Name of the Members.
1. Green Audit	1. Dr. Santosh Rathee 2. Ms. Geeta 3. Ms. Poonam 4. Dr. Upasana 5. Dr. Sonia 6. Mrs. Reetu
2. Environment Audit	1. Dr. Santosh Rathee 2. Ms. Geeta 3. Ms. Poonam 4. Dr. Upasana 5. Dr. Sonia 6. Mrs. Reetu
3. Energy Audit	1. Dr. Santosh Rathee 2. Ms. Geeta 3. Ms. Poonam 4. Dr. Upasana 5. Dr. Sonia 6. Mrs. Reetu

Principal 
Tika Ram Girls College
Sonapat

☎ 0130-2242059, 9468100659, 9350712944
✉ principal.trgc@gmail.com 🌐 www.trgc.edu.in



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



The Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- ✚ **Mr. Rakesh Pathak,** [Director & Electrical Expert]
- ✚ **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- ✚ **Mrs. Laxmi Raikwar Singadiya** [Chemical Engineer]
- ✚ **Mr. Sachin Kumawat** [Sr. Project Engineer]
- ✚ **Mr. Hemendra Khadekar** [Sr. Electrical Engineer]
- ✚ **Mr. Charchit Pathak** [Asst. Project Engineer]
- ✚ **Mr. Aakash Kumawat** [Assistant Jr. Engineer]
- ✚ **Mr. Mohan Choudhary** [Sr. Electrician]



EXECUTIVE SUMMARY

Green Initiative Taken by University

✚ CAMPAIGN OF PLANTATION AND GREEN CAMPUS

The college has around **186 Nos** trees on campus. It's a good initiative taken by management for a green campus under the campaign of a plantation. **It is Appreciable.**

RECOMMENDATION: -

✚ 5 DUST BIN SYSTEM

It is observed that college has adopted two dustbin systems for all kinds of waste generated on the college campus. It is recommended to 5 dust bin system for the segregation of all type of waste generated in the college campus.

✚ INSTALLATION ORGANIC CONVERTER

There is good potential for the installation of an organic converter to treat organic waste generated from the kitchen, canteen, trees, and lawn area of the college campus. The output of above organic converter is good manure for gardens and plants on the campus.

✚ QR CODE SYSTEM ON TREE

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, college can provide QR codes on the trees for their information and to exploit the rapidly growing platform for a unique purpose.



Green Audit Report Tika Ram PG Girls College, Sonapat, Haryana The Academic Year 2022-23



OTHER SUGGESTIONS & RECOMMENDATIONS

Some of the very important suggestions.

- Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.
- Increase recycling education on campus.
- Increase Awareness of Environmentally Sustainable Development in the college campus.
- Practice Institutional Ecology- Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.
- Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development.
- Collaborate for interdisciplinary approaches- To develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.
- Increase reduce, reuse, and recycle education on campus.
- Develop a butterfly garden that arouses appreciation towards flora and fauna diversity.
- Name all the trees and plants (Plant DNA barcodes) with their common name and scientific name.
- Arrange training programmes on environmental management system and nature conservation.
- Ensure the participation of students and teachers in local environmental issues.
- Renovation of the cooking system in the canteen to save gas by installing a solar water heater system with a heat pump.
- Avoid plastic/thermocool plates and cups in the college-level or department-level functions.



CHAPTER-1 INTRODUCTION

1.1 About College

Tika Ram PG Girls College is the manifestation of the dream seen by its founder, the legendary saintly figure Ch. Tika Ram. During the span of the last twenty-five years since its establishment in 1992, the college has made remarkable progress in different spheres & has travelled a cherishable journey.

Starting with the bare minimum requirements, the college has undergone a complete transformation. Being set in the heart of the town, the college is not only facilitating urban students but also commutes hailing from suburban or rural areas.

The institution has a spacious girls' hostel with all the facilities. The college has extensive green grounds, PG Block, an Arts Block, Library, well-equipped Labs, Computer Labs, spacious classrooms, and an auditorium providing excellent scope for all curricular & co-curricular activities.

The college has a spacious & well-maintained canteen to cater to the needs of students as well as the members of the staff. The college is working continuously to improve opportunities for disabled, socially disadvantaged & girls from the rural area.

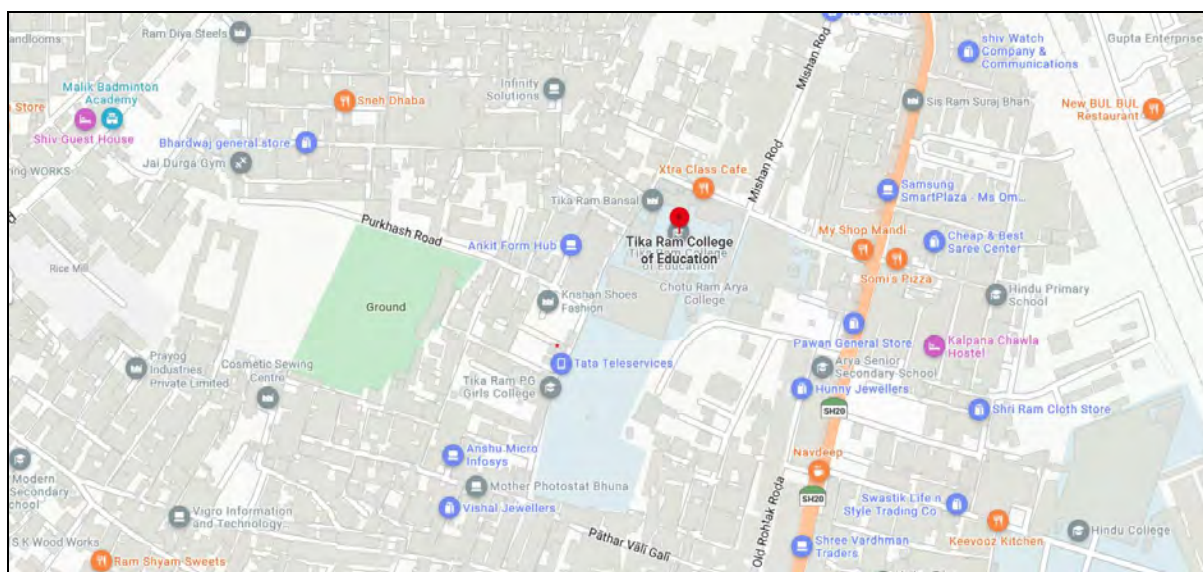


Image of Tika Ram Girls College from Google map



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



VISION

Tika Ram Girls College visualizes a future where rural girls' students are truly empowered through education. A scholarly and vibrant learning environment will be provided to the students. The institute will emerge as an institute of excellence with a difference wherein we develop intellectual, emotional, Cultural, moral, and ethical values in students.

MISSION

The mission of the institute is to sensitize rural girls toward society and make them an agent for social change. To direct the mind of the young generation in such a way that they engage themselves in the task of nation-building. Holistic development through participation in curricular and co-curricular activities beyond the curriculum. To develop courage and confidence in the changing global scenario. To motivate the faculty members for academic research and extension activities to help the students to find solutions to the current problems of society. To motivate female students to strive for self-reliance and entrepreneurship.



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



The college build-up area

Details are the total build-up area given in the table

Sr.No.	Description	Area (Sqm)
1	The total area of college	165115.15
2	The total covered area at the ground	32120.74
3	The total covered area on the first floor	49687.66
4	The total covered area on the second floor	1870.91
5	Total covered area	133689.31
6	Plantation area, Green lawn, and grounds	56290.43

The college population

No. of college population year wise

No. of student/staff	2020-21	2021-22	2022-23
Teaching staff	57	61	62
Non-teaching staff	35	43	42
Students	2319	2379	2133



Green Audit Report

Tika Ram PG Girls College, Sonapat, Haryana

The Academic Year 2022-23



The layout of the college campus

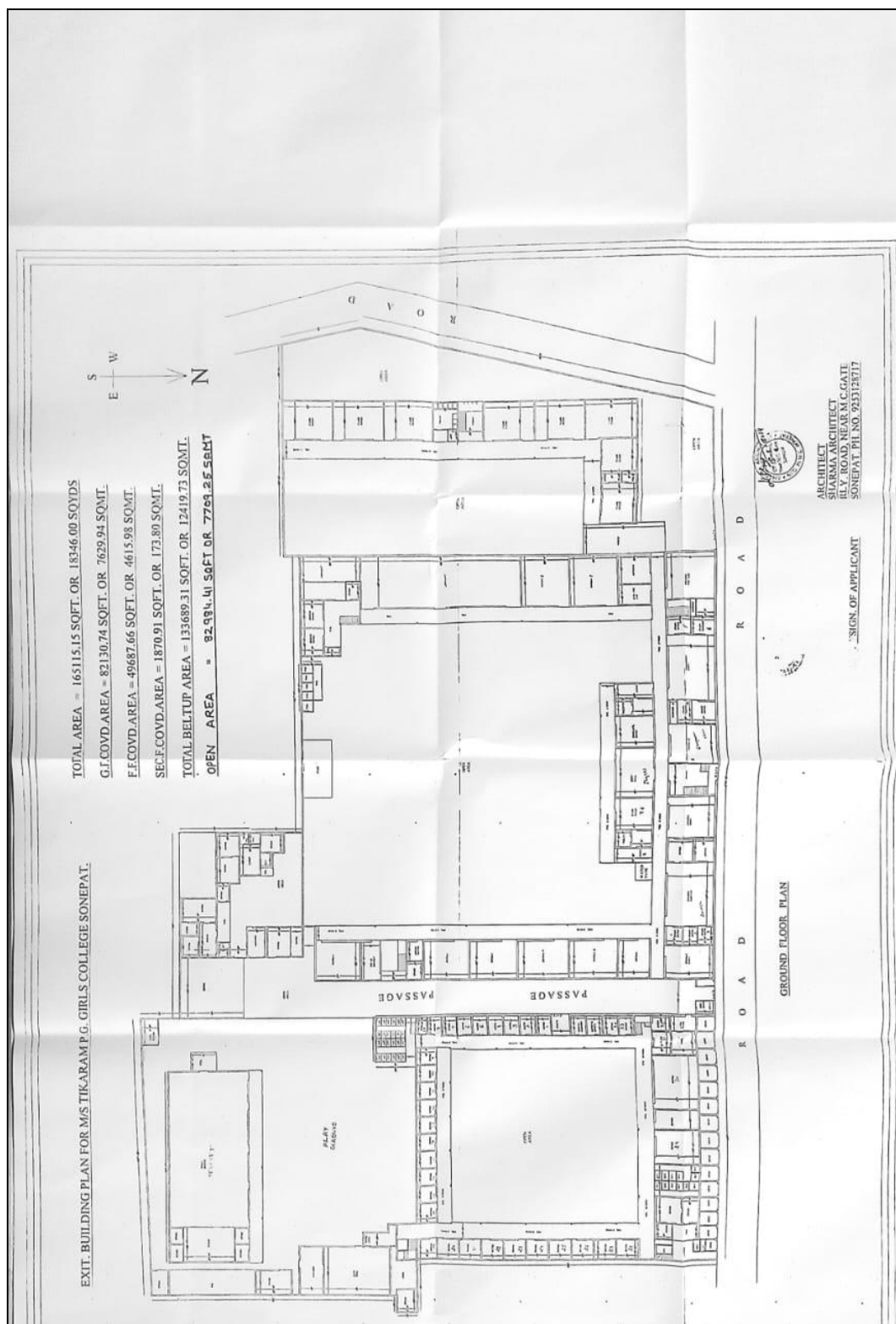




Green Audit Report

Tika Ram PG Girls College, Sonapat, Haryana

The Academic Year 2022-23





Green Audit Report Tika Ram PG Girls College, Sonapat, Haryana The Academic Year 2022-23



1.2 About Green Auditing

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 into the environment.

Green audit means to identifying opportunities for sustainable development practices, enhancing environmental quality, improving health, hygiene, and safety, and reducing liabilities to achieve values of virtue. A green audit also provides a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of “**Tika Ram PG Girls College, Sonapat (H.R.)**” enables assessment of the lifestyle, action, and its impact on the environment. This green audit was mainly focused on greening indicators like utilization of green energy (solar energy) and optimum use of secondary energy sources (petrol and diesel) in the college campus, vegetation, carbon footprint of the campus, etc. Green auditing aims to help the institution to apply sustainable development practices and to set examples before the community and young learners.

1.3 Objectives of Green Auditing

The general objective of a green audit is to prepare a baseline report on “Green campus” and alternative energy sources (solar energy), measures to mitigate resource wastage, and improve sustainable practices.

The specific objectives are:

- ✚ To inculcate values of sustainable development practices through a green audit mechanism.
- ✚ Providing a database for corrective actions and plans.
- ✚ To identify the gap areas and suggest recommendations to improve the green campus status of the college.



CHAPTER- 2

GREEN CAMPUS & SUSTAINABLE DEVELOPMENT

2.1 Green Audit

In the survey, the focus has been given to the assessment of the present status of plants and trees on the college campus and efforts made by the college authorities for nature conservation. The campus is in the vicinity of approximately more than 186 trees. The detail is given below:

Green Campus





Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



2.2 List of plants on the college campus.

Sr. no.	Tree Name	Botanical Name	Total
1	Peepal	Ficus religiosa	4
2	Neem	Azadirachta indica	1
3	Tulsi	Ocimum sanctum	1
4	Bargad	Ficus benghalensis	1
5	Lemon	Citrus limon	2
6	Jamun	Syzigium cumini	4
7	Money plant	Epiparrium anereum	2
8	Ashok	Polyalthia longifolia	3
9	Amla	Phyllanthus emblica	1
10	Harshinger	Nyctanthes arbor-tristis	4
11	Champa	Plumeria rubra	1
12	Ficus Panda	(Ficus panda)	28
13	Orange	Citrus aurantium	1
14	Gudhal	Hibiscus	14
15	Lili	Lilium	6
16	China Palm	Livistona chinensis	23
17	Areca Palm	Dypsis lutescens	10
18	Kaner	Nerium oleander	1
19	Chandine	Hibiscus mutabilis	1
20	Shatoot	Morus alba	3
21	Christmas tree	Picea abies	13
22	Guldadi	Chrysanthemum	11
23	Kochia	Bassia scoparia	25
24	Aloe vera	Aloe vera	5
25	Fonis palm	Phoenix dactylifera	21

The college has **186 trees** on campus. This is a good initiative taken by management for a green campus under the campaign of the plantation. **It's appreciable.**



Chapter-03

CARBON FOOT PRINT ANALYSIS

3.1 About Carbon footprint.

Climate change is one of the biggest challenges faced by the world, nations, governments, institutions, businesses, and mankind today.

Carbon footprint is a measure of the impact your activities have on the amount of carbon dioxide (CO₂) produced through the burning of fossil fuels and is expressed as the weight of CO₂ emissions produced in tonnes.

We focus on consumption in each of our five major categories: housing, travel, food, products, and services. In addition to these, we also estimate the share of national emissions over which we have little control, government purchases, and capital investment.

For simplicity and clarity, all our calculations follow one basic method. We multiply a user input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption, and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet, and spending behavior.

Although working out your inputs can take some investigation on your part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in your calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint...





3.2 Methodology and Scope

The carbon footprint gives a general overview of the college greenhouse gas emissions, converted into CO₂ -equivalents and it is based on reported data from internal and external systems. The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders. The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the “Greenhouse Gas Protocol Corporate Accounting and Reporting Standard” (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions -ISO 14064. This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the college. This involves accounting for and reporting on, the GHG emissions from all those activities for which the company is directly responsible. The items quantified in this study are classified under the ISO 14064 standards: The report calculates the greenhouse gas emissions from college. This includes electricity, as well as emissions associated with diesel consumption in the institute vehicle. The emission associated with air travel, waste generation, administration, and marketing-related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2, or 3 areas classified under the ISO 14064 standards.

3.3 Carbon Emission From Electricity

Direct emissions factors are widely published and show the number of emissions produced by power stations to produce an average kilowatt-hour within that grid region

Unlike other energy sources, the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use comes from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is a significant contributor to GHGs emissions from the unit. Electricity used on site is the most direct, and typically the most significant, contributor to a unit's carbon footprint. Thus, using an average fuel mix for generating electricity, the carbon dioxide intensity of electricity for the national grid is assumed to be 0.9613 KgCO₂/Kwh



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip). Electricity is purchased from the grid

Table:- 4.1 Electricity Purchased from the Grid and Emissions from the Electricity Import

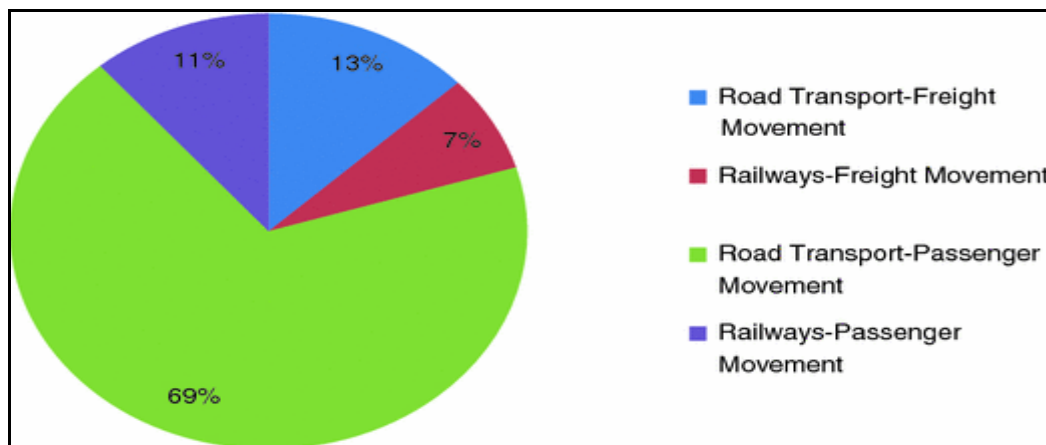
Sr. no	Year	Total unit Consumption by APDCL	Unit	Emission Factor kg CO ₂ e/kWh	Emission ton CO ₂ e/year
1	2022-23	16923	kWh	0.9613	16.26

Observation:-

Total CO₂ emission by indirectly from electricity is 16.26 tons CO₂ e/year in 2022-23'. It will be reduced to installation of a solar system.

3.4 Carbon Emission From Vehicles.

In India, it is the third most CO₂ emitting sector, and within the transport sector, road transport contributed more than 90% of total CO₂ emissions (IEA, 2020; Ministry of Environment Forest and Climate Change, 2018)



Transportation (29 percent of 2019 greenhouse gas emissions) – The transportation sector generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuels for our cars, trucks, ships, trains, and planes.

We have also considered the total GHGs emission done by transportation facilities available on the campus like Cars, ambulances, Buses, etc. We consider the different types of vehicles which are operated on petrol and diesel fuels

The energy team has analyzed the following vehicle movement for the college campus.



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



Calculation of Carbon footprint analysis: -

As per discussion by the concerned department in the college and data provided by Management.

The following details are given in the table: -

Sr. No.	Month & Year	Diesel Consumption (Ltr.)	Bus Travelling per month (KM)
1	Apr-22	989.16	5651
2	May-22	1433.21	8536
3	Jun-22	1226	7147
4	Jul-22	1198	5380
5	Aug-22	1564	3656
6	Sep-22	6952	1512
7	Oct-22	5028	1096
8	Nov-22	1608	6096
9	Dec-22	1228	7902
10	Jan-23	1155	4290
11	Feb-23	1417	6457
12	Mar-23	1134	4439
	Total	24932.4	62162

❖ CO₂ Emissions from a gallon of gasoline: 8,887 grams CO₂/ gallon

❖ CO₂ Emissions from a gallon of diesel: 10,180 grams CO₂/ gallon

(1 US Gallon = 3.7854 liters)

❖ CO₂ Emissions from a Litre of gasoline: 2347.95 grams CO₂/ Liter.

❖ CO₂ Emissions from a Litre of diesel: 2689.56 grams CO₂/ liter.

CO₂ Per liter

$$\text{Total CO}_2 \text{ Emissions} = \frac{\text{CO}_2 \text{ Per liter}}{\text{Average Mileage (Km/Liter)}} \times \text{Distance (in km)}$$

$$\text{Total CO}_2 \text{ Emissions} = \frac{2689.59}{18} \times 62162 = \mathbf{935393.4 \text{ gram or } 9.354 \text{ Kg/day}}$$



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



When Vehicle traveling in 286 Days in Year =

$$6752.18 \times 286 = 1931123 \text{ Kg/year or } 19311.2 \text{ ton/year}$$

3.5 Carbon emission from DG sets: -

The college has 04 no. DG sets installed on the college campus

Total diesel consumption in the year Apr-2022 to Mar-2023 is 963.88 liter

Sr.No.	Month& Year	Dieseal Qty.
1	Apr-22	200
2	May-22	198
3	Jun-22	30
4	Jul-22	60
5	Aug-22	55
6	Sep-22	60
7	Oct-22	80
8	Nov-22	20
9	Dec-22	30
10	Jan-23	30
11	Feb-23	100
12	Mar-23	100
Total		963

Every liter of diesel fuel contains 720 grams of pure carbon. In an average liquid hydrocarbon-burning engine. It can be assumed that about 99 % of the fuel is Oxidized (It is assumed that somewhat less than 01 % will fail to fully oxidize and will be emitted as a particulate of unburned hydrocarbons instead of CO₂).

Calculation of Total CO₂ =

- ❖ CO₂ Emissions from a Littrre of diesel: 2689.56 grams CO₂/ liter.
- ❖ Diesel consumption Apr-2022 to Mar-2023 = 963 Liter
- ❖ $963 \times 2689 = 2591873.32$ gram. or **2.591 Ton/year**



3.6 Biomass Calculation and CO² Sequestration of the Trees: -

1. Estimation of above-ground biomass (AGB)

$$K = 34.4703 - 8.0671D + 0.6589 D^2$$

Where = K is above-ground biomass.

D is Breast height diameter in (cm)

- 1 Estimation of below ground biomass (BGD)

$$BGB = AGB \times 0.15$$

- 2 Total Biomass (TB)

$$TB = AGB + BGB$$

- 3 Calculation of carbon dioxide Weight sequestered in the tree in Kg.

$$C = W \times 0.50$$

- 4 Calculate the weight of CO₂ sequestered in the tree per year in Kg.

$$CO_2 = C \times 3.666$$

Where: -

AGB = Above ground biomass.

D = Diameter of tree breast height.

BGB = Below Ground Biomass.

C = Carbon

TB = Total Biomass.



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



Biomass calculation of the tree

Sr. no.	Tree Name	Botanical Name	Average Diameter CM (10 to 100)	AGB	BGB	Total	Carbon Storage	Amount of Co2 Sequestered	Total	Total Amount of Co2 Sequesterd	Annually Co2 Sequesterd amount (Ton/year)
1	Peepal	Ficus religiosa	48	1211.4	181.7	1393.2	696.6	2553.7	4	10215	0.14
2	Neem	Azadirachta indica	32	471.5	70.7	542.2	271.1	993.9	1	994	0.01
3	Tulsi	Ocimum sanctum	12	35.4	5.3	40.7	20.4	74.7	1	75	0.00
4	Bargad	Ficus benghalensis	60	1994.5	299.2	2293.7	1146.8	4204.3	1	4204	0.06
5	Lemon	Citrus limon	16	79.2	11.9	91.1	45.5	166.9	2	334	0.00
6	Jamun	Syzygium cumini	36	623.9	93.6	717.5	358.7	1315.2	4	5261	0.07
7	Money plant	Epiparmnum anereum	10	21.7	3.3	24.9	12.5	45.7	2	91	0.00
8	Ashok	Polyalthia longifolia	42	893.2	134.0	1027.2	513.6	1882.9	3	5649	0.08
9	Amla	Phyllanthus emblica	38	708.3	106.2	814.5	407.2	1493.0	1	1493	0.02
10	Harshinger	Nyctanthes arbor-tristis	36	623.9	93.6	717.5	358.7	1315.2	4	5261	0.07
11	Champa	Plumeria rubra	45	1046.2	156.9	1203.2	601.6	2205.4	1	2205	0.03
12	Ficus Panda	(ficus panda)	24	231.9	34.8	266.7	133.3	488.9	28	13688	0.19
13	Orange	Citrus Aurantium	39	752.5	112.9	865.3	432.7	1586.2	1	1586	0.02
14	Gudhal	Hibiscus	32	471.5	70.7	542.2	271.1	993.9	14	13915	0.19
15	Lili	Lilium	12	35.4	5.3	40.7	20.4	74.7	6	448	0.01
16	ChinaPalm	Livistona, chinensis	30	403.5	60.5	464.0	232.0	850.5	23	19561	0.27
17	Areca Palm	Dypsis lutescens	22	185.6	27.8	213.4	106.7	391.2	10	3912	0.05



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



18	Kaner	Nerium oleander	18	109.2	16.4	125.6	62.8	230.2	1	230	0.00
19	Chandine	Habernuemuntane	34	545.0	81.8	626.8	313.4	1148.8	1	1149	0.02
20	Shatoot	Morusalba	12	35.4	5.3	40.7	20.4	74.7	3	224	0.00
21	Christmas tree	Piceaapies	44	993.9	149.1	1143.0	571.5	2095.0	13	27235	0.37
22	Guldadi	Chrysanthemum	16	79.2	11.9	91.1	45.5	166.9	11	1836	0.03
23	Kochia	Bassi scoparia	26	283.7	42.5	326.2	163.1	598.0	25	14949	0.20
24	Aloevara	Aloevara	20	144.7	21.7	166.4	83.2	305.0	5	1525	0.02
25	Fonis palm	Phoenixdactylifera	62	2144.0	321.6	2465.6	1232.8	4519.5	21	94909	1.29
Total CO ₂ Emission neutralize by the trees											3.15



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



The college has **186 trees** on campus. This is a good initiative taken by management for a green campus under the campaign of the plantation. **It is appreciable.** There are total CO₂ sequestered of **3.15 Tons /Year.** It is **appreciable.**



Calculation of CO₂ Emission of college : -

Total Carbon Footprint generated by the campus	=	Carbon footprint by electricity
		+
		Carbon footprint by vehicle
		+
		Carbon footprint by DG Sets.
		-
		Carbon Neutralize by the tree,

Total Carbon Footprint by campus: $16.26+9.354+2.591 - 3.15=$ **25.055 tons/year**

Recommendation: - Installation of renewable energy sources like solar systems, solar water heaters, solar light, solar pumping to reduce electricity CO₂ emission.

3.7 Other Emissions Excluded

This study did not evaluate the carbon sequestration potential of existing plantation activities and emissions from the staff commuting, food supply, official flights, paper products, water supply, and waste disposal and recycling due to limited data availability. The current study identifies areas where data monitoring, recording, and archiving need to be developed for enlarging the scope of mapping of GHGs emissions in the future years. Accordingly, a set of tools and record-keeping procedures will be developed for improving the quality of data collection for the next year's carbon footprint studies.



CHAPTER- 4 WASTE MANAGEMENT

4.1 About Waste:

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 public health waste management is important for an eco-friendly campus. In universities, different types of waste are generated, and its collection and management are very challenging.

Solid waste can be divided into three categories: biodegradable, non-biodegradable, and hazardous waste. A bio-degradable waste includes food waste, canteen waste, waste from toilets, etc. Non-biodegradable wastes include what is usually thrown away in homes and schools such as plastic, tin 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 at 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 University. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Table 4.1 Different types of waste generated on the college campus.

Sr. No.	Types of Waste	Particulars
1	Solid wastes	Damaged furniture, paper waste, paper plates, food waste, etc
2	Plastic waste	Pen, Refill, Plastic water bottles and other plastic containers, wrappers, etc
3	E-Waste	Computers, electrical and electronic parts, etc
4	Glass waste	Broken glass wares from the labs etc
5	Chemical wastes	Laboratory waste etc
6	Bio-medical Waste	Sanitary Napkin etc

4.2 Waste Management Practices Adopted by the College

The audit team also visited various departments, the canteen, and other areas, to find out waste generation areas and waste collection points for further improvement. Details are given in the table.

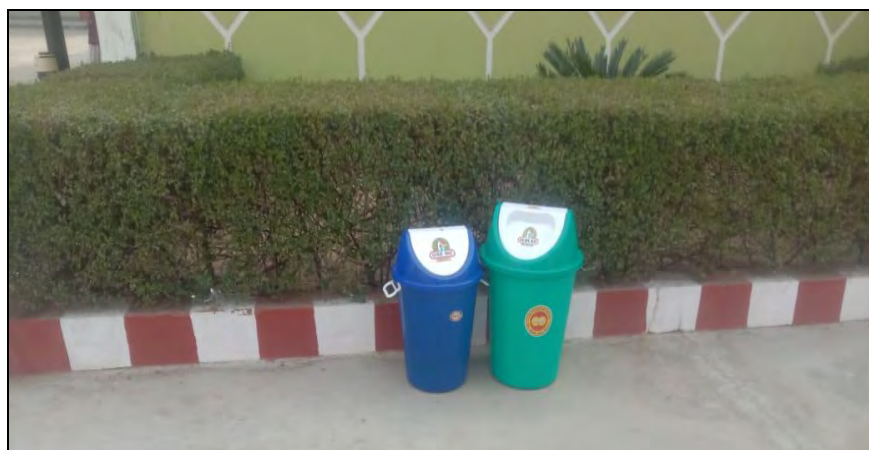


Figure: - 4.1 Dustbin system on the college campus

Recommendation

It is recommended adopte 5 bin waste collection system for collecting different types of waste generated in the collage premises.



Recommended 5 dust bin waste collection System



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



Table: 4.2 List of waste collection dustbin system

Sr.No.	Location	No. of Dustbin
1	Old building	12
2	New building	10
3	Garden	8
4	Canteen	4
5	Hostel	12
Total		46

4.3 Compost pit

The college has installed a compost pit, all type of organic waste is disposed of in this pit, and generated manure is utilized in plant and trees on the campus. It's appreciable.



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



CHAPTER - 5
AIR QUALITY MEASUREMENT

5.1 Air Quality Measurement

The green audit team conducted an air monitoring survey on the college campus. Details are given in Table 5.1

Old Building Detail

Sr. No.	Location / Room No.	PM2.5 µg/m ³	PM10 µg/m ³	Particle	CO2 ppm	C	%
1	Class room	20.2	33.7	4647	452	27	30
2	Political Science	22.8	36.7	3728	453	28	31
3	Economics Dept.	21	33.5	3707	467	28	30
4	English dept.	20.3	33.9	4088	450	28	30
5	Maths dept.	21.6	34.1	4612	453	28	31
6	Classroom	22	35.9	4267	470	28	30
7	Physics lab 1	21	54.7	3374	471	28	33
8	Hindi lab	21.8	35.1	4830	564	29	32
9	Staff room	22.1	35	3947	511	29	32
10	Physics lab 2	24	37.6	4591	48.3	29	32
11	Physics dept	22	35	4023	433	29	32
12	Physics lab 3	19.3	30.8	4446	548	29	32
13	Chemistry lab	22.3	36	4531	553	29	32
14	Staff room	22.3	37	4280	596	28	34
15	Chemistry lab 2	23.4	38.6	4228	572	28	33
16	Library	19.5	31.5	4048	529	28	32
17	Geography Lab 2	21.7	33.8	3826	480	29	27
18	History Dept.	20.3	32.6	4889	449	29	28
19	Geography Lab 1	20.3	32.6	4889	449	29	28
20	Geography Dept.	23.7	39.7	4588	541	29	29
21	Physical dept.	21.3	33.7	3747	529	30	28
22	Physical lab	21.3	34.4	4098	470	30	29
23	English & Hindi dept.	20.5	33	3712	482	30	29
24	Computer lab	22.3	36	4440	495	30	33
25	History/ Political dept	23	36.4	4040	493	30	33
26	Computer dept.	19.4	30.4	3631	497	30	32
27	Computer lab2	18.7	29.4	4366	500	30	30



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23






New Building

Sr. No.	Location / Room No.	PM2.5 µg/m ³	PM10 µg/m ³	Particle	CO2 ppm	C	%
1	Principal Office	18.8	30	3846	510	32	22
2	Retiry room	18.3	29.9	3892	496	33	25
3	Office	18.3	29.4	3869	494	33	24
4	Deputy Supretended	18.6	30.4	3493	499	33	24
5	Commerce dept.	18.4	30	3543	532	33	26
6	Computer lab	19.1	30.3	3716	641	33	26
7	Common room	19.4	30.2	3818	645	33	26
8	Red cross room	19.2	30.1	3615	632	33	26
9	Gym	17.7	27.9	519	447	33	25

Hostel

Sr. No.	Location / Room No.	PM2.5 µg/m ³	PM10 µg/m ³	Particle	CO2 ppm	C	%
1	Classroom	17.1	27.7	3191	480	31	27
2	Classroom	16.4	24.5	3261	443	30	26
3	Classroom	16.1	26.7	3261	463	31	25
4	Classroom	16.2	23.5	3252	440	30	26
5	Warden room	16.4	26.5	3479	452	31	23
6	room	16.2	25.4	3365	466	31	24
7	room	18.3	26.1	3665	476	31	24
8	room	16.1	25.1	3666	466	31	23
9	room	16.5	26.4	3645	462	30	24
10	Guard room	15.4	25.5	3255	465	32	24

Observation:-

-  PM_{2.5} value is higher side. The 24-hour concentration of PM_{2.5} is considered unhealthy when it rises above **35.4 µg/m³**
-  PM₁₀ value is an acceptable range. It should be below **155 µg/m³**
-  CO₂ value is an acceptable range. It should be below 1000 ppm.

CHAPTER- 6

RECOMMENDATIONS AND SUGGESTIONS

6.1 QR Code system

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, the college can be provided QR codes on the trees for their information and to exploit the rapidly growing platform for a unique purpose.



Fig: 6.1 QR code system for plants

These codes can give students all the information they need to know about the tree — from their scientific name to its medicinal value. They only need to put their smart-phones to use. QR codes to them, making it easier for everybody to learn about a plant or a tree at the tip of their fingers,” If any app generating a QR code, which is available for free on the online stores, can be used to avail the information of the trees.

Eco-restoration programmes

- Frame long-term eco-restoration programmes for replacing exotic Acacia plantations with indigenous trees and need of the hour is to frame a holistic campus development plan.



6.2 Other Suggestions

Some of the very important suggestions are: -

- ✚ Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.
- ✚ Increase recycling education on campus.
- ✚ Increase Awareness of Environmentally Sustainable Development on the College campus.
- ✚ Practice Institutional Ecology- Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.
- ✚ Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development.
- ✚ Collaborate for Interdisciplinary Approaches- To develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.
- ✚ Increase reduces, reuse, and recycling education on campus.
- ✚ Develop a butterfly garden that arouses appreciation towards flora and fauna diversity.
- ✚ Name all the trees and plants (Plant DNA barcodes) with their common name and scientific name.
- ✚ Arrange training programs on environmental management systems and nature conservation.
- ✚ Renovation of the cooking system in the canteen to save gas by installing a solar water heater system with a heat pump.
- ✚ Establish a procurement policy that is energy-saving and eco-friendly.



Green Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



END OF THE REPORT

THANKS



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



ENVIRONMENT AUDIT REPORT



TIKA RAM PG GIRLS COLLEGE, SONEPAT

(Affiliated to M.D. University, Rohtak)

Mission Road, Sonapat-131001

Haryana

www.trgc.edu.in

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, OM Apartment, 214 Indrapuri Colony,
Bhawarkuan, Indore – 452 001 (M. P.), India

0731-4948831, 7869327256

Email ID: eempirical18@gmail.com

www.eeplgroups.com

(2022-23)



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



CONTENT

Sr. No.	Items	Page No.
I	Acknowledgement	4
II	Green Monitoring Committee	5
III	Environment Policy	6
IV	The Audit Team	8
V	Executive Summary	9
Chapter-1	Introduction	10
1.1	About College	10
1.2	Environment Auditing	15
1.3	Objectives of Environment Audit	15
1.4	Target Areas of Environment Audit	15
1.5	Methodology for Conducting An Environment Audit	16
Chapter-2	WATER CONSUMPTION AND WASTEWATER SOURCES	18
2.1	Source of Fresh Water and Use Area	18
2.2	Water Accounting & Metering system	18
2.3	Water Flow and Power Measurement	19
2.4	Water Storage Capacity on the College Campus	20
2.5	Water Use Areas on the College Campus	21
2.6	Reverse Osmosis (RO) on the College Campus	21
2.7	Freshwater Uses for Gardening	22
2.8	Waste Water Generation sources	23
Chapter-3	RAINWATER HARVESTING SYSTEM	24
3.1	Rainwater Harvesting Systems	24
3.2	Rainwater Harvesting Potential of The College	25



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Tika Ram PG Girls College, Sonapat, Haryana** for giving us an opportunity to conduct an Environment audit for the Institute.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation during the study.

Rajesh Kumar Singadiya

(Director)


M.Tech (Energy Management), Ph.D. (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi
Certified Water Auditor (NPC, Govt. of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



Green Monitoring Committee

**Tika Ram Girls College**
Affiliated to MDU, Rohtak
Mission Road, Sonapat (Haryana)

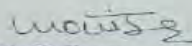

DR. MONIKA VERMA
Principal

Ref. No. TRG/ 2243 Dated 11/04/2023

Constitution of Committee for Energy / Environment/ Green

In view of Environmental impact assessment & procedure for situation requiring urgent action regarding regular assessment of pollution, soil degradation & waste management following Committee are required to be constituted for saving the Environment w.e.f. date of issue. for the period of three years.

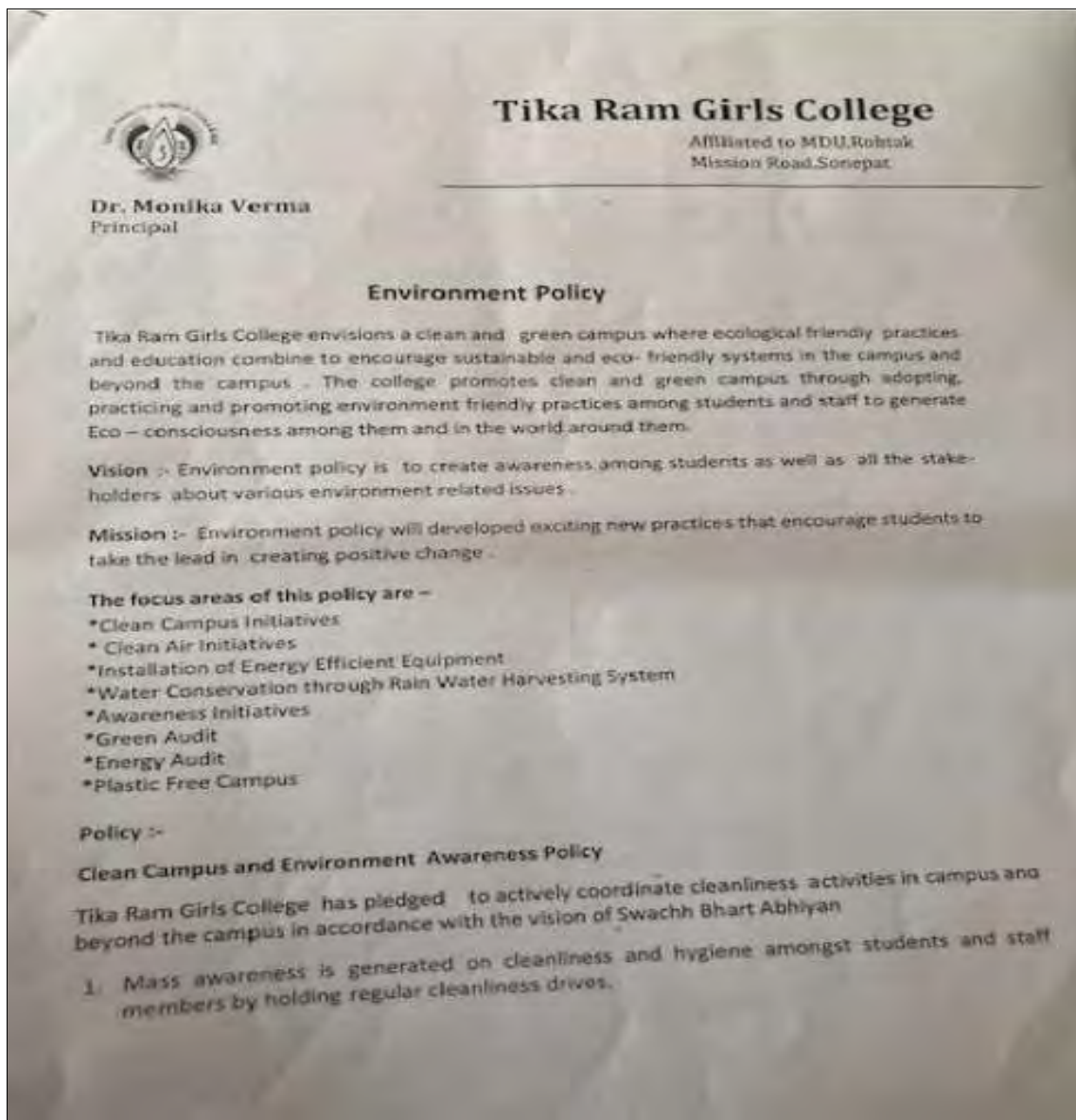
Name of the Committee	Proposed Name of the Members.
1. Green Audit	1. Dr. Santosh Rathee 2. Ms. Geeta 3. Ms. Poonam 4. Dr. Upasana 5. Dr. Sonia 6. Mrs. Reetu
2. Environment Audit	1. Dr. Santosh Rathee 2. Ms. Geeta 3. Ms. Poonam 4. Dr. Upasana 5. Dr. Sonia 6. Mrs. Reetu
3. Energy Audit	1. Dr. Santosh Rathee 2. Ms. Geeta 3. Ms. Poonam 4. Dr. Upasana 5. Dr. Sonia 6. Mrs. Reetu

Principal 
Tika Ram Girls College
Sonapat 

☎ 0130-2242059, 9468100659, 9350712944
✉ principal.trgc@gmail.com 🌐 www.trgc.edu.in



Environment Policy





Environment Audit Report Tika Ram PG Girls College, Sonapat, Haryana The Academic Year 2022-23



2. Activities under "Swachh Bharat Abhiyan" will be a key competent of community work being done by NSS and Eco club Volunteers of the college.
3. Events like poster and slogan writing, essay writing, speeches and skits on "Swachh Bharat" are Organised.
4. Rallies on the themes related to "Swachh Bharat Abhiyan" are conducted to create mass awareness.
5. Conduct workshops on the 3Rs "Reduce, Reusing and Recycling of waste.
6. Administer of pledge by students and staff members to maintain cleanliness of the campus and its surrounding areas.
7. Ban of plastic in the college campus.

Landscape and Clean Air Initiatives :-

1. To organize annual tree plantation drives
2. To encourage students to hold tree planting events.
3. We encourage our students and staff to use public transportation.

Energy Saving and Energy Efficient Equipment

We commit to install environment friendly electrical appliances that save energy and reduce wasteful inefficiencies. We believe in using LED lights to save energy.

Water Conservation through Rain Water Harvesting System

1. The institute has rain water harvesting system for conservation of water
2. Reduce use of paper by supporting digitalization of internal assessment records.
3. Encourage students to use emails for assignment submission.
4. Organise workshops for students on solid waste management

Conduct Green Audit :-

The institute aims to conduct a green audit of our college campus to assess our strength and weakness. Green audit is useful to find out where most energy or water is being used. The College can consider how to make savings. It will promote financial savings through reduction of resources use.

Conduct Energy Audit :-

Energy Audit is essential to reduce carbon footprint. It will identify wastage of energy.

Plastic Free Campus :-

In view of the Government of India's resolution to ban all single use plastic, the college administration strictly bans the use of plastic in its premises to make it a "Plastics free campus".

Principal
Tika Ram PG Girls College
Sonapat

Coordinator



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- ✚ **Mr. Rakesh Pathak,** [Director & Electrical Expert]
- ✚ **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- ✚ **Mrs. Laxmi Raikwar Singadiya** [Chemical Engineer]
- ✚ **Mr. Sachin Kumawat** [Sr. Project Engineer]
- ✚ **Mr. Hemendra Khadekar** [Sr. Electrical Engineer]
- ✚ **Mr. Charchit Pathak** [Asst. Project Engineer]
- ✚ **Mr. Aakash Kumawat** [Assistant Jr. Engineer]
- ✚ **Mr. Mohan Choudhary** [Sr. Electrician]



EXECUTIVE SUMMARY

The executive summary of the environmental audit report furnished in this section briefly gives the identified water conservation measures that can be implemented in a phased manner to conserve water and increase the productivity of the collage.

INITIATIVE FOR ENVIRONMENT MANAGEMENT TAKEN BY COLLEGE

+ RAINWATER HARVESTING SYSTEM

- The college has a “Rainwater Harvesting System” on the institute campus for maintaining the groundwater level. This system saves about 70 to 80 % of the rooftop rainwater of the building. It is appreciable.

AUDIT RECOMMENDATION

+ FRESH WATER MONITORING SYSTEM

- Installation of a “**Cloud-based (IoT based) groundwater extraction monitoring system**” for the bore well to quantify freshwater consumption per day in the institute.
- Install water flow meters (Mechanical or Electronics) on the bore well water distribution network, like fresh water consumption per day of individual buildings.

+ WASTE WATER TREATMENT PLANT

There is a requirement to install Sewerage Treatment Plant (STP) for wastewater generated from various activities on the campus. All wastewater generated from the above activity is collected in separate tanks and it should be treated in the proposed STP Plant

+ DRIP WATER IRRIGATION

Use a drip water irrigation system for plants and trees.



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



USE EFFICIENT WATER TAPS

Water-saving taps either reduce water flow or automatically switch off to help save water. So, it is highly recommended to install efficient water taps in college campus to reduce water consumption.



CHAPTER-1

INTRODUCTION

1.1 About College

Tika Ram PG Girls College is the manifestation of the dream seen by its founder, the legendary saintly figure Ch. Tika Ram. During the span of the last twenty-five years since its establishment in 1992, the college has made remarkable progress in different spheres & has travelled a cherishable journey.

Starting with the bare minimum requirements, the college has undergone a complete transformation. Being set in the heart of the town, the college is not only facilitating urban students but also commutes hailing from suburban or rural areas.

The institution has a spacious girls' hostel with all the facilities. The college has extensive green grounds, PG Block, an Arts Block, Library, well-equipped Labs, Computer Labs, spacious classrooms, and an auditorium providing excellent scope for all curricular & co-curricular activities.

The college has a spacious & well-maintained canteen to cater to the needs of students as well as the members of the staff. The college is working continuously to improve opportunities for disabled, socially disadvantaged & girls from the rural area.

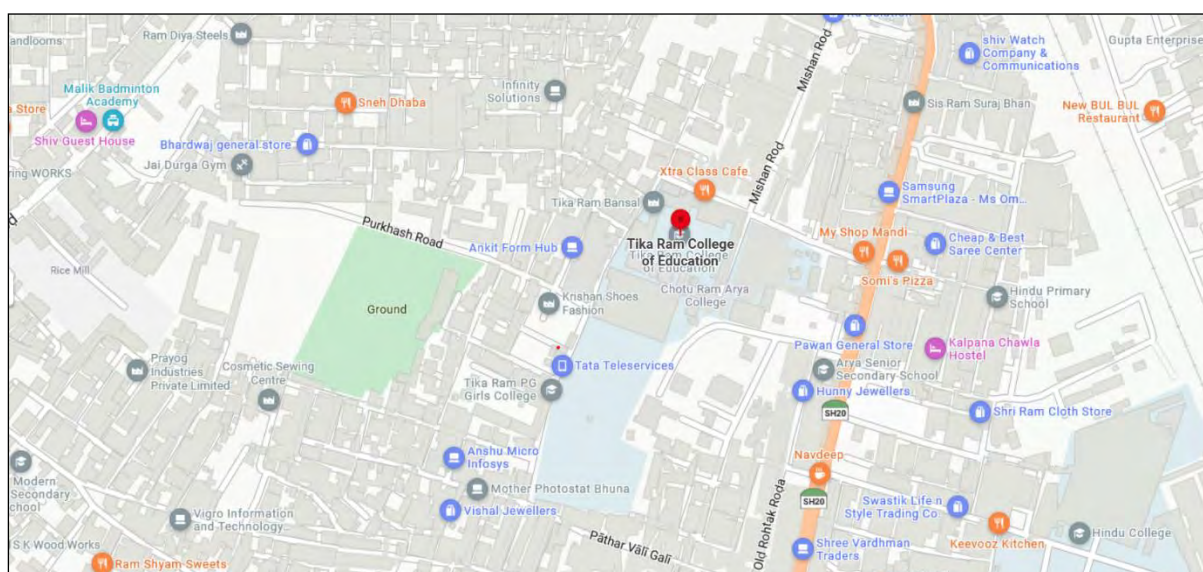


Image of Tika Ram Girls College from Google map



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



Vision

Tika Ram Girls College visualizes a future where rural girls' students are truly empowered through education. A scholarly and vibrant learning environment will be provided to the students. The institute will emerge as an institute of excellence with a difference wherein we develop intellectual, emotional, Cultural, moral, and ethical values in students.

Mission

The mission of the institute is to sensitize rural girls toward society and make them an agent for social change. To direct the mind of the young generation in such a way that they engage themselves in the task of nation-building. Holistic development through participation in curricular and co-curricular activities beyond the curriculum. To develop courage and confidence in the changing global scenario. To motivate the faculty members for academic research and extension activities to help the students to find solutions to the current problems of society. To motivate female students to strive for self-reliance and entrepreneurship.



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



College build-up area

Details are the total build-up area given in the table

Sr. No.	Description	Area (Sqm)
1	Total area of the college	165115.15
2	Total covered area at ground	32120.74
3	Total covered area on the first floor	49687.66
4	Total covered area on the second floor	1870.91
5	Total covered area	133689.31
6	Plantation area, Green lawn, and grounds	56290.43

College Population

No. of college population year wise

No. of student/staff	2020-21	2021-22	2022-23
Teaching staff	57	61	62
Non-teaching staff	35	43	42
Students	2319	2379	2133



Environment Audit Report

Tika Ram PG Girls College, Sonapat, Haryana

The Academic Year 2022-23



The Layout of the college campus

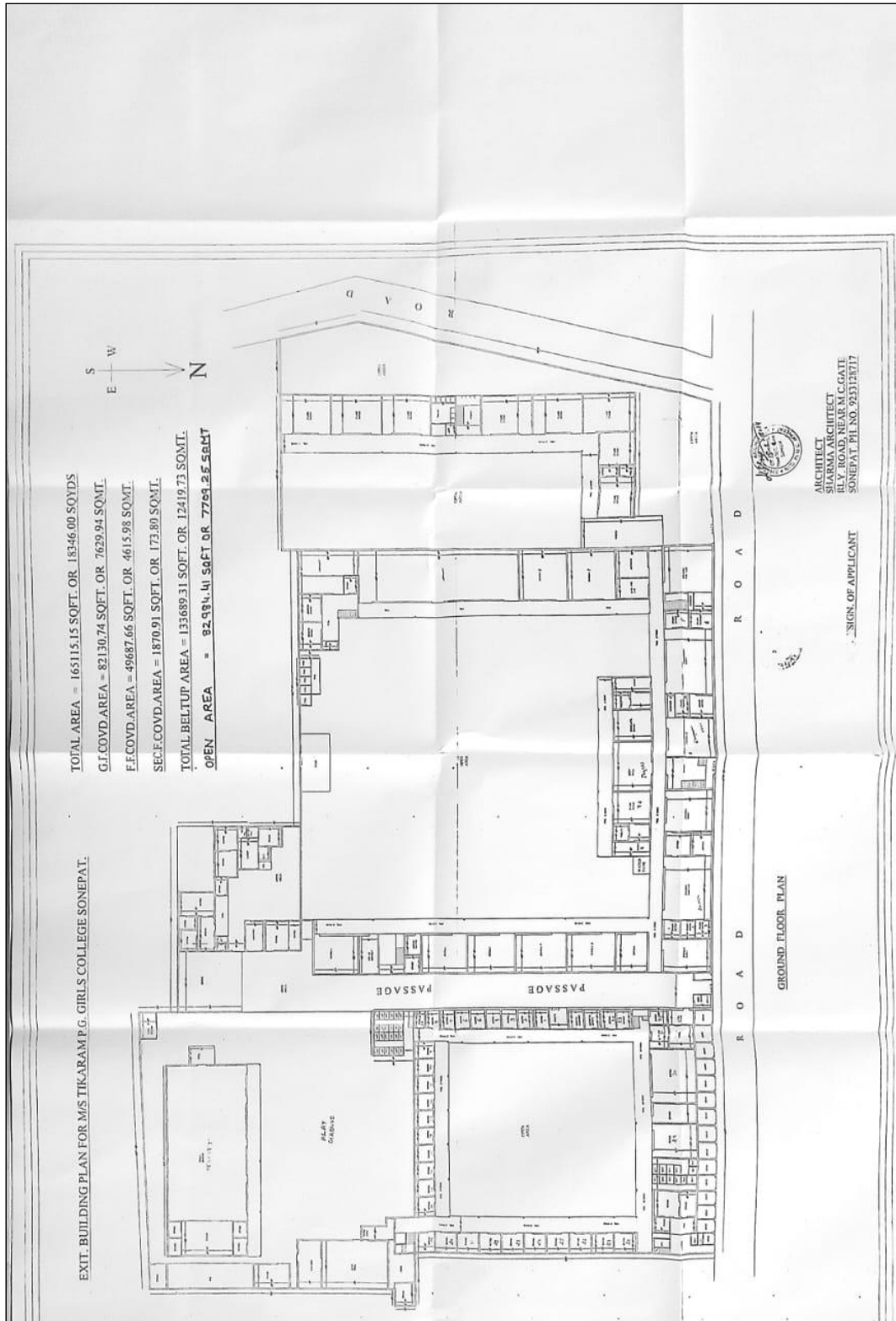




Environment Audit Report

Tika Ram PG Girls College, Sonapat, Haryana

The Academic Year 2022-23





1.2 About Environment Auditing

Water audits can be a highly valuable tool for institutes in a wide range of ways to improve their energy, environment, and economic performance, while reducing wastage and operating costs. Water audits provide a basis for calculating the economic benefits of water conservation projects by establishing the current rates of water use and their associated cost.

1.3 Objectives of Environment Audit

The general objective of the water audit is to prepare a base line report on water conservation measures to mitigate consumption, and improve quality and sustainable practices.

The specific objectives are:

- ✚ To monitor water consumption and water conservation practices.
- ✚ To assess the quantity of water, usage, the quantity of wastewater generation, and their reduction within the college.

1.4 Target Areas of Environment audit

This indicator addresses water sources, water consumption, irrigation, stormwater, appliances and fixtures aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

1.5 The Methodology followed for conducting an Environment audit

Step 1: Walkthrough survey

- ✚ Understanding of existing water sourcing, storage, and distribution facility.
- ✚ Assessing the water demand and water consumption areas/processes.
- ✚ Preparation of detailed water circuit diagram.



Environment Audit Report Tika Ram PG Girls College, Sonapat, Haryana The Academic Year 2022-23



Step 2: Secondary Data Collection

- ✚ Analyze historic water use and wastewater generation
- ✚ Field measurements for estimating current water use
- ✚ Metered & unmetered supplies.
- ✚ Understanding of “base” flow and usage trends at the site
- ✚ Past water bills
- ✚ Wastewater treatment scheme & costs etc.

Step 3: Site Environment Audit Planning (based on on-site operations and practices)

- ✚ Preparation of water flow diagram to quantify water use at various location
- ✚ Wastewater flow measurement and sampling plan

Step 4: Conduction of Detailed Environment Audit & Measurement

- ✚ Conduction of field measurements to quantify water/wastewater streams
- ✚ Power measurement of pumps/motors
- ✚ Preparation of water balance diagram
- ✚ Establishing water consumption pattern
- ✚ Detection of potential leaks & water losses in the system
- ✚ Assessment of productive and unproductive usage of water
- ✚ Determine key opportunities for water consumption reduction, reuse & recycle.

Step 5: Preparation of Environment Audit Report

- ✚ Documentation of collected & analyzed water balancing and measurement
- ✚ Projects and procedures to maximize water savings and minimize water losses
- ✚ Opportunities for water conservation based on reducing/recycling/ reuse and recharge options.

CHAPTER- 2

WATER CONSUMPTION AND WASTE WATER SOURCES

2.1 Source of fresh water and use area

The main source of freshwater is the bore well for the college. Freshwater is mainly used for drinking, housekeeping, gardening, domestic activity, and new construction project. Details of the bore well are given in table 2.1

Table 2.1 Details of Freshwater sources.

Sr. No.	Fresh Water Sources	Location	Motor Power(HP)	Remark
1	Borewell-01	Near new building	7	For freshwater supply
2	Borewell-02	Near old building	3	For freshwater supply
3	Borewell-03	Near college gate	7	For freshwater supply

2.2 Water Accounting & Metering system

It was observed that there is a requirement for water flow meters on bore wells to quantify per-day ground water extraction from different sources.



Fig 2.1 Fresh water supply from the bore well of the college campus



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



2.3 Water Flow Measurement and Power measurement

Sr. No.	Location	Voltage	Current	Power Factor	Power Consumption(kW)	Measure Waterflow (m3/hr)
1	New building	380	8.7	0.87	5.0	6.1
2	Old building	315	8.5	0.91	4.2	3.43
3	Near College gate	Under maintenance				



Figure: - 2.1 Water flow measurement in the college

2.4 Water Storage Capacity in College Campus

There are different types of tanks available in college for water storage like Overhead RCC tanks and PVC tanks etc.

Table 2.3 Water Storage tank in the college

Sr. No	Location	Type of Tank	Unit Capacity(Litter)	Quantity
1	Old building	PVC tank	1000	1
2	Old building	PVC tank	2000	1
3	Near Hall/Mesh	PVC tank	1000	1
4	Near Hall/Mesh	PVC tank	500	1
5	New building	PVC tank	2000	1
6	New building	PVC tank	1000	1
7	New building	PVC tank	500	1
8	Near garden	PVC tank	500	1
9	New building	PVC tank	3000	1
10	New building	PVC tank	1000	1
Total			12500	10



Fig 2.3 Water storage tank in college



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



2.5 Water use areas on the college campus

Water is preliminary used for drinking, domestic, gardening, and lab activity. The audit team visited various departments and buildings to determine appliances. The details of the washroom, toilet, and taps are given in the table

Table: 2.5 Details of washroom and uses taps in various areas

Sr. No.	Location	Hand Wash	Toilet	Taps
1	New building	22	12	28
2	Old building	27	19	29
3	Hostel	30	25	37
4	Garden	3	4	10
	Total	82	60	104

2.6 Reverse Osmosis (RO) on the college campus

Table: 2.6 Details of RO on the college campus

Sr. No.	Location	RO	Water Cooler
1	New building	1	2
2	Main gate	1	1
3	Old building	-	1
4	Hostel	1	1
	Total	3	5

2.7 Freshwater uses for gardening

The college has installed a water sprinkler system for the lawn area in front of the main admin block. **It is appreciable.**



Fig 2.4: Water Sprinkler System in college

Observation: - There is good potential for water-saving by adopting the “Automatic Watering 360 adjustable misting nozzle irrigation Drippers system” for other areas of the university.



Adjustable Misting Nozzle Irrigation Drippers



Proposed water timer

Fig 2.5: Proposed a drip water irrigation system for institute



Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23



2.8 Waste Water Generation Sources

At present wastewater generated from various departments' canteen, and lab activities like washrooms, hand washing, RO rejected, etc is discharging into the drain line. It should be collected in a separate tank and treat in proposed STP plant. After that treated water reuse activities like gardening, toilet and washroom etc.

CHAPTER- 3

RAINWATER HARVESTING SYSTEM

3.1. Rainwater harvesting systems

Rainwater harvesting is a technique to capture the rainwater when it precipitates, store that water for direct use or charge the groundwater and use it later.

There are typically four components in a rainwater harvesting system:

- ✚ Roof Catchment.
- ✚ Collection.
- ✚ Transport.
- ✚ Infiltration or storage tank and use.

If rainwater is not harvested and channelized its runoffs quickly and flows out through storm water drains. For storm-water management, the recharge pits, percolation pits, and porous trenches are constructed to allow storm water to infiltrate inside the soil.

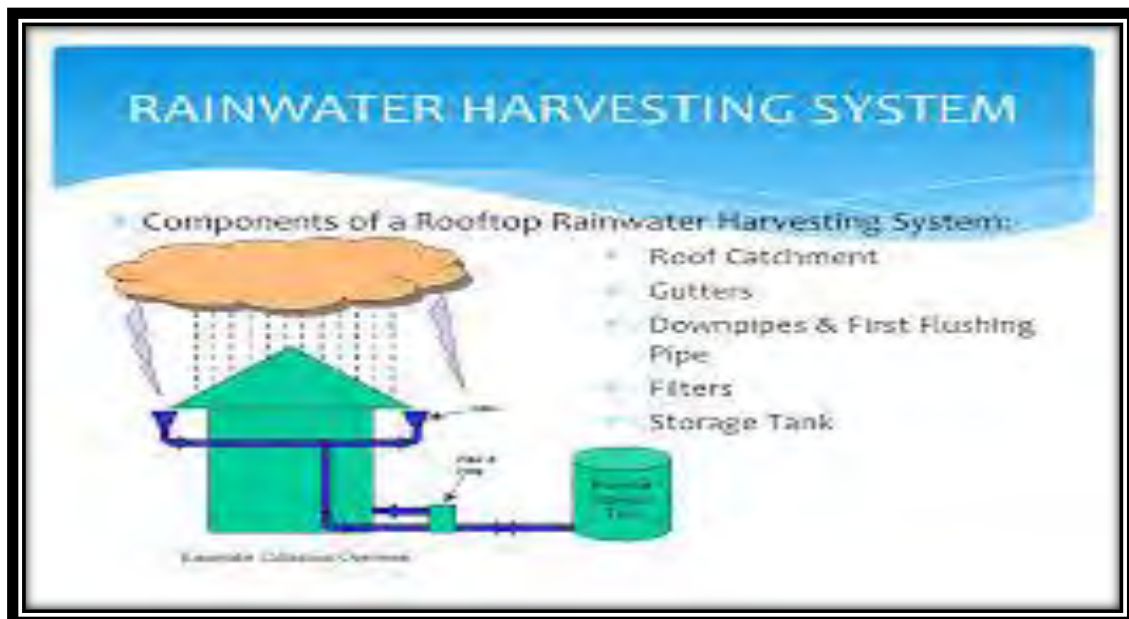


Fig.: 3.1 Components of a rooftop rainwater harvesting system

3.2 Rainwater harvesting system in college

The college has rainwater harvesting systems on campus.



Fig.3.2: Rain Water Harvesting System on the college campus



**Environment Audit Report
Tika Ram PG Girls College, Sonapat, Haryana
The Academic Year 2022-23**



**End of The Report
Thank you**