GREEN AUDIT REPORT 2022

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NCERT

REGIONAL INSTITUTE OF EDUCATION, BHOPAL
National Council of Educational Research and Training

THE GREEN AUDIT TEAM

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CONTENTS

IMPORTANT ABBREVIATION	
GAR	Green Audit Report
IQAC	Internal Quality Assurance Cell
RIE	Regional Institute of Education
NAAC	National Assessment and Accreditation Council
NCC	National Cadet Corps
NSS	National Service Scheme
RIE Bhopal	Regional Institute of Education Bhopal
NCERT	National Council of Education, Research and Training
B.Sc B.Ed	Integrated Bachelor of Science and Bachelor of Education
B.A B.Ed	Integrated Bachelor of Art and Bachelor of Education
B.Ed.	Bachelor of Education
M.Ed.	Master of Education
PhD	Doctor of Philosophy
Soil Pollution	SP
Nature Club	NC
Green Initiatives	GI
Organic Fruits and Vegetables	OFV
Greenhouse	GH
Landscape Management	LM
Rainwater Harvesting	RWH
Water Conservation	WC
Harsh Weather Conditions	HWC
Campus Greenery	CG
Electrical Energy	EE
Joule (Watt X Second)	J
Kilowatt-hour	kWh
Board of Trade Unit	B.O.T
Energy Audit	EA
High Speed Diesel Generator	HSDG
Teaching Equipment	TE
Computer Lab	CL
Lighting, Fans & Air-Conditioning	LFA
Laboratory Equipment	LE
Office Equipment	OE
Cafeteria Items	CI
Hostel Facilities	HF
Miscellaneous Needs	MN
Grid connected Solar Plant	SP

EXECUTIVE SUMMARY

Everything around us forms our environment and our lives depend on the flora and fauna around us. Our environment affects all aspects of our life including the holistic development of a student. Similarly, all our day-to-day activities affect the environment. The environment of an institute comprises the physical and the socio-cultural environment. The physical environment includes the school building and the classrooms, library, laboratories corridors, kitchen, toilets, garden and also the playground. The sociocultural environment is manifested by the institute, with climate of teaching, by the teachers, student activities, inclusivity, attitude towards learning, social behavior, discipline etc.

Physical environment (includes Green and eco-friendly surrounding) of an educational institute help student to nurture sociocultural environment in institution. The Green audit of the educational institutions encourages for judicious utilization of resources around us and adaptation of green practices for sustainable development.

The Green Audit Report (GAR) 2022, mentored and guided by the Internal Quality Assurance Cell (IQAC) at Regional Institute of Education (RIE) Bhopal inspected different aspects of environmental performance within campus. According to the norms and parameters designed by National Assessment and Accreditation Council (NAAC), the audit covers the inspection of energy consumption, green cover, and waste generation. It has closely studied the carbon emission in the college campus.

The team consisting Principal RIE Bhopal, Head, Department of Education in Science and Mathematics (DESM), faculties of agriculture and electronics and electrical section have expertise to develop green and eco-friendly and sustainable practices for last many years. Henceforth, the data were collected and reported on the basis of their experiences with the help of cadets of National Cadet Corps (NCC) and National Service Scheme (NSS). This report has been covering the state of the environmental resources available at the institute, enlists the strengths, weaknesses, and suggestions for further enhancement of the current quality of ‘green- facilities’.

RIE, BHOPAL – A brief instruction of Institute

The Regional Institute of Education Bhopal, is a premier institute of education located in Bhopal, the capital city of the Indian state of Madhya Pradesh. The institute was established in 1963 by National Council of Education, Research and Training (NCERT) with the aim of promoting quality teacher education and research in the field of education. RIE Bhopal offers undergraduate, postgraduate, and doctoral programs in education and related fields. Some of the courses offered by the institute include Integrated Bachelor of Science and Bachelor of Education (B.Sc. B.Ed.) and Integrated Bachelor of Art and Bachelor of Education (B.A B. Ed.), Bachelor of Education (B.Ed.), Master of Education (M.Ed.) and Doctor of Philosophy (Ph.D). The institute also offers diploma and certificate courses in various fields of education.

Apart from academic programs, RIE Bhopal also conducts various research activities, training programs, and workshops for teachers and educators. The institute has a well-equipped library, computer lab, science lab, and sport facilities to support its academic and research activities. The institute also has a hostel facility for students who come from outside the city. RIE Bhopal is known for its quality education and has produced many successful teachers, educators, and researchers over the years. The institute has a team of highly qualified and experienced faculty members who are dedicated to providing quality education and guidance to their students.

RIE Bhopal is actively involved in research activities in the field of education. The institute has a research center that conducts research on various aspects of education such as curriculum development, teacher training, educational technology, and inclusive education. RIE Bhopal has collaborations with various national and international organizations in the field of education. The institute has tie-ups with universities and educational institutions in countries such as Australia, and South Korea for student and faculty exchange programs. Overall, RIE Bhopal is a premier institute of education that provides quality teacher education and research facilities to its students. The institute is committed to promoting excellence in education and has a rich tradition of producing successful teachers and researchers.

1 WHAT IS GREEN AUDIT?

A green audit is an assessment of an organization's environmental impact and sustainability practices. It is also known as an environmental audit or eco-audit. A green audit typically involves a review of an organization's energy consumption, water usage, waste management practices, and carbon footprint. The audit may also assess the organization's compliance with environmental regulations and identify potential areas of risk or liability.

NAAC New Delhi has made it mandatory for all higher educational institutions to submit an annual Green Audit Report (GAR). Furthermore, corporate social responsibility of the higher educational institutions ensures that the institute contributes towards the reduction of global warming by reducing their carbon footprint. The green audit process involves a team of trained professionals who collect and analyze data on the organization's environmental impact. The team may use various tools and techniques such as surveys, data analysis, and site visits to gather information. Based on the findings of the green audit, the team may develop an action plan to promote sustainability and reduce environmental impact. The action plan may include measures such as promoting energy-efficient practices, reducing waste generation, improving water management, and promoting sustainable procurement practices.

Overall, a green audit is an important tool for organizations to promote environmental sustainability and reduce their impact on the environment. The audit can help organizations identify areas for improvement and develop effective strategies to promote sustainability and reduce environmental impact.

1.1 Green audit in RIE Bhopal

Objectives: The main objective of the green audit is to assess the environmental impact of the institute and to identify areas where sustainability practices could be improved. The audit aims to promote environmental awareness among staff and students and to encourage the adoption of sustainable practices in the institute.

Methodology: The green audit was conducted by a team of faculty members, staff, and students who have experience in environmental sustainability. The audit involved a detailed assessment of the institute's energy consumption, waste management practices, water usage,

and carbon footprint. The team used various tools and techniques such as surveys, data collection, and analysis to identify areas of improvement.

Action Plan: Based on the findings of the green audit, RIE Bhopal developed an action plan to improve its sustainability practices. The plan included measures such as installing energy-efficient lighting systems, promoting the use of e-books and online resources, and conducting awareness campaigns on waste segregation and composting.

Outcomes: The green audit and the subsequent action plan resulted in significant improvements in RIE Bhopal's sustainability practices. The institute was able to reduce its energy consumption by implementing energy-efficient lighting and air conditioning systems. It also promoted the use of e-books and online resources, which reduced paper consumption. The institute also established a waste management system that promoted waste segregation and composting.

Overall, the green audit conducted by RIE Bhopal helped to promote environmental awareness and encourage sustainable practices in the institute. The audit and the subsequent action plan resulted in significant improvements in RIE Bhopal's sustainability practices, which are expected to have long-term benefits for the environment and the community.

1.2 Importance of green audit

1. **Identifying environmental risks and opportunities:** A green audit helps organizations to identify potential risks and opportunities related to their environmental impact. By evaluating their environmental performance, organizations can identify areas where they can improve their environmental practices and reduce their impact on the environment.
2. **Compliance with environmental regulations:** Green audit helps organizations to comply with environmental regulations and standards. By conducting regular environmental audits, organizations can ensure that they are following all relevant environmental laws and regulations, and are meeting the required environmental standards.
3. **Reducing environmental impact**: The primary goal of a green audit is to identify areas where an organization can reduce its environmental impact. By identifying areas for improvement, organizations can take action to reduce their energy consumption, waste

generation, and carbon emissions, and improve their overall environmental performance.

4. **Enhancing reputation:** A good environmental performance can enhance an organization's reputation and increase its credibility among stakeholders. By demonstrating a commitment to sustainability and environmental responsibility, organizations can improve their brand image and attract customers who are environmentally conscious.
5. **Cost savings:** Implementing environmental practices identified through green audits can lead to cost savings. For example, reducing energy consumption and waste generation can result in lower utility bills and reduced waste disposal costs.

1.3 Target areas of the audit

1. Water audit
2. Energy audit
3. Waste audit
4. Landscape audit
5. Carbon footprint analysis

Figure 1. Entrance of Regional Institute of Education, Bhopal

2 METHODOLOGY ADOPTED AT RIE

NAAC has not explicitly defined a specific methodology for conducting a green audit. However, a green audit is typically an assessment of an institution's environmental performance and sustainability practices. Here are some general steps that may be adopted for conducting a green audit:

Determine the scope and objectives of the audit: This involves identifying the areas of the institution's operations and facilities that will be assessed and defining the goals and objectives of the audit.

Conduct a preliminary assessment: This involves gathering information about the institution's environmental policies, procedures, and practices, and identifying potential environmental risks and impacts.

Develop audit criteria and indicators: This involves developing a set of criteria and indicators against which the institution's environmental performance will be evaluated. The criteria and indicators should be aligned with the institution's objectives, goals, and policies.

Collect data and evidence: This involves gathering data and evidence to assess the institution's environmental performance, such as energy consumption, waste generation, water usage, and greenhouse gas emissions.

Analyze the data and evidence: This involves evaluating the data and evidence collected and comparing it to the established criteria and indicators.

Identify areas for improvement: This involves identifying areas where the institution's environmental performance falls short of the established criteria and indicators, and recommending actions to improve performance.

Develop an action plan: This involves developing an action plan that outlines the steps the institution will take to improve its environmental performance.

Monitor and review progress: This involves monitoring and reviewing progress against the action plan and revising it as necessary. After keen review of different aspects and available

methodologies for Green auditing, the Green audit team at RIE Bhopal, has divided complete auditing process in to three stages.

- **Pre audit stage**
- **Audit stage**
- **Post audit stage**

Pre Audit	Audit stage	Post audit
Determining scope and goals for the audit	On Site visit	Tabulation of collected data
Formation of audit teams	Collection of data for water, waste, energy landscape, carbon and foot print audit	Analysis of the data collected
Audit planning	Review of supporting documents and policies, available literature	Discussions on the reviewed data
On-Field orientation by team	Interviews of responsible staff and care-takers, students	Strategies for maximum utilisation of resources
Discussion about areas to be audited	Notes on the problematic areas that needs fixing	Final drafting of report
Preparation of the different task for audit stages		

Figure 2 Lecture on Gandhi Darshan and Present education (includes Mahatma Gandhi's vision on clean and green India, Khadi and Aatm nirbhar Bharat) delivered by Dr. Rajendra Khimani, Vice Chancellor, Gujarat Vidyapeeth, Ahmedabad

Figure 3 Consultant of Micro Irrigation, PSSCIVE Bhopal called on Principal RIE Bhopal to discuss micro irrigation in farmland and gardens

Environment awareness drive on campus

Figure 4 Rally for Go green campaign

Figure 5 Plantation on campus with staff, alumni and guests

Figure 6 Run for nature

3 PRE-AUDIT STAGE

To promote green practices at RIE Bhopal, a team was formed that consisted of both experienced and environmentally conscious faculty members, as well as students enrolled in NCC and NSS as cadets. These Students have also completed work education course either in Agriculture or Electronics to aware current green and energy saving techniques. The NCC and NSS cadets have been oriented on environmental sustainability through different lectures, training programs, and activities time to time organized in the institute.

In addition to the orientation session, the students had the opportunity to visit forest, farmland and lakes under different exposure visit for the courses like botany, zoology and agriculture. Hence, these initiatives likely provided the students with more detailed information on how to conduct a green audit, as well as hands-on experience in applying the concepts they had learned.

Overall, the formation of this team demonstrate the institute's commitment to promoting sustainability and reducing its environmental footprint. Through the green audit process, the team can identify areas where the college can improve its environmental performance, and develop an action plan to implement changes that will benefit both the college and the environment.

Water audit

Water, which covers over two thirds of the planet, is essential for human survival. Human activities and climate change are adversely affecting the natural water cycle, which is putting immense pressure on the freshwater ecosystem. The degradation of the natural water cycle is a result of pollution, infrastructural advancements, and resource extraction.

Therefore, it is crucial to promote the management, protection, and restoration of freshwater sources in and around college campuses. The green audit was significant in assessing the quality of the water supply in our college and identifying measures we can take to improve it. As freshwater is a vital resource, it is essential to take action to preserve and conserve it.

- **Waste audit**

As the world’s population approaches 8 billion, the sound management of waste and chemicals is becoming challenging. While chemicals are major contributors to world economies, clean

technologies, poverty alleviation, and their sound management is essential to avoiding risks to human health and ecosystems and substantial costs to national economies. The Green Audit was essential in this regard because it helped us to understand the various chemicals that were generated in our science labs and what steps were being taken for their safe disposal. It also helped us to understand how the waste generated in the college was being jetted out without causing harm to the surrounding ecosystem.

- **Energy audit**

The Energy Audit is a crucial aspect of a green audit, particularly in today's energy-driven era where energy conservation is of utmost importance. The daily tasks we undertake require a significant amount of energy, which in turn puts tremendous pressure on our already limited natural resources. The generation of energy also poses a significant risk of depleting non-renewable sources, which are already scarce due to human intervention.

To combat these challenges, Energy Audit serves as a vital tool for adopting a systematic approach to energy management. It aims to strike a balance between the total energy inputs and their usage while identifying all the energy streams within a facility. By doing so, it enables informed decision-making in the realm of energy management.

- **Landscape audit**

As the human population continues to grow, the need for space for habitation also increases. Unfortunately, this results in a decrease in the planet's green cover. The fauna that thrives in the form of forests and farmland plays a crucial role in providing food, fresh air, and maintaining the habitable temperature range of the planet. It is therefore essential to address the problems that can lead to the deterioration of the planet as we know it.

Conducting an audit is a small but important step in bringing attention to these issues. Additionally, it highlights the significance of healthy green foliage and emphasizes the need to maintain a livable home for future generations. Preserving our environment and promoting sustainability should be a top priority. The green audit provides an opportunity to assess the impact of human activities on the environment and identify ways to minimize this impact.

It emphasizes the need to preserve natural habitats and protect the flora and fauna that thrive within them. Ultimately, it is up to us to recognize the importance of protecting our planet and take action to promote sustainability. By maintaining healthy green cover, we can help ensure a better future for ourselves and the generations to come.

- **Carbon footprints audit**

A carbon footprint is the total amount of greenhouse gases (including carbon dioxide and methane) that are generated by our actions. Carbon footprints are usually measured in equivalent tons of Carbon Emissions that is produced annually either by individuals, organizations, a product or an event, among others. The Green Houses Gases whose sum results in a carbon footprint comes from the production and consumption of fossil fuels, food, industries and manufacturing units, production and generation of electricity, transportation and the human and animal respiration process.

Month wise different major green activities on the campus

April 2022

Figure 7 Inauguration of Gyan Niketan Hostel and Vivekanand Park by Director NCERT on 15 April 2023. New environmentally-friendly building and park have constructed on the campus, incorporating green designs.

July 2022

Figure 8 Distribution of saplings to students of different schools on the occasion of the world population day, dated 11 July 2022

August 2022

Figure 9 Plantation of seedling on 15th August 2022 by Principal and Campus green committee

September 2022

Figure 10 Cleanliness drive under Swachhta Pakhwara

Figure 11 Felicitation of Safai Karyakartas and gardeners

October 2022

Figure 12 Plantation of saplings during Swachchta pakhwara

Figure 13 Bidding of old files and furniture

4 AUDIT STAGE

4.1 Water audit

Water audit has been conducted with an aim to understand the water usage, wastage and water saving practices on the RIE campus. The primary source of water at the institute is Narmada water line. Narmada water supply by Bhopal Municipal Corporation (BMC), Bhopal by three different Narmada water lines viz. 1" line, 3" line and 4" line, respectively. These lines supply water to a main water sump, which has a capacity of 2, 00,000 liter water.

Main sump is connected to a water tank (capacity, 1, 20,000 lit) that supplies water to college, school, hostels, guest houses and residential blocks.

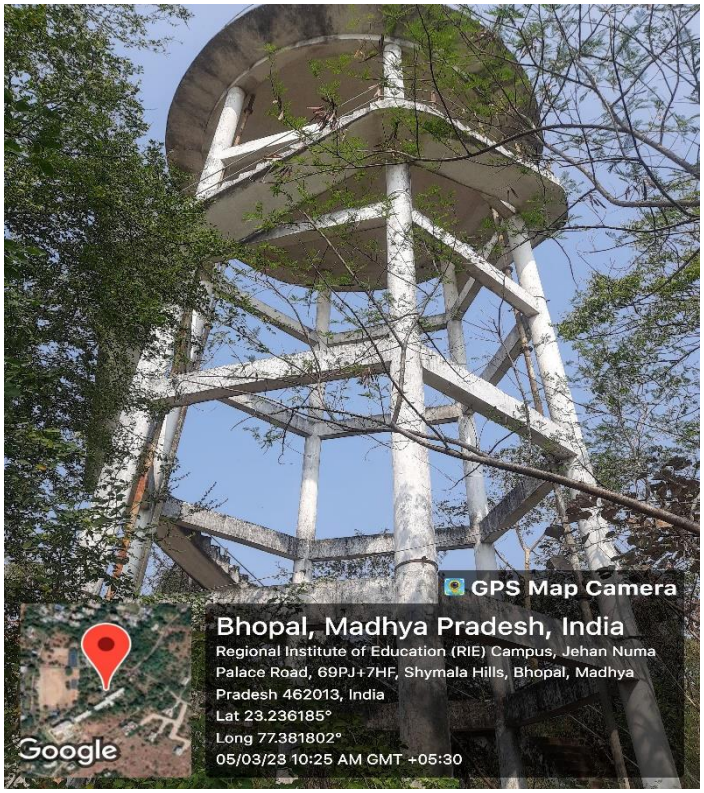


Figure 14 a water tank with a capacity of 120,000 liters located on the campus, which provides water to the entire campus.

Campus has five hostels (2 boys, 3 girls). The major quota of water is consumed in these five hostels, where the total strength of holsters are 635. Each hostel is equipped with a sump capable of holding 50,000 liters of water, which is intended to fulfill the various water requirements of the students, including usage for toilets, drinking, and cooking purposes in the mess. Sumps supply water to plastic water tanks (Sintex) located on rooftop in hostels.

Then water is consumed by residential blocks where forty one teaching and non-teaching staffs are residing along with their families. The Institute boasts two guest houses, each with a capacity to accommodate up to one hundred guests at a time. Due to the frequent booking of these guest houses, there is a continuous and high demand for water supply in order to meet the needs and requirements of the guests during their stay. However, main college building has less consumption of water then hostels and residential blocks. Water plays a critical role in fulfilling the various requirements of the main building, including the operation of water coolers, toilets, fountains, and practical laboratories.

Water is also used in three chemistry laborites (organic, inorganic and physical chemistry) where institute has adopted water saving analytic techniques. A positive aspect to note is that there has been a significant reduction in water wastage.

For aesthetic beatification and botanical diversity, campus has 14 gardens (5 gardens attached to hostels, 3 gardens attached to main college building, 2 independent gardens, 2 garden attached to guest house, a children park, and a Science park). There is huge demand of water in these gardens, however drip irrigation system has also been implemented in two rose gardens. The trees along the roadside are also irrigated using a dripping system. Total covering area of gardens are 22, 016 sqm. Five open tanks are located in these gardens where rainwater is collected and use for watering to plants during dry spells.

Harvested rainwater can be used for various purposes such as irrigation, domestic use, and groundwater recharge. It is a sustainable way to conserve water and can be implemented at various levels. In reference to topographical settlement of RIE Bhopal, it is located on hill top of shyamla hills and bottom of hills is surrounded by the Upper Lake, which is one of the biggest reservoirs in India. Complete rainwater drains away from college to upper lake. Thus there is almost zero possibilities for major rainwater harvesting practices like ground water recharge, percolation pits, recharge wells etc. Due to the mountainous terrain, bore wells have not been excavated in this area.
However, RIE Bhopal has been trying to implement rooftop rainwater harvesting practices in order to store water in college sumps.

Figure 15 Digital 3D representation of mountain terrain of RIE Bhopal representing runoff area (Source, Google Earth, Imagery date 15.10. 2021 Landsat/copermicus)

Figure 16 Hilly view of RIE Bhopal and scene of upper lake reservoir, Bhopal

4.1.1 Objectives of water audit:

- ✓ To formulate policies and strategies to ensure the sustainable management of fresh water resources.
- ✓ To identify the water losses caused by leakages and overflow from water tanks.
- ✓ To identify instances of water wastage on the college campus.
- ✓ To explore cost-effective techniques for saving water.
- ✓ To raise awareness among the students, staff, and management regarding responsible water usage.

4.1.2 Estimated daily consumption of water in campus:

According to estimates, the daily consumption of water in the Regional Institute of Education (RIE) Bhopal campus is approximately 2,30,000 liters. This consumption includes various activities such as drinking water, washing, cleaning, gardening, and other academic and non-academic purposes. To ensure that the water is used efficiently, the institute has implemented various measures such as rainwater harvesting, water recycling, and the use of low-flow fixtures. These measures not only reduce the institute's water usage but also promote sustainability and conservation of natural resources.

Table 1: Water consumption in RIE Bhopal	
Water consumption for each day:	233 unit (2, 33,000 liters liters/day)
Water consumption for each month	7000 unit (7,000,000 liters)
Water consumption for each activity	
(a) for drinking liters/day	50,000 liters
(b) for hostlers (activities such as bathing, washing and cleaning)	60,000 liters
(c) for residential staff	30,000 liters
(c) for cleaning and sanitation on campus	20,000 liters
(d) for watering in the garden	10, 000 liters
(e) for running construction activities	63,000 liters
Total (a+b+c+d+e)	2,330,000 liters

Table 2: Data of water use in college campus		
S.no	**Parameters**	**Response**
1.	Man-made sources of water	Narmada line
2.	Total no. of bore wells	0
3.	Total no of sumps	7
4.	Total no. of motors.	18
5.	Total horse power of the motors.	4 motors- 10 HP/each (Main sump) 12 motors-1.5 HP/each (Hostel and gardens) 1 motors- 5 HP/each (Gyan Niketan hostel) 1 motor- 8 HP/each (Agri farm)
6.	Capacity of sumps	Main sump – 200000 lit Other sumps – 50,000 lit
7.	No. of water tank	1
8.	Capacity of water tank	1,20,000 lit
9.	No. of plastic water tank (sintex)	125
10.	Combined capacity of water tank	120000
11.	Is there any wastage of water?	No
12.	Where is the waste water discharged?	Savage tanks
13.	Is waste water generated from the labs?	Yes
14.	Whether waste water from labs is mixed with the ground water?	No
15.	Is lab water treated before its disposal?	No
16.	Whether any green chemistry method practiced in labs?	Yes, **Micro-Scale Analysis** technique is used by the chemistry students.
17.	No. of water coolers.	33
18.	Amount of water used for sanitary purposes.	10,000 litre
19.	No. of bathrooms in staff rooms, hostel.	1
20.	No. of bathroom in hostels	65
21.	No. of toilet urinals.	65
22.	No. of waterless toilets.	Nil
23.	Total no. of water taps. In laboratory	144

24.	No. of taps in the canteen.	5
25.	No. of taps in the laboratories.	123
26.	Is there any leakage and loss of water from the taps?	No
27.	Are there any signs reminding people to turn off the tap after use?	Yes
28.	Total no. of water fountains.	1
29.	Total no. of leaky water fountains.	Nil
30.	How often are the gardens watered?	Daily
31.	Total amount of water used for gardening and irrigation.	10000 liters per day
32.	Is drip irrigation used for gardening?	Yes
33.	Amount of water used for cleaning college buses	No buses
34.	Is rain water harvesting practiced?	Rainwater is collected from rooftops through pipelines into the water sumps located in hostels.
35.	No. of water meters in the college.	3 (for three water lines)
36.	Amount of water charges paid for the water connections	1" water line – 45,000/- yearly 3" & 4" line –70,000 /- monthly

4.1.3 Initiatives taken towards promotion of water management

- Water conservation and green awareness campaigns conducted by the NSS.
- Greenery and vegetation added for better retention of groundwater.
- Adopting Micro-analysis technique for better disposal of lab water.
- Removing any leaking water pipes or taps.
- Installing tank overflow alarms.
- Sustainable use of water by strictly following the principle of reducing, reusing and recycling thereby minimizing water wastage.

4.1.4 Waste domestic water disposal and management plan

There are sewage and sludge tanks built into the plinth of the building to dispose of sewage water. However, the institution is planning to take a positive step towards sustainable and eco-friendly waste management by developing a sewage treatment plant in the near future. The aim of the treatment plant is to treat the wastewater from hostels and staff colonies and recycle it for watering the gardens. The institution has a proper plan in place for the management and maintenance of the sewage treatment plant to ensure its long-term sustainability and

effectiveness. RIE believes installing the sewage treatment plant will reduce the amount of sewage that needs to be disposed of and conserve water resources by using the treated water for gardening purposes. This will also reduce the environmental impact of the institution and promote responsible waste management practices.

Different water ssystem on the campus

Figure 17 Radhakrishnan fountain in front of main building

Figure 18 Drip irrigation system in rose gardens

4.2 Energy audit

An electrical energy audit is a comprehensive evaluation of the energy usage and efficiency of electrical systems and equipment in a building or facility. The purpose of an energy audit is to identify opportunities to reduce energy consumption, lower energy costs, and improve the overall energy efficiency of a building or facility. Some common uses of electrical energy in RIE Bhopal is as given below:

1. **Lighting:** Electrical energy is used to power the lighting systems in classrooms, laboratories, libraries, and other areas of the campus.
2. **Air conditioning systems**: Heating, ventilation, and air conditioning (HVAC) systems require electrical energy to regulate the temperature and maintain a comfortable environment in classrooms, offices, and other buildings.
3. **Computers and IT equipment**: Electricity is required to operate computers and other IT equipment, this includes desktop computers, laptops, servers, printers, and other peripherals.
4. **Audio-visual equipment** Bhopal have many Smart Classes, lecture halls, auditoriums, and other facilities that require audio-visual equipment, such as projectors, speakers, and microphones, which require electrical energy.
5. **Laboratory equipment:** Science departments in RIE, Bhopal often use specialized laboratory equipment, such as microscopes, spectrometers, and centrifuges, which require electricity to function.
6. **Kitchen and dining facilities:** RIE, Bhopal have five hostel and one canteen.IT have dining halls and food service facilities that require electrical energy for cooking, refrigeration, and other food-related tasks.

4.2.1 Electric Energy

Electrical Energy-Electrical Energy is the capacity for doing electrical work. In other words, electrical energy is the work done by the moving streams of the electrons or charges.

Unit- Joule (Watt X Second)

The commercial or practical unit of energy is the kilowatt-hour (kWh) which is also known as the Board of Trade (B.O.T) unit. Usually, one kWh is called One Unit.

1000Watt X 1 Hour = 01 Unit Electrical Energy

4.2.2 Objectives of energy audit

- ✓ To assess and determine the sources of energy consumption on the campus
- ✓ To identify the sections that cause maximum wastage
- ✓ To determine the areas with maximum potential for conservation of electrical energy.
- ✓ To recognize the effective cost and energy saving proposal along with vital payback periods, which could be put to effect in the college facilities
- ✓ To help our college maximize the efficiency of its investments and installations for its students.

4.2.3 The institution uses energy in the following forms:

- ✓ From M. P. M. K. V. V. Co. Ltd.
- ✓ Electricity SOLAR Grid connected Solar Plant (75 KW)
- ✓ High Speed Diesel Generator (HSDG), (160 KVA)

4.2.4 Total Electrical Consumption on the campus includes:

- ✓ Teaching Equipment such as LCD Projectors and Monitors
- ✓ Computer Lab
- ✓ Lighting, Fans & Air-Conditioning
- ✓ Laboratory Equipment
- ✓ Office Equipment such as Printers, Xerox machines, Computers, etc.
- ✓ Cafeteria Items such as Refrigerators, Coffee Machine, Water Filters, etc
- ✓ Hostel Facilities
- ✓ Other Miscellaneous Needs such as CCTV, UPS, Router system, Flood light, Pumping motor etc.

4.2.5 Monthly Electricity Consumption (KWH) and Bill for the year (2022-2023)

Table 3. Electric consumption at RIE Campus

S.No.	Month	Electricity Reading Consumption	Electricity Bill (INR)
1.	Mar-22	43139.00	380918.00
2.	Apr-22	72193	618395.00
3.	May-22	12366	719167.00
4.	Jun-22	83130	726930.00
5.	Jul-22	60450	595035.00

6.	Aug-22	53988	534785.00
7.	Sep-22	49961	504353.00
8.	Oct-22	47178	440059.00
9.	Nov-22	44109	397231.00
10.	Dec-22	45476	408533.00
11.	Jan-23	49754	456720.00
12.	Feb-23	47618	445517.00

- The average cost for electricity consumption for the college is INR 5,18,970 Rs/Month.

Table 4. Fan load in the campus		
Total no. of fan	Total power in Watt	Total power in KW
1478	102789	103

Table 5. Lighting load in the campus	
Total no. of lighting fixture	Total power in Watt
709	19354

Table 6. Number of appliances in the campus	
Total no. of air-conditioner	130
Total No. of photocopy machine	13
Total No. of projector	44
LCD/Television	30
Total No of printers	65
CCTV camera	95
Computer	334

Table 7. Calculation of consumption of energy						
S.No.	**Name of the Appliance**	**Power rating (Watt)**	**Qty.**	**Power consumption (Watt)**	**Usage (Hrs/Day)**	**Power Consumption/day (Watt)**
	A	**B**	**C**	**D = B X C**	**E**	**F = E X F**
1	Fan	70	1478	103460	8	827680
2	Lighting Fixture	27	709	19143	8	153144
3	Air Conditioner	1100	130	143000	4	572000
4	Photo Copy machine	1000	13	13000	3	39000
5	Overhead Projector	150	44	6600	4	26400
6	Television	95	30	2850	3	8550
7	Laser Printer	250	65	16250	3	48750
8	CCTV camera	50	95	4750	24	114000
9	Computer	200	334	66800	6	400800

* The Total Energy Consumption recorded here is approximate. Actual Energy Consumption might differ based on the actual usage of the appliance for a particular time period.

4.2.6 Initiatives taken towards promotion of energy conservation:

Energy conservation is the practice of reducing the amount of energy consumed by individuals. It is essential to help mitigate climate change, reduce greenhouse gas emissions, and save money. Several initiatives will be taken to promote energy conservation in the RIE Bhopal. Consumption and Conservation of energy is in the hands of the responsible RIE students and Staff. The staff and students of RIE, Bhopal participate willingly and thoughtfully in playing their part for making the campus a place of conscious consumption. Here are some of them:

- ✓ Education and awareness campaigns are an essential part of promoting energy conservation. Institute should be organize some programme for promoting energy conservation through advertising campaigns, school programs, and community events.
- ✓ Institutes can switch to energy-efficient lighting, such as LED bulbs, which can save up to 75% of energy compared to traditional incandescent bulbs.
- ✓ Energy is saved through ‘screen-saver’ facility available for every computer.

- ✓ 5 Stars' energy saving ACs are used in the seminar halls and office.
- ✓ 5 Stars' energy saving Refrigerators are used in the Canteen.
- ✓ Set the thermostat of AC on 25 degrees Celsius can save a significant amount of energy. Lowering the thermostat by one degree Celsius in the winter and raising it by one degree Celsius in the summer can save up to 10% on heating and cooling costs.
- ✓ RIE Bhopal can purchase energy-efficient equipment such as computers, printers, and Lab Instrument. These devices are designed to use less energy while providing the same level of functionality.
- ✓ Use of natural light during the day in the classrooms and library.
- ✓ Cross Ventilation is provided in Library, Laboratory & Classrooms, which reduced the heavy use of ceiling fans and ACs
- ✓ The Practical exams may be scheduled during the afternoon hours to save electrical lighting.
- ✓ Reflective off- White paint on the classroom walls to increase the brightness.
- ✓ RIE Bhopal can replace more Street Lamps around the campus and parking by solar powered LED Street light.
- ✓ RIE, Bhopal can install more solar panels on building rooftops and parking roof to generate clean energy. This can help reduce their dependence on grid electricity and lower their carbon footprint.
- ✓ LED lights may be used in Seminar Hall and Auditorium.
- ✓ Encouraging students, faculty, and staff to adopt energy-efficient practices, such as turning off lights, Fan, ACs and other electrical and Electronics devices when not in use, using natural

4.3 Waste audit

RIE Bhopal has implemented effective solid waste management practices such as waste segregation, composting, and recycling to promote responsible waste management. The institute has also taken measures to reduce the use of single-use plastic on campus by replacing plastic bottles and bags with eco-friendly alternatives. Regular awareness programs are conducted to educate students and staff about sustainable waste management practices. The commitment of RIE Bhopal towards sustainable waste management and reducing plastic waste is commendable. These efforts contribute towards creating a cleaner and greener environment on campus and inspire others to adopt similar practices.

4.3.1 Objectives of waste audit

- ✓ To evaluate the activities leading to waste generation.
- ✓ To evaluate the efficiency and effectiveness of the waste management practices employed by the college
- ✓ To determine the composition, structure, and approximate quantities of the generated waste.
- ✓ To identify any shortcomings in the segregation, treatment, and disposal of waste.
- ✓ To identify any possible environmental impacts arising from the generated waste.

Table 8 Land occupied by NCERT RIE Bhopal campus

1	Area of land (Acres) (Approx.)	104.40 Acres (68.61 for RIE Bhopal and 32.79 Acre for PSSCIVE Bhopal)
2	Built Up area (Acres) (Approx.)	4.447 Acres

Table 9 Total area utilized

Sr. No.	Name of places	Area occupied
1	Academic purpose (Main college building, laboratories DMS, Dispensary)	15,301.55 sqm
2	Residential purpose (Hostels, Staff quarter)	2, 695.28 sqm
3	Farmland	96, 598 sqm
4	Garden	22, 016 sqm
5	Play ground	25,000 sqm
6	Canteen	155 sqm
	Total	1, 61,766.83 sqm Or 40 Acres

Table 10 Counts of facilities

Sr. No.	Facilities	Count
1	No. of toilets	85
2	Total no. of classrooms	20
3	No. of classrooms with LCD facilities	28
4	Seminar halls	04

Table 11 Approximate amount of waste generated per day

	Bio degradable (in kg)			**Non-bio Degradable (in kg)**			**Hazardous (in kg)**		
	<0-1	2-10	>10	<0-1	2-10	>10	<0-1	2-10	>10
Office		√					√		
Canteen		√			√		√		
Laborites	√						√		
Hostels		√			√		√		
Dispensary	√								

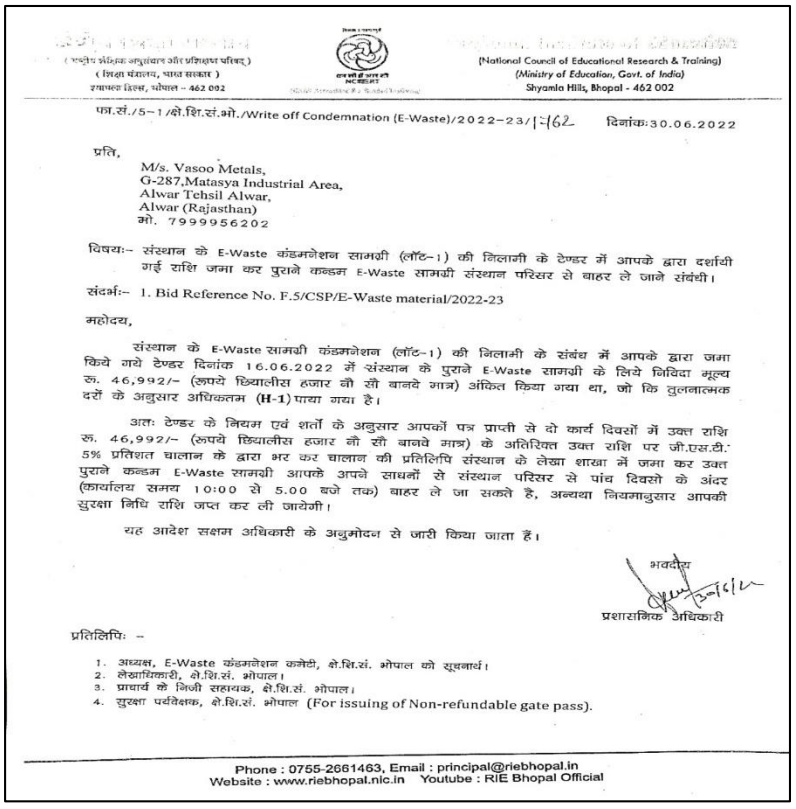
4.3.2 Different sources of waste on campus and management

4.3.2.1 E-Waste collection shed

The Central store, RIE, Bhopal has taken responsibility to collect e-waste from different computer laboratories (Mathematics, Library and ET section), staff and students throughout the year. A dedicated e-waste collection shed is available for stroning then bidding/e-bidding of e-waste materials. Once in a year, the e-waste collected and handed over to e-waste solution providers approved by Ministry of environment, forest and climate change, Central Government of India for appropriate management.

The e-waste solution drive is a valuable initiative that raises awareness among staff and students about the adverse consequences of disposing of e-waste as regular garbage. By sensitizing them to the importance of managing e-waste responsibly, the program encourages individuals to take an active role in reducing their environmental impact. Through this drive, individuals learn about the harmful effects of e-waste on the environment and the benefits of proper e-waste disposal. Such an approach helps to foster a sense of responsibility and stewardship towards the environment while promoting sustainable practices

Figure 19 e-waste and solid waste collection shed at RIE Bhopal



(राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्)
(शिक्षा मंत्रालय, भारत सरकार)
श्यामला हिल्स, भोपाल - 462 002

(National Council of Educational Research & Training)
(Ministry of Education, Govt. of India)
Shyamla Hills, Bhopal - 462 002

फा.सं./5-1/के.शि.सं.भो./Write off Condemnation (E-Waste)/2022-23/1462 दिनांक: 30.06.2022

प्रति,

M/s. Vasoo Metals,
G-287,Matasya Industrial Area,
Alwar Tehsil Alwar,
Alwar (Rajasthan)
मो. 7999956202

विषयः- संस्थान के E-Waste कंडमनेशन सामग्री (लॉट-1) की निलामी के टेण्डर में आपके द्वारा दर्शायी गई राशि जमा कर पुराने कन्डम E-Waste सामग्री संस्थान परिसर से बाहर ले जाने संबंधी।

संदर्भः- 1. Bid Reference No. F.5/CSP/E-Waste material/2022-23

महोदय,

संस्थान के E-Waste सामग्री कंडमनेशन (लॉट-1) की निलामी के संबंध में आपके द्वारा जमा किये गये टेण्डर दिनांक 16.06.2022 में संस्थान के पुराने E-Waste सामग्री के लिये निविदा मूल्य रु. 46,992/- (रुपये छियालीस हजार नौ सौ बानवे मात्र) अंकित किया गया था, जो कि तुलनात्मक दरों के अनुसार अधिकतम (H-1) पाया गया है।

अतः टेण्डर के नियम एवं शर्तों के अनुसार आपकों पत्र प्राप्ती से दो कार्य दिवसों में उक्त राशि रु. 46,992/- (रुपये छियालीस हजार नौ सौ बानवे मात्र) के अतिरिक्त उक्त राशि पर जी.एस.टी. 5% प्रतिशत चालान के द्वारा भर कर चालान की प्रतिलिपि संस्थान के लेखा शाखा में जमा कर उक्त पुराने कन्डम E-Waste सामग्री आपके अपने साधनों से संस्थान परिसर से पांच दिवसो के अंदर (कार्यालय समय 10:00 से 5.00 बजे तक) बाहर ले जा सकते है, अन्यथा नियमानुसार आपकी सुरक्षा निधि राशि जप्त कर ली जायेगी।

यह आदेश सक्षम अधिकारी के अनुमोदन से जारी किया जाता हैं।

भवदीय

प्रशासनिक अधिकारी

प्रतिलिपिः -

1. अध्यक्ष, E-Waste कंडमनेशन कमेटी, के.शि.सं. भोपाल को सूचनार्थ।
2. लेखाधिकारी, के.शि.सं. भोपाल।
3. प्राचार्य के निजी सहायक, के.शि.सं. भोपाल।
4. सुरक्षा पर्यवेक्षक, के.शि.सं. भोपाल (For issuing of Non-refundable gate pass).

Phone : 0755-2661463, Email : principal@riebhopal.in
Website : www.riebhopal.nic.in Youtube : RIE Bhopal Official

Figure 20 Bidding of e-waste under condemnation committee 2022, RIE Bhopal

4.3.2.2 Hazardous waste management

Hazardous waste such as batteries, e-waste, and chemicals were managed and disposed of properly. RIE is on the direction to make a partner with authorized e-waste recyclers to dispose of electronic waste, while hazardous chemicals should be stored, handled, and disposed of safely.

4.3.2.3 Sold and plastic waste

The task of managing solid and plastic waste at RIE Bhopal can be challenging due to the campus's wide area. With a large area to cover, it can be difficult to ensure that waste is properly managed and disposed of in an environmentally friendly manner. Here are some ways to manage solid and plastic waste at RIE Bhopal:

Waste segregation: Implementing waste segregation at source is an essential first step in managing solid and plastic waste in educational campuses. The segregation should be done at the point of generation, and waste should be separated into different categories such as biodegradable, non-biodegradable, hazardous waste, and recyclables.

Reduce, Reuse, and Recycle: Promote the 3 R's - Reduce, Reuse, and Recycle - to minimize the amount of waste generated. This can be achieved by promoting the use of eco-friendly products, avoiding single-use plastics, encouraging the reuse of materials, and setting up a recycling program on campus.

4.3.2.4 Single use plastic free campus

Single-use plastics refer to items that are used only once before being thrown away, such as plastic bags, straws, water bottles, and food packaging. These items are often not biodegradable and can take hundreds of years to break down in the environment, causing harm to wildlife and ecosystems. To address this issue, RIE Bhopal has implemented various measures to reduce the use of single-use plastics on campus. For instance, the institution has banned the use of plastic bags since 2018 and encourages students and staff to use cloth bags instead. Plastic water bottles have also been replaced with reusable bottles that can be refilled at water stations throughout the campus. Additionally, plastic cutlery and plates have been replaced with biodegradable alternatives made from materials like cornstarch

Figure 21: The institution has banned the use of plastic bags since 2018 and encourages students and staff to use cloth bags instead.

Figure 22 Dustbins have been installed at various places to segregate dry and wet waste.

4.3.2.5 Decomposing and vermicomposting unit

RIE Bhopal has implemented composting and vermicomposting units as part of its waste management strategy. The composting unit collects and processes organic waste materials generated on campus, such as food waste, leaves, and grass clippings, using microorganisms to break down the organic matter into compost. This nutrient-rich compost is used as fertilizer in the campus gardens. In addition, a vermicomposting unit has been set up that uses worms to decompose organic waste. The worms consume the organic matter and produce castings, which are a highly effective fertilizer. The vermicomposting unit is used to process kitchen waste and food waste generated in the campus canteen. These efforts help to reduce the amount of waste sent to landfills and promote a more sustainable and eco-friendly environment in RIE Bhopal.

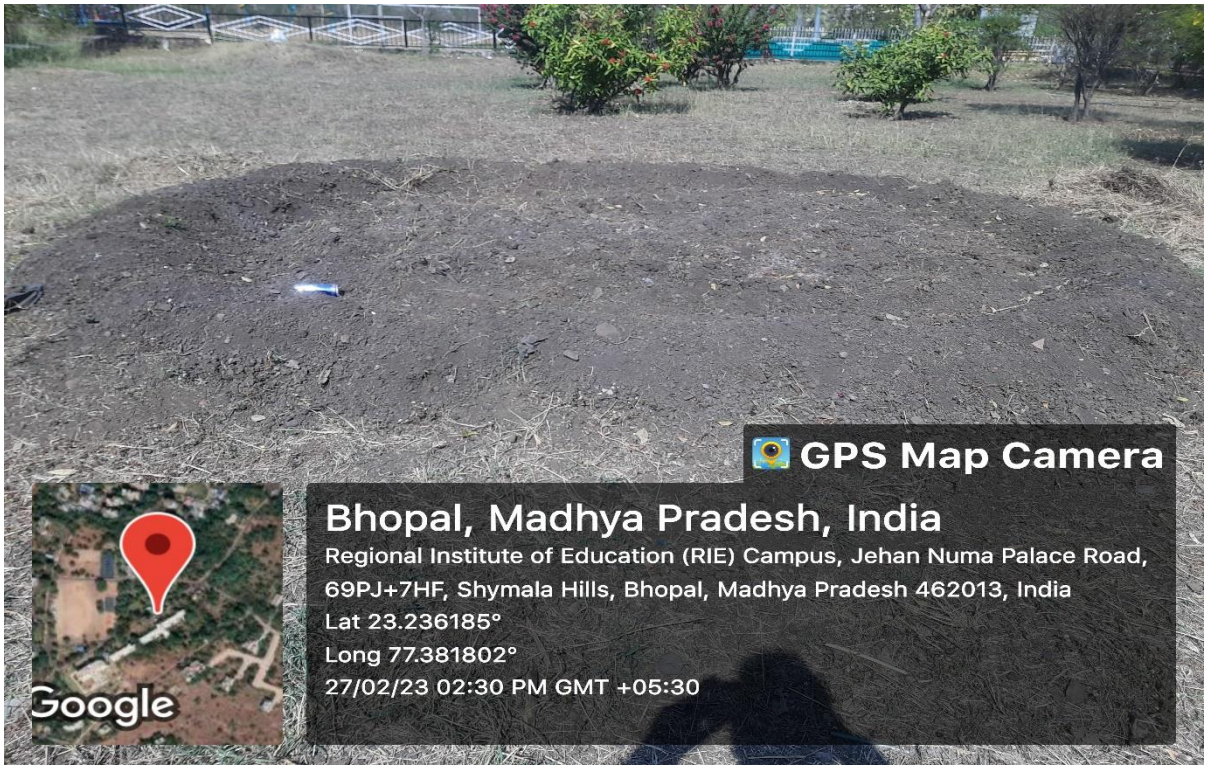


Figure 23 A compost pit was prepared at DMS school garden to decompose organic scraps and dry and/or green plant leaves.

Figure 24 A vermicomposting unit has been set up that uses worms to decompose organic waste.

4.3.2.6 Medical waste disposal

A small medical dispensary has been running inside the RIE campus. Very low medical waste is generated at this dispensary. Primary medical facilities have been provided at the dispensary without any charges. Generated medical waste is collected by medical disposal van time to time. Most often, trash vehicle run by Bhopal municipal corporation (BMC) Bhopal has a separate chamber to collect medical waste (needles and syringes, masks, used bandages or other dressings) and lab waste like glass ware etc.

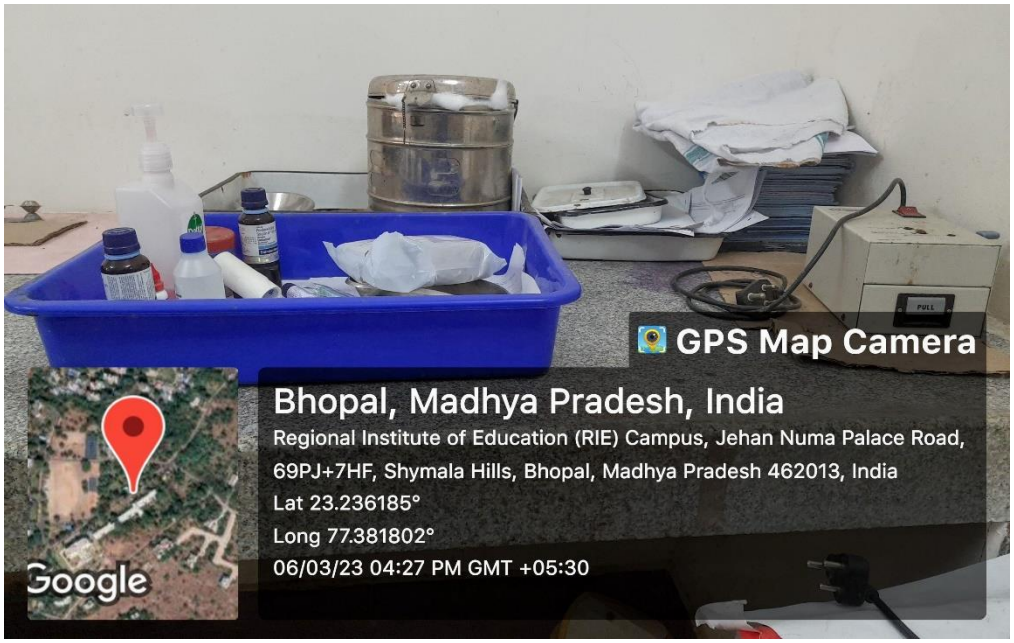


Figure 25 Medical waste and needle burner & syringe destroyer

4.3.2.7 Sanitary pad incinerator

Fourteen sanitary pad incinerators were installed in ladies washrooms in hostels and institute. Sanitary pad incinerators are devices designed to safely dispose of used sanitary pads by incinerating them at high temperatures. The use of sanitary pad incinerators can have several benefits, including reducing the risk of environmental contamination, minimizing the spread of germs and diseases, and providing a convenient and discreet way for women to dispose of their sanitary pads.

Figure 26 Sanitary pad incinerator or Sanitary napkin disposal machines located in washrooms of girls hostels and ladies toilet at college.

4.4 Landscape audit

The importance of a green and clean environment in an educational institution cannot be overstated. A well-maintained and aesthetically pleasing campus creates a positive and conducive atmosphere for students to learn and grow. A green campus not only enhances the physical appearance of the institution but also plays a vital role in promoting a healthy environment for the students. The presence of plants and trees helps to purify the air, reduce noise pollution and create a cool and refreshing environment. Moreover, it has been proven that exposure to green spaces has a positive impact on mental health and can reduce stress levels among students.

In addition to outdoor plantation, indoor plantation is also crucial in creating a fresh and healthy environment inside the classrooms and other indoor spaces. Indoor plants are known to improve air quality by absorbing pollutants and releasing oxygen, which in turn helps to enhance cognitive function and improve productivity among students. By placing indoor plants strategically throughout the campus, educational institutions can create a harmonious and sustainable environment that benefits both students and faculty alike. Ultimately, the focus on maintaining a green and clean campus reinforces the institution's commitment to sustainability and sets an example for students to follow in their future endeavors.

Figure 27 Beautiful lawn with ornamental plants and garden features in front of main campus building at RIE Bhopal

4.4.1 Objectives of landscape audit:

- ✓ Explore the current types of plants and trees present on the campus.
- ✓ Evaluate the soil quality on the college premises for planting purposes.
- ✓ Determine and supply the necessary nutrients for the optimal growth of the flora and fauna on the campus.
- ✓ Formulate policies to create a well-balanced ecological system for a sustainable campus.
- ✓ Enlist the naturally surviving animal, insects, birds along with flora and fauna on the campus.

4.4.2 The audit focused on the green cover includes

- ✓ Natural forest: habitat of local species
- ✓ Ornamental gardens and lawns
- ✓ Medicinal garden
- ✓ Farmland (Outside the campus, 8 km)
- ✓ Animals (Birds, pets, etc.) on the campus

4.4.3 Natural forest: habitat of local species

A nature forest, covers 50% area of the campus, is a complex and diverse habitat of local species of flora and fauna (No. of major forest trees 612, table no.12). It also provides food for numerous animal species, as well as helps regulate the climate and plays an essential role in water management. RIE acknowledges that natural forests are important resources that provide valuable products such as wood and medicinal plants. However, in accordance with the guidelines set forth by BMC, Bhopal, RIE is committed to not cutting down any trees in the forest.

To conserve natural forests in RIE Bhopal, a multi-faceted approach has been adopted in the institute that involves staff/student involvement, sustainable management practices, increasing green cover, educating the public, and enforcing laws and regulations. Planting additional trees and shrubs can contribute to increasing the density of green cover while providing a variety of benefits such as improved air quality, shading, and reducing noise.

Table 12. Important forest species in natural forest

1	पलाश	*Butea monosperma* (Fabaceae)	200
2	तेंदू	*Diospyros melanoxylon* (Ebenaceae)	3
3	वांस	*Bambusa arundinacea* (Poaceae)	100
4	इमली	*Tamarindus indica* (Fabaceae)	10
5	बेर	*Ziziphus mauritiana* (Rhamnaceae)	30
6	बबूल	*Acacia nilotica* (Fabaceae)	10
7	कदम्ब	*Neolamarckia cadamba* (Rubiaceae)	5
8	कड़ी पत्ता	*Murraya koenigii* (Rutaceae)	30
9	नीम	*Azadirachta indica* (Meliaceae)	50
10	जंगली जलेबी	*Pithecellobium dulce* (Fabaceae)	20
11	साल	*Shorea robusta* (Dipterocarpaceae)	2
12	आम	*Mangifera indica* (Anacardiaceae)	30
13	जामुन	*Syzygium cumini* (Myrtaceae)	20
14	शीशम	*Dalbergia sissoo* (Fabaceae)	5
15	नीलगिरी	*Eucalyptus* (Myrtaceae)	10
16	सगौन	*Tectona grandis* (Lamiaceae)	50
17	पीला गुलमुहर	*Delonix regia* (Fabaceae)	4
18	लाल गुलमुहर	*Lagerstroemia speciosa* (Lythraceae)	10
19	महुआ	*Madhuca longifolia* (Sapotaceae)	2
20	शहतूत	*Terminalia chebula* (Combretaceae)	20
21	बरगद	*Ficus benghalensis* (Moraceae)	5
22	पीपल	*Ficus religiosa* (Moraceae)	5
23	शेमल	*Bombax ceiba* (Malvaceae)	10

Figure 28 Flora and fauna grown naturally in the natural forest

4.4.4 Ornamental gardens and lawns

All the buildings in the campus (college, hostels, and guest houses) have surrounded by lawns and gardens for aesthetic beatification and botanical diversity. There are five gardens attached to five hostels, three gardens attached to main college building, two garden attached to guest house, a children park, a Science park and two independent gardens. The garden has diverse species of seasonal flowers, ornamental plants, flowering trees, and palms.

In addition, RIE houses 40 varieties of potted plants both indoors and outdoors that are distributed throughout the entire campus. The primary method of irrigation is provided by the Narmada pipeline, which is installed on campus. In the hostels, recycled wastewater gathered from the kitchen is utilized for watering purposes. The soil is enriched with organic manure derived from animal and organic waste. Furthermore, the plants' well-being is sustained by the use of fertilizers like urea and DAP.

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Figure 29 Different ornamental plant species in the science garden

Table 13: Important ornamental plant species grown in the different gardens

	Plant Name	Scientific Name	**Family**
1	Rose (Gulab)	*Rosa spp.*	Rosaceae
2	Marigold (Genda)	*Tagetes spp.*	Asteraceae
3	Hibiscus (Gudhal)	*Hibiscus spp.*	Malvaceae
4	Jasmine (Mogra)	*Jasminum spp.*	Oleaceae
5	Chrysanthemum (Guldaudi)	*Chrysanthemum spp.*	Asteraceae
6	Petunia (Petunia)	*Petunia spp.*	Solanaceae
7	Dianthus (Gul-e-Mehndi)	*Dianthus spp.*	Caryophyllaceae
8	Cosmos (Cosmos)	*Cosmos spp.*	Asteraceae
9	Sunflower (Surajmukhi)	*Helianthus spp.*	Asteraceae
10	Zinnia (Zinnia)	*Zinnia spp.*	Asteraceae
11	Boxwood (Boxwood)	*Buxus spp.*	Buxaceae
12	Privet (Privet)	*Ligustrum spp.*	Oleaceae
13	Leyland Cypress	*Cupressocyparis leylandii*	Cupressaceae
14	Japanese Yew	*Taxus cuspidata*	Taxaceae
15	Holly (Holly)	*Ilex spp.*	Aquifoliaceae
16	Jacaranda (Neeli Gulmohar)	*Jacaranda mimosifolia*	Bignoniaceae
17	Gulmohar (Gulmohar)	*Delonix regia*	Fabaceae
18	Cassia (Sonia)	*Cassia spp.*	Fabaceae
19	Amaltas (Amaltas)	*Cassia fistula*	Fabaceae
20	Champa (Champa)	*Michelia spp.*	Magnoliaceae

4.4.5 Birds and animals found in the campus

List of birds :

1. Pigeon black
2. Pigeon white
3. Rose ringed parakeet
4. Black kite
5. White bellied drongo
6. Asial koel (Male)
7. Old world sparrow
8. Peacock
9. Parrot
10. Owl

List of animal:

1. Dog
2. Fox
3. Tortoise
4. Rabbit
5. Snacks
6. Fish

Figure 30 Photos of Indian and migratory birds in college campus

4.5 Carbon footprint audit

The majority of an individual's carbon footprint comes from transportation, housing, and food. It is surprising that many common activities such as flying, driving, living, working, and eating contribute significantly to carbon emissions that harm the climate. Greenhouse gases include carbon-containing gases like carbon dioxide and methane. These gases are produced through various human activities such as the burning of fossil fuels, land clearance, production and consumption of food and goods, building construction, and transportation services. However, calculating the exact carbon footprint is a challenging task due to the lack of complete data and knowledge of the complex interactions between processes that contribute to greenhouse gas emissions. Natural processes that store or release carbon dioxide can also impact carbon footprints.

4.5.1 The objectives of calculating carbon footprints are as follows

- ✓ To gain a deeper understanding of the college's contribution to climate change.
- ✓ To identify the sources of carbon emissions.
- ✓ To determine the amount of emissions generated by the college.
- ✓ To pinpoint areas where emissions can be reduced.
- ✓ To identify strategies for reducing carbon emissions

4.5.2 Steps taken to reduce carbon footprint

Reducing carbon footprint is a critical step towards mitigating the harmful effects of climate change. RIE Bhopal has taken several steps to reduce its carbon footprint, some of which are:

Conducting an audit: A carbon audit assess the amount of carbon emissions it generates. The audit helps to identify areas where the institute can reduce its carbon footprint and develop strategies to achieve carbon neutrality.

Switching to renewable energy: RIE Bhopal has been working in the direction to switch renewable energy sources such as solar power to reduce its dependence on electric consumption. This step will not only help reduce carbon emissions but also reduce energy costs.

Figure 31 Solar panels on the rooftop of RIE, Bhopal

Promoting sustainable transportation: The institute is promoting sustainable transportation methods such as cycling, carpooling, and public transport to reduce carbon emissions from transportation.

Promoting sustainable practices: RIE Bhopal has been encouraging to adopt sustainable practices such as recycling, reducing waste, and using environmentally friendly products to reduce its carbon footprint.

Encouraging environmental awareness: The institute can encourage environmental awareness among its students, staff, and the surrounding community to promote sustainable living practices and reduce carbon emissions.

Implementing energy-efficient measures: RIE Bhopal can implement energy-efficient measures such as using LED lights, installing motion sensors, and using energy-efficient appliances to reduce energy consumption and carbon emissions.

5 POST AUDIT STAGE

(Recommendation, Suggestion and Conclusion)

The campus demonstrates conscious energy consumption by utilizing natural light and ventilation to save energy and minimize the use of tube lights and air conditioning. The availability of fresh drinking water is abundant, and the taps are in good condition to reduce water wastage. The campus is kept clean and litter-free, and dried leaves are collected to prepare manure for the plants and trees on the campus. Additionally, 60% of the campus area, including the hostel, is covered in vegetation, which is well-maintained by qualified caretakers and gardeners.

The campus is committed to energy conservation and utilizes natural light as much as possible. While the classrooms lack natural light for some parts of the day, the campus takes measures to minimize the use of tube lights and LEDs during daylight hours. This conscious consumption of energy not only helps to reduce the carbon footprint of the campus but also helps to reduce the overall energy bill.

In addition to energy conservation, the campus is also committed to sustainable water use. The campus takes measures to collect rainwater, and wastewater is treated before being released, reducing water pollution. The campus is home to a diverse range of flora and fauna. The staff and students are acknowledged to protect the plants, trees and animals and provide the care they need to thrive. This not only contributes to the beauty of the campus but also provides a natural environment for students to learn and grow. In summary, the campus demonstrates a strong commitment to sustainability and energy conservation. Through its conscious consumption of energy, sustainable water use, and careful stewardship of the flora and fauna on the campus, it sets an example for others to follow.

Recommendations and suggestions

5.1 Water management practices

The following points suggest measures that can be taken to conserve water and reduce pollution on a college campus:

- Install a water harvesting facility to facilitate better conservation of water.

- Install drip irrigation methods in college gardens to avoid wastage of water during gardening.
- Regularly check for any leaking or damaged pipes to prevent water loss.
- Propose the installation of dual flush or low flow toilets to reduce water consumption.
- Plant trees that can thrive without water/irrigation to reduce water usage.
- Put a layer of mulch around trees and plants to slow the process of evaporation.
- Make special provisions for the conservation of the natural water source, such as the well, and take measures to minimize water evaporation.
- Take conscious and informed steps in reducing land pollution to prevent the degradation of underground water resources.
- Strictly keep litter waste under check to avoid unnecessary pollution of water.
- Plant filters to purify water from laboratories to aid in activities such as washing vehicles.
- Collect and recycle waste water from the canteen and hostel to water existing vegetation on campus.

In summary, these measures include installing water harvesting facilities, using drip irrigation methods, monitoring pipes for damage, installing low flow toilets, planting drought-resistant trees, using mulch to slow down evaporation, conserving natural water sources, reducing land pollution, controlling litter waste, filtering water from laboratories, and recycling waste water. By adopting these measures, colleges can conserve water and reduce pollution on their campuses.

5.2 Waste management practices

The following are recommendations for waste management at the college**:**

- The college management should strive to reduce or eliminate hazardous or chemical waste that is directly disposed of in landfills.
- Waste should be converted into a useful and potential resource for energy generation.
- Appropriate waste handling and disposal measures that meet legislative requirements should be recommended by the management.
- Waste materials should be categorized to facilitate proper disposal.

- Recycling and reuse practices should be promoted among students.
- Single-use plastic should be banned at the college.
- Food waste should be used to feed the animal population on campus.
- A filtering system should be installed in newly assembled laboratories.
- Efforts towards achieving zero waste in the campus should be concentrated

In summary, the management of the college should focus on minimizing waste by reducing hazardous and chemical waste that goes into landfills. Waste should be categorized and handled appropriately in line with legislative requirements. Waste should be converted into a resource for energy generation, and recycling and reuse practices should be promoted among students. Single-use plastics should be banned, and waste from food products can be used to feed the animal population on campus. A filtering system should be installed in newly assembled laboratories, and concentrated efforts should be made towards achieving zero waste on campus.

5.3 Energy saving practices

- Aim to improve fuel efficiency and reduce carbon emissions from vehicles on campus.
- Opt for natural sources of electricity generation to reduce carbon footprint.
- Promote the use of public transport or fuel-less means of transport such as cycling to achieve cleaner air and lower greenhouse gas emissions.
- Invest in a generous number of solar power appliances to save power during the day.
- Strictly stick to head count for food preparation in the canteen and hostel to avoid wastage of LPG and fuel energy.
- Promote carpooling, upgrade to LED lighting, and initiate energy-saving campaigns like Earth Hour and 'Fridays for Future.'

Overall, the college should take various steps to reduce its carbon footprint and promote sustainable practices. This includes improving fuel efficiency and reducing carbon emissions from vehicles, using natural sources of electricity generation, promoting the use of public transport or cycles, investing in solar power appliances, avoiding food wastage, promoting carpooling, upgrading to energy-efficient LEDs, advocating for a chartered bike stand, and encouraging students to save energy. Additionally, the Nature

Club should take up activities to educate students on energy-saving modes and campaigns like Earth Hour and Fridays for Future should be initiated by the college to raise awareness and encourage action towards a sustainable future.

5.4 Landscape management practices

- Hostel mess should decrease animal product consumption and prefer local, seasonal produce.
- Encourage use of sustainable/recyclable materials by students to reduce soil pollution.
- Increase funds allocated to Nature Club for promoting green initiatives around campus.
- Invest in growing organic fruits and vegetables to avoid chemicals/fertilizers in market products.
- A greenhouse could sustain plant life under harsh weather conditions.
- Landscape management should prioritize native plants for campus greenery.
- Implement rainwater harvesting techniques to conserve water.

Overall, the College should focus on landscape management by adopting sustainable practices. This can be done by reducing animal product consumption in the hostel mess and promoting the use of sustainable and recyclable materials among students to reduce soil pollution. Additionally, funds allocated to the Nature Club should be increased to aid campus green initiatives. The college should invest in growing organic fruits and vegetables and prioritize native plants for campus greenery. A greenhouse and rainwater harvesting techniques can be implemented to sustain plant life and conserve water.

6 SUPPORTING LITRATURE

1. University Grants Commission (UGC) Guidelines on Eco-Friendly and Sustainable Campus Development (2016)

2. Green Campus Initiative by Ministry of Environment, Forest and Climate Change, Government of India

3. TERI (The Energy and Resources Institute) Green Campus Initiative

4. Indian Green Building Council (IGBC) Green Campus Rating System

5. National Assessment and Accreditation Council (NAAC) Criteria for Assessment of Universities and Colleges (2018) - criterion 7 is related to environment sustainability and is applicable to higher education institutions in India

6. All India Council for Technical Education (AICTE) Guidelines on Environmental Sustainability for Technical Institutions (2018)

7. Sustainable Campus Network India (SCN India) - a network of higher education institutions in India working towards sustainability in their campuses

ANNEXURE

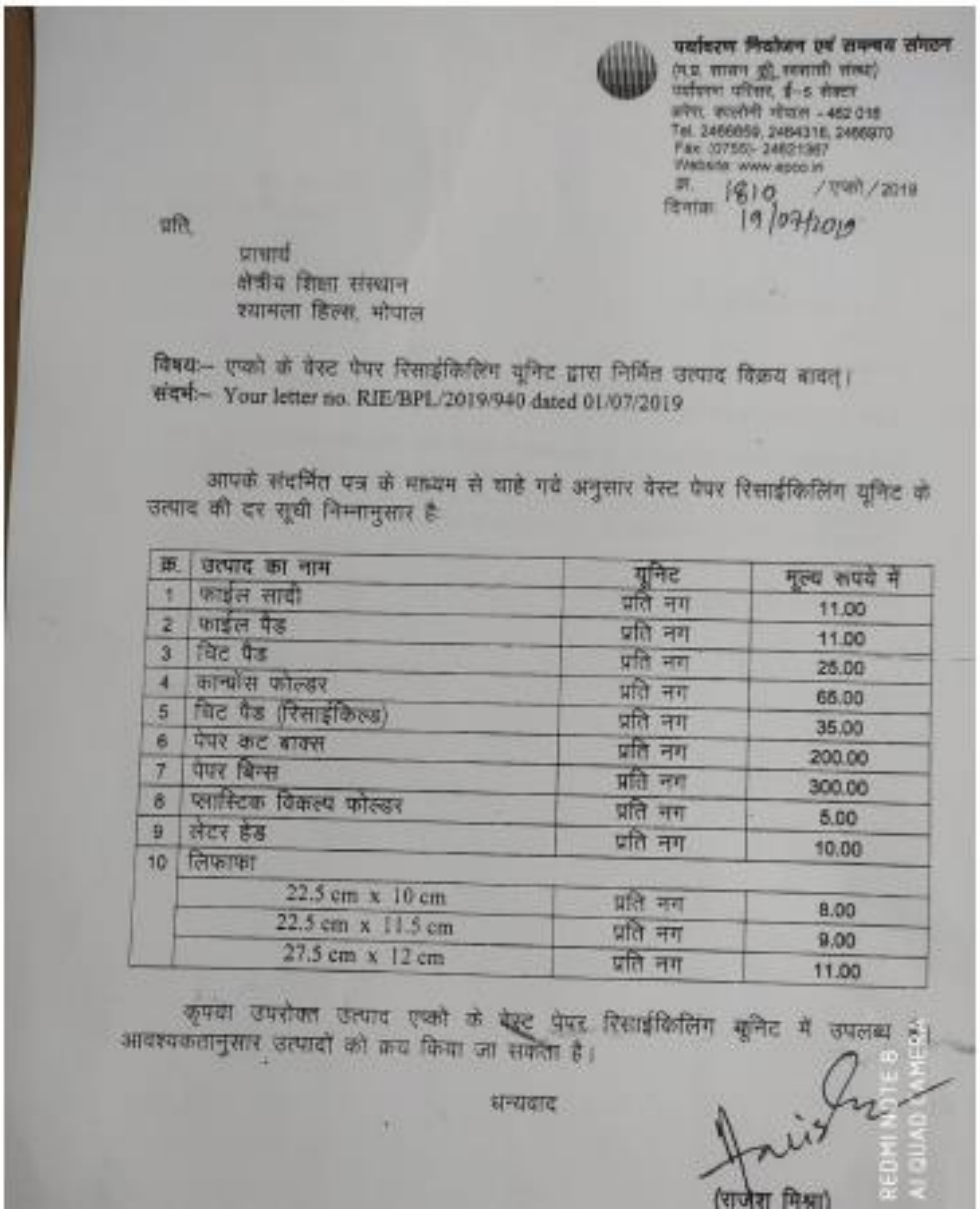
Promotion of organic farming 19-12-2022
Cultivation of Potato (*Solanum tuberosum*) in RIE Farmland

Green Initiative with Government and non-government organizations

Plantation drive with AWNI welfare society Bhopal 19-12-2022

The Environmental Planning & Coordination Organization (EPCO)

Contributing waste papers/files/used manuals etc. and purchasing different products made from recycled waste



पर्यावरण नियोजन एवं समन्वय संगठन
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क्र. 1810 /एप्को/2019
दिनांक 19/07/2019

प्रति,

प्राचार्य
क्षेत्रीय शिक्षा संस्थान
श्यामला हिल्स, भोपाल

विषयः– एप्को के वेस्ट पेपर रिसाईकिलिंग यूनिट द्वारा निर्मित उत्पाद विक्रय बाबत्।
संदर्भः– Your letter no. RIE/BPL/2019/940 dated 01/07/2019

आपके संदर्भित पत्र के माध्यम से चाहे गये अनुसार वेस्ट पेपर रिसाईकिलिंग यूनिट के उत्पाद की दर सूची निम्नानुसार है

क्र.	उत्पाद का नाम	यूनिट	मूल्य रूपये में
1	फाईल सादी	प्रति नग	11.00
2	फाईल पैड	प्रति नग	11.00
3	चिट पैड	प्रति नग	25.00
4	कान्वोस फोल्डर	प्रति नग	65.00
5	चिट पैड (रिसाईकिल्ड)	प्रति नग	35.00
6	पेपर कट बाक्स	प्रति नग	200.00
7	पेपर बिन्स	प्रति नग	300.00
8	प्लास्टिक विकल्प फोल्डर	प्रति नग	5.00
9	लेटर हेड	प्रति नग	10.00
10	लिफाफा		
	22.5 cm x 10 cm	प्रति नग	8.00
	22.5 cm x 11.5 cm	प्रति नग	9.00
	27.5 cm x 12 cm	प्रति नग	11.00

कृपया उपरोक्त उत्पाद एप्को के वेस्ट पेपर रिसाईकिलिंग यूनिट में उपलब्ध है। आवश्यकतानुसार उत्पादों को क्रय किया जा सकता है।

धन्यवाद

(राजेश मिश्रा)

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Green Audit Certificate

Date - 14th March 2023

To
The Principal
REGIONAL INSTITUTE OF EDUCATION
Bhopal

This is to certify that the **REGIONAL INSTITUTE OF EDUCATION (RIE), BHOPAL** has conducted the green audit following a proper procedure in the month of **December 2022**. All the mandatory requirements of Green Audit were systematically followed by the institution. The staff and students were an integral part in the process of Green Audit. The students were trained to conduct the audit under the supervision of faculty. The efforts taken by the institution to make it environmental friendly are really commendable. We believe that the suggestions given by auditors will help the institution to take more creative and innovative steps to further enhance efforts towards Green Environment and Energy conversation. Hence, we recommend this report to be considered for any certification purpose.

Mahesh Pandya
(Environmental Engineer)
Director, ParyavaranMitra

PARYAVARAN MITRA * E/20934/AHD * AHMEDABAD

P-1855
20/3/23
BHOPAL

REGIONAL INSTITUTE OF EDUCATION, BHOPAL
National Council of Educational Research and Training