

Green Audit Report-2025

SHIVAJI COLLEGE

(UNIVERSITY OF DELHI)

Ring Road, Raja Garden, New Delhi- 110027



Submitted by

ABP INDUSTRIES

(Certified Energy & Green Audit Agency)

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We express our sincere gratitude to the Management of Shivaji College, University of Delhi, for providing us the opportunity to carry out the **Green Audit assignment**. We are deeply thankful for their keen interest, active involvement, and continuous support throughout the course of the study.

We also appreciate the management team's cooperation and assistance, which enabled us to conduct comprehensive assessments, perform detailed measurements, and gather essential operational data for the audit.

Our interactions with the management team and staff members of the college clearly reflected their strong commitment to energy conservation, efficiency improvement, and sustainability. The proactive steps already taken toward implementing several energy-saving measures are truly commendable and deserving of sincere appreciation.

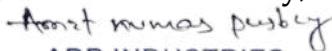
We express our heartfelt thanks to **Prof. Virender Bhardwaj, Principal**, Shivaji College, for his insightful discussions, valuable guidance and support during this audit. His consistent concern and commitment towards developing a sustainable and energy-efficient campus is highly appreciable.

Our sincere gratitude to **Prof. Tejbir Singh Rana, Vice Principal**, Shivaji College for his invaluable inputs and support in this audit process. His knowledge and concern towards conservation and sustainability is highly noticeable.

We extend our sincere thanks to **Dr. Gunjan Sirohi, Assistant Professor**, Department of Botany, Shivaji College for her dedicated involvement, insightful discussions, and effective coordination throughout the process of this audit.

Special thanks to **Dr. Ashwani Sharma, Assistant Professor**, Department of Environment Science, Shivaji College for his valuable inputs during the entire audit process.

(Amit Kumar Purbey)


ABP INDUSTRIES
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ACCREDITED ENERGY AUDITOR
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Team Leader & Accredited Energy Auditor

AUDITOR CERTIFICATE



ऊर्जा दक्षता ब्यूरो

(भारत सरकार, विद्युत मंत्रालय)

BUREAU OF ENERGY EFFICIENCY

(Government of India, Ministry of Power)



10/02/Accred./BEE/22

31st May, 2022

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Sub: Application for accreditation as accredited energy auditors- reg.

विषय: मान्यता प्राप्त ऊर्जा लेखा परीक्षकों के रूप में मान्यता के लिए आवेदन

Sir,

महोदय,

The undersigned is to refer to your application for the accreditation of Energy Auditors and the subsequent Virtual interview you had before the Accreditation Advisory Committee on 11th May, 2022 at BEE office, New Delhi.

प्रत्यायन सलाहकार समिति के समक्ष ऊर्जा लेखा परीक्षकों की मान्यता के लिए आपका आवेदन और उसके बाद के आभासी साक्षात्कार के लिए आपका आवेदन 11th मई, 2022 को ऊर्जा दक्षता ब्यूरो कार्यालय, नई दिल्ली में किया गया।

We are pleased to inform that the Accreditation Advisory Committee has recommended your name for the accreditation as Accredited Energy Auditor in **Textile, Hotel, Steel and Thermal Power Plant Sector**. Your name will be included in the list of Accredited Energy Auditor for these Sectors, maintained by BEE on its website (www.beeindia.gov.in).

हमें यह बताते हुए प्रसन्नता हो रही है कि प्रत्यायन सलाहकार समिति ने मान्यता के लिए आपके नाम की सिफारिश वस्त्र, इस्पात, होटल और थर्मल पावर प्लांट क्षेत्र में मान्यता प्राप्त ऊर्जा लेखा परीक्षक के रूप में की है। आपके नाम को ऊर्जा दक्षता ब्यूरो द्वारा अपनी वेबसाइट (www.beeindia.gov.in) पर अनुरक्षित मान्यता प्राप्त ऊर्जा लेखा परीक्षक की सूची में शामिल किया जाएगा।

भवदीय

(रजनी थॉमसन)

समन्वयक (परीक्षा)

स्वहित एवं राष्ट्रहित में ऊर्जा बचाएँ Save Energy for Benefit of Self and Nation

चौथा तल, सेवा भवन, आर.के.पुरम, नई दिल्ली-110 066, वेबसाइट/Website : www.beeindia.gov.in

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GREEN AUDIT CERTIFICATE



1. EXECUTIVE SUMMARY

With the growing concerns over environmental degradation, rising energy costs, and the global energy crisis, Green Audit has gained significant importance across educational and institutional establishments. The Green Audit at Shivaji College, Raja Garden, Delhi was conducted in the month of **September 2025** with the objective of assessing the institution's environmental performance and promoting sustainable campus practices.

The study primarily focuses on evaluating the efficient utilization of natural and energy resources, assessing waste management systems, and identifying opportunities for resource conservation. It also emphasizes areas such as energy and water management, waste segregation and recycling, biodiversity conservation, sanitation, and sustainable infrastructure.

The audit aims to create environmental awareness among students and staff, ensure compliance with environmental regulations, and provide practical recommendations to enhance the campus's eco-friendly and sustainable operations. Through such initiatives, Shivaji College demonstrates its commitment towards sustainable development and continual environmental improvement:

Table 1: Summary of Environmental Matrix

| S. No. | Attributes | Metric |
|--------|---|--|
| 1 | Total campus area | 10.35 acres |
| 2 | Total Green area | 6.49 acres |
| 3 | Capacity of roof top on-grid solar power plants | 290 SPV panels @250 W each (75 kW capacity) |
| 4 | Solar Power generated (Roof top solar) | 95000 kW/year |
| 5 | Capacity of rain water harvesting unit | 120000 Liters/year |
| 6 | Ground water recharge pit | One at 125 feet depth; located in park |
| 7 | Processing capacity of bio-composting unit | 2080 kg/year |
| 8 | Processing capacity of vermicomposting unit | 850 kg/year |
| 9 | Output of paper recycling unit | 55 kg/year |
| 10 | Food waste recycling unit in college | 2 specialized bins (each of 20 kg capacity) installed in canteen |

| S. No. | Attributes | Metric |
|--------|--|--|
| 11 | Capacity of sewage treatment plant (STP) | 130 KLD |
| 12 | Capacity of effluent treatment plant (ETP) | 10 KLD |
| 13 | Quantity of reused RO waste water | 3177162 litres/year |
| 14 | Status of single use plastic | Banned officially |
| 15 | Number of plantation drives conducted | Conducted twice yearly by garden committee on the occasion of Van Mahotsav and Teachers Day |
| 16 | Total number of trees in campus | 480 trees with bark and girth |
| 17 | Tree species in campus | 42 tree species |
| 18 | Indigenous fauna seen in campus | Peacock, sparrows, parrot, parakeet, owl, squirrel, varieties of butterflies, 7 varieties of grass eating/worm eating/grain eating birds and raptors such as kites |
| 19 | Herbal garden of college | Size: 800 sq yard, plant species: 65 (enclosed with an iron mesh) |
| 20 | Energy Efficient LED lights in college | Yes |
| 21 | Vehicle free zone of college | Yes |
| 22 | Solid waste generated by college | 21600 kg/year (approx. 90 kg/day in two rickshaws for 240 days including floor waste, dust bins and canteen waste) |

2. ABOUT THE COLLEGE

Introduction

Shivaji College, affiliated with the University of Delhi, is a prestigious co-educational institution offering a diverse array of undergraduate and postgraduate programs across Humanities, Science, and Commerce disciplines.

Located in West Delhi, Shivaji College is a leader in higher education, holding an 'A' grade accreditation from NAAC. It was recognized among the top 10 Science colleges in India in a 2017 India Today survey. In 2024, the college made significant strides, advancing from 70th to 49th position in the NIRF rankings, reflecting its commitment to academic excellence.

Founded in 1961 by the distinguished Hon'ble Dr. Panjabrao Deshmukh, Union Minister for Agriculture, social activist, and farmer-leader, the college aimed to provide quality higher education to both boys and girls in the predominantly rural area of Matiala. In 1967, it was taken over by the Government of Delhi, relocated to Karampura, and eventually moved to its current campus in Raja Garden in 1976. Shivaji College has progressed significantly from its modest origins and basic facilities to a campus with impressive amenities.

Shivaji College offers 20 undergraduate courses across Science, Commerce, and Humanities, along with a self-financed Bachelor's in Business Economics program and three postgraduates (M.A.) courses. It attracts students from all over India, with over 47% of the student body coming from outside Delhi.

Shivaji College fosters research and innovation, with senior faculty supervising Ph.D. scholars and participating in UGC-sponsored research projects. The college's growth is mirrored in its infrastructure—what started in a small building with borrowed science laboratories has now expanded into a 10.35-acre campus, which includes modern academic buildings, residential complexes, and sports facilities. The newly inaugurated Jijabai Academic Block, houses state-of the-art laboratories, multipurpose halls, and research spaces.

With a commitment to holistic development, Shivaji College boasts an impressive sports infrastructure, including a volleyball court, football field, cricket ground, and facilities for basketball, tennis, and athletics. The college also focuses on sustainability, with initiatives such as a plastic ban, tree plantation drives, solar panels, rainwater harvesting, and waste management systems.

The college takes pride in its green campus, incorporating eco-friendly initiatives like tree plantation, a no-smoking policy, and solar energy. The inclusive environment supports

students from all walks of life, fostering mutual growth through academic exchanges and partnerships with other institutions.

At Shivaji College, the motto "Amritam Tu Vidya" signifies the transformative power of knowledge—shaping character, opening doors to opportunities, and contributing to a better world.

The institution remains dedicated to empowering students to pursue excellence, foster innovation,

and make meaningful contributions to society.

The college management is highly committed to energy conservation and promoting a sustainable environment.

Environment & Sustainability Committee

The Environment and Sustainability Committee of Shivaji College, University of Delhi, is dedicated to promoting environmental stewardship and sustainability within the college campus. This committee oversees a wide range of initiatives aimed at enhancing ecological consciousness and sustainable practices. Key responsibilities include the maintenance of the college garden and horticultural work, fostering biodiversity and green spaces. The Eco Club plays a vital role in raising environmental awareness through various activities and campaigns. Additionally, the committee manages the installation and upkeep of rooftop solar panels, contributing to renewable energy usage. Effective solid waste management and a paper recycling unit are part of their efforts to reduce the campus's environmental footprint. The committee also conducts regular environment and energy audits to monitor and improve sustainability practices. Overseeing of the sewage treatment plant ensures proper waste management and water conservation. Through these initiatives, the committee strives to create a greener, more sustainable campus environment.

3. INTRODUCTION

3.1 THE PROJECT

Green Audit a Tool for Environmental Protection and Conservation:

The modernization and industrialization are the two important outputs of twentieth century which have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for sustainable environment.

Considering the present environmental problems of pollution and excess use of natural resources, Hon. Prime Minister, Shri. Narendra Modiji has declared the Mission of Swachh Bharat Abhiyan. Also, University Grants Commission has mentioned „Green Campus, Clean Campus“ mission mandatory for all higher educational institutes. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiatives for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

3.2 NEED OF GREEN AUDITING:

Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals are become habitual for everyone especially, in common areas. Now, it is necessary to check whether our processes are consuming more than required resources?

Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

3.3 GOALS OF GREEN AUDIT:

University has conducted a green audit with specific goals as:

- ✚ Identification and documentation of green practices followed by university.
- ✚ Identify strength and weakness in green practices.
- ✚ Conduct a survey to know the ground reality about green practices.
- ✚ Analyze and suggest solution for problems identified from survey.
- ✚ Assess facility of different types of waste management.
- ✚ Increase environmental awareness throughout campus.
- ✚ Identify and assess environmental risk.
- ✚ Motivates staff for optimized sustainable use of available resources.
- ✚ The long-term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

3.4 OBJECTIVES OF GREEN AUDIT:

- ✚ To examine the current practices which can impact on environment such as of resource utilization, waste management etc.
- ✚ To identify and analyze significant environmental issues.
- ✚ Setup goal, vision and mission for Green practices in campus.
- ✚ Establish and implement Environmental Management in various departments.
- ✚ Continuous assessment for betterment in performance in green practices and its evaluation.
- ✚ To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.

3.5 METHODOLOGY:

The Environmental Auditing Process is a systematic approach used to evaluate an organization's compliance with environmental regulations, management systems, and sustainability goals. It helps identify areas for improvement and ensures responsible environmental practices.

✚ **Planning:**

The first stage involves defining the audit objectives, scope, and criteria. A detailed audit plan is prepared, outlining timelines, locations, and key focus areas.

✚ **Choosing Audit Team:**

An experienced and multidisciplinary team is selected to conduct the audit. The team's expertise ensures accurate data collection and unbiased evaluation.

✚ **Inspecting Site / Collection of Data:**

The audit team visits the site to inspect facilities, review documents, and gather data related to resource consumption, waste generation, and environmental compliance.

✚ **Analyzing Results of Audit:**

Collected data is analyzed to identify deviations from standards and areas needing improvement. Findings are compared with legal and organizational requirements.

✚ **Evaluating Audit:**

A final evaluation report is prepared summarizing observations, conclusions, and recommendations. It provides actionable steps for enhancing environmental performance and achieving sustainability targets.



3.6 NAAC CRITERIA VII ENVIRONMENTAL CONSCIOUSNESS:

Universities are playing a key role in development of human resources worldwide. Higher education institutes campus run various activities with aim to percolate the knowledge along with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solution for issues related to environment. Different types of evolutionary methods are used to assess the problem concerning environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green audit etc.

National Assessment and Accreditation Council (NAAC) which is a self governing organization that declares the institutions as Grade according to the scores assigned at the time of accreditation of the institution. Green Audit has become mandatory procedure for educational institutes under Criterion VII of NAAC. The intention of green audit is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring etc. for making the institution more eco-friendly.

Students are the major strength of any academic institution. Practicing green actions in any educational institution will inculcate the good habit of caring natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, No vehicle day, Rain water harvesting, etc. will make the students good citizen of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of Global warming through Carbon Footprint reduction measures.

4. ENVIRONMENTAL OVERVIEW OF CAMPUS

4.1 ENVIRONMENT & SUSTAINABILITY COMMITTEE

Shivaji College, University of Delhi, is dedicated to promoting environmental stewardship and sustainability within the college campus. This committee oversees a wide range of initiatives aimed at enhancing ecological consciousness and sustainable practices. Key responsibilities include the maintenance of the college garden and horticultural work, fostering biodiversity and green spaces. The Eco Club plays a vital role in raising environmental awareness through various activities and campaigns. Additionally, the committee manages the installation and upkeep of rooftop solar panels, contributing to renewable energy usage. Effective solid waste management and a paper recycling unit are part of their efforts to reduce the campus's environmental footprint. The committee also conducts regular environment and energy audits to monitor and improve sustainability practices. Overseeing of the sewage treatment plant ensures proper waste management and water conservation. Through these initiatives, the committee strives to create a greener, more sustainable campus environment.

4.2 ENVIRONMENTAL MATRIX OF CAMPUS

Shivaji College has a comprehensive environment matrix driven by its Centre for Environment and Disaster Management (CEDM) and Environment & Sustainability Committee, featuring initiatives like solar energy adoption, rainwater harvesting, waste management systems (paper recycling, food waste processing, vermicomposting), a plastic ban, restricted vehicle entry, and tree plantation drives to foster a green, sustainable campus. The college also promotes environmental awareness through its Department of Environmental Studies and student-led Eco Club activities.

4.3 CAMPUS ENVIRONMENT & INFRASTRUCTURE

- **Green Spaces:** The college maintains a green campus with tree plantation drives to reduce its carbon footprint and foster biodiversity.
- **Solar Energy:** Rooftop solar panels are installed to promote renewable energy usage.
- **Water Management:** Rainwater harvesting pits and a sewage treatment plant are in place to conserve water.

- **Waste Management:** Initiatives include a plastic ban, a paper-recycling unit, and a food waste processing unit with vermicomposting.

4.4 POLICY & GOVERNANCE

- **Environment & Sustainability Policy:** The college has a formal policy guiding its environmental and sustainability efforts.
- **Environment & Sustainability Committee:** This committee oversees the implementation and maintenance of environmental initiatives, including waste management and solar panels.
- **Restricted Access:** Vehicle entry on campus is restricted to reduce pollution.

4.5 EDUCATION & AWARENESS

- **Centre for Environment and Disaster Management (CEDM):** A dedicated center focused on research, education, and outreach to promote environmental sustainability and disaster resilience.
- **Department of Environmental Studies:** Offers a compulsory course in Environmental Studies for all students under the University of Delhi's Choice Based Credit System (CBCS).
- **Eco Club:** Student members raise environmental awareness through various campaigns and activities.

4.6 KEY METRICS

- The college provides "Environmental Matrices" annually, detailing metrics such as total campus area, total green area, and the capacity of solar and rainwater harvesting units.



Shivaji College, University of Delhi
 (Accredited by NAAC with 'A' grade)
Environmental Metrics 2024-25

| S. No. | Attributes | Metric |
|--------|---|--|
| 1 | Total campus area | 10.35 acres |
| 2 | Total Green area | 6.49 acres |
| 3 | Capacity of roof top on-grid solar power plants | 290 SPV panels@250 W each 75 kW capacity |
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| 16 | Total number of trees in campus | 480 trees with bark and girth |
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| 18 | Indigenous fauna seen in campus | Peacock, sparrows, parrot, parakeet, owl, squirrel, varieties of butterflies, 7 varieties of grass eating/worm eating/grain eating birds and raptors such as kites |
| 19 | Herbal garden of college | Size: 800 sq yard, plant species: 65 (enclosed with an Iron mesh) |
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| 21 | Vehicle free zone of college | Yes |
| 22 | Solid waste generated by college | 21600 kg/year (approx. 90 kg/day in two rickshaws for 240 days including floor waste, dust bins and canteen waste) |

१३:३३:३३
 24/4/25.
 (PROF. T. S. RANA)
 Convener
 CEDM (Centre for Environment and Disaster Mgmt.)

Figure 1: Environmental Matrix-2024-25



Figure 2: Green Area of Campus

5. GREEN AUDIT

5.1 FLORAL DIVERSITY OF COLLEGE

The Shri Shivaji College of Education area is immensely diverse with a variety of tree species performing a variety of functions. College has developed aesthetic and botanical garden in the premises and also develops ornamental plants in earthen pot in college corridors. To create- green cover, eco-friendly atmosphere, pure oxygen at the college campus, plantation program is organized every year. The trees of the college have increased the quality of life, not only the college fraternity but also the people around of the college. Many species of birds are dependent on these trees mainly for food and shelter. Nectar of flowers and plants is a favourite of birds and many insects. Leaf – covered branches keep many animals, such as birds and squirrels. Thus, the college has been playing a significant role in maintaining the environment this includes the plants, greenery and sustainability of the campus to ensure that the buildings confirm to green standards. Total 480 different plants species become recorded during the physical inspection of college campus. The campus has also developed a digital garden, a comprehensive online platform featuring detailed information about the college's flora. This innovative initiative provides easy access to tree data, promoting environmental awareness and stewardship. Pictures and list of trees are given below:



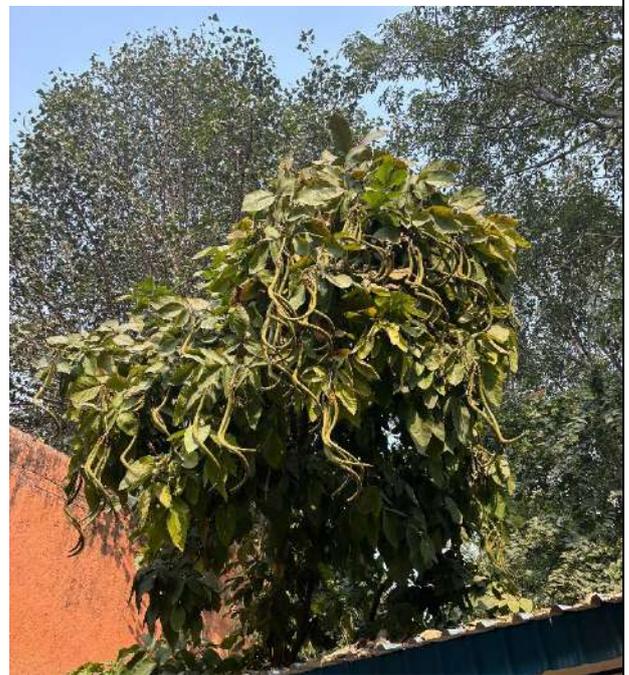
Ficus benghalensis



Ashok tree



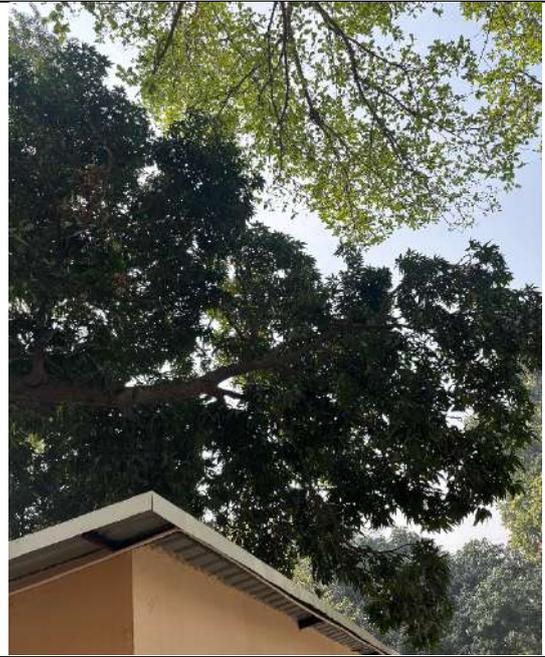
Champa



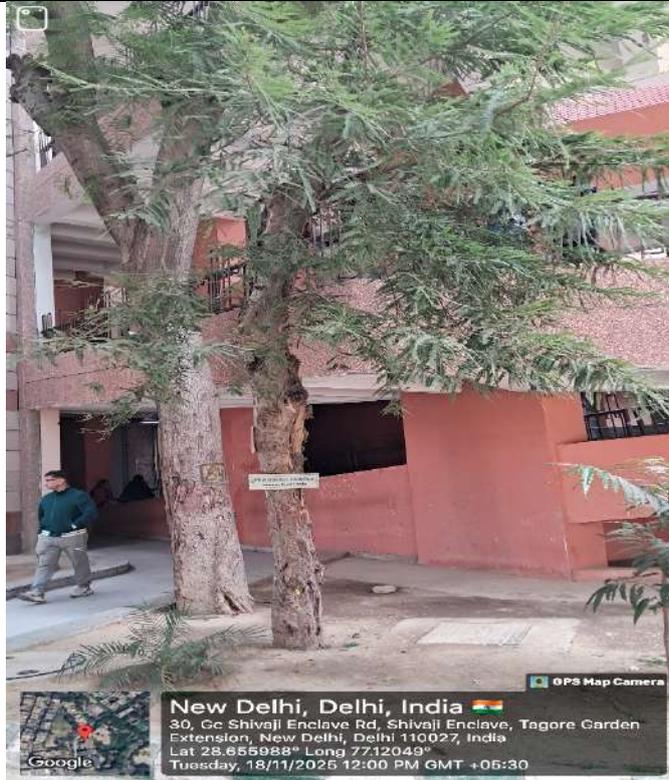
Fernandoa adenophylla



Hibiscus flower



Mangifera indica



Phyllanthus emblica

Figure 3: Pictures of Tree

Table 2: List of Trees

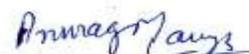
Following are the details of trees as on 01-01-2025 present in the Shivaji College
(University of Delhi) campus:

| S. No | Common name of trees | Scientific name | Total Number present |
|-------|------------------------------|---------------------------------|----------------------|
| 1 | Silver oak tree | <i>Grevillea robusta</i> | 4 |
| 2 | Kanak champa tree | <i>Pterospermum acerifolium</i> | 5 |
| 3 | Neem tree | <i>Azadirachta indica</i> | 37 |
| 4 | Red gum tree (safeda) | <i>Eucalyptus</i> | 14 |
| 5 | Jamun tree | <i>Syzygium cumini</i> | 11 |
| 6 | False Ashoka tree | <i>Monoon longifolium</i> | 56 |
| 7 | Peepal tree | <i>Ficus religiosa</i> | 24 |
| 8 | Gular tree | <i>Ficus racemosa</i> | 11 |
| 9 | Mango tree | <i>Mangifera indica</i> | 7 |
| 10 | Mulberry tree | <i>Morus alba</i> | 23 |
| 11 | Shesham tree | <i>Dalbergia sissoo</i> | 2 |
| 12 | Semal tree | <i>Bombax ceiba</i> | 14 |
| 13 | Alstonia tree | <i>Alstonia scholaris</i> | 15 |
| 14 | Jalebi tree | <i>Pithecellobium dulce</i> | 1 |
| 15 | Kadamb tree | <i>Neolamarckia cadamba</i> | 3 |
| 16 | Mahua tree | <i>Madhuca longifolia</i> | 1 |
| 17 | Amaltas tree | <i>Cassia fistula</i> | 5 |
| 18 | Bel tree | <i>Aegle marmelos</i> | 7 |
| 19 | Banyan tree | <i>Ficus benghalensis</i> | 4 |
| 20 | Karanj tree | <i>Pongamia pinnata</i> | 8 |
| 21 | Bottle brush | <i>Melaleuca viminalis</i> | 2 |
| 22 | Guava tree | <i>Psidium guazava</i> | 2 |
| 23 | Imli tree | <i>Tamarindus indica</i> | 3 |
| 24 | Kachnnaar tree | <i>Bauhinia variegata</i> | 3 |
| 25 | Citrus tree | <i>Citrus sp.</i> | 1 |
| 26 | Pillkhan | <i>Ficus virens</i> | 3 |
| 27 | Chinese lemon | <i>Citrus mandarin</i> | 2 |
| 28 | Lagerstromium tree | <i>Lagerstroemia indica</i> | 11 |
| 29 | <i>Ficus benzamina</i> | <i>Ficus benzamina</i> | 7 |
| 30 | Gulmohar tree | <i>Delonix regia</i> | 4 |
| 31 | <i>Senna siamea</i> tree | <i>Senna siamea</i> | 3 |
| 32 | Maulsari tree | <i>Mimusops elengii</i> | 2 |
| 33 | Marodfalli tree | <i>Fernandoa adenophyllum</i> | 14 |
| 34 | Chamrod tree | <i>Ehretia laevis</i> | 23 |
| 35 | Amla tree | <i>Phyllanthus emblica</i> | 3 |
| 36 | Royal palm | <i>Roystonea regia</i> | 12 |
| 37 | Dhak | <i>Butea monosperma</i> | 1 |
| 38 | Putranjiva tree | <i>Putranjiva roxburghii</i> | 4 |
| 39 | Bakain tree | <i>Melia azedarach</i> | 1 |
| 40 | <i>Ceiba pentandra</i> | <i>Ceiba pentandra</i> | 2 |
| 41 | Sahjan tree | <i>Moringa oleifera</i> | 1 |
| 42 | <i>Diospyros sp.</i> | <i>Diospyros sp.</i> | 2 |
| 43 | Pili kaner | <i>Thevetia peruviana</i> | 3 |
| 44 | Arjun | <i>Terminalia arjuna</i> | 4 |
| 45 | <i>Caryota urens</i> | <i>Caryota urens</i> | 1 |
| 46 | <i>Leucaena leucocephala</i> | <i>Leucaena leucocephala</i> | 4 |

| | | | |
|----|-----------------------------|---------------------------------|------------|
| 47 | <i>Livistonia chinensis</i> | <i>Livistonia chinensis</i> | 9 |
| 48 | Copperpod | <i>Peltaphorum pterocarpum</i> | 6 |
| 49 | Ficus | <i>Ficus microcarpa</i> | 49 |
| 50 | Shirish | <i>Albizia lebbeck</i> | 2 |
| 51 | Lasora | <i>Cordia dichotoma</i> | 1 |
| 52 | Kaim (Yamuna kadamb) | <i>Mitragyna parviflora</i> | 1 |
| 53 | Nimbu | <i>Citrus limon</i> | 1 |
| 54 | Baheda | <i>Terminalia bellirica</i> | 1 |
| 55 | Champa | <i>Plumeria</i> | 5 |
| 56 | Harshingar | <i>Nyctanthus arbor-tristis</i> | 3 |
| 57 | Balamkheera | <i>Kigelia africana</i> | 2 |
| | Total | | 450 |



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5.2 FAUNAL DIVERSITY OF COLLEGE

Shri Shivaji College of Education is located geo-position between Latitude - 28.6553249°N and longitude Latitude 77.120580°E in Mahatma Gandhi Rd, Shivaji Enclave, Raja Garden, New Delhi, Delhi, 110027, India. College campus consists of main building, aesthetic and botanical garden area, open place, parking etc. So, campus green cover, openness and availability of food and water is suitable for different faunal species. In the fauna, several species of butterflies, dragonflies, moths, spiders, amphibians, reptiles, birds and mammals have been recorded and documented from the college campus. Many animals are present in campus are dependent on the trees mainly for food and shelter. Flowers and fruits are eaten by monkeys, and nectar is a use by birds and many insects. Leaf – covered branches of tree keep many animals, such as birds and squirrels, out of reach of predators.

The faunal diversity from different habitats in Shri Shivaji College Campus is very rich represented by various groups of animals.

Highest number of birds and butterfly species were recorded from Gardens of College campus followed by open land, Road side plants, mixed scrub and seasonal ponds. This pattern of high species diversity in Botanical and Aesthetic Garden is due to high plant diversity, heterogeneous habitat availability and protection.



Figure 4: Pictures of Faunal

5.3 VERMICOMPOSTING UNIT

A Vermicomposting Unit is a setup where organic waste is decomposed biologically by earthworms and microorganisms.

The end product, called vermicompost, is a natural fertilizer rich in nitrogen, phosphorus, potassium, and micronutrients.

The campus has adopted a Vermicomposting Unit as one of its key Green Audit initiatives to promote sustainable waste management practices. Organic waste generated from canteen, garden, and other campus areas is systematically collected and processed through the vermicomposting unit. This initiative not only reduces the volume of biodegradable waste but also produces nutrient-rich organic manure, which is utilized for maintaining the campus greenery.

Through this practice, the institution demonstrates its commitment to environmental sustainability, waste-to-wealth conversion, and creating a cleaner, greener campus ecosystem





Figure 5: Vermicomposting Unit

5.4 BIO-COMPOSTING UNIT

A Bio-Composting Unit is a system designed to convert biodegradable waste (such as food waste, garden waste, agricultural residue, etc.) into organic compost using microorganisms like bacteria and fungi.

Unlike vermicomposting, it does not use earthworms — the entire process depends on microbial activity.

The campus has adopted a Bio-Composting Unit as one of its key Green Audit initiatives to promote sustainable solid waste management. Biodegradable waste generated from the campus premises, such as food waste and garden litter, is systematically processed through microbial decomposition to produce nutrient-rich organic compost. This compost is effectively utilized for maintaining the campus gardens and green areas, thereby reducing waste disposal to landfills and enhancing environmental sustainability.



Figure 6: Bio-composting Unit

5.5 PLASTIC BOTTLE RECYCLING UNIT

The campus has implemented a PET recycling unit, which facilitates the collection of waste PET bottles within the premises. The collected bottles are then processed through specialized machines and sent to external facilities for recycling. This initiative exemplifies best practices in sustainability and green auditing, contributing to a more environmentally responsible campus ecosystem.

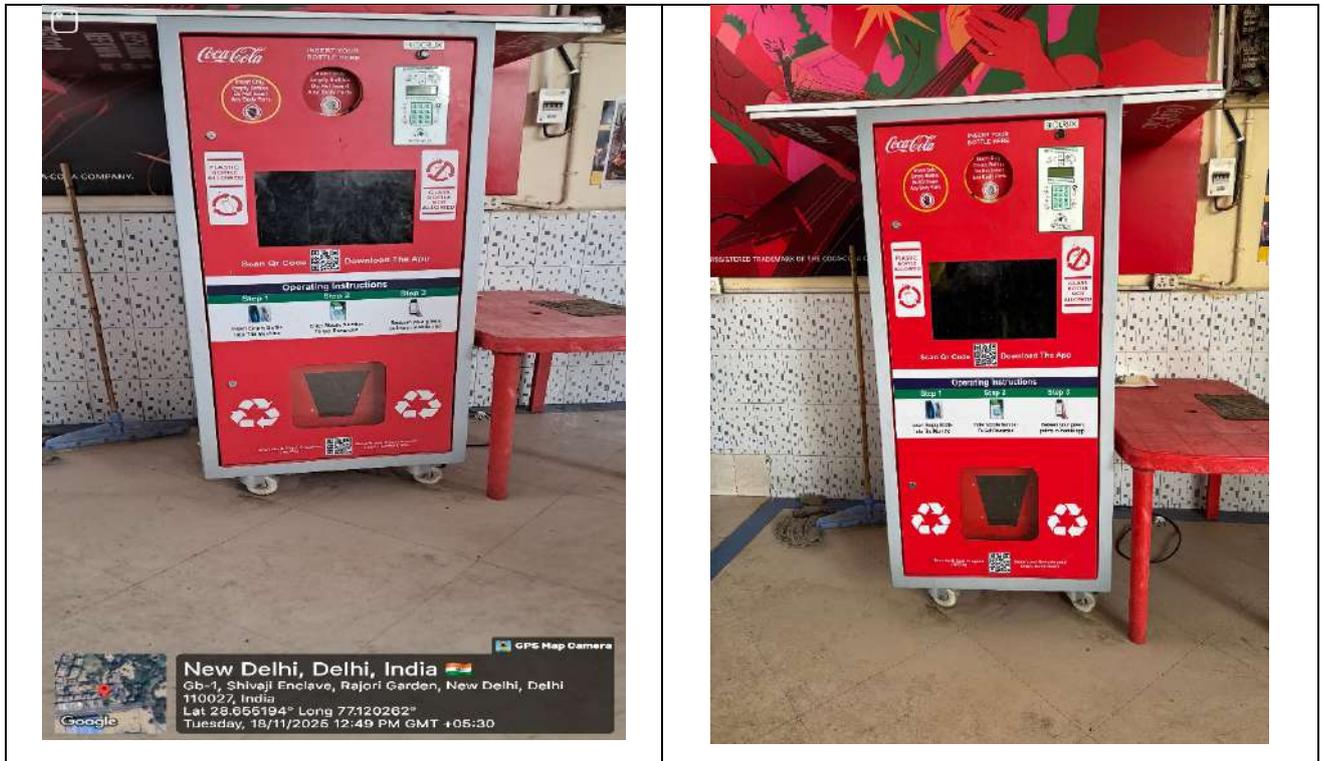


Figure 7: PET Bottle Recycling Unit

6. ENVIRONMENTAL AUDIT

6.1 SOILED WASTE MANAGEMENT AUDIT

Solid waste pollution is a biggest problem of 21st century. The “Use and throw” culture is highly growing and spreading in society. When useful things become useless, they are thrown out as a waste, it makes serious affect to environmental. Solid waste audit includes the waste production and disposal of different wastes like paper, food, plastic, biodegradable, hazardous, construction, glass, E- waste etc. Quantity of biodegradable waste varies according to season. Biodegradable waste also mainly consists of leaves and waste paper of office, library and students. Most of the departments including office, library is major contributing in the paper waste generation. Very less amount of plastic waste generated during the working days of college. E-waste generated in the campus is very less in quantity. Administration conducts the awareness programmes regarding E-waste Management with the help of various departments. Metal waste, e-waste and wooden waste is stored and given to authorized scrap agents for further processing.

Overall college campus having open area with plantation so tree dropping waste such as leaves become naturally mix with soil and decomposed. Waste bins are placed at several points in the college to collect food waste and these are collected by workers. The college has adopted pit composting and vermicomposting activity in open space for tree leave in campus. The main purpose of this is to reduce biodegradable waste in the college campus. Manual generated through pit composting activity is utilised for gardening activity. Paper waste can be reduced by maximizing e-communication and e-learning.

Table 3: List of Solid waste generation areas

| Sr. No. | Location | Type (Biodegradable Waste/Plastic Waste/E-waste) | Contents |
|---------|---------------------------------------|--|--------------------------|
| 1 | Library | Biodegradable | Paper |
| 2 | Computer Centre | E-Waste | Keyboard, CPU, Mouse, AC |
| 3 | Physiology Lab | Biodegradable | Paper |
| 4 | Science Lab | Biodegradable/Plastic | Packing Material |
| 5 | Girl Common Room | Biodegradable | Sanitary Waste |
| 6 | Dept. of Physical Education and Sport | Biodegradable | Paper |
| 7 | Administrative Office | Biodegradable | Paper |
| 8 | Staff Room | Biodegradable/Plastic | Paper/Drinking Bottle |
| 9 | Multipurpose Hall | Biodegradable/Plastic | Paper/Plastic Cups |
| 10 | Research Cell | Biodegradable | Paper |

| | | | |
|----|--|-----------------------|-----------------|
| 11 | Botanical Garden | Biodegradable | Leaves/Branches |
| 12 | Aesthetic Garden | Biodegradable | Leaves/Branches |
| 13 | Method Room Commerce/Social Science/Language | Biodegradable/Plastic | Paper/Wrapper |
| 14 | ET Lab | Biodegradable/Plastic | Paper/Wrapper |

6.1.1 PAPER RECYCLING UNIT

During the audit, it was observed that the campus has implemented a waste paper recycling plant, effectively managing paper waste generated from various facilities across the campus. This commendable initiative not only reduces waste but also promotes sustainability, contributing to a more environmentally responsible and eco-friendly campus ecosystem.

The benefits of this initiative include:

Reduction in paper waste sent to landfills

- ❖ Conservation of natural resources (trees, water, energy)
- ❖ Decrease in greenhouse gas emissions associated with paper production
- ❖ Promotion of a culture of sustainability and environmental awareness among students, faculty, and staff
- ✚ This best practice demonstrates the campus's commitment to reducing its environmental footprint and promoting sustainable practices



Figure 8: Pictures of Paper Recycling Unit

6.2 WATER MANAGEMENT AUDIT

Fresh Water: During the campus audit, it was observed that the sole source of water supply is from the Municipal Corporation of Delhi (MCD). The fresh water consumption within the campus is limited to domestic purposes only, such as drinking, handwashing, and toilet flushing. It was also observed that the campus has already installed water efficient taps in maximum toilets and washbasin.

Waste Water Audit: During the audit, it was observed that the campus has installed a 130 KLD Sewage Treatment Plant (STP) for the treatment of domestic wastewater generated from various sections of the campus. The treated water from the STP is reused for gardening and landscape maintenance, which significantly reduces the dependency on fresh water and promotes sustainable water management.

The campus has adopted wastewater recycling practices as part of its green initiatives, ensuring that effluent discharge is minimized and environmental compliance is maintained.

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Regular monitoring of the STP performance, water quality testing, and maintenance activities are carried out to ensure efficient operation.

Additionally, the institution has undertaken awareness programs on water conservation and best environmental practices among staff and students. The initiative not only supports resource optimization but also enhances environmental consciousness across the campus community.

Overall, the installation and reuse of treated water through the STP reflect the campus's commitment towards sustainable development and effective implementation of Green Audit measures. Pictures of STP is given below:



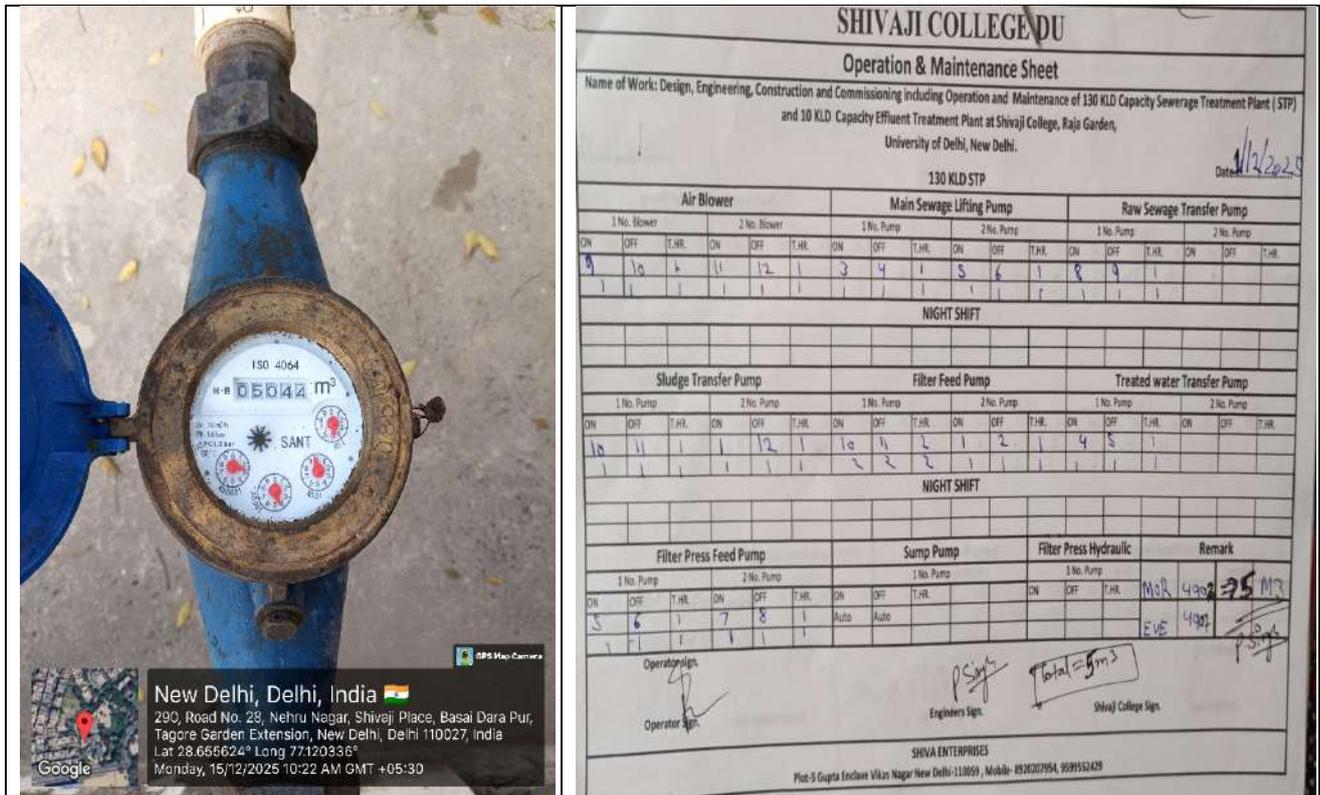


Figure 9: Pictures of STP

General Recommendations & Suggestions of Water Saving

For Domestic Use

- ❖ Timely Detection and repair of all leaks.
- ❖ Avoiding use of running water while hand-washing.
- ❖ Using over flow stop valve in the overhead tanks to check over flow of water.
- ❖ Turning off the main valve of water while going outdoor.
- ❖ Avoiding use of hose for washing floors; Use of broom may be preferred.
- ❖ Minimizing water used in cooling equipment by following manufacturer’s recommendations.
- ❖ Watering of lawn or garden during the coolest part of the day (early morning or late evening hours) when temperature and wind speed are the lowest. This reduces losses from evaporation.
- ❖ Avoiding use of excess fertilizers for lawns in view of the fact that application of fertilizer increases the requirement of water in addition to polluting the groundwater.
- ❖ Planting of native and/or drought tolerant grasses, ground covers, shrubs, and trees. Once established, they do not need to be watered as frequently and they usually survive a dry period without much watering.

- ❖ Grouping of plants based on water needs while planting them.
- ❖ Turning off water tap a little before watering time to use full water available in hose.
- ❖ Avoiding over watering of lawns. A good rain eliminates the need for watering for more than a week.
- ❖ Setting sprinklers to water the lawn or garden only, not the street or sidewalk.
- ❖ Avoiding installation or use of ornamental water features unless they recycle the water and avoiding running them during drought or hot weather.
- ❖ Installation of high-pressure, low-volume nozzles on spray washers.
- ❖ Replacement of high-volume hoses with high-pressure, low-volume cleaning systems.
- ❖ Equipping spring-loaded shutoff nozzles on hoses.
- ❖ Installation of float-controlled valve on the make-up line, closing filling line during operation, provision of surge tanks for each system to avoid overflow.
- ❖ Adjusting flow in sprays and other lines to meet minimum requirements.
- ❖ Washing vehicles less often, or using commercial car wash that recycles water.
- ❖ In case of big establishments like hotels, large offices and industrial complexes, community centres, etc. dual piped water supply may be insisted upon. Under such an arrangement one supply may carry fresh water for drinking, bathing and other human consumptions whereas recycled supply from second line may be utilized for flushing out human solid wastes. This may be made mandatory.
- ❖ Similarly, water harvesting through storming of water runoff including rainwater harvesting in all new building on plots of 100 sq. m and above may be made mandatory.

Water taps or Faucets Flow analysis

Water efficient faucets and fixtures are available in the market now a days to reduce water consumptions in wash basins by reducing flow without compromising comfort level of user. The audit team has conducted the flow sample base measurement on existing taps installed in wash basin to identify the water saving potential at faucets. Faucets flows can easily be reduced without affecting the comfort of the water user by using appropriate flow regulator technology for these fixtures. This will result in impressive savings of around 50 percent of faucets water use. Flow regulators, especially the aerators are inexpensive and are easy to install and maintain. This is why they are often considered as the low hanging fruits of water saving programs.



Therefore, based on sample flow measurement, we recommend the use of water efficient tap/faucets having flow of 3 to 5 LPM for the plant premises. The Flow Control aerator generates thin streams (like shower aerator) of water to cover wider area for rinse, when compared to conventional aerators. This results in lesser-run time of faucet and easiness for user and ultimately water saving. Flow Control Aerator can easily be installed in existing faucets.

Water use Urinals:

Low water uses urinals:

In some of the standard systems, water is applied automatically through a continuous drip-feeding system or by automated flushing at a set frequency, 24x7, regardless of whether or not the urinal has been used. Water consumption varies with the system model at an average of 4 liters per flush. Water-efficient urinals use 2.8 liters per flush and in recent times smart flush systems using 0.8 liters per flush have also been launched.

Waterless urinals:

There are various technologies available for waterless urinals. In oil barrier technology, the urinals operate through the use of an oil wall between the urine and the atmosphere, preventing odor from escaping. In another technology, the barrier has been replaced by a seal with a collapsible silicone Bore that closes after the fluid has passed through it, to prevent gases from flowing into room. A third system uses biological blocks which include microbial spores and surfactants which can be placed into any urinal, thus eliminating water use. By breaking down the urine into components, build-up of sludge and crystals which causes blockages are prevented. Bidets and urinals water use accounts for 3 percent of office buildings water use.

Dual Toilets Flushing system

A dual-flush toilet is a variation of the flush toilet that uses two buttons or handles to flush different levels of water. A significant way to save water in buildings is to replace single-flush toilets with dual flush toilets. The standard dual-flush toilets use six Liters of water on full and three liters on a half-flush.

Replacing old toilets will result to a reduction of toilet water consumption. More cost-effective results can be achieved by replacing only the toilet trim system.

Toilet Tank Bank

With economical, maintenance free 'Green Toilet Bank' it is very easy to save water on toilet flushing, it helps to save 3 liters water on every flushing, with no sacrifice on performance. Toilet Bank filled with water is hanged inside the toilet flushing tank or reservoir. It will displace an amount of water equivalent to 3 Liters in the tank, which means every flush we will save water, thus saving money. Less the water use, the less is the need to recycle.

6.3 NOISE AUDIT

Noise pollution is one of the biggest problems of our society. Unwanted sound or sound at wrong place at wrong time is considered as a noise pollution. The major source of noise identified in the college campus has been predominantly the vehicular movement, and the transportation activities.

During the noise audit, it was observed that the surrounding area is predominantly green and developed with gardening and open spaces. There are no major industries or high-noise-generating activities in the nearby vicinity. Due to this favorable environment, the ambient noise levels remain low and well within the permissible limits. The presence of greenery further helps in natural sound absorption, contributing to a calm and noise-free atmosphere around the premises

7. ENERGY AUDIT

7.1 INTRODUCTION OF ENERGY AUDIT

During the Green Audit, it was observed that the campus has been conducting Energy Audits periodically as part of its sustainability and environmental management initiatives. This proactive approach reflects the institution's commitment toward energy efficiency, conservation, and sustainable resource utilization.

The periodic energy audits help in identifying areas of high energy consumption, assessing the performance of electrical equipment, and recommending energy-saving measures to optimize operational efficiency. Through the implementation of audit recommendations, the campus has been able to reduce energy wastage, lower electricity costs, and minimize its carbon footprint.

Furthermore, the institution encourages the use of energy-efficient appliances, LED lighting systems, and BLDC fans, along with promoting awareness programs on energy conservation among students and staff.

Overall, the regular conduct of energy audits demonstrates the campus's dedication to continuous improvement and its active contribution to sustainable development goals (SDGs). Shivaji College has also installed 75 kWp solar power generation system as a net metering system, this is a good initiative as renewable energy source, pictures of solar system are given below:





Figure 10: Solar Pictures

7.2 GENERAL RECOMMENDATION'S:

Conduct Institutional Training / Awareness Program 14th December 'National Energy Conservation Day':

The National Energy Conservation Day is organized on 14th December every year by the Bureau of Energy Efficiency (BEE) with an aim to showcase India's achievements in energy efficiency and conservation. BEE - Ministry of Power celebrate every year Energy Conservation Week from 14th December – 20th December.

Create Awareness:

All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity.

1. There has to be Institute level student community that keeps track of the energy consumption Parameters of the various departments, class rooms, halls, areas, meters, etc.
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.

3. Need to create energy efficiency/ renewable energy awareness among the college campus i.e. solar, wind, Biogas energy. College should take initiative to arrange seminars, lectures, paper presentation competition among students and staff for general awareness.

Display the stickers of save electricity:

Save nature everywhere in the campus. So that all stakeholders encouraged to save the electricity.

- ❖ Most of the time, all the tube lights in a class room are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF.
- ❖ All projectors to be kept OFF or in idle mode if there will be no presentation slides.
- ❖ All computers to have power saving settings to turn off monitors and hard discs, say after 10 minutes/30 minutes.



Make your Monitor use less Power:

Decrease brightness of the monitor. 100% brightness isn't required all the time. All external monitors have buttons to adjust the brightness.

Increase Effectiveness - Install reflectors:

Light globes generally disperse light in all directions from the source. If a ceiling mounted light does not direct the light back down to the working plane, more fittings will be required to achieve the required lux levels. So, the effectiveness of the reflectors (or minimizing losses

due to poor reflectors) is important. Reflectors should be both reflective as well as carefully designed to disperse light effectively on the working plane at the design height of the fitting (e.g., light should not be concentrated in one area, providing too much light, whilst falling short of required levels in another area). Although once known mainly for LEDs in white light, general illumination applications are today's most energy-efficient and rapidly developing lighting technology.

Silver Reflectors. This is the reflector that reflects the lightest.

White Reflectors. More flexible between indoor and outdoor use.

1. Gold Reflectors
2. Black Reflectors
3. White Reflectors

Save Electricity with star labelled Appliances:

It is strongly recommended to use higher star-rated appliances (such as 4-star and 5-star rated products) to ensure energy efficiency and long-term savings. Appliances like refrigerators, air-conditioners, washing machines, fans, and geysers consume a large share of household and industrial electricity. By choosing energy-efficient models, you can:

Reduce electricity bills – A 5-star rated appliance consumes 20–40% less power than a 1-star model.

Save natural resources – Less energy demand means reduced pressure on power plants and fossil fuels.

Protect the environment – Lower energy consumption results in fewer greenhouse gas emissions.

Long-term benefits – Though slightly costlier at the time of purchase, high star-rated appliances provide significant savings over their lifetime.

8. INITIATIVES TAKEN BY THE COLLEGE

During the Green Audit at the Shivaji College, it was observed that the College has taken Initiatives for Promote Sustainability and maintaining the Green Campus, Details are given below:

- **Cleanliness Drives:**

The college actively conducts cleanliness drives under the *Swachhata Pakhwada* campaign to promote hygiene, sanitation, and environmental responsibility among students and staff.

- **“Swachhata Hi Seva” Campaign:**

As part of the national initiative, the college organizes awareness activities and cleanliness programs to inculcate a sense of civic duty and environmental cleanliness.

- **Observation of Global Handwashing Day:**

The college observes *Global Handwashing Day* to create awareness about personal hygiene and its role in preventing diseases and promoting public health.

- **Resource Utilization and Waste Management Practices:**

The college focuses on efficient utilization of resources and conversion of waste, particularly biodegradable waste, into usable components. The key practices include:

- ✓ **Bio-composting** of organic waste
- ✓ **Vermi-composting** to produce nutrient-rich manure
- ✓ **Bio-bins** for composting canteen waste
- ✓ **Sewage treatment facility** for wastewater management
- ✓ **10 KLD Effluent Treatment Plant (ETP)** for treatment and reuse of wastewater
- ✓ **Paper recycling** to minimize paper waste and promote reuse
- ✓ **Rain water harvesting** for collection and storage of rain water

- **Collaboration with NGO (MoU):**

Shivaji College has signed a Memorandum of Understanding (MoU) with the NGO *Lakshya – A Society for Social and Environmental Development*. The college organizes various social, environmental, and awareness programs in collaboration of Lakshya Society for students. Few are mentioned below:

- **E-Waste Awareness Program:**

In collaboration with the MoU partner *Lakshya*, the college organizes e-waste awareness programs to educate students on the hazards of electronic waste and the importance of its safe disposal and recycling.

➤ **Add-on Course on Sustainable Development Goals (SDGs):**

The college offers an add-on course on *Sustainable Development Goals (SDGs)* in collaboration with *Lakshya*, aiming to enhance students' understanding of sustainability, environmental conservation, and global development issues.

➤ **Mental Health Awareness Program:**

In association with the MoU partner *Lakshya*, the college organizes webinars and awareness programs on mental health to promote emotional well-being, stress management, and a supportive campus environment.

• **Rain water harvesting system:**

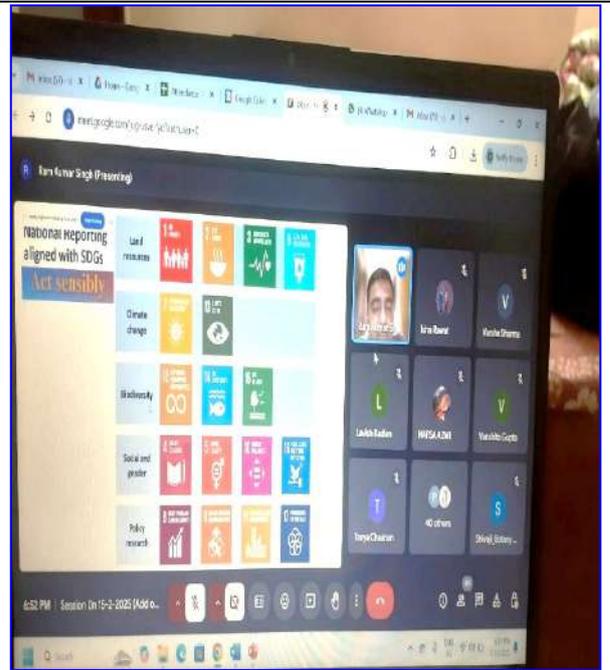
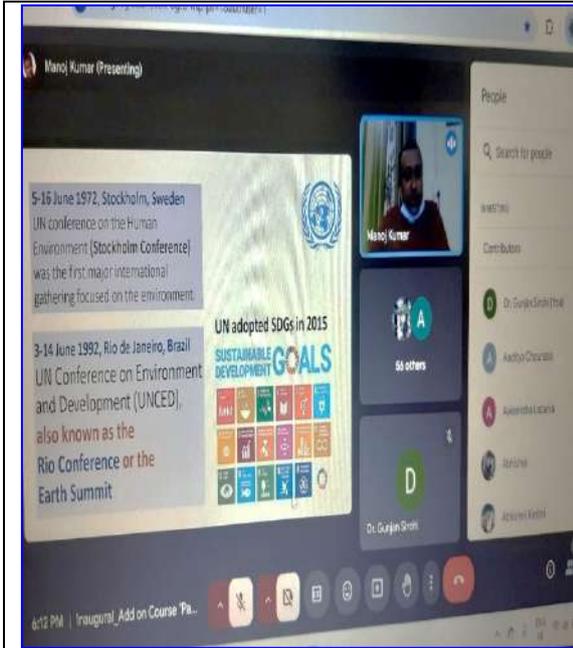
The college has two (02) rainwater harvesting systems to promote groundwater recharge and efficient utilization of rainwater. Each system is equipped with an underground storage tank having a capacity of 5 m × 3 m × 4 m. These systems help in collecting and conserving rooftop rainwater, thereby reducing dependence on freshwater sources and supporting sustainable water management practices within the campus.

• **Development of Nursery:**

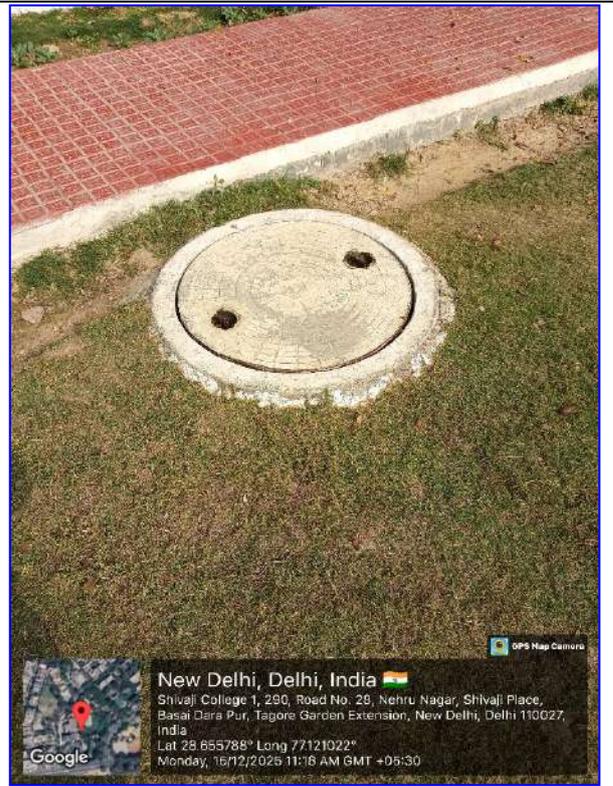
The College has development of a Nursery for promoting greenery and ecological balance within the campus.



Green Audit Report of Shivaji College, New Delhi



Initiatives Taken By The College



Rain water Harvesting system

9. RECOMMENDATION

A Green Audit should not be an end in itself, but the beginning of a continuous journey of improvement. By adopting these recommendations.

a) **Enhance Energy Efficiency**

- Continue periodic energy audits to monitor performance.
- Replace conventional fans and lights with BLDC fans and LED fixtures.
- Install motion sensors and automatic timers in classrooms, corridors, and washrooms.
- Promote the use of renewable energy sources, such as rooftop solar systems.

b) **Water Conservation Measures**

- Regularly monitor and maintain the Sewage Treatment Plant (STP) for optimum performance.
- Expand the use of treated water for gardening and cleaning.
- Install aerators on taps and dual-flush systems in toilets to reduce water wastage.
- Conduct awareness drives on “Save Water” initiatives among staff and students.

c) **Solid Waste Management**

- Strengthen segregation at source for biodegradable, plastic, and e-waste.
- Promote vermicomposting and bio-composting units for organic waste.
- Partner with authorized recyclers for safe e-waste disposal.

d) **Green Campus Initiatives**

- Increase tree plantation and maintain green cover.
- Encourage vertical gardening and roof-top vegetation where possible.
- Adopt rainwater harvesting systems to recharge groundwater.

e) **Environmental Awareness & Education**

- Organize training programs, workshops, and seminars on environmental sustainability.
- Display eco-awareness posters and signages across the campus.
- Involve students in eco-club activities and green drives regularly.

f) **Monitoring and Documentation**

- Maintain proper records of energy, water, and waste data for annual green reporting.
- Develop a Green Policy Document to guide future environmental actions.

10. CONCLUSION

The Green Audit of the institution highlights its commitment towards environmental protection and sustainable practices. The campus has adopted various eco-friendly initiatives such as efficient energy utilization, effective water management through rainwater harvesting systems, development of green areas including plantation and nursery, and systematic waste management practices.

The institution continuously promotes environmental awareness among students and staff, encouraging responsible use of natural resources and conservation measures. Regular monitoring of water and energy consumption, along with the maintenance of a clean and green campus, reflects a proactive and responsible approach towards sustainability.

Overall, the Green Audit findings indicate that the institution has taken positive steps towards minimizing its environmental impact. With continued implementation of green initiatives and periodic review of environmental practices, the institution can further strengthen its sustainability performance and contribute effectively towards environmental conservation.

The Green audit of Shiva ji college has done successfully with satisfaction and valid for five years upto the year 2030.

11. SITE PHOTOGRAPHS

