Sathyabama Institute of Science and Technology

Water Audit

June 2025-May 2026

Prepared by

CWM
GREEN FOREVER

Centre for Waste Management

Audited by

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EXECUTIVE SUMMARY

Water is one of the most valuable natural resources and plays a vital role in sustaining academic institutions by supporting teaching, research, residential facilities, landscaping, sanitation, and other campus operations. Efficient water resource management has become increasingly important in the context of rapid urbanization, growing water demand, climate variability, and the need to promote sustainable development. Higher educational institutions have a significant responsibility to adopt sustainable water management practices while fostering environmental awareness among students, faculty, and the wider community.

The **Water Audit** of **Sathyabama Institute of Science and Technology** was conducted to comprehensively evaluate the institution's water resources, consumption patterns, distribution systems, wastewater management practices, and conservation initiatives. The audit aimed to assess the efficiency of existing water management systems, identify opportunities for improving water use efficiency, and recommend practical measures to enhance long-term water sustainability across the campus.

The audit included a detailed assessment of water procurement, storage, distribution, utilization, rainwater harvesting, wastewater treatment, recycling, and reuse practices. Comprehensive field inspections, stakeholder interactions, institutional record verification, and infrastructure evaluations were carried out to assess the effectiveness of the campus water management system. Particular emphasis was placed on understanding water consumption across academic buildings, hostels, laboratories, administrative blocks, dining facilities, landscape irrigation, and other operational areas.

The assessment indicates that the institution has developed a well-organized water management framework supported by multiple water sources, adequate storage infrastructure, efficient distribution networks, and a robust wastewater treatment system. Water supplied through tanker services and bore wells is systematically stored and distributed to meet the daily requirements of the campus. The institution has also implemented comprehensive rainwater harvesting measures that contribute to groundwater recharge and enhance water availability during periods of reduced rainfall.

One of the notable strengths identified during the audit is the operation of a **1.5 MLD Sewage Treatment Plant (STP)** based on **Sequential Batch Reactor (SBR)** technology. The treated

wastewater is effectively reused for landscape irrigation and other non-potable applications, significantly reducing dependence on freshwater resources and supporting the principles of water conservation and circular resource management.

The audit further highlights the institution's proactive approach towards minimizing water losses through regular maintenance of water supply infrastructure, prompt repair of leakages, efficient storage systems, and adoption of water conservation practices. Awareness programmes, student participation, and institutional policies further reinforce responsible water use and promote a culture of environmental stewardship within the campus community.

The findings of this Water Audit establish a valuable baseline for monitoring institutional water performance and planning future improvements. The recommendations presented in this report focus on enhancing water-use efficiency through smart metering, expansion of rainwater harvesting infrastructure, advanced groundwater recharge systems, water-efficient fixtures, digital monitoring technologies, and continuous awareness programmes. Implementation of these measures will strengthen the institution's resilience to future water challenges while improving operational efficiency and reducing environmental impacts.

Overall, the Water Audit demonstrates that **Sathyabama Institute of Science and Technology** has established a strong and sustainable water management system aligned with national environmental priorities and global sustainability principles. The institution's commitment to water conservation, wastewater recycling, rainwater harvesting, and responsible resource management serves as an exemplary model for higher educational institutions seeking to achieve long-term water security and sustainable campus development.

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CHAPTER 1

INTRODUCTION

1.1 About Sathyabama Institute of Science and Technology

Sathyabama Institute of Science and Technology is one of India's premier multidisciplinary institutions, recognized for its excellence in higher education, research, innovation, and sustainable development. Established under Section 3 of the University Grants Commission (UGC) Act, 1956, the institution has consistently demonstrated its commitment to academic excellence, technological advancement, environmental stewardship, and societal development.

The University offers a comprehensive range of undergraduate, postgraduate, doctoral, and research programmes in Engineering, Science, Technology, Management, Law, Dental Sciences, Pharmacy, Nursing, Arts and Science, and Allied Health Sciences. Supported by experienced faculty, state-of-the-art laboratories, advanced research centres, and modern infrastructure, the institution provides an environment that promotes innovation, interdisciplinary learning, and industry-oriented education.

Accredited with the highest **'A++' Grade by the National Assessment and Accreditation Council (NAAC)**, Sathyabama Institute of Science and Technology has established itself as a leading institution in teaching, research, innovation, and community engagement. The University has consistently secured commendable positions in national and international rankings, reflecting its pursuit of academic excellence and institutional quality.

Apart from academic achievements, the institution has demonstrated exceptional commitment towards environmental sustainability by implementing numerous initiatives in water conservation, renewable energy, waste management, biodiversity conservation, green campus development, and climate resilience. Sustainable resource management has become an integral part of the University's governance, academic activities, research programmes, and extension initiatives.

The campus is designed to incorporate environmentally responsible infrastructure, including rainwater harvesting systems, sewage treatment facilities, water recycling systems, energy-efficient buildings, and extensive green landscapes. These initiatives significantly reduce the

institution's environmental footprint while promoting responsible utilization of natural resources.

Through active participation of faculty members, students, researchers, and administrative staff, Sathyabama Institute of Science and Technology continues to create a culture of sustainability that encourages innovation, environmental responsibility, and community participation. The institution remains committed to producing socially responsible graduates capable of contributing to sustainable national and global development.

1.1.1 Vision

To emerge as a globally recognized multidisciplinary institution that fosters academic excellence, innovation, research, entrepreneurship, and sustainable development while creating socially responsible global citizens.

1.1.2 Mission

Sathyabama Institute of Science and Technology is committed to:

- Delivering high-quality education through innovative teaching, research, and experiential learning.
- Promoting multidisciplinary research that addresses emerging scientific, technological, environmental, and societal challenges.
- Developing competent professionals with strong ethical values, leadership qualities, and social responsibility.
- Encouraging innovation, entrepreneurship, and industry collaboration.
- Integrating sustainability into education, research, campus operations, and community outreach.
- Contributing to national development through environmentally responsible practices and knowledge dissemination.

1.1.3 Objectives of the Water Audit

The Water Audit was conducted with the following objectives:

- To evaluate the existing water resources and water supply systems within the campus.

- To assess water consumption patterns across academic, residential, research, and administrative facilities.
- To identify opportunities for improving water-use efficiency.
- To evaluate the effectiveness of rainwater harvesting and groundwater recharge systems.
- To assess wastewater generation, treatment, recycling, and reuse practices.
- To identify potential sources of water loss and recommend suitable conservation measures.
- To promote sustainable water resource management through efficient planning and monitoring.
- To establish baseline data for future water management and continuous improvement.

1.1.4 Scope of the Water Audit

The Water Audit covered all major water-related infrastructure and operational activities within the campus, including:

- Water procurement and supply systems.
- Bore wells and tanker water management.
- Raw water storage facilities.
- Distribution networks.
- Drinking water systems.
- Reverse Osmosis (RO) plants.
- Rainwater harvesting structures.
- Groundwater recharge practices.
- Sewage Treatment Plant (STP).
- Wastewater recycling and reuse.
- Landscape irrigation.
- Water consumption in hostels, laboratories, hospitals, canteens, and academic buildings.
- Water conservation initiatives.
- Water quality management.
- Institutional policies related to water management.

1.1.5 Importance of Water Audit

Water is a finite and increasingly stressed natural resource. Effective water management is essential for ensuring long-term sustainability, reducing operational costs, protecting groundwater resources, and enhancing climate resilience.

A Water Audit enables institutions to:

- Quantify water consumption and identify areas of high demand.
- Detect inefficiencies and potential water losses.
- Improve operational performance of water supply systems.
- Optimize wastewater treatment and reuse.
- Enhance rainwater harvesting and groundwater recharge.
- Promote responsible water consumption among stakeholders.
- Support institutional sustainability goals and environmental compliance.
- Contribute towards national water conservation initiatives and the United Nations Sustainable Development Goals (SDGs).

1.2 Audit Team

The Water Audit was conducted by the Centre for Waste Management and validated by Enviroworks Private Limited, Chennai. The audit team comprised experienced environmental professionals, faculty members, researchers, and technical staff representing multiple academic departments.

The multidisciplinary composition of the audit team ensured comprehensive assessment of environmental practices, energy management systems, campus infrastructure, biodiversity conservation, waste management, water conservation, and sustainability initiatives implemented across the institution.

The audit methodology included document review, stakeholder consultations, field inspections, data verification, questionnaire-based assessment, and evaluation of environmental management practices. The collaborative approach adopted during the audit enabled objective assessment of institutional performance and formulation of practical recommendations for continual environmental improvement.

The Centre for Waste Management coordinated all audit activities with active support from faculty members, research scholars, technical staff, and student volunteers, reflecting the

institution's commitment to participatory environmental management and sustainable campus development. Following are the members associated in the Audit

Centre for Waste Management

Dr.Dawn S S

Dr.Nirmala N

Dr.J.Arun

Dr.P.Priyadharsini

Dr.A.Santhosh

Dr.S.Sujithra

Mr.J.Jayakanth

Ms.A.Bhuvaneswari

Ms.S.V.Sivasankari

Mr.A.Silambarasan

Ms.J.Merlin

The team functions with the designated audits. The team has undergone Green, Energy and Environmental Audit training in July 2020 and are upgrading the skills as per requirement. Wasmanpro Environmental Solutions LLP, Chennai provided Audit training. Since then the team pursues the internal Green, Energy and Environmental Audits periodically.

1.3 Periodicity of Audit

The internal audit team initiated the audit for 2025 – 2026 period in June 2025. Inventories to pursue the audit were revised based on the recommendations given by the external audit team in the previous year's audit report. Each member of the internal audit team is allotted with a particular audit and is supported by student volunteers. The audit takes place during the third week of every month, and compilation of the inventories is done by the in-charge and reviewed by the Lead Internal Auditor. The review of the audit happens quarterly by the External Audit team before the Final Audit report is validated in May every year. The external audit was undertaken by Enviroworks Pvt.Ltd for the year June 2025 to May 2026.

CHAPTER 2

WATER AUDIT

2.1 Introduction

Water is an essential natural resource that supports the functioning of educational institutions by meeting the requirements of drinking, sanitation, laboratories, hostels, food preparation, landscaping, research, healthcare facilities, and other campus operations. With increasing freshwater scarcity, rapid urbanization, climate variability, and rising demand, the efficient management of water resources has become a critical component of sustainable campus development.

A Water Audit is a systematic evaluation of water resources, infrastructure, consumption patterns, treatment systems, and conservation practices within an institution. It enables organizations to quantify water usage, identify areas of inefficiency, minimize losses, improve operational performance, and develop sustainable strategies for water conservation and reuse.

The Water Audit of **Sathyabama Institute of Science and Technology** was conducted to assess the institution's overall water management system, including water procurement, storage, distribution, utilization, wastewater treatment, recycling, rainwater harvesting, and groundwater recharge initiatives. The audit also evaluated existing conservation measures and identified opportunities for improving water-use efficiency while ensuring uninterrupted water availability across the campus.

The audit findings provide a comprehensive understanding of the institution's current water management practices and establish a baseline for future planning, performance monitoring, and continual improvement. The assessment also supports institutional compliance with environmental regulations, accreditation requirements, and the United Nations Sustainable Development Goals (SDGs), particularly **SDG 6 – Clean Water and Sanitation**.

2.2 Objectives of the Water Audit

The Water Audit was conducted with the following objectives:

- To evaluate the availability and utilization of water resources within the campus.

- To assess water consumption across academic, residential, research, healthcare, and administrative facilities.
- To examine the efficiency of water storage and distribution systems.
- To evaluate rainwater harvesting and groundwater recharge initiatives.
- To assess wastewater generation, treatment, recycling, and reuse practices.
- To identify areas of water loss, wastage, and inefficiency.
- To recommend practical measures for improving water conservation and management.
- To establish baseline data for continuous monitoring and sustainable water governance.

2.3 Scope of the Water Audit

The Water Audit covered all major water-related infrastructure and operational activities within the institution, including:

- Water procurement and supply.
- Bore well and tanker water management.
- Water storage facilities.
- Distribution networks.
- Drinking water treatment systems.
- Reverse Osmosis (RO) plants.
- Hostels and residential facilities.
- Laboratories and research centres.
- Hospital and healthcare facilities.
- Academic buildings.
- Administrative offices.
- Canteens and dining facilities.
- Landscape irrigation systems.
- Rainwater harvesting structures.
- Sewage Treatment Plant (STP).
- Wastewater recycling and reuse.
- Stormwater drainage system.
- Water conservation initiatives.

2.4 Audit Methodology

The Water Audit was carried out using a structured and evidence-based methodology to ensure a comprehensive evaluation of the institution's water management practices.

Preliminary Assessment

An initial review of institutional records, previous audit reports, water bills, infrastructure drawings, and maintenance records was undertaken to understand the existing water management system.

Site Inspection

Detailed inspections were conducted throughout the campus to evaluate water supply infrastructure, storage facilities, pumping systems, distribution networks, rainwater harvesting structures, wastewater treatment facilities, and irrigation systems.

Stakeholder Consultation

Interactions were conducted with faculty members, maintenance personnel, administrative staff, engineers, housekeeping teams, gardeners, and student representatives to understand water consumption practices, operational procedures, and conservation measures.

Questionnaire-Based Survey

A structured questionnaire was used to collect information regarding water sources, storage capacity, distribution systems, conservation practices, leakage management, wastewater reuse, rainwater harvesting, and future improvement opportunities.

Infrastructure Assessment

The audit team evaluated:

- Raw water storage tanks.
- Distribution tanks.
- Overhead tanks.
- Drinking water systems.
- RO plants.
- Bore wells.

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- Water pumps.
- Plumbing systems.
- Sewage Treatment Plant.
- Stormwater drainage network.
- Rainwater harvesting infrastructure.

Data Verification and Analysis

Information obtained through surveys and site inspections was verified using institutional records and operational data. The collected information was analyzed to evaluate water efficiency, identify gaps, and formulate practical recommendations for improvement.

2.5 Water Audit Questionnaire

A comprehensive questionnaire was developed to assess the institution's water management practices. The questionnaire included the following key indicators:

- Source of water supply.
- Daily water consumption.
- Storage capacity.
- Water distribution system.
- Water quality monitoring.
- Drinking water facilities.
- Water usage in hostels and laboratories.
- Water usage in hospitals and canteens.
- Rainwater harvesting systems.
- Groundwater recharge measures.
- Sewage Treatment Plant performance.
- Wastewater recycling.
- Landscape irrigation.
- Water-saving technologies.
- Leakage management.
- Maintenance practices.
- Student awareness programmes.
- Institutional water management policy.

- Future water conservation initiatives.

2.6 Existing Water Infrastructure

The institution has developed a comprehensive water supply and distribution network capable of meeting the daily water requirements of academic, residential, healthcare, and administrative facilities.

Water Sources

Water is procured through multiple sources to ensure uninterrupted supply.

The primary sources include:

- Water supplied through tanker services.
- Institutional bore wells.
- Groundwater extraction from owned and leased bore wells.

The institution receives approximately **25–30 tanker loads per day**, each with a capacity of **12,000 litres**, during periods of full campus occupancy. Additionally, water is sourced from **three bore wells**, including one owned bore well and two leased bore wells.

Water Storage System

The campus is equipped with an extensive water storage network comprising:

- Four raw water storage tanks.
- Three treated water storage tanks.
- One rainwater collection tank.
- Nine primary storage tanks.
- Multiple distribution tanks.
- Fifteen Syntex storage tanks.

The total storage capacity of the campus is approximately **1 million litres (1 MLD)**, ensuring continuous water availability during peak demand.

Water Distribution Network

Water is distributed through a well-designed network serving:

- Academic blocks.
- Administrative buildings.
- Central library.
- Hostels.
- Hospital.
- Dental College.
- Research laboratories.
- Sports facilities.
- Workshops.
- Food courts.
- Canteens.

The distribution system consists of multiple overhead tanks, pumping stations, pipelines, and pressure-regulating systems that ensure reliable water supply throughout the campus.

Drinking Water Facilities

Safe drinking water is provided through **two Reverse Osmosis (RO) plants**, each with a capacity of **20,000 litres**, supplying potable water to hostels and academic buildings. The institution has also installed **96 water coolers** at strategic locations across the campus to ensure easy access to safe drinking water for students, faculty members, staff, patients, and visitors.

2.7 Water Consumption Pattern

The audit identified the following major water-consuming activities:

- Drinking water.
- Hostels.
- Toilets and bathrooms.
- Laboratories.
- Hospital.
- Academic departments.

- Administrative offices.
- Canteens and kitchens.
- Gardening and landscape irrigation.
- Cleaning operations.
- Wash basins.
- Floor cleaning.
- Research activities.

The institution has adopted efficient operational practices to minimize water wastage while ensuring adequate supply for all essential activities.

2.8 Rainwater Harvesting and Water Conservation

Rainwater harvesting forms an important component of the institution's water conservation strategy.

Stormwater generated during rainfall is effectively collected and directed through a dedicated drainage network, facilitating groundwater recharge and reducing surface runoff. The institution continuously strengthens its rainwater harvesting infrastructure to improve water availability and enhance groundwater sustainability.

Additional water conservation measures implemented by the institution include:

- Regular inspection of pipelines and valves.
- Immediate repair of leaking taps.
- Controlled overflow management.
- Efficient irrigation scheduling.
- Preventive maintenance of water distribution systems.
- Student awareness campaigns promoting responsible water use.

The audit observed that water losses due to leakage are minimal because defective plumbing fixtures are promptly repaired as part of the institution's maintenance programme.

2.9 Summary

The Water Audit indicates that Sathyabama Institute of Science and Technology has established a robust water management system supported by diversified water sources, adequate storage capacity, efficient distribution infrastructure, drinking water treatment facilities, and proactive water conservation measures.

The institution's integrated approach to water resource management provides a strong foundation for sustainable campus development while ensuring long-term water security and responsible utilization of available water resources.

Institution procures water from three locations outside campus. While there are no bore wells inside the campus, the water requirement is managed by tanker arrangements. With increasing strength of population in campus, water consumption is increasing. To accommodate the requirements the number of overhead tanks have been increased. The table below gives the location and increase in numbers and capacities of the tankers.

Table 1 Location of tanks and capacities in campus

Location of the Overhead Tank	**Numbers**	**Capacity per tank in Litres**
Computer Science Block	4	20,000
Antony Hostel	1	20,000
Dental College	4	20,000
St.Paul's Block	2	50,000
Sathyabama Research Park	2	20,000
Architecture	1	50,000
IRC	2	20,000
Gopalakrishnan Hostel	2	20,000
MGR Hostel	3	20,000
Col Dr.Jeppiaar Hostel	3	20,000
Blocks 10,11,12	3	20,000
Blocks 20 A, 20B	2	20,000
Col Dr.Jeppiaar Home	2	20,000
Janakiammal Hostel	4	20,000
Mother Theresa Hostel	4	20,000

Panimalar Hostel	4	20,000
Mary Emaculate Hostel	2	20,000
Rosary Hostel	3	20,000
Aero Department	1	20,000
Central Library	2	20,000
Block 1	2	20,000
Block 4	1	20,000
Block 8	1	20,000
Mechanical lab	1	20,000
Biotech Department	1	20,000
ECE Department	1	20,000
Block 16	2	20,000
Block 18	2	20,000
CoE office	2	20,000
Old CoE office	2	20,000
Admin Block	2	20,000

Table 2 Sewage treated water storage tanks and usage

Number of Tanks	12
No.of loads	14
Usage	Gardening
	Toilet flushes in blocks 2-8,18, common restrooms

CHAPTER 3

SEWAGE TREATMENT, WATER RECYCLING AND AUDIT FINDINGS

3.1 Sewage Treatment Plant (STP)

Efficient wastewater management is an integral component of sustainable water resource management. Higher educational institutions generate considerable quantities of domestic wastewater from hostels, academic buildings, laboratories, hospitals, canteens, and other campus facilities. Treating and reusing this wastewater significantly reduces dependence on freshwater resources while minimizing environmental impacts.

Sathyabama Institute of Science and Technology has established a modern **Sewage Treatment Plant (STP)** with a treatment capacity of **1.5 Million Litres per Day (MLD)**. The STP has been designed to efficiently treat domestic wastewater generated across the campus and produce treated water suitable for non-potable applications such as landscape irrigation and campus maintenance.

The operation of the STP reflects the institution's commitment to sustainable water management, environmental protection, and circular economy principles by recovering valuable water resources instead of discharging untreated wastewater into the environment.

3.2 STP Treatment Process

The institution has adopted the **Sequential Batch Reactor (SBR)** process, an advanced biological wastewater treatment technology recognized for its high treatment efficiency, operational flexibility, and ability to produce superior quality treated water.

The treatment process consists of the following major units:

- Bar Screen
- Raw Sewage Collection Sump
- Receiving Chamber
- Fine Screen Channel
- Grit Chamber
- Sequential Batch Reactor (SBR)

- Clarified Water Tank
- Treated Water Storage Tank
- Sludge Collection Sump
- Sludge Drying Beds
- Pressure Sand Filter
- Activated Carbon Filter
- Treated Water Collection Tank

These treatment units collectively remove suspended solids, biodegradable organic matter, nutrients, and pathogenic microorganisms, thereby producing treated water that meets the requirements for landscape irrigation and other approved non-potable applications.

3.3 Wastewater Recycling and Reuse

One of the major strengths identified during the Water Audit is the institution's effective reuse of treated wastewater.

The audit observed that approximately **1.10 MLD** of wastewater is treated daily, of which nearly **0.88 MLD** is successfully recycled and reused for landscape irrigation and other non-potable purposes. This significantly reduces dependence on freshwater resources while enhancing overall water-use efficiency.

The reuse of treated wastewater provides several environmental and operational benefits, including:

- Conservation of freshwater resources.
- Reduction in groundwater extraction.
- Lower operational costs associated with water procurement.
- Continuous irrigation during periods of water scarcity.
- Improved landscape maintenance.
- Reduced wastewater discharge into the environment.
- Promotion of circular water resource management.

The institution's wastewater recycling programme demonstrates an excellent example of sustainable campus water management.

3.4 Water Balance Assessment

A water balance assessment provides valuable insights into the movement of water within the campus and helps identify opportunities for improving water-use efficiency.

The major components of the institutional water cycle include:

Water Inputs

- Tanker water supply.
- Bore well water.
- Rainwater harvested during monsoon.
- Groundwater recharge.

Water Utilization

- Drinking water.
- Hostel facilities.
- Academic departments.
- Research laboratories.
- Hospital.
- Administrative buildings.
- Food courts and kitchens.
- Toilets and bathrooms.
- Landscape irrigation.
- Campus cleaning activities.

Wastewater Generation

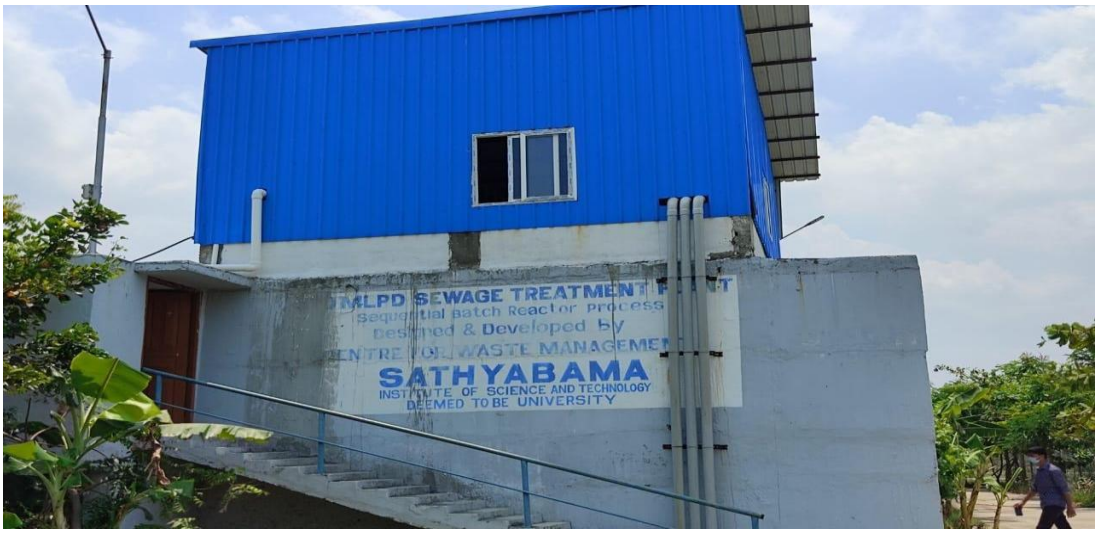
Wastewater generated from various campus activities is collected through the sewer network and conveyed to the Sewage Treatment Plant for treatment.

Water Recovery

Following treatment, reclaimed water is reused for:

- Gardening.

- Lawn irrigation.
- Plantation maintenance.
- Landscape development.
- Other approved non-potable applications.



This integrated water cycle significantly improves water efficiency while reducing freshwater demand and wastewater discharge.

3.5 Water Conservation Measures

The audit observed that the institution has implemented several effective water conservation practices across the campus.

Rainwater Harvesting

Stormwater generated during rainfall is collected through a dedicated drainage network and directed towards rainwater harvesting structures, contributing to groundwater recharge and improved water availability.

Covered Water Storage Tanks

All major storage tanks are properly covered, minimizing evaporation losses and preventing contamination.

Leakage Prevention

Regular inspections and preventive maintenance ensure that leaking taps, damaged pipelines, and faulty plumbing fixtures are repaired promptly. During the audit, no significant leakage of taps, pipelines, tanks, or urinals was observed.

Drinking Water Management

Reverse Osmosis (RO) systems ensure a continuous supply of safe drinking water across hostels and academic facilities.

Efficient Irrigation

Treated wastewater is utilized for irrigation, reducing dependence on freshwater while maintaining the campus green cover.

Water Awareness

The institution regularly conducts awareness programmes encouraging responsible water use among students, faculty members, and staff.

3.6 Key Audit Findings

The Water Audit identified several noteworthy strengths in the institution's water management system.

Water Supply

- Reliable water procurement through tanker supply and bore wells.
- Adequate storage infrastructure.
- Continuous water availability throughout the campus.

Water Infrastructure

- Well-maintained storage tanks.
- Efficient distribution system.
- Proper pumping arrangements.
- Safe drinking water facilities.

Wastewater Management

- Modern STP with SBR technology.
- High wastewater treatment efficiency.
- Extensive reuse of treated wastewater.

Water Conservation

- Rainwater harvesting.
- Groundwater recharge.
- Prompt leakage management.
- Water-saving operational practices.

Environmental Sustainability

- Reduced freshwater dependency.
- Promotion of circular water management.
- Reduced environmental pollution.
- Sustainable irrigation practices.

These findings demonstrate the institution's proactive approach towards integrated water resource management and environmental sustainability.

3.7 Best Practices

The audit identified several best practices that distinguish the institution as a model for sustainable water management.

- Large-capacity Sewage Treatment Plant.
- Sequential Batch Reactor (SBR) treatment technology.
- Extensive reuse of treated wastewater.
- Rainwater harvesting system.
- Covered water storage tanks.
- Prompt repair of plumbing leakages.
- Dedicated RO drinking water facilities.
- Efficient campus-wide water distribution.

- Sustainable landscape irrigation.
- Student participation in water conservation programmes.
- Regular awareness campaigns on responsible water use.
- Integration of water conservation into institutional sustainability initiatives.

These practices significantly contribute to water conservation, operational efficiency, and environmental protection.

3.8 Recommendations

Although the institution has established an effective water management system, the following recommendations are proposed to further strengthen sustainability.

Short-Term Recommendations

- Display water conservation awareness boards throughout the campus.
- Encourage immediate reporting of leaking taps through an online grievance portal.
- Conduct periodic water audits and leak detection surveys.
- Promote responsible water use among students and staff.

Medium-Term Recommendations

- Install smart water meters in individual buildings.
- Replace conventional flush systems with dual-flush cisterns to reduce water consumption by 30–40%.
- Expand rainwater harvesting infrastructure.
- Install water-efficient fixtures and flow regulators.
- Introduce drip irrigation for all landscaped areas.

Long-Term Recommendations

- Develop a Digital Water Management System.
- Install IoT-based water monitoring sensors.
- Prepare annual Water Footprint Reports.
- Establish a Water Conservation Committee.
- Implement Artificial Intelligence-based leak detection systems.

- Develop a campus Water Sustainability Dashboard.
- Work towards ISO 46001 (Water Efficiency Management Systems) certification.

3.9 Overall Evaluation

The Water Audit confirms that Sathyabama Institute of Science and Technology has established a comprehensive and sustainable water management system supported by efficient infrastructure, responsible operational practices, and a strong institutional commitment to environmental stewardship.

The institution has successfully integrated water conservation, wastewater treatment, rainwater harvesting, and resource recovery into its campus operations, thereby reducing freshwater demand and enhancing long-term water security.

The existing infrastructure, combined with the proposed recommendations, provides a strong foundation for achieving higher standards of water efficiency and sustainable campus management. Continued investment in advanced water technologies, digital monitoring systems, and stakeholder engagement will further strengthen the institution's position as a leading model of sustainable water resource management.

CHAPTER 4

FUTURE ACTION PLAN, ENVIRONMENTAL EDUCATION AND CONCLUSION

4.1 Future Action Plan

Water is a finite and invaluable natural resource that requires continuous monitoring, efficient management, and sustainable utilization. Although Sathyabama Institute of Science and Technology has established a comprehensive water management system, continuous improvement is essential to address future challenges associated with increasing water demand, climate variability, and sustainable campus development.

To further strengthen institutional water security and improve resource efficiency, the following strategic initiatives are recommended.

4.1.1 Smart Water Management

The institution should gradually adopt digital technologies for real-time monitoring and management of water resources. Installation of smart water meters and IoT-enabled monitoring systems in academic buildings, hostels, laboratories, hospitals, and administrative blocks will enable continuous tracking of water consumption, early detection of leakages, and optimization of water distribution.

4.1.2 Expansion of Rainwater Harvesting

Existing rainwater harvesting systems may be expanded by constructing additional recharge pits, percolation wells, recharge trenches, and rooftop rainwater harvesting systems across

newly developed buildings. These measures will enhance groundwater recharge and reduce dependence on external water sources during periods of limited rainfall.

4.1.3 Water Efficiency Improvement

The institution should progressively replace conventional plumbing fixtures with water-efficient alternatives, including:

- Dual-flush toilet systems.
- Low-flow faucets.
- Sensor-operated taps.
- Water-efficient showerheads.
- Flow regulators for irrigation systems.

These interventions can substantially reduce daily water consumption without affecting user convenience.

4.1.4 Strengthening Wastewater Reuse

The treated water generated from the Sewage Treatment Plant should continue to be maximally utilized for:

- Landscape irrigation.
- Tree plantations.
- Lawn maintenance.
- Roadside greenery.
- Construction activities where appropriate.
- Toilet flushing in future developments, wherever technically feasible.

This will further reduce freshwater demand and enhance circular water resource management.

4.1.5 Digital Water Dashboard

A centralized digital Water Management Dashboard may be developed for monitoring:

- Daily water procurement.
- Water consumption.

- Tank storage levels.
- STP performance.
- Water recycling efficiency.
- Rainwater harvesting.
- Water quality monitoring.
- Water conservation indicators.

Such a system will facilitate evidence-based decision-making and improve institutional water governance.

4.2 Environmental Education and Awareness

Long-term success of any water conservation programme depends on the active participation of all stakeholders. Sathyabama Institute of Science and Technology has consistently promoted environmental awareness through academic programmes, research, outreach activities, and student engagement.

To further strengthen environmental consciousness, the following initiatives are recommended:

- Organize annual **Water Conservation Week** involving students, faculty, and staff.
- Conduct workshops on sustainable water management and climate resilience.
- Introduce certificate programmes on Integrated Water Resource Management.
- Organize interdepartmental competitions on innovative water-saving technologies.
- Encourage student-led water auditing projects.
- Promote community outreach programmes in nearby villages on rainwater harvesting and groundwater recharge.
- Display water conservation messages at prominent locations across the campus.
- Strengthen Eco Club and NSS activities related to water conservation.
- Conduct regular awareness campaigns on reducing water wastage and responsible water use.
- Encourage research projects addressing emerging challenges in water sustainability.

These activities will promote environmental stewardship while creating a culture of responsible resource utilization among future professionals.

4.3 Institutional Best Practices

The Water Audit identified several noteworthy practices that demonstrate the institution's commitment to sustainable water resource management.

Sustainable Water Supply

- Diversified water procurement through tanker supply and bore wells.
- Adequate raw water and treated water storage facilities.
- Reliable campus-wide water distribution network.

Wastewater Management

- Modern **1.5 MLD Sewage Treatment Plant** based on Sequential Batch Reactor (SBR) technology.
- High percentage of treated wastewater reuse for non-potable applications.
- Effective sludge management and filtration systems.

Water Conservation

- Extensive rainwater harvesting infrastructure.
- Groundwater recharge initiatives.
- Covered water storage tanks minimizing evaporation losses.
- Prompt maintenance of plumbing systems.

Green Campus Integration

- Utilization of treated wastewater for maintaining extensive campus greenery.
- Sustainable irrigation practices.
- Water-efficient landscape management.

Student Engagement

- Student participation in water conservation programmes.
- Environmental awareness campaigns.
- Research projects related to water sustainability.
- Community outreach activities promoting responsible water use.

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These best practices collectively contribute towards improving water efficiency while supporting environmental sustainability.

4.4 Alignment with Sustainable Development Goals (SDGs)

The institution's water management initiatives contribute directly to several United Nations Sustainable Development Goals (SDGs).

Sustainable Development Goal	Institutional Contribution
SDG 4 – Quality Education	Promoting environmental education and water literacy through academic programmes and awareness activities.
SDG 6 – Clean Water and Sanitation	Efficient water management, wastewater treatment, recycling, rainwater harvesting, and groundwater recharge.
SDG 9 – Industry, Innovation and Infrastructure	Adoption of modern wastewater treatment technologies and sustainable water infrastructure.
SDG 11 – Sustainable Cities and Communities	Sustainable campus planning and responsible water resource management.
SDG 12 – Responsible Consumption and Production	Efficient water utilization and circular water management practices.
SDG 13 – Climate Action	Climate-resilient water management through conservation and groundwater recharge.
SDG 15 – Life on Land	Water conservation supporting biodiversity, landscaping, and ecosystem protection.
SDG 17 – Partnerships for the Goals	Collaboration with environmental consultants, researchers, industries, and government agencies for sustainable water management.

4.5 Overall Conclusion

The Water Audit confirms that **Sathyabama Institute of Science and Technology** has established a comprehensive, well-planned, and sustainable water management system that effectively supports the academic, research, residential, healthcare, and administrative functions of the institution.

The audit demonstrates that the University has adopted a holistic approach to water resource management by integrating water procurement, storage, distribution, conservation, wastewater treatment, recycling, and rainwater harvesting into a unified management framework. These initiatives significantly reduce dependence on freshwater resources while enhancing long-term water security and environmental sustainability.

The institution's **1.5 MLD Sewage Treatment Plant**, based on **Sequential Batch Reactor (SBR)** technology, serves as a cornerstone of its water sustainability programme by enabling efficient treatment and reuse of wastewater for landscape irrigation and other non-potable applications. Combined with rainwater harvesting and groundwater recharge initiatives, this reflects the University's commitment to the principles of the circular economy and responsible resource management.

The audit also highlights the active involvement of faculty members, students, administrative staff, and maintenance personnel in implementing water conservation measures and promoting environmental awareness. This collaborative approach has fostered a culture of sustainability across the campus and strengthened the institution's environmental governance.

Overall, Sathyabama Institute of Science and Technology demonstrates exemplary performance in sustainable water management and serves as a model for higher educational institutions seeking to integrate environmental responsibility into campus operations. The recommendations presented in this report provide a practical roadmap for continuous improvement through smart water management, enhanced monitoring, expansion of water conservation initiatives, and adoption of emerging technologies.

By continuing to invest in sustainable infrastructure, stakeholder engagement, and innovative water management practices, the institution is well positioned to achieve higher benchmarks in water efficiency, climate resilience, and environmental stewardship, while contributing meaningfully to national priorities and the United Nations Sustainable Development Goals.

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