ENVIRONMENTAL
AUDIT REPORT (2020-21)

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SREE VIDYANIKETHAN
Engineering College (Autonomous)

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(AUTONOMOUS)

(Affiliated To JNTUA, Ananthapuramu, Approved by AICTE, New Delhi, Accredited by NBA and NAAC 'A')

Sree Sainath Nagar, A. Rangampet, Tirupati, Andhra Pradesh – 517 102

Audit Committee

1.	**Dr. O. Eswara Reddy** Professor, HoD and BOS Chairman Department of Civil Engineering	**Chairman**
2.	**Dr. Hemadri Prasad Raju** Associate Professor Department of Civil Engineering	**Convener**
3.	**Dr. M. Sujatha** Professor & Head Department of EEE	**Member**
4.	**Dr. N. M. G. Kumar** Professor Department of EEE	**Member**
5.	**Dr. M. M. Kesavulu** Associate Professor Department of BS & H	**Member**
6.	**Mr. Ch. Umamaheswara Rao** Senior Administrative Officer SVEC	**Member**

Preface

The environment gives us countless benefits that we can't repay our entire life. The forest and trees filter the air and absorb harmful gases. Plants purify water, reduce the chances of flood, and maintain natural balance and many others. The good quality environment is the basis for the life existence on the earth which has been undermined for the past few decades due to enormous increase in pollution levels. The adverse effects due to it had been experiencing through many incidents such as increase in air pollution and water pollution related deaths. Local and Global environmental issues are throwing challenges to people who had long been causing damage to the environment on which we depend for our survival and growth. Even today many are not aware of environmental issues around us. Maximum awareness has been tried to bring among the people to safeguard environment.

Sree Vidyanikethan Engineering College, in its pursuit for improving environmental quality and to maintain a pristine environment for the all stake holders and the future generation of students, has made a self-inquiry on environmental quality of the campus with the following objectives: (i) To focus on different types of waste generation and its handling; (ii) To understand the current practices of waste management, reuse of wastewater, water and energy conservation methods, transportation, etc; (iii) To promote environmental awareness through participatory auditing process; and (iv) To create a report that document baseline data of good practices and provide future strategies and action plans towards improving environmental quality for future.

This report is compiled by an environmental audit committee constituted by IQAC. The measurement of quality was entrusted with the Department of Civil Engineering. The committee has made short term and long term suggestions to take environmental protection to higher levels and it is hoped that this will receive due attention of SVEC authorities and also all stake-holders.

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ENVIRONMENTAL AUDIT

Objective: To observe the environmental quality and effective working of environmental management systems such as Water storage, treatment and usage, Wastewater treatment and reuse, Solid waste management etc., and to suggest best available methods to improve its efficiency.

The 'Environmental Audit' provides insights into the existing status of handling of both solid and liquid wastes, and also hazardous and non-hazardous wastes. It includes the different types of wastes produced in the campus from various activities such as domestic activities, cleaning of floors in class rooms and staff rooms, toilets and other areas and sanitisation of desks and tables and chairs in all class rooms and staff rooms during the COVID time. Suggestions are provided to improve environmental quality and recommendations as per the 'Environmental Policy' of the institute to be suggested to improve the best practices in the campus is described in the Environmental Management Plan.

1. **Solid Waste Audit:** This indicator addresses the solid waste production and disposal method for various types of wastes: Fallen leaves, grass and plant cuttings and bush trimmings, paper waste, plastic waste, construction waste, glass waste, kitchen and food wastes, dust etc.

2. **Energy Audit**: This indicator addresses energy sources and consumption, energy monitoring, and energy conservation for lighting, appliances, equipment, cooking and vehicles.

3. **Water Audit:** This indicator addresses water sources, rainwater harvesting, treatment and consumption including watering of trees, gardens, lawns and parks in the landscape.

4. **Wastewater Audit:** This indicator addresses wastewater generation, treatment and management including reuse of treated wastewater for trees, gardens, lawns and parks in the landscape and storm water management.

5. **Hazardous Waste Audit:**

    A. **Chemical Waste:** This indicator addresses hazardous waste from laboratories, medical waste, art supplies, colours, dies, oils used for DG sets and chemicals used in the laboratories, campus toilets cleaning and maintenance.

B. **E-Waste:** This indicator addresses the management of discarded electronic components including computer monitors, printers, SMPS and UPS batteries, multi-media systems, etc.

C. **Bio-medical Waste:** This indicator addresses the management of used syringes, cotton, outdated medicines etc.

6. **Air Quality Audit:** Air quality in the academic institute is very imperative parameter for health of all the stakeholders like students, faculty and staff of the institute. This indicator addresses the air pollution sources and disbursement, pollen grains, natural dust, vehicular emissions, generators, fires and laboratory fumes, etc.

7. **Noise Environment Audit:** This indicator addresses the noise levels from DG sets, Vehicular movements, Lab and other construction Equipment etc.

8. **Environmental Management Plan:** It provides strength, weaknesses and suggestions on the environmental management systems of Sree Vidyanikethan Engineering College campus. It also suggests about which area is to be given priority and how to implement the same.

The audit committee visited various facilities and recorded the available data in the campus on 28-07-2021 from 9 A.M. to 5 P.M. and interacted with the respective in-charges for managing water and wastewater, solid waste, hazardous waste (chemical and biomedical), energy, greenery waste, noise and air quality. The committee has looked into different aspects of environmental issues and came out with the following findings and suggestions for further improvement.

Findings and Recommendations:

1. Solid Waste

Garden Waste:

Fallen leaves, grass and plant cuttings and bush trimmings (Figures 1a. and 1b.) are produced on an average 400 kg per month (about 15 kg per day) from the SVEC campus, V-Hostel and Ladies Hostel campuses. It is sent to dairy farm for shredding, drying and composting along with the cow dung and kitchen waste.

Vegetable and Food Waste:

Vegetable and food waste is generated in canteens and messes on an average 9000 kg per month (about 300 kg per day). Food waste about 200 kg is sent to piggery farms on daily basis and the remaining 100 kg per day which is mostly vegetable waste is sent to dairy farm for composting (Figure 1c. and 1d.).

Figure 1a. Garden Waste Storage

1b. Grass Cutting Waste

Figure 1c. Canteen Waste Segregation

Figure 1d. Composting Pits

Recommendations:

Garden and Food Waste may be alternatively used for generation of biogas and the biogas can be used for cooking and heating purposes. About 20 to 22.5 kg biogas (equivalent to one and half LPG cylinder capacity) can be produced from 200 kg food waste generated every day. Garden waste can be continued to produce manure by composting process along with the cow dung.

Construction and Demolition Waste:

Construction and demolition waste (Figure 2) in the form of broken bricks, dismantled walls and concrete is generated about 4000 kg

per month on an average. It is dumped at low lying areas in the premises back yard and levelled and compacted.

Figure 2: Construction And Demolition Waste Utilization at Low Lying Area to provide Elevated Path to the Power House Building and Toilet Facility

Recommendations:

Waste materials generated such as iron rods, flats of different sections from the construction and demolition activities may firstly be reused in repairing and making new items for various requirements and finally left out materials may be sold for recycling.

Miscellaneous Waste:

Recyclable materials such as plastics, glass, wood, steel, tin cans, paper and cardboards are generated around 12000 kg per year (1000 kg per month) from academic activities such as classrooms and offices. They are segregated under dry condition and useful parts of them are utilized (Figure 3) for reuse within the campus for various works and the remaining are disposed to local vendors once in a while for recycling.

Figure 3: Sign Boards Made Up of Discarded Metal Cuttings

Adequate numbers of plastic dustbins in each class room and staff rooms (Figure 4); metallic dustbins (having two cylinders of blue and light yellow colour for disposal of non recyclable and recyclable materials respectively (Figure 5) in every floor of the building and in all the buildings and along the road sides at junctions and important locations are provided. The frequency of solid waste collection is twice in a week. Single use plastics in the campus banned and proper disposal of plastic generated from different sources makes the campus plastic free. E-Administration is followed through an ERP system eradicating paper usage in all the functions of institute.

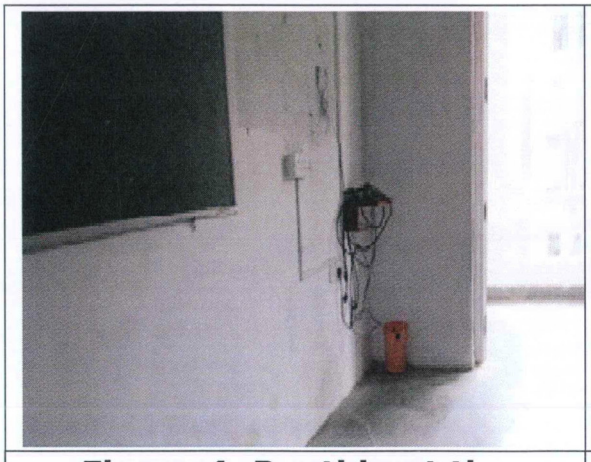

Figure 4: Dustbin at the corner of classroom

Figure 5: Dustbin at corridor which has two bins - one for recyclables and other one non-recyclable material

Recommendations:
Old and broken tables, desks and benches from class rooms and office rooms are firstly reused in repairing and making new items for various requirements and finally left out materials may be sold for recycling.

2. Energy:

Andhra Pradesh State Electricity Board has been supplying electrical power through its grid. During non supply hours or grid failure, the institute utilizes 4 DG sets of capacity 250 KVA, 82 KVA, 40 KVA and 50 KVA to meet the emergency power requirements for class rooms, labs and computer centre and library.

However, in the recent past to save power, LED bulbs were used for newly constructed buildings and some of the incandescent and fluorescent tube lights are replaced with LED bulbs in the existing buildings as and when they get fused. Majority of the class rooms, laboratories, administrative blocks, computer centers, libraries, seminar halls and staff rooms were provided with LED lighting system for saving power and to be energy efficient. Presently, the power consumption through lighting system about 55 percentage is met by LED bulbs. Green construction materials and construction practices have been used in the construction of college infrastructure.

The Solar Power Plant of Capacity 500 KVA has been installed and it meets about 50% of the power demand by the institute.

Recommendations:
In future, it is suggested that **all bulbs** may be replaced with **LED bulbs** to save power further.

3. Water:

About 2,70,000 liters of water per day is used for domestic purpose such as drinking, cooking, washing, bathing, cleaning, flushing of urinals and toilets.

The ground water available in the campus contains hardness more than the drinking water standards (IS10500:2012). The institute has five RO systems at SVEC campus (0.5kL/hr, 1kL/hr, 2kL/hr – 2 No. and 3kL/hr – 1 No.) and they are usually operated during morning (4 am to 9 am) and evening (6 pm to 10 pm). RO treated

water is used about 20,000 litres per day, supplied to all blocks through integrated pipeline system to water coolers in the SVEC campus. The RO reject water about 10,000 litres are being used for gardens along with the fresh water.

Manual alert system is provided to check overflow of water tanks. The water works man always keep track on the water tanks.

4. Wastewater:

Wastewater is produced from the wash rooms, toilets of all buildings and canteens. The total quantity of wastewater generated is about 2,00,000 litres per day. This wastewater (sewage) is collected in the respective septic tanks provided at the each block. Each septic tank has two chambers and after settling of sludge in the first chamber the clarified effluent goes to second chamber from which it is pumped to tanker and used for gardens. Some water is absorbed in the ground and helps in ground water recharge. Also, three sewage treatment plants (150 KLD at Girls Hostel, 200 KLD at Boys Hostel and a new Sewage Treatment Plant (STP – 250 KLD) installed at V Block are being used for the sewage treatment. The clarified wastewater which has partial treatment in the septic tank and the wastewater treated through STP is pumped into tractor tankers and reused for trees, gardens and lawns (Figure 6).

Campus is sufficiently equipped with sustainable rain water harvesting systems such as rainwater harvesting percolation pits (Figure 7), pond (Figure 8) and sumps are well constructed at appropriate locations and maintained to store rainwater and recharge groundwater through a well connected drainage network designed for collecting rainwater runoff from roof tops and open areas to percolation pits and pond in the campus premises. The stored rainwater is mainly used for gardening and construction. Further, most of the internal pavements and open spaces are laid with porous/permeable concrete paver tiles separated by joints so that the rainwater is allowed to infiltrate into the ground thereby increasing the ground water table. Landscape is maintained such that each and every drop of rainwater is collected and drained into rainwater harvesting systems. Drains are always kept clean.

Figure 6: Watering bushes and plants using clarified septic tank water by filling the tanker

Figure 7: Rain Water Harvesting Pit near Fasak Canteen

Figure 8: Rain Water Harvesting Pond at Main Entrance Gate

Recommendations:
Further, rain water harvesting can be improved by dividing into number of zones after thorough contour survey. Few more percolation pits may be constructed for groundwater recharge after topographical reassessment and rain water storage tanks also may be constructed for consumption in domestic activities and for gardens.

5. Hazardous Waste:

A. Chemical Waste:

Chemicals used in laboratories are in very trace quantity which gets diluted when washed the used glassware items like measuring jars, beakers, conical flasks, burettes and pipettes. It goes to septic tanks and from there to sewage treatment plant for treatment.

Hazardous waste in the form of 1) spent batteries, 2) Waste oils from buses/vans and DG sets is generated which is approximately 200 kg per month on an average. This is sold to authorized dealers. Waste from DG sets is majorly used for smothering of iron sheets for formwork of construction.

Recommendations:
Secured Landfill Pit is constructed at slightly higher level at the isolated place by digging pit of size 0.6 m x 1.2 m x 0.9 m with

plastic layer at the bottom of the pit and after each dump of waste a 0.1 m layer of earth is to be filled and at the top it has to have cover (lid like) until it is fully filled. Then it has to be fully covered with 0.3 m thick earth and grass may be grown on top of it.

B. E-Waste:

An e-waste in the form of discarded electronic components including computers, keyboards, printers, UPS batteries, multi-media systems, etc. is generated on an average of 400 kg per year (about 35 to 40 kg per month).

Figure 9: Electronic Waste Storage

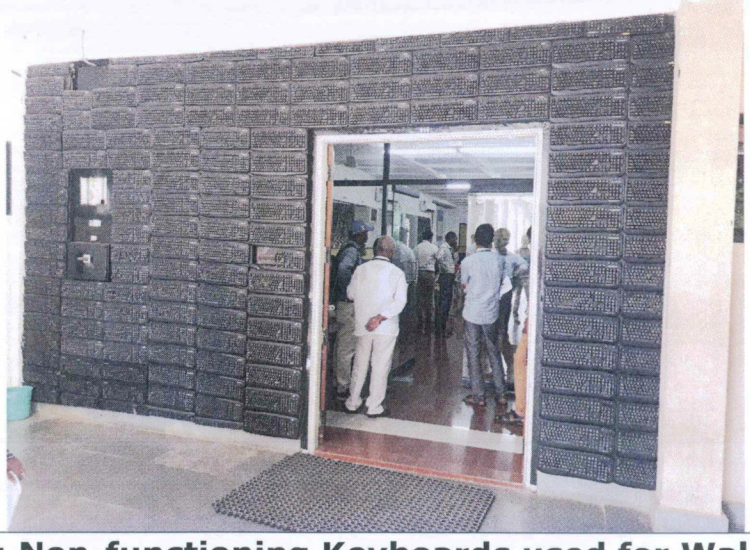

Figure 10: Non-functioning Keyboards used for Wall Cladding as Decoration

The e-waste is safely stored in the designated area (Figure 9) and some of the working components are used for repairing of computers and some other usefulness like decorative purpose (for example keyboards as wall cladding – Figure 10). The remaining waste is given to vendors for recovery, recycling and disposal purpose.

Recommendations:
E-waste being stored may further be used for recovery and reuse of various components in the repair and assembly of new computers and it may be given to the needy at low cost or free of cost.

C. Bio-medical Waste:

Biomedical waste includes used cotton and discarded syringes, saline bottles and tubes, expired medicines and tablet covers. Biomedical waste is generated very meagerly on an average of 0.5 kg per week and it is stored safely and given to gram panchayat for safe disposal.

6. Air Quality:

The air quality is normal in the college premises, and it has dust free environment. During construction it is seen that the surroundings are watered. No fumes from any laboratory process are generated. In the workshop, from the welding and lathe operations are time bound, localized and precautions are taken by using safety equipment.

Further, Campus is maintained emission free by using bicycles, battery cars within the campus and walking is encouraged by providing the vehicles parking at entrance itself and the motorized vehicles are not permitted (Figure 11) on the roads within the campus. Roads are laid and well maintained with greenery on both sides and proper rainwater drains to attract pedestrians to walkover. Further, college runs buses both for faculty, non teaching staff and students to encourage public transport. Faculty and staff follow car pooling and bike pooling to reduce carbon footprints.

In the engineering workshops, the staff members and students must use masks as a protective measure for avoiding inhalation of dust laden air.

Figure 11: Sign Board display with "NO VEHICLE ENTRY"

7. Noise Environment:

The institute though located nearby the highway NH205, the class rooms in various buildings is constructed 200 m away from the campus road-side wall to avoid noise pollution from vehicles passing on the highway. The DG sets are provided with silencers and away from the class room buildings (Figure 12) and hence there is noise free environment in the campus.

Figure 12: DG Sets with Silencers to avoid Higher Noise Production

In engineering workshops the staff members and students must use ear-plugs and goggles as protective measure for prevention of hearing loss and eye injuries.

8. Environmental Management Plan:

Based on the findings, the following holistic suggestions on the environmental management of Sree Vidyanikethan Engineering College campus are recommended.

- Solid waste component of grass and bush cuttings and fallen leaves and kitchen waste shall be composted in composting pits instead of composting on surface. The number of composting pits 3 Nos. of size each 6.0 m x 1.0 m x 1.0 m to accommodate the waste and converting it into organic manure. The organic manure can be used as bio-fertilizer for plants and trees in the campus.
- Number of sensor based ***water conservation*** systems can be increased.
- Number of sensor based **energy conservation** systems can be increased.

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