



# SCMS SCHOOL OF ENGINEERING & TECHNOLOGY

VIDYA NAGAR, KARUKUTTY, ERNAKULAM – 683576, PHONE: 0484-2882900, 2450330

E-Mail: [sset@scmsgroup.org](mailto:sset@scmsgroup.org) Website: [www.scmsgroup.org/sset](http://www.scmsgroup.org/sset)

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## **7.1.2\_2 The Institution has facilities and initiatives for management of the various types of degradable and non-degradable waste.**

### **WASTE WATER MANAGEMENT**

#### **Wastewater sources**

One administrative block, two academic blocks, five laboratory blocks, one canteen, two hostels and one auditorium is present in the campus. The toilets, washbasins and urinals of two academic blocks, various laboratories, two hostels and the wastewater from cooking, dishwashing etc. from the canteen are the major wastewater sources of ETP. The wastewater generated from the administrative block alone is treated using a separate septic tank.

#### **Waste water collection network**

The waste water collection network shows the path flow of the waste water from the various blocks into the Effluent Treatment Plant. The sullage from canteen is passed through an oil trap and is then collected in a collection tank. The sewage from academic block- I, academic block- II, ladies hostel and junior men's hostel is also collected in the collection tank, from where it is sent to the ETP. The sewage from administrative block alone is treated by a separate septic tank.

#### **Waste water treatment facility**

The ETP in the campus incorporates various treatment units that can be adopted in the treatment of waste water. It includes the tertiary treatment of sewage using Reverse Osmosis and UV sterilization unit, so that other than irrigation purposes the treated wastewater can be used for drinking purposes. A process diagram of the effluent treatment plant in the campus is shown in figure 1.1. The effluent treatment plant in SSET campus consists of the following units:

- Screen and Oil Trap (OT)
- Septic Tank
- Two staged anaerobic filter
- Moving bed bio-film reactor (MBBR)
- Secondary clarifier
- Disinfection Tank (DT)
- Pressure sand filter (PSF), Activated carbon filter (ACF)
- Reverse Osmosis unit (RO)
- UV sterilization unit



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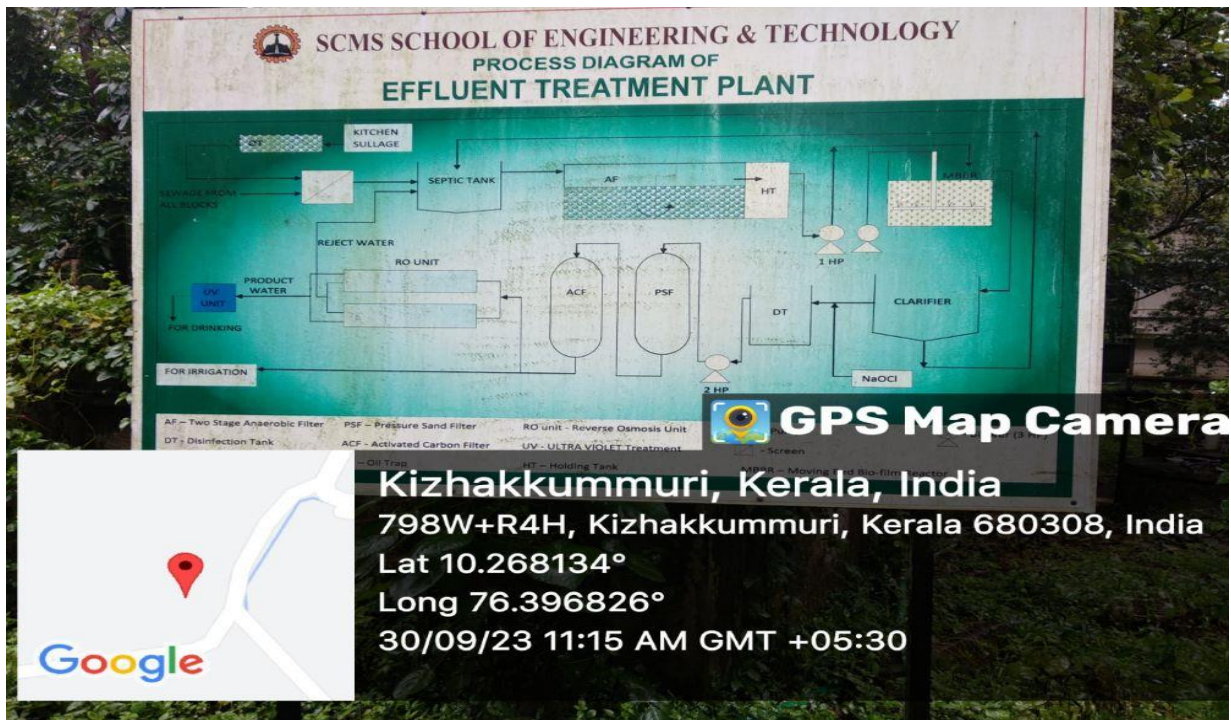
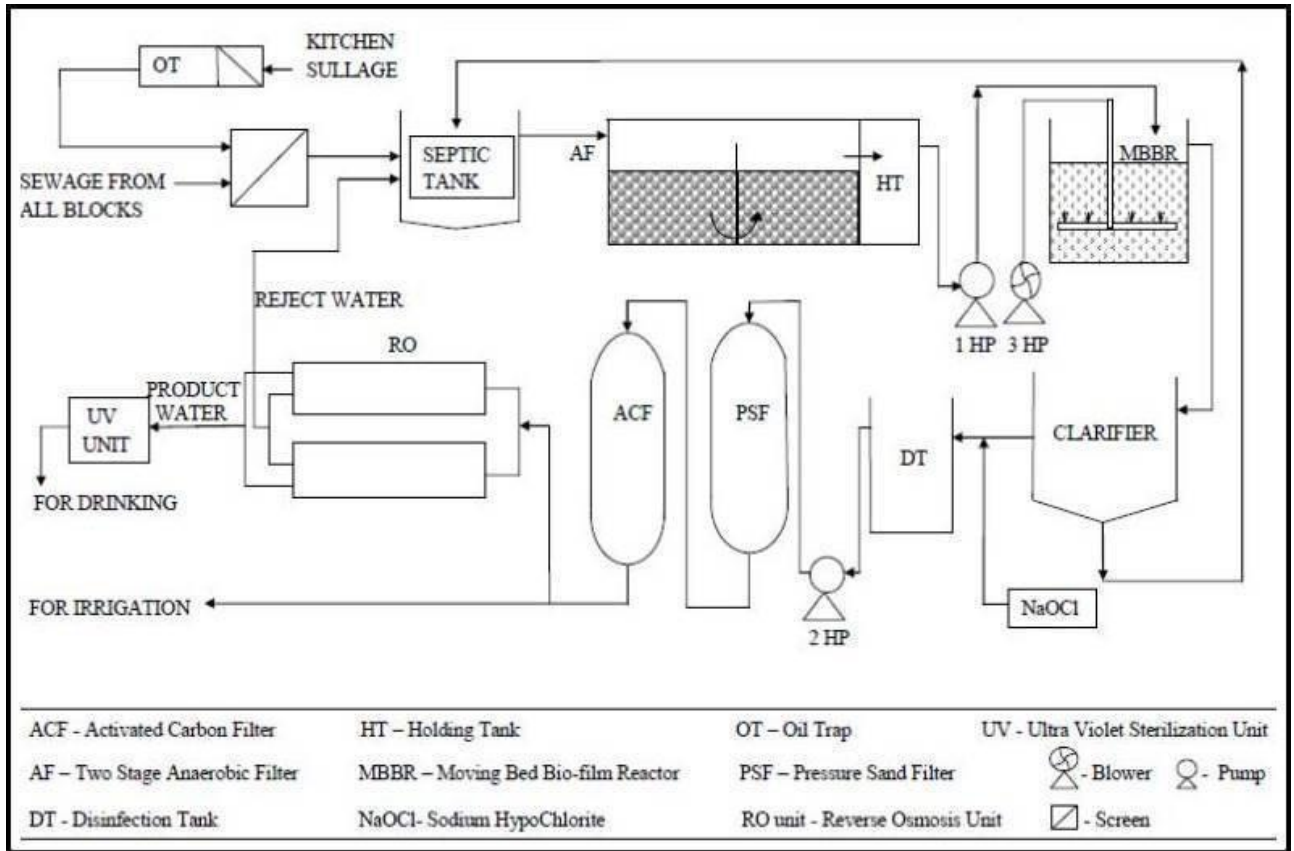


Figure 1.1 Process diagram of ETP at SSET campus



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**Figure 1.2 Reverse Osmosis unit in ETP of SSET campus**



**Figure 1.3 Green audit team inspecting the clarifier of ETP**



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**Table 1.1 Characteristics of influent and effluent of ETP, SSET campus**

Parameter	Influent of STP	Outlet of STP	Standard (Environmental Protection) Rules, 1986	Standard BIS (ISI)
pH	6.6	6.9	5.5 - 9.0	5.5 - 9.0
Temperature (°C)	27.7	27.6	NA	NA
TDS (mg/l)	605	404	NA	2100
Suspended Solids (mg/l)	190	20	200	NA
Free Chlorine (mg/l)	0	0.7	NA	NA
Oil & Grease (mg/l)	51.5	0	10	30
COD (mg/l)	352	70	NA	NA
BOD <sub>5</sub> at 20°C (mg/l)	205	30	100	500
Sulphate (mg/l)	12.3	4	NA	1000
Phosphate (mg/l)	33	5.7	NA	NA

## SOLID WASTE MANAGEMENT

### 1. Scope of Waste

Waste audit encompasses the entire spectrum of waste collection, segregation, reuse, recycle, incineration and landfill. Appropriate suggestions and justifications would be put forth to improve the efficiency of the system as a whole.

### 2. Waste Generation in the Campus

Waste generated in the campus varies from paper, plastic, cloth, glass, food and sanitary items. Their sources include academic blocks, hostels, office, canteen and kitchen. The waste that is generated from all these sources if not handled properly may pose a serious health and environmental hazards. The wastes generated from various activities in the campus are mentioned below.



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- **Canteen**

Food waste of 200 kg and vegetable waste of around 30 kg are generated daily from the canteen which are taken to a nearby pig farm. Other wastes including paper, plastic (milk cover = 90 nos., curd cover = 30 nos., masala cover = 15 nos.) and special wastes of 5 kg is generated per day within the canteen.

- **Administrative block and Academic blocks**

Rubbish of about 6 kg is collected daily and burnt in garbage burner. Mixed paper wastes including answer sheets, question papers, newspapers, magazines, office papers, used notebooks etc. is generated @ 4.5 ton per year. Mixed paper wastes are sent to SCMS Muttom campus, from where it is taken by Plan@earth for recycling.

- **Hostels**

Wastes including paper, plastic, sanitary items, bags etc. weighing around 10 kg are daily collected and burnt in the garbage burner. Plastic bottles are also taken by Plan @ Earth for recycling.

- **E-Waste**

E-waste generated in the campus, which is around 500 kg has been stored in a room in Academic block - I.

- a. Methodology**

SSET campus includes an Administrative block of 6 floors, Academic block-I of 3 floors, Academic block-II of 4 floors, engineering laboratories and workshops, ladies' hostel of 3 floors, junior boys' hostel of 3 floors and a full time working canteen which provides food for around 1000 people at a time. To evaluate the trends of waste generation and waste management techniques adopted at campus, interviews were conducted with the cleaning staff, administrative officers and students. The amount of waste generated, major sources of waste and frequency of waste collection were enquired from the cleaning staff. The details about the sources of waste generation in the campus are shown in Table 1.2.



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**Table 1.2 Sources of wastes**

Sl. No.	Source	Types
1	Hostels	Paper, plastics, cloth, electronic items, leather, rubber, sanitary.
2	Academic Areas	Paper, plastic, electronic items, sanitary items, food
3	Canteen	Food, vegetable wastes, plastics, paper, gunny bags
4	Office	Paper, plastic
5	Labs	Concrete blocks, electronic items, paper

**Table 1.3 Frequency of Waste Collection from Various Sources**

Sl. No.	Source	Frequency of Collection
1	Academic Blocks	Once a day
2	Hostels	Once a day
3	Canteen	Twice a day
4	Road Side Dustbins	Once a week

**Table 1.4 Daily Waste Generated**

Sl. No.	Waste Type	Weight (Kg Per day)	Percentage by Weight
1	Food waste, Kitchen wastes	235	89.1
2	Newspaper/mixed papers	9.5	3.7
3	Rubbish (Paper waste, Plastic etc)	19	7.2
4	E-waste	0.25 (90 kg per annum)	0.0009
	<b>Total</b>	<b>263.75</b>	<b>100</b>



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## WASTE GENERATION STATUS OF THE CAMPUS

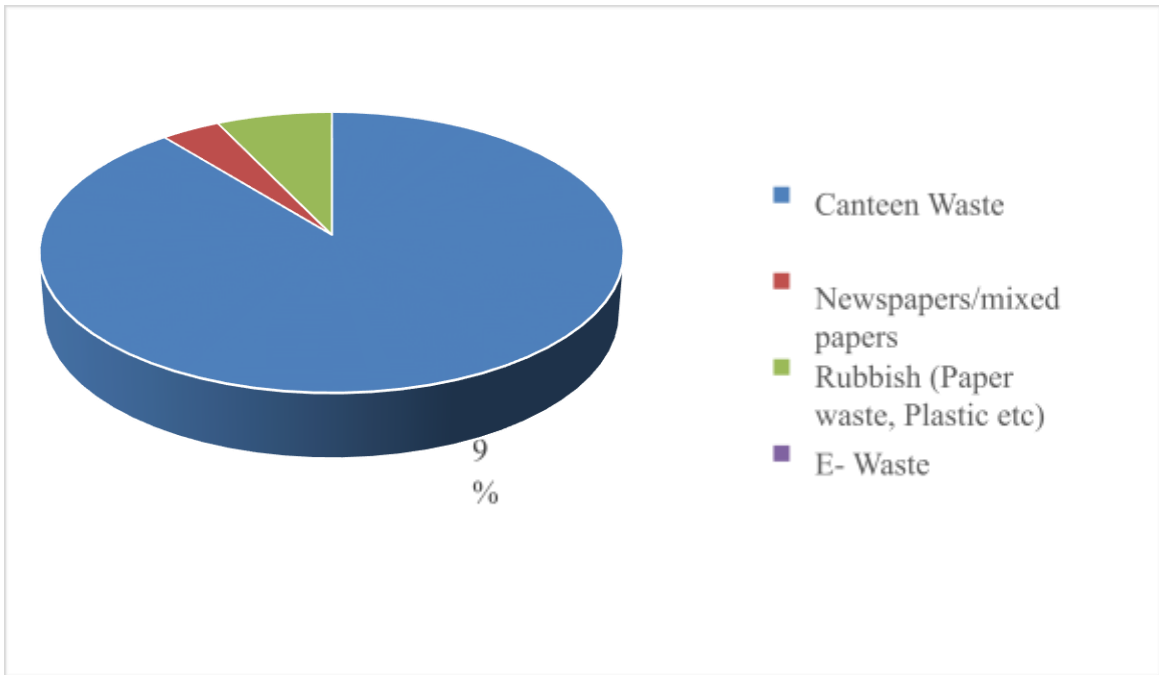


Figure 1.4. Percentage by weight of yearly waste generated

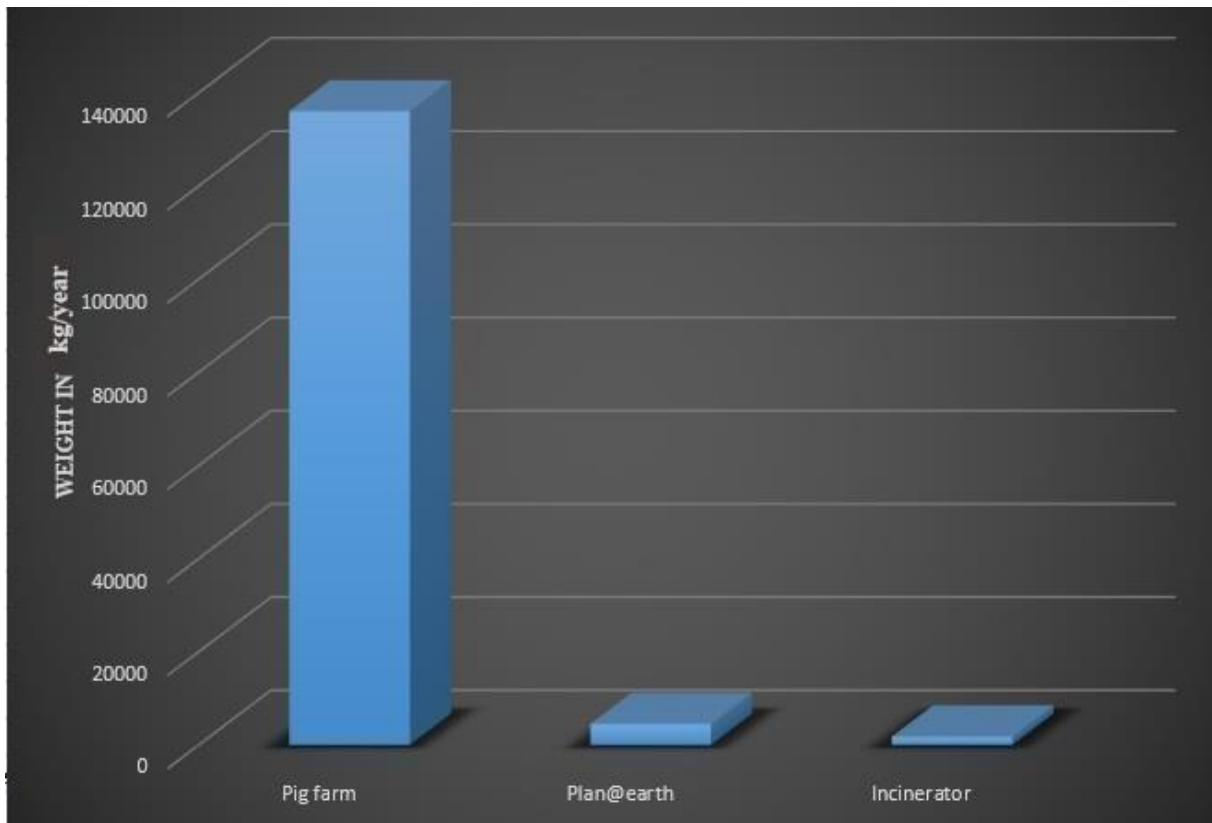


Figure 1.5 Waste disposal trend at SSET campus



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The SSET, Karukutty campus serves as a living laboratory of sustainable practices by integrating academia, student life and campus operations, researching new solutions through campus practices for sustainable waste management. Students have played a vital role in encouraging environmental consideration in every functional facet of the institution. An efficient management of waste starts with regular collection of waste generated. This task has been made easier by placement of dustbins at appropriate places. Dustbins are placed at canteens, each corridor of all the buildings, roadsides, etc. Covered dustbins are used in order to prevent breeding of infectious vectors. The plastic bottles from the hostels, canteen and campus are sorted by the workers which is further collected by plan @ Earth for recycling. Campus wastes dominantly paper, plastic, thermocole, sanitary, ceramic, etc. which cannot be reused nor recycled and other combustible wastes from each building are collected by the cleaning staffs of the campus which is later on burnt in the garbage burner each day.

The SSET, Karukutty campus is now making a conscious effort to establish the campus as a **'zero waste'** zone, through a slew of scientific and environment-friendly measures. A number of initiatives have been put in place to promote the concept of **'reduce, reuse and recycle'** and contribute mite to protecting the environment.

## A) Management of Paper Waste

Papers are segregated based on the following basic paper grade categories:

- Magazines
- Mixed Paper
- Old
- Newspapers
- Carton

Mixed paper is a broad category that often includes items such as discarded mail, telephone books, paperboard and catalogues. High grade deinked paper is made of high grade paper such as letterhead, copier paper, envelopes, and printer and convertor scrap that has gone through the printing process. One-sided used papers are collected and sent back to offices, dispensaries, provisional stores, etc. for reuse as scratch pads. Double-sided used papers are collected, accumulated and sold for recycling by Plan @ Earth.





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### B) Management of Food Waste.

Food wastes and all other organic wastes from canteen are taken daily to a pig farm located at Idukki. The amount of organic matter being retained at the campus is nil.



**Figure 1.6 Tank for removing sediments and floating matter from canteen waste water before reaching ETP**

### C) Management of Combustible Waste

A garbage burner of capacity 150 kg is installed at the campus in which the combustible wastes like paper, plastic, wrappers, gunny bags, paper bags, clothes, sanitary waste etc are burnt daily. The ashes and residues from the garbage burner are removed once in a month which is used for gardening. No fuel is used for burning the waste.



**Figure 1.7 Garbage burner at SSET, Karukutty**



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**Figure 1.8 Green audit team inspecting garbage burner**

## **D) Management of Recyclable Waste**

Wastes including newspapers, magazines, cartons, mixed papers and plastic bottles and are collected by Plan @ Earth periodically for recycling. E-wastes from the campus like cabinets, monitors, keyboards, mouse, motherboard, hard discs, switch ports, UPS, CDs, SMPS, LCD projectors, printers, battery etc are presently stored in a room in Academic Block – I.

## **E) Separate collection bins for food, paper and plastics wastes in the campus**





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