7.1.3. Describe the facilities in the Institution for the management of the following types of degradable and non-degradable wastes

This indicator addresses management of waste from college and hostel canteen, paper waste, hazardous wastes from laboratories and worn-out electric & electronic goods, and plastic wastes. Hazardous materials represent significant risks to human health and ecological integrity. Hazardous wastes are also leached out through the e-waste generated in the campus. They often persist in the environment leaving a legacy of land and water contamination for generations. They also accumulate in the tissues of organisms and become concentrated within food chains, leading to cancer, endocrine disruption, birth defects, and other tragedies. The minimization, safe handling, and ultimate elimination of these materials are essential to the long-term health of the planet.

1. **Solid waste management**

The main producer of Solid waste in campus includes canteen waste, hostel kitchen waste, and Institutional waste. The solid waste generated in the institution will be waste papers, answer sheets and domestic waste like kitchen waste. The institution makes necessary arrangements for disposal of solid waste. The Institution implements solid waste management by enforcing the waste segregation rules. Dustbins are placed in every classroom, laboratory, rest rooms, and mess at different locations in the campus. The bins are as follows:

1. The Green-colored dustbins are meant for wet and biodegradable wastes. For Ex: Kitchen wastes including vegetables and fruits skins.
2. The Blue dustbins are meant for disposal of plastic wrappers and non-biodegradable wastes.
3. Yellow dustbins are meant for papers and glass bottles.
4. Red bin are meant to segregate domestic hazardous waste, which consists of bio-medical waste like cotton bandage or anything with human fluids.

Sweepers are allotted to each floor who manages all the waste generated in the campus. All waste/garbage from college and hostel is segregated at source and disposed of in a proper

manner. The wet waste from the hostels/canteen is given away to Bio gas plant. Wastes like newspapers and stationary is sold to proper recycling agencies/vendors.

Photo.1: Waste segregation system

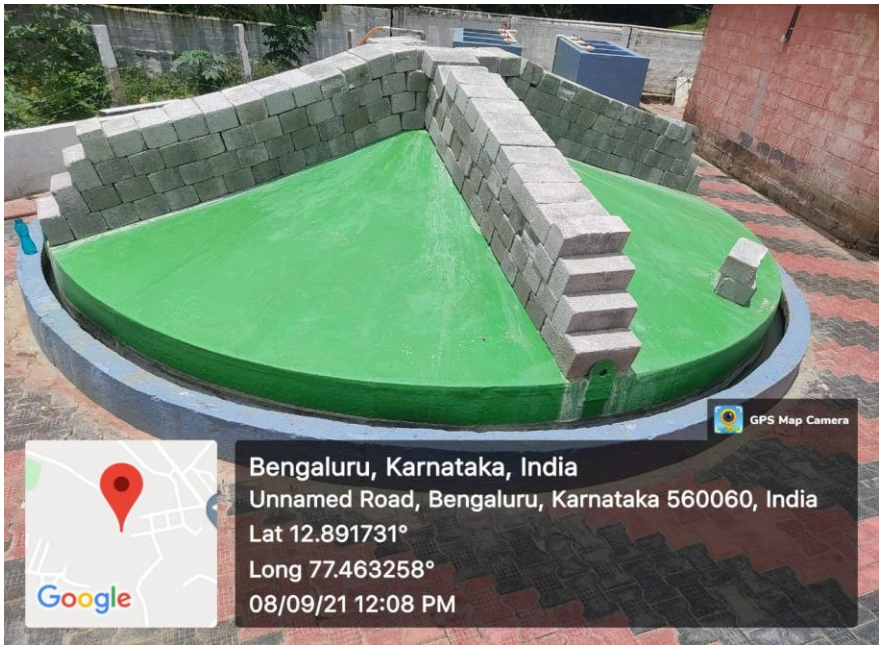


Photo.2: Centralized Bio-gas plant at RajaRajeswari Medical College and Hospital (RRMCH)

Table.1: Specifications of Bio gas plant

Sl. No.	Specifications	Descriptions
1	Type of digester	Floating drum
2	Diameter of digester	5.5 m
3	Depth of Digester	2.75 m
4	Material of floating gas holder	Steel with FRP coating
5	Digester Capacity	70-80 m^3 / day

Amount of Biogas produced using bio gas plant

Number of students in boys hostel=130

Number of students in boys hostel=130

Walk through students in the college campus= 3000

Number of teaching staff and supporting staff in the campus=200

Average amount of wet waste collecting per day= 65 kg / day

Amount of Gas produced in the digester= 14 m^3 / day

Amount of gas equivalent to LPG Gas = 1/3 of domestic LPG cylinder

Application of Biogas produced=Gas produced is supplied to bio gas stove for cooking.

2. Liquid waste management

One sewage treatment plant of capacity 100 KLD for the treatment of waste waters originating from the both RajaRajeswari College of Engineering and RajaRajeswari Dental College and Hospital is in operation in the premises of RajaRajeswari Dental College and Hospital a sister concern organization and is located at a lower level. This STP facility primarily treats the waste waters generating from RRCE, RRDCH and hostel. Generally the STP is operated at 80% capacity levels and depending upon semester breaks the influent fluctuations are accordingly smoothened. On an average 70 KLD of treated waste water is available for its reuse. Biologically treated waste water is disinfected using liquid chlorine prior to its pumping for the uses. As per KSPCB stipulations, the treated waste waters are reused within the campus as out lined in the following paragraphs. The Institution follows the systematic procedure for proper management and disposal of liquid waste.

The waste water is collected from college and hostels and then discharged into the under drainage system leading to STP. It is treated along with other waste waters arising from Dental college and hospital. The treatment scheme comprises of a biological treatment called ASP (Activated Sludge Process) system wherein the aerobic bacteria stabilizes all the organic matter and also neutralizes the microbial population. The STP has been performing smoothly and deliver effluents with BOD values below 10 mg/l. The aerobic treatment followed by disinfection results in microbe concentration below 100 units as stipulated in the consent. Likewise all other listed parameters are also complied with. Analysis reports are regularly forwarded to the KSPCB.

Photo.3: Sewage Treatment Plant of 100 KLD in operation at RajaRajeswari Dental College and Hospital (RRDCH)

WATER REUSE PLAN

The total water requirement for the institution is 55 KLD. Borewell and rain water are being used in the campus. A total of 18,463 sq m Green zone has been developed with short, medium and tall trees along with other horticultural development and vacant areas in the campus. This also requires regular watering for the survival. Through the hydrant systems network, the treated water is pumped from the STP to utilize for the following purposes.

The treated waste water from STP is utilized for the following purposes:

i) Gardening and maintaining greenery within the campus.

ii) Secondary flushing in toilets in the hostel buildings.

iii) Buses and other vehicles washing within the campus.

iv) Kitchen gardening near boy's hostel

v) Cleaning of paved surfaces

vi) Cleaning of solar water heating collector panels

Table.2: Total requirement of water

Sl. No.	Total requirement of water	
1	Fresh	80 KLD
2	Recycled	20 KLD
3	Total	100 KLD
4	Source of water	Bore well and Rainwater
5	Whether canteen facility provided for day students etc.	Yes
6	Waste water generation in KLD	100 KLD
7	STP capacity	100 KLD (Located in the premises of RajaRajeswari Dental College and Hospital)
8	Technology employed for Treatment and mode of disposal of treated sewage	Activated Sludge Process
9	Scheme of disposal of excess treated water if any	Gardening, Lawns, Toilet and Flush out
10	No. of ponds, wells, taps, toilets, waterless urinal	500 Taps 32 Toilets
11	No. and capacity of water tanks for storage 3 number	Each 40,000 litres storage capacity

i) **Gardening and maintaining greenery within the campus**

Institute maintains greenery within campus measuring as large as 4,450 sq m is provided with small gardening plants, trees that are maintained round the year on top priority. Since these plants have small and shallow roots the water demand is also high, so frequent watering is required to ensure survival of the plants. In general a total of 35 KLD is required on any non monsoon day.

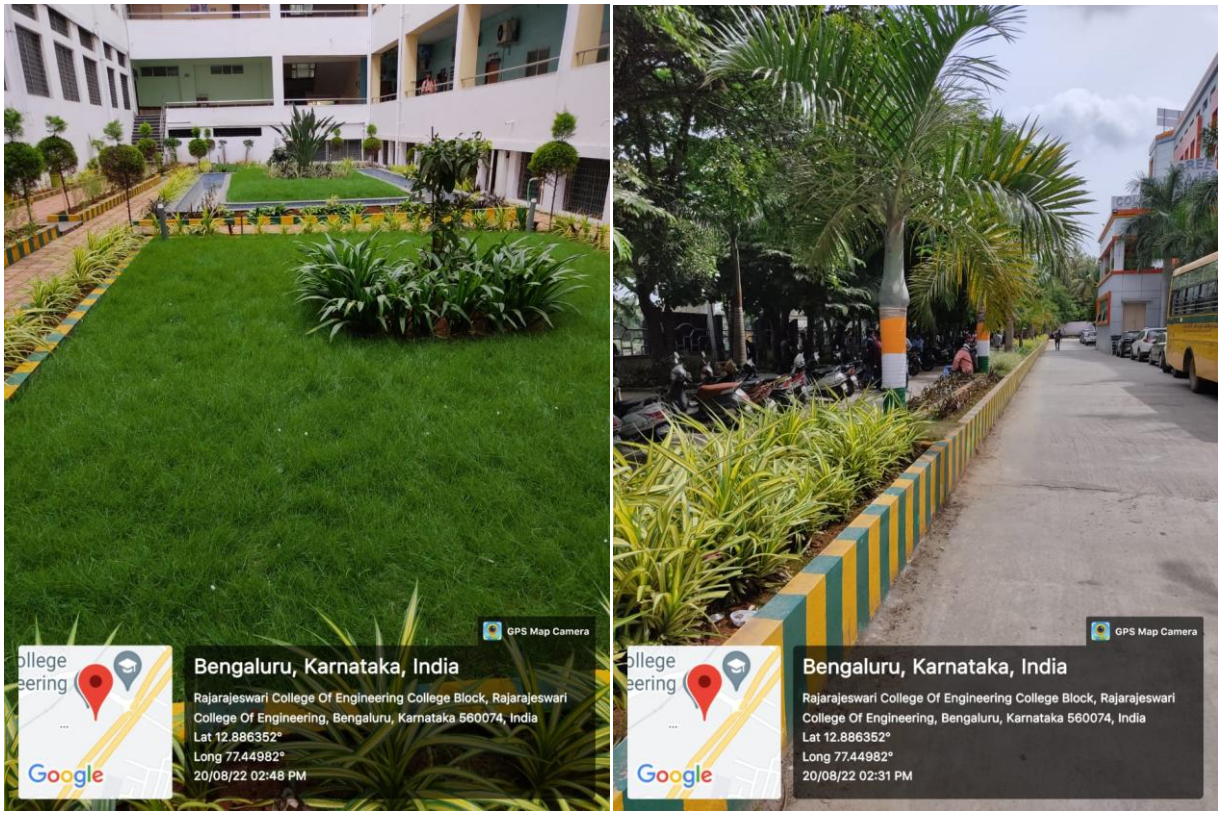
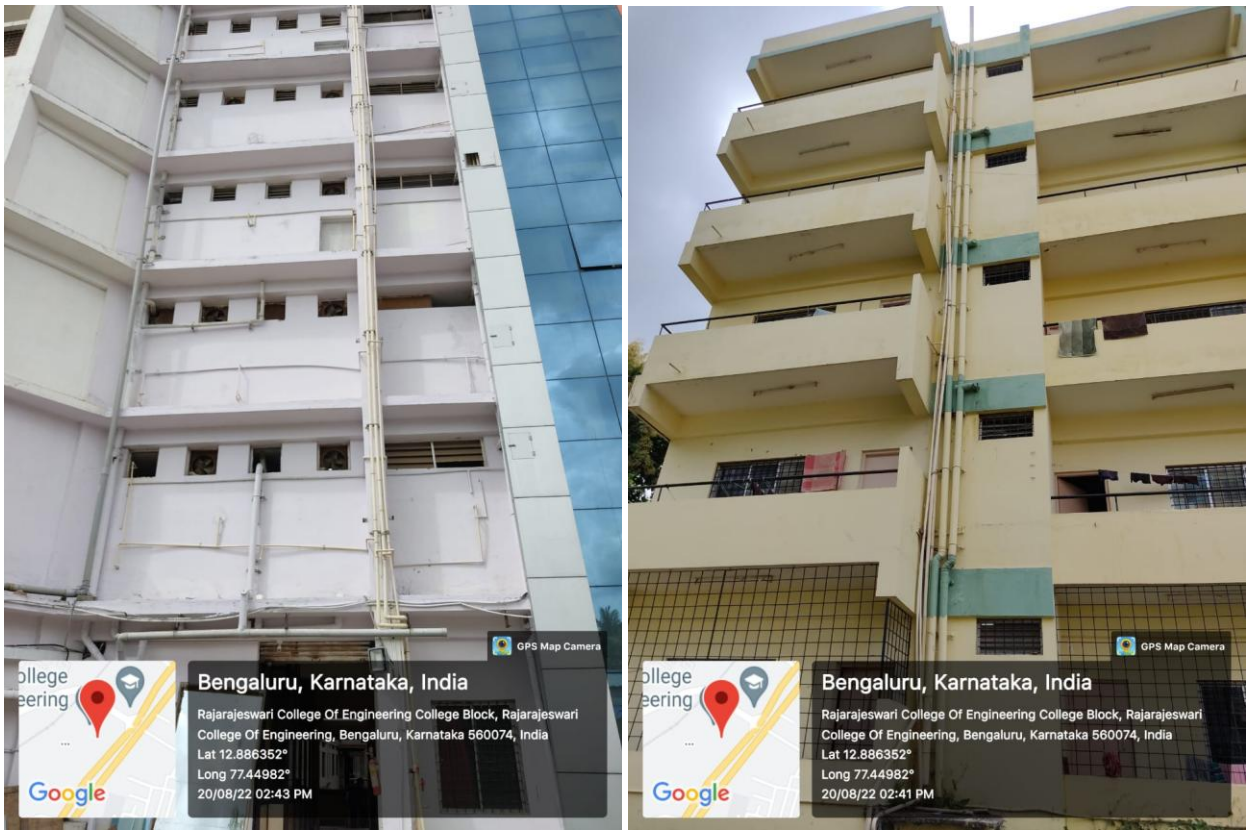


Photo.4 Green Belt Development at RRCE

ii) Secondary flushing in toilets in the hostel buildings.

Duel plumbing system has been provided in Boys Hostel, Girls Hostel .In general a sum total of 20 KLD is required for the flushing purpose.



Phor.5 Duel Plumbing for Secondary Flushing

iii) Buses and other vehicles washing within the campus.

The institute operates Buses, Cars and other vehicles. Additionally the students staying in the premises also use the treated water to wash their cars and two wheelers. Provision of 5 KLD has been made for the purpose.

Phot.6 College bus fleet and washing area

iv) Kitchen gardening near boy's hostel

Few patches in the premises are used to grow vegetables (on Trial basis) which are often watered with treated water. The demand here could be approximated to 2 KLD during non monsoon time.

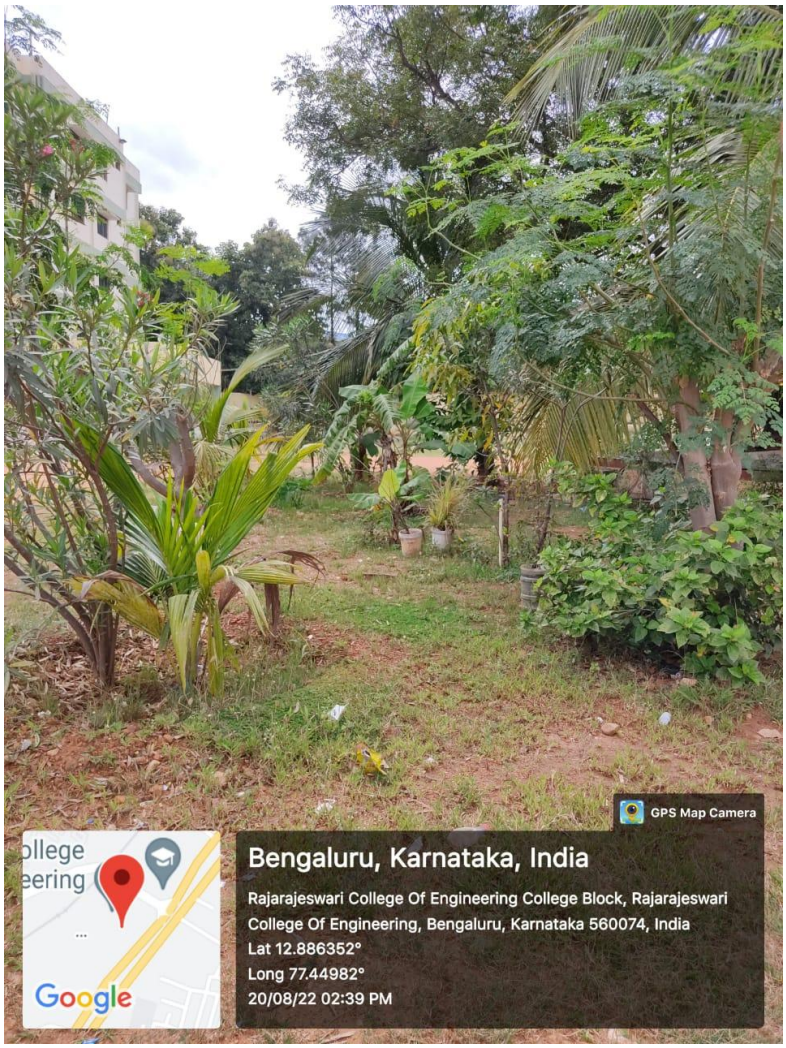


Photo.7 Kitchen Gardening near Mess Area

v) Cleaning of paved surfaces

Occasionally whenever cleaning of paved concrete surfaces is required; the treated water is used for the purpose, though not quantifiable, yet could be approximated to 4 KLD.

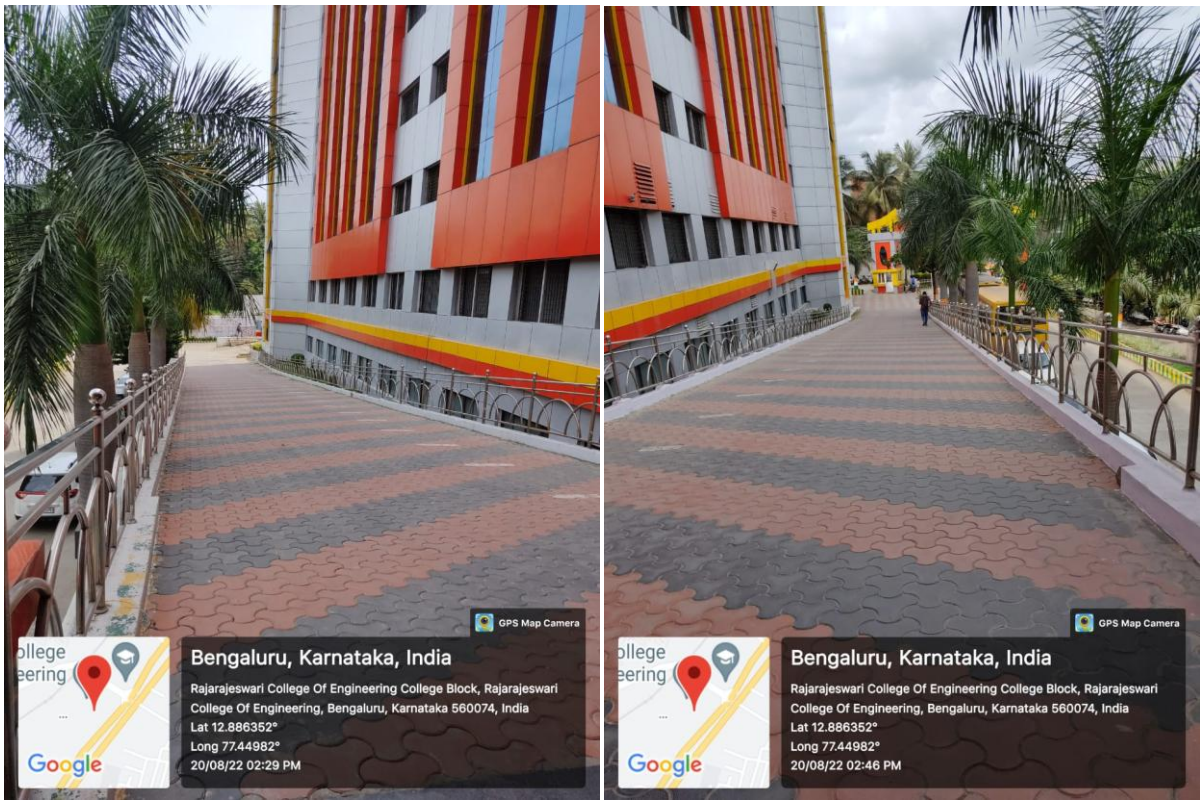


Photo 8. Paved Roads and Surface

vi) Cleaning of solar water heating collector panels:

Frequent cleaning of solar thermal panels and 4 number storage tanks is also carried out by treated water and this consumption though fluctuating is of the order of 4 KLD.

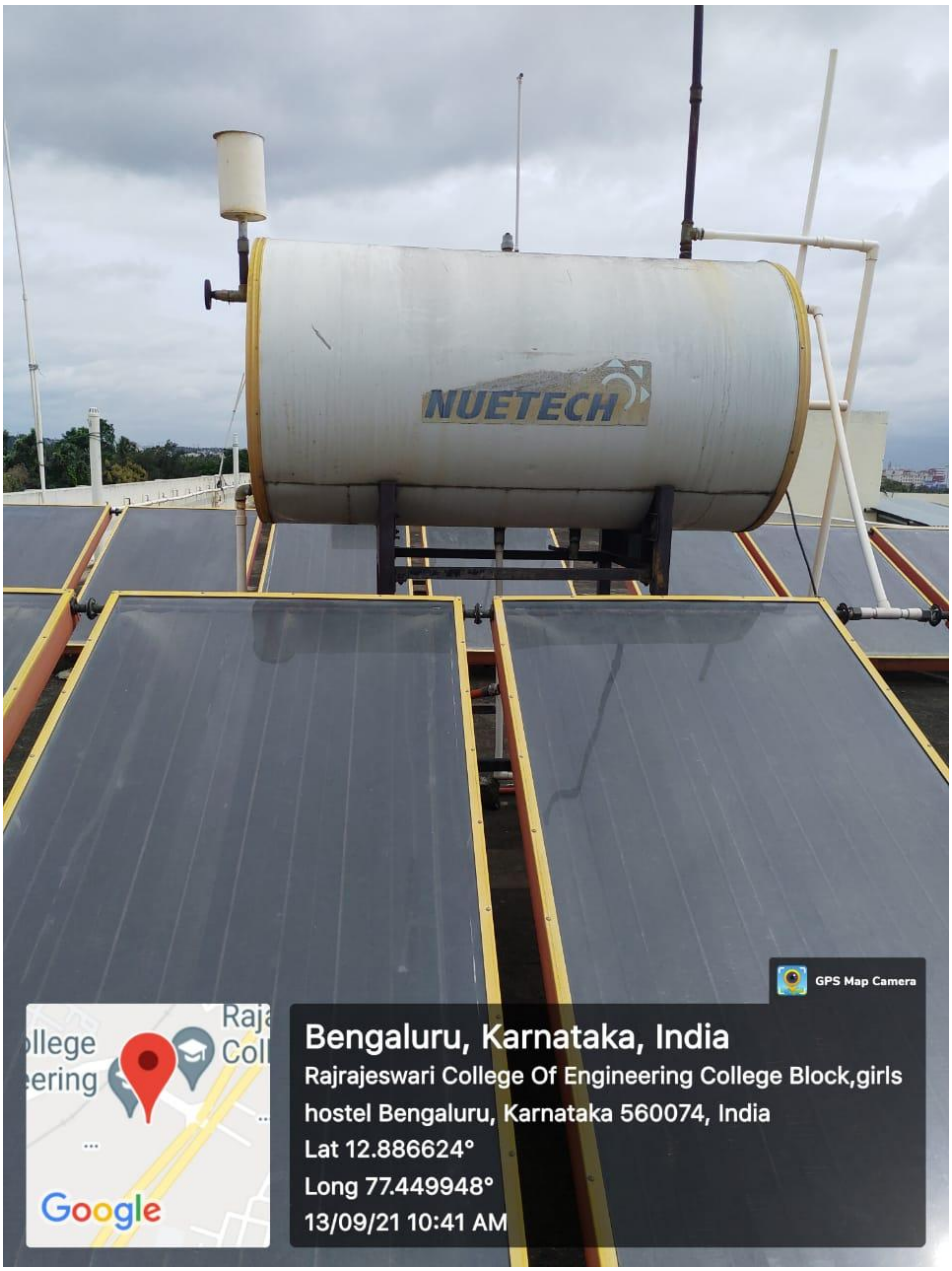


Photo.9: Cleaning solar water heating system collector panels on roof tops

Summary:

In the light of ample land area availability with minimal building construction, entire treated water is being reused within the campus, although during peak summer months the demand exceeds the supply and vice versa during the rainy season. KSPCB may consider the release of excess treated water into the storm water drains specifically during heavy and continuous rainfall when ample dilution is available. The reuse of the treated water can be summarized in the following table:

Sl. No.	Used for	Area/ No.s	Quantity of treated water used KLD
1	Green Belt	4,450 sq m	35
2	Secondary Flushing	25	20
3	Bus and Car Washing	10	5
4	Kitchen gardening	200 sq. m	2
5	Cleaning of Paved Surfaces	3	4
6	Cleaning of Solar Panels	4	4
		Total	70

3. Biomedical waste management

Red category municipal solid waste from Engineering College is quite less. Safe disposal of the waste is adopted to reduce adverse effect on human, animal health and aesthetics. The collected waste is transported to RRDCH for further incineration along with the biomedical waste.

4. E-Waste management

The obsolete computers and other wastes generated from the electronic equipment's are auctioned to authorized e-waste dealers and the hazardous materials in those equipment's are removed and disposed as per norms. The old computers are also exchanged with new computer. The electronic waste components such as computer system components, CPU and ICs are used in practical demonstration to our students. Some of the reusable electronic components like resistors, capacitors, inductors, diode, transistor, thermistors etc. are removed from the gadgets and used by students in making projects. The segregated waste is also transferred to RRMCH for further disposal with the recycling agencies.

5. Waste recycling system

Paper waste is sold out for its recycling in paper industry. Cement concrete cubes as a waste of Concrete Lab are used for routine concrete works in campus. Vermicomposting used to recycle horticulture waste. Liquid Waste after proper treatment used in gardening plants. Kitchen waste is used in centralized Bio gas plant to generate Methane gas.

6. Hazardous chemicals and radioactive waste management

Photo.10. Acid store room in chemistry lab to store hazardous chemicals

Generally, no hazardous waste is generated in the campus from any Department. The Condemned batteries are exchanged for the purchase of new batteries. All precautions are taken to store few concentrated acids/chemicals in chemistry laboratories in a safe and separate room.

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