



## Metric No. 7.1.3

**Describe the facilities in the institution for the management of degradable and non-degradable waste (within 500 words)**



**Laxminarayan Institute of Technology, Nagpur**  
**Self-Study Report**

# **SOLID WASTE MANAGEMENT**

## Waste generated and reuse in premise

### Objectives:

**Route 1:** Microbial digestion of vegetable waste from Hostel Mess into Organic Manure

**Route 2:** On spot weed control through 'Weed-O-Friend' strategy into Organic Manure

### 1.0 Preface

There are two boys hostels namely Old and New, having total capacity for 215 students existing in the premises of Institute itself. From the survey, it has been estimated that about 12 to 15 kg vegetable waste (uncooked) is generated per day from hostel mess. Besides this, the Institute is situated on Hillock of 71-acre campus, wherein about 30% area is enclosed by weeds. This area is cleaned periodically by maintenance section of university round the year. Due to lack of any suitable disposal methods, both these biomasses are uncollected and littered in the campus itself.

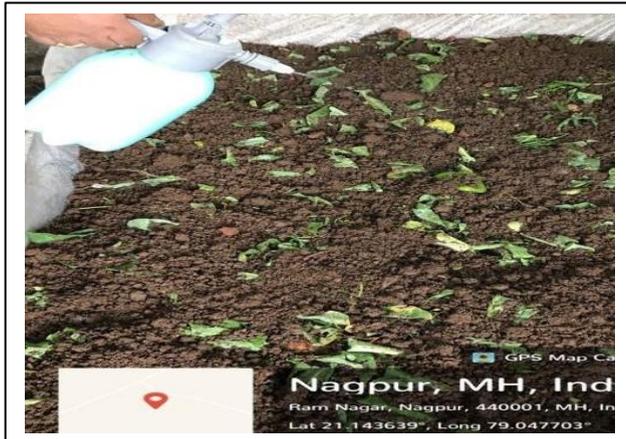
To provide a concomitant solution, a methodology has been brought in to practice by turning these left-over in to organic manure by microbial digestion. This project is supported by M/s NCS Green Earth, Hingna with whom Institute have signed MOU in September 2019.

### 1.1 Process details: Route 1

To initiate the plan, an unused shed attached to new boys hostel having 125 Sq. feet (approx.) has been identified to carry out composting activity. Two different horizontal compartments of 20 Sq. feet's were fabricated for spread of kitchen waste and weeds individually. Over this, a microbial solution 'Quick Break' developed by NCS Green Earth, Hingna was sprinkled twice or thrice a week (depending on quantity of waste). The speciality of this method is, it does not create pungent odour while digestion and catalyse the process in 5 to 6 weeks. Experimental trials are in progress to generate a database for quantitative and qualitative analysis of compost from both the raw materials. The various steps involved in the overall process are depicted below.



**Storage of vegetable waste & weeds encapsulated with soil**



## Spraying of 'Quick Break' solution on organic waste to convert into Manure at Composting Centre

### 1.2 Roles & Methodology included in MoU

- NCS Green Earth shall provide methodologies for composting.
- NCS Green Earth shall provide "Quick Break" – bio composter FREE along with a 200 Liters drum to store "Quick Break Concentrate Solution".
- LIT shall create/allocate a waste composting shed of around 100 to 150sq ft to carry out the composting activities.
- LIT shall ensure that the composting method is followed as per protocol recommended by Green Earth

NCS Green Earth shall provide analysis facility for the compost generated from trial batches for C:N ratio and other nutrients.

### 1.3 Measurement & Reporting:

LIT shall create and allocate a project team for Compost study with the following parameters:

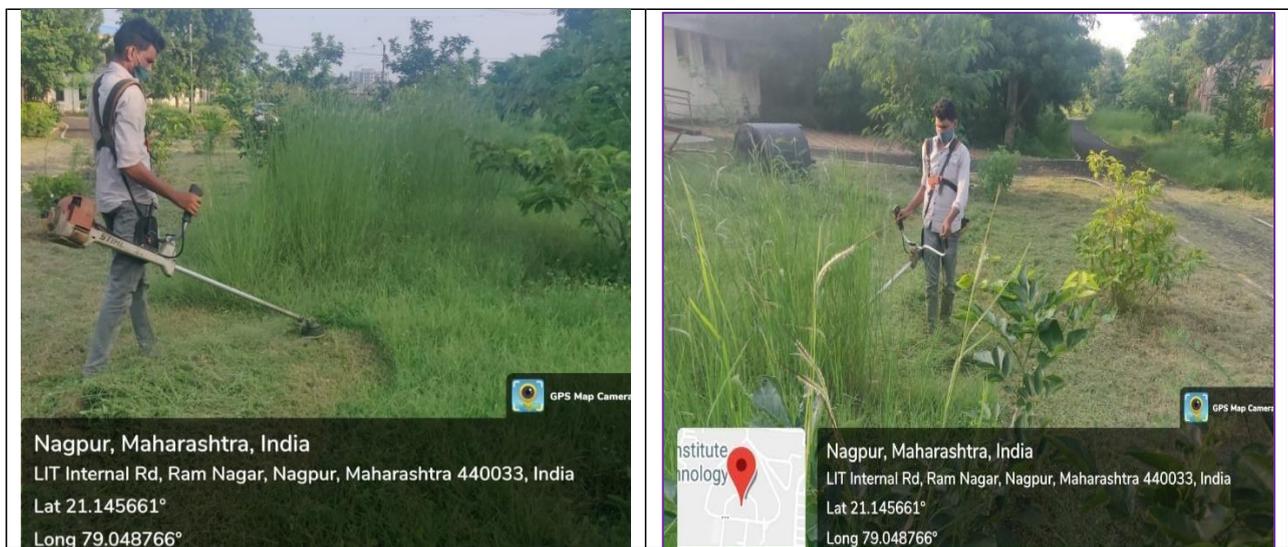
1. Marking the compost for Date Range of waste.
2. Generating the database for input feed (type of vegetable and biomass) from Hostel Mess menu in periodic cycle.
3. To evaluate the impact of variation in input feed on quality of compost/manure

## 2.0 Process details: Route 2

### On spot weed control through 'Weed-O-Friend' strategy

#### 2.1 Preface

As mentioned earlier, LIT Campus is having widespread area with vegetation and is studded with enormous weeds which are difficult to control. Although periodical maintenance is carried out in regular intervals to clean-up the campus, nevertheless, needs a provision of hefty funds in university budget every year. The basic objective of this route is to curtail the expenditure and treat the weeds and unwanted vegetation 'on spot' by spraying the microbial solution over it. To execute this, NCS Green Earth has developed a **Weed-O-Friend** strategy to control the weeds organically and convert it into compost on spot.



To implement the plan on trial basis, an area about (30 X 20 F approx.) has been identified nearby composing chamber which is usually dense with weeds. Using brush cutter, the weeds were cutted and a heap of waste biomass was made. Subsequently, the microbial solution was sprinkled over the heap to convert into manure on spot twice a week as displayed in the photographic images.



The average time expected to convert the biomass into organic manure is about two months from the date of cutting.

## **2.2 Roles & Methodology as per MoU**

1. NCS, Green Earth shall provide methodologies for on spot composting of weeds by providing bio composter FREE along with a 200 Liter Drum required to create “Quick Break Concentrate Solution”
2. LIT shall organize the manpower & tools for weed cutting & spreading on the field after every 4 to 6 weeks
3. LIT and NCS Green earth shall mutually optimize an alternate route for blending of weeds and organic waste from hostel mess to turn it in to manure, if required
4. NCS Green Earth shall provide analysis facility for the compost generated from trial batches for C:N ratio and other nutrients

## **2.3 Measurement & Reporting:**

1. For the first year at least 25% area shall be marked by LIT for targeted work and remaining can be continued with old process for comparative evaluation
2. LIT shall constitute a team of students and faculty to study the impact of ‘Quick Break solution’ on spread areas for quantification through visual observation of weed control.
3. NCS Green Earth shall provide a facility to analyse the soil quality, nutrition, porosity, microbial eco-system, and other necessary parameters.
4. LIT shall conduct a green audit of complete process to establish a cost-benefit analysis.
5. Database generation for the said activity throughout year to notice the impact of seasonal variation if any.

## **Summary**

1. The **first route** of microbial digestion methodology for turning food waste from hostel mess to organic compost has been successfully implemented at LIT premises with a capacity of 150 Kg (approx.) per month. It is noteworthy that due to pandemic situation, the hostel mess is closed from last few months. To mitigate, currently the vegetable waste is procured from one of the known restaurants of city.
2. The **second route** of controlling weeds along with improving soil fertility vis a vis generating compost is quite promising under win-win situation. The experimental trials are in progress at different locations at LIT campus from last couple of months.
3. Studies are in pipeline to analyse the Carbon: Nitrogen ratio and other nutrients from the compost generated as such from both the routes.

## **3.0 Green Audit for the Composting Activity**

The following data has been collected from Garden Superintendent , Rashtrasant Tukadoji Maharaj Nagpur University for the expenditure incurred to carry out the

cutting and cleaning of bushes, wild grass, and weeds etc. at LIT premises for the academic session 2020 to 2021.

Sr. No.	Particulars of area	Total area of premises	Unit	Rate in Rs	Amount in Rs
1.	Pariksha bhavan, Infront and behind LIT Sabhagruha, Around Employee society building, Infront and behind Canteen and both side of road and Hill area, Front and backside of Main administrative building of LIT and area surrounded to Chemical engineering building, Food technology, Paper and pulp, Surface coating and Plastic and polymerization, & Petrochemical department building.	80,302.72	Sq Meter	4.20	3,37,271/-
2.	12% GST				40,473/-
3.	Sanctioned rate 1 % below as per work order				-3,777
4.	<b>Total Payable Amount in Rs</b>				<b>3,73,966/-</b>

It is noteworthy that the current expenditure is based on Rs 4.20 per Sq meter which is likely to be **revised to Rs 5 per Sq meter from 20/09/2021**.

As per our collaboration, for the first year at least 25% area shall be marked for targeted work. It is expected that after a period of two years, the growth of such weeds would restrict to 40% besides generation of organic manure on spot. This would result not only in improving the fertility of soil but also generate compost at bulk level. Moreover, the maintenance cost for the same can be curtail by at least 25% per year. Accordingly, more than **1lakh rupees as per revised rate** can be saved per anum vis-a-vis generation of organic manure.

Currently, we have started our trial study by marking approximately 20% area in a premises and waiting for the expected outcome. Based on results, there will be a gradual rise in the targeted area for upcoming years for the composting.

After qualitative and quantitative evaluation of the compost generated through hostel mess and premises, it would subsequently recommend for commercialization with the help of NCS Green Earth Chemicals, Hingna to justify the title 'Waste to Wealth'.

**LIQUID AND HAZARDOUS CHEMICAL  
WASTE MANAGEMENT**

## Effluent Treatment Plant for Chemical Laboratories

**Objective:** To conduct trial test for treatment of laboratory effluent from Chemical Engineering Building, LIT

### 1. Using conventional route

#### Preface

There exist three major practical laboratories in chemical engineering building, out of which two belongs to Applied chemistry department namely Applied Organic and Applied Inorganic chemistry laboratory. The third one is mass transfer laboratory under the curriculum of chemical engineering department. Approximately 385 students per week from chemical engineering and chemical technology branches are utilizing these laboratories for carrying out experiments and developing practical skill as a part of their academic syllabus.

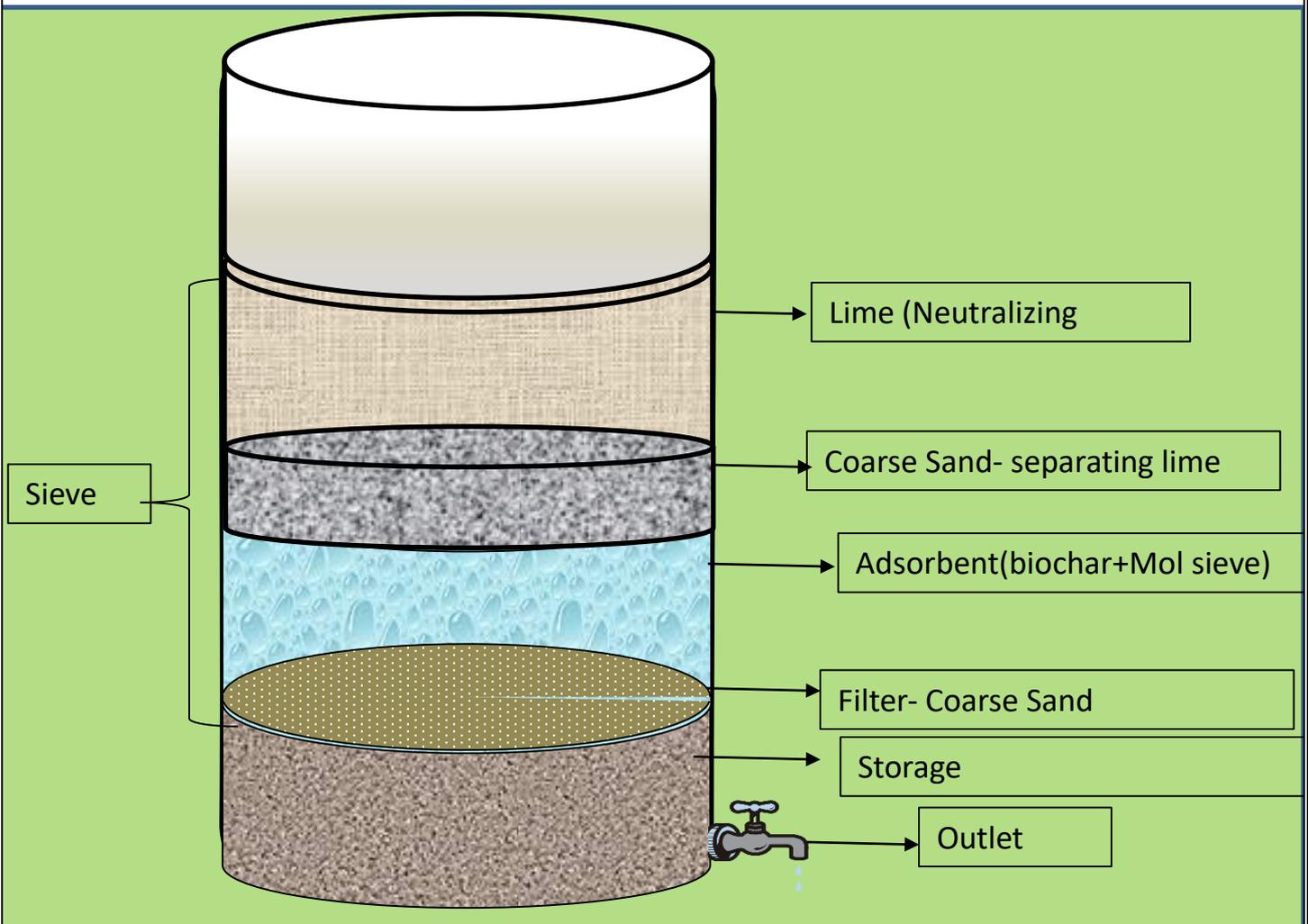
During this, students are getting exposure of number of solid and liquid phase chemicals. Majority of them are neutralized or consumed in the reaction to form either product or complex. However, it has been frequently noticed that due to error or repeat of experimental process to obtained satisfactory yield or results, a good number of chemicals are getting discharged in to sink in diluted form. The broad range of chemicals thus pollute water bodies through such activities from academic organizations are always worrisome. The most common chemicals that would like to contaminate the sewage from the laboratory outlets are listed below.

Sr. No.	Laboratory	Chemicals (Liquide discharge in dilute form)
1.	Mass Transfer	Acetic acid, sodium hydroxide, nitrobenzene, aniline, benzene, and toluene
2.	Applied Organic/Organic Process Technology	Sodium hydroxide, hydrochloric acid, nitric acid, sulfuric acid, potassium permanganate, phenol, bromine solution acetic acid, ammonia solution, methyl alcohol, formalin solution, aniline, zinc dust and Phenolphthalein indicator with color complexes of naphthol and mild carboxylic acids.
3.	Applied Inorganic/Inorganic Process Technology	Sodium hydroxide, hydrochloric acid, sulfuric acid, sodium thiosulfate, potassium permanganate, potassium dichromate, calcium carbonate, ammonium hydroxide, ammonium chloride, methyl red, Phenolphthalein, starch, potassium iodide, copper sulfate, coloring complex of EDTA and EBT indicator, ethyl

		alcohol, Barium diphenyl amine sulfonate, sodium oxalate and MnO <sub>2</sub> , Patton & Reeder's indicator.
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From the above data, a laboratory scale treatment column is designed which consists of Lime, Sand and peroxide doped Charcoal bed for neutralization, removal of suspended solid and adsorption of colored impurities respectively. The presence of minute concentration of hydrogen peroxide is expected to promote the decomposition of aromatics and other chemicals via advanced oxidation to certain extent.

The **Biochar** used here is biogenic and developed from **Bambo wood** at department of oil and surfactant technology, LIT itself. Experimental trials are in progress for its application in laboratory to optimize its saturation period. The unit will be replaced once saturated and could be recycled again. The insight of treatment unit is displayed below for reference.



In view of the above, the remediation units thus nominated as '**Eco-bin**' for neutralization vis-à-vis safe disposal for chemicals are fabricated and installed successfully for selected laboratories of the Institute wherein the volume of effluent is limited.



42WX+6F3 LIT GARDEN, Ram Nagar, Nagpur, Maharashtra 440033, India

Latitude 21.1457451° Longitude 79.04848474°  
Local 12:02:43 PM Altitude 270.52 meters  
GMT 06:32:43 AM Tuesday, 28-09-2021



42VX+XJX, Ram Nagar, Nagpur, Maharashtra 440033, India

Latitude 21.1451936° Longitude 79.0490745°  
Local 12:16:16 PM Altitude 279.2 meters  
GMT 06:46:16 AM Tuesday, 28-09-2021



42VX+XJX, Ram Nagar, Nagpur, Maharashtra 440033, India

Latitude 21.1451936° Longitude 79.0490745°  
Local 12:51:29 PM Altitude 279.2 meters  
GMT 07:21:29 AM Tuesday, 28-09-2021



42VX+XJX, Ram Nagar, Nagpur, Maharashtra 440033, India

Latitude 21.1451093° Longitude 79.0490704°  
Local 02:24:34 PM Altitude 279.1 meters  
GMT 08:54:34 AM Sunday, 26-09-2021



These '**Eco-bins**' can be regenerated in non-tedious way and more than 60% of material can be recycled again. Further, the laboratories present in chemical engineering building like applied chemistry and mass transfer is producing effluent up to 1 KLD in a week which would be needing common effluent treatment plant besides presence of these disposal units. To cater this, a small scale effluent treatment plant based on '*Zero waste discharge*' using *sustainable green practices* is under construction.

## **2. Green route by 'Bio-augmented' wetlands technology**

This method for sewage/wastewater treatment is known as Constructed Wetlands or Phytoremediation technique. Constructed Wetlands are engineered systems that utilize the natural functionality of the vegetation, sediments/substrate/natural filter media and micro-organisms to purify the wastewater streams. The combination of substrates, plants, hydrology, and microorganisms can efficiently remove organic pollutants, nutrient concentrations, even certain hazardous metals, and toxic contaminants in the water bodies.

### **2.1 Proposed Treatment Process Flow**

The laboratory effluent will be passed through '*Eco-bin*' as discussed earlier before it reaches into effluent receiver tank via basin of each laboratory.

1. Laboratory effluent will be treated with Microbiological products developed by BlueDrop in the effluent receiver tank before passing it to the Green ETP (Bio-Augmented Wetlands Technology).

2. The Microbiologically activated effluent water will then pass through the roots of plants recommended for Green ETP, where the water will be treated by the plants and the microbial activity.
3. The treated water will be collected in the receiver tank from where it can be used as per user requirements. The protocol for sustainable remediation is mentioned below:



## 2.2 KEY FEATURES OF AERATED WETLANDS

- Low Carbon Footprint than passive systems
- Lower Operational costs compared with conventional method
- Mitigated risk of clogging
- Effective Ammonia removal
- Prevents biomass/mineral/inorganic accumulation
- Flexible and Scalable
- 30+ years of effective life
- Robust operations
- Flexible for modular design
- Quick to construct and commissioning

### Summary

To resolve the disposal problem of used liquid chemicals through various laboratories is addressed under green practices here. Laboratories were identified based on qualitative and quantitative studies of effluent and suitable treatment on spot using 'Eco-bin' has been implemented successfully. Moreover, for bulk volume with variable components in laboratory effluent, a green route is adopted to treat the waste which not only curtails energy input but also obviates sludge generation while conduct. Currently, the expected outcome in the form of decline in pollution using these techniques is more than 90% however, the actual results would be noted once the pandemic will be over, and students will be back to laboratories.

Accordingly, installation work of trial setup for 1 KLD effluent treatment is in progress at the basement of chemical engineering building where the pretreated/ neutralized laboratory effluent from chemical engineering building is collected into storage tank. Initially, the effluent is neutralized through specially designed 'Eco-bin' kept near the sink to minimize the pollutant load and adjust the required pH of effluent for biological treatment. Studies for contact time and selections of materials that are used in the neutralization process are still in progress. Once it is optimized, a neutralizer of suitable capacity will be installed before storage tank. It is noteworthy that biological treatment is a pH dependent process hence this step would be playing key role here. The microbial source is then added to storage tank and later it is charged into wetland tank where the actual treatment is carried out using roots of specific plants. Currently, the treated water is planned for irrigation and artificial recharge for groundwater however, a proposal is in pipeline for recycling the same as 'flush water' in the washrooms of chemical engineering building.



**Nagpur, Maharashtra, India**  
LIT Internal Rd, Ram Nagar, Nagpur, Maharashtra 440033, India  
Lat 21.145661°  
Long 79.048766°

**Construction work for Bio-augmented Wetland based ETP is in progress.....**

# **E-WASTE MANAGEMENT**

Computers are upgraded to the latest versions, rather than buying new machines, in order to reduce electronic waste from computers and its peripherals. However, obsolete CPUs, monitors, motherboard, key boards, mouse, compact discs, printers, cartridges etc. generated as electronic waste are disposed from our computer laboratories by selling it to scrap vendors time to time at the pre-decided rates as per the annual rate contract.

# WASTE RECYCLING SYSTEM

Water that drains from the air conditioner is free from the chlorine, salt or any chemicals, so it can be used for watering the plants, or in wash area. As in summer air contains more water particles (humidity). In the hot weather of Nagpur City, air conditioner on continuous running may produce five to ten-liter water in a day.

The water comes from air conditioner due to dehumidification process. This water is just the vapour present in the room air. In this process, the water is actually undergoing a distillation process indirectly. (evaporation from water bodies into air ->> condensing the vapor by cooling coils).

This distilled water is very good for plants. So, we can use the water from A/C for plants.

A bucket to air conditioner drain hose/pipe is attached, captured the water which can be used can for cleaning purpose or directly plants pot can be kept.

## Preface

With the advancement in structural engineering, the administrative buildings, classrooms, computer laboratories and equipment-education infrastructure has become a crucial elements of learning environments in colleges and universities. There is strong evidence that high quality infrastructure facilitates better instruction, improves student outcomes, and reduces dropout rates. Besides this, the physical facilities for faculty and staff which mainly includes, sitting accommodations, internet connectivity, canteen, and attachments such as light fixtures and air conditioning system has a significant impact on employee morale. Particularly, usage of air conditioner not only provides healthy environment but also helps them focus, take pride in working in organizations which would results in their productivity. Here are just some of the ways that office air conditioning can improve the productivity...

- Comfortable working environment
- Maintain a stable temperature
- Temperature and humidity control
- Prevents health problems due to Sick Building Syndrome
- Better functioning of technological equipment's

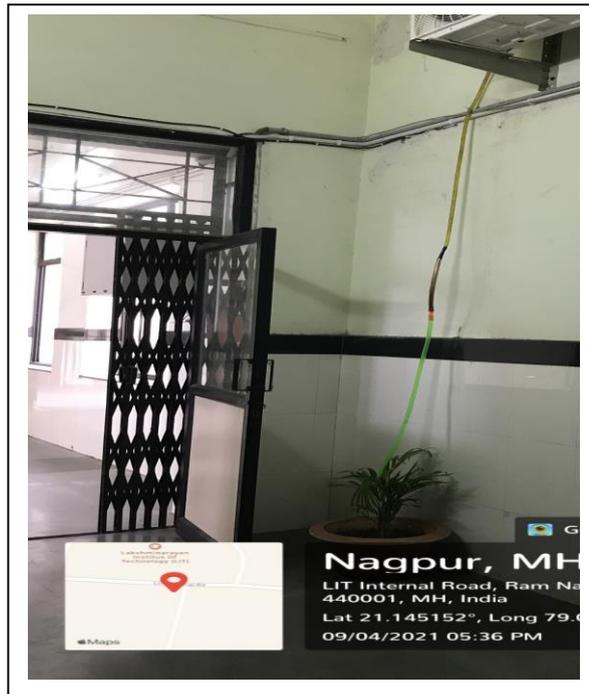
There are several reports supporting these facts and as a result, it is evident that most of the government institutes, colleges and university buildings presently are well equipped with air conditioners of various brands. But, on the contrary, there is a noticeable amount of water continuously ejecting from the condenser vent due to dehumidification. There is a provision of small outlet (condense vent) through which this pure water is discharged endlessly from machine which is futile. In India, more than 80% air conditioners are installed on wall mounting fashion wherein the condensed water is expelled using small rubber or PVC piping of 1 or 2 feet. It is noteworthy that this water is flowing regularly without any use from the wall surface causing slow damage to infrastructure besides unpleasant look.

It has been estimated from the trial studies that at a fixed temperature of 25 °C, almost 1.5 liter water can be collected per hour from vent for an average size hall. This quantity

would like to differ with variation in chamber size with relative humidity data and off course by personal use. Few such locations were spotted in the premises of Laxminarayan Institute of Technology and attempts has been made to avoid the loss of water via extending the vent pipeline for plantation. The pre and post treated images of the conservation of such futile water was captured by camera and revealed below.



Chemical Engineering Building



Instrumentation Lab (Department of Applied Chemistry)



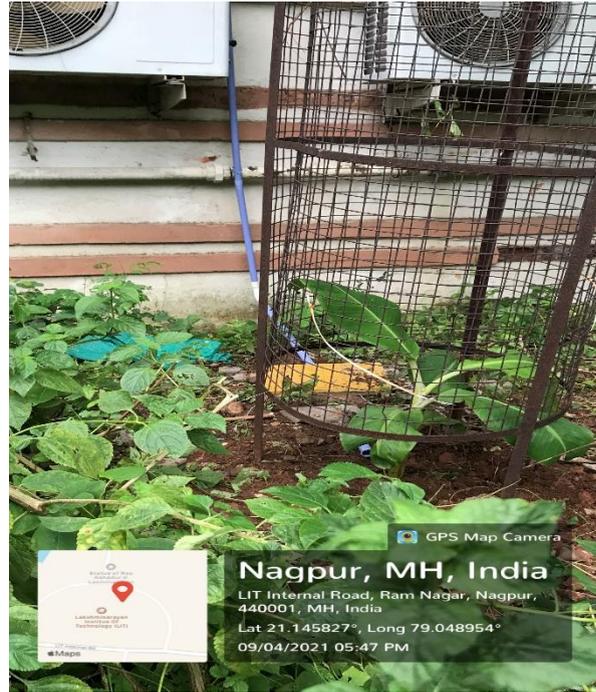
IQAC Hall Administrative Building (Point-1)



IQAC Hall Administrative Building (Point-2)



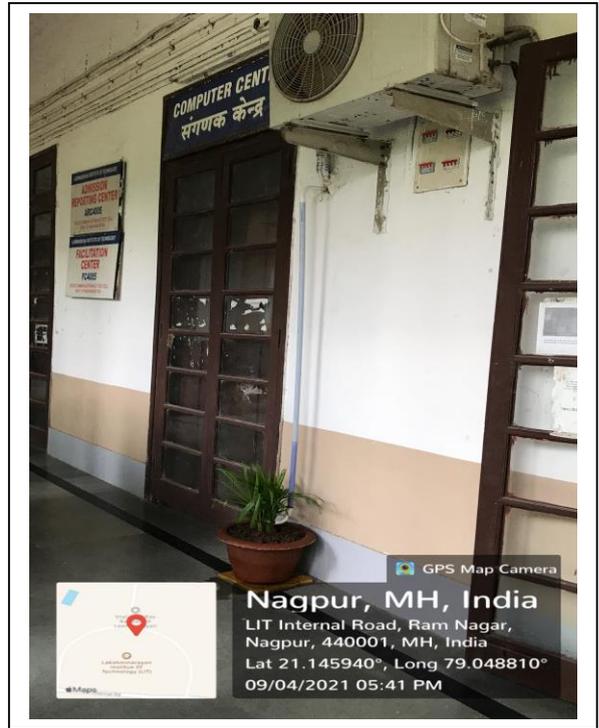
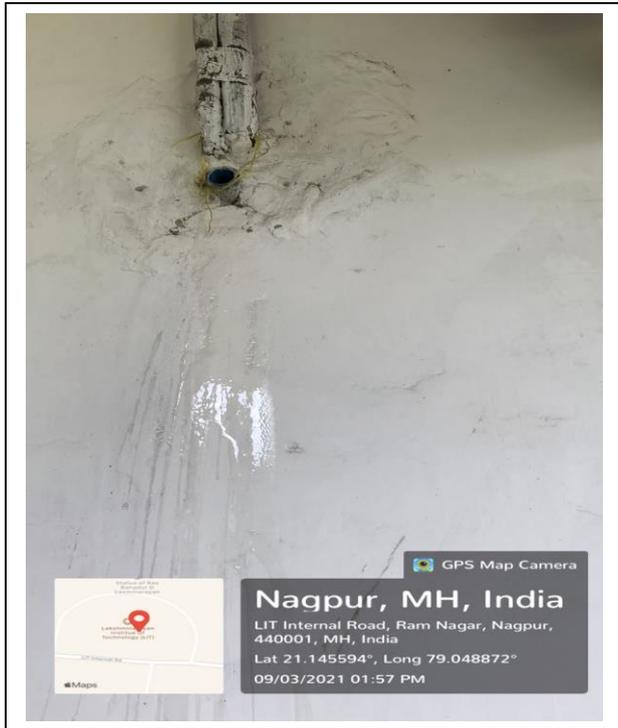
Back yard of ARC Hall for first year admission (Point 1)



Back yard of administrative building (Banana tree is growing upon AC vent water)



ARC Hall Administrative building



Computer Laboratory passage (Administrative building)



Non-teaching staff supporting the activity

## Summary

1. The major objective of the task is to create awareness among the students and faculty/staff to conserve surplus water rejected from air conditioning units and recycle it in the time of scarcity.
2. It has been estimated that about 1.5 liter of pure water is drain out from one air conditioner unit of 1.5 ton capacity per hour at fixed temperature 25<sup>0</sup>C from a cabin of 200 Sq feet approximately. We are using AC for at least 8 months in a year wherein the four months of rainy season are having maximum humidity.
3. A significant quantity of water is ejected during this which is mostly damaging the wall surface or saturated elsewhere. To avoid this, a preliminary work is initiated to conserve the water and reuse it for irrigation using pots and land under special drive. Nine suitable locations were selected for carrying out this activity at LIT premises.
4. The laboratories or halls where the cooling area is large, such AC vents are extended using PVC pipelines and connected to plants and trees of garden since the expected effluent is little bulky. The remaining chambers where the cooling area is less, the vents are extended using rubber tubes and the outlet is connected to flowerpots of appropriate size.
5. Studies are in pipeline to design a small size hold tank or collection unit before the water enters in a pot to avoid overflow of water.



MEPL/MKT/20-21/12301

January 2, 2021

To,  
**M/s. LAXMINARAYAN INSTITUTE OF TECHNOLOGY**  
AMRAVATI ROAD  
NAGPUR.

**Kind Attn: Dr. Bharat Bhanvase**

**Subject: Quotation for Disposal of Expired Lab Chemical Bottles at CHWTSDF**

Dear Sir,

With reference our telephonic discussion regarding Disposal of Expired Lab Chemicals at CHWTSDF; we hereby quote for Hazardous Waste Disposal, Unloading & Handling Charges / Transportation Charges with the specified details as below:

SR.NO.	DISPOSAL CHARGES - WASTE/S	REVISED CHARGES (RS.)	UOM
1	DISPOSAL CHARGES (EXPIRED CHEMICAL /BOTTLES)	23862.00	MT
2	UNLOADING CHARGES	120.00	MT
4	TRANS. CHARGES (FOR 1.0 MT CAPACITY VEHICLE)	1100.00	TRIP

- NOTE
1. TOLL CHARGES EXTRA AS PER ACTUAL SHALL BE APPLICABLE
  2. GST APPLICABLE @18% ON ALL ABOVE CHARGES
  3. QUOTATION VALID TILL 31/03/2021

Please feel free to contact us about any of the specifics of this quotation.

Thanking you for considering MEPL for your waste management needs.

Regards,  
For **Maharashtra Enviro Power Limited**

Authorized Signature

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CIN-U 40105 MH 2005 PLC 150780

(Lab Accredited By NABL and Recognised by Ministry of Environment and Forests)

Site Off : CHW01, Mandwa, MIDC, Butibori, Nagpur - 441108. Ph. : 9923596274

email : meplnu.mkt@smsl.co.in

Corporate Office : 20, I.T. Park Parsodi, Nagpur - 440 022. Maharashtra. (India)

Ph. 0712-7125000, Fax : 0712-7125000 Web : www.smsl.co.in

Reg. Office : 267, Ganesh Phadanavis Bhavan, Near Triangular Park Dharampeth,

Nagpur-440010.



AN ISO CERTIFIED COMPANY  
ISO 9001 : 2008 49121 / A / 0001 / UK / En  
ISO 14001 : 2004 49121 / B / 0001 / UK / En  
OHSAS 18001 : 2007 49121 / C / 0001 / UK / En

**MAHARASHTRA**  
**ENVIRO POWER LIMITED**  
(NAGPUR UNIT)

(Common Hazardous Waste Transport Storage and Disposal Facility)



# SMS Group

## Master Creation Form

All fields with \* marks are mandatory.

Section 1: Company Details and General Information

DATE OF SUBMISSION:=	
*Company code:-	3300/30/33
NAME OF THE COMPANY /VENDOR NAME:=	Laxminarayan Institute of Technology, RTM Nagpur University, Nagpur
*Full legal entity name	Laxminarayan Institute of Technology, RTM Nagpur University, Nagpur
VENDOR DETAIL ADDRESS(AS PER FOLLOWS):-	Opposite to Bharatnagar, Amravati Road, Nagour
STREET/HOUSE NUMBER*	Amravati Road
ADDRESS 1 *	Opposite to Bharatnagar,
ADDRESS2	
CITY *:-	Nagpur
STATE *:-	Maharashtra
*PIN No:-	440033
COUNTRY *	India
CONTACT PERSON NAME * :=	Dr. Raju Mankar
TELEPHONE NO *:-	0712-2531659
MOBILE NO *	9422095110
EMAIL *:=	<a href="mailto:rajumankar@gmail.com">rajumankar@gmail.com</a>
Web site address:-	<a href="http://www.iitnagpur.in">www.iitnagpur.in</a>
FAX:=	
VENDOR STATUS:-	Proprietary/Partnership/Public Limited/Pvt limited/ <b>Govt</b> /others (specify) Govt.
*Nature of Business:	Manufacturer: <input type="radio"/> Authorized Agent: <input type="radio"/> Trader: <input type="radio"/> Consulting Firm: <input type="radio"/> <b>Other (specify): Education/Unive</b>
Type of Industry *	<b>Education</b>
Whether Registered under MSME Act If Yes, Provide Registration No.	
Whether Located in SEZ/EOU*	EOU
	* <b>Customer /vendor/employee/subcontractor/consultant</b>
*Reconciliation account :(refer atatched sheet Reconciliation account list)	10700005
Registration Numbers:-	
*GST Registration No.	27AAAJR0769D2Z3
Dealer Type under GST (Regular / Composition Scheme/ URD) *	Regular
GST Registration No. in More than One State	
*If yes, please insert State-wise GST registration details in the below table	
Is vendor defaulter in payment of GST?	
Product for which registration is sought for*	
	Product description Not Applicable
	HSN code Not Applicable
	GST Rate Not Applicable
Service for which registration is sought for*	
	Service description Education
	HSN code Not Applicable
	GST Rate Not Applicable
PAN No.*	AAAJR0769D
Pan Holder Name *	Rashtrasant Tukadoji Maharaj Nagpur University
*TDS Section (NOP):-:(refer atatched sheet NOP)	

<b>TAN No.* (Tax Deduction Account No.)</b>	Not Applicable	
<b>PF Registration No.(For Contractor)</b>	Year of establishment	
<b>ESIC Registration No ( For Contractor)</b>		
<b>Labour License No. (Mandatory in case of Labour Contractor) *</b>	Not Applicable	
Certifications obtained (ISO, OHSAS)	Yes	No
If yes , please specify the certification		
Name & reference of three companies where supply is being done		
Company 1		
Reference Person & Number		
Company 2		
Reference Person & Number		
Company 3		
Reference Person & Number		
Turn Over of last three years		
Year 1		
Year 2		
Year 3		
<b>* BANK DETAILS :</b>		
<b>Bank name</b>		
<b>ACCOUNT NUMBER</b>		
<b>BRANCH ADDRESS</b>		
<b>IFSC CODE</b>		
<b>MICR CODE</b>		
Information of dealer network across country / state		
For Subcontractor		
<i>Manpower Employed</i>	<i>Type</i>	<i>Nos</i>
	Technicians	
	Engineers	
	Managers	
Details of main machinery and other equipments with capacity		
<b>Other Additional Information : Please attach copies wherever relevant</b>		
Name, Address & telephone Numbers of partners / directors*: Complete Product details List of all customers List of companies where already registered		
Director, Laxminarayan Insitute of Technology, RTM Nagpur University, Opposite to Bharatnagar, Amravati Road, Nagour mobile no. 9422095110 Old Chemical Bottles		
Details of relatives working with SMS Ltd.		
Name Department Designation Location Relationship		
Name ( Vendor representative) Designation :		
I decalre that the information furnished above is true and correct to the best of my knowledge. I Undertake to inform you at the earliest any change in details mentioned above. Signature Date:		
<b>Following Supporting Documents need to be submitted :</b>		
a) Address proof	Submitted	
b) Copy of registration certificate/ Incorporation		
c) Copy of PAN Card	Submitted	
d) Copy of GST Registration Certificate	Submitted	
e) Bank Account details	Submitted	
f) Supporting documents for MSME (if applicable)	NOT APPLICABLE	
g) SEZ/ EOU registration Certificate. (if applicable)	NOT APPLICABLE	
h) Copy of Tax Deduction a/c No.	NOT APPLICABLE	
<b>Procurement Officer Project / HO</b>		
		<b>Project Manager / Proc. Head</b>
CHECKED BY MARKETING DEPT. :=		
		<b>Mr. Rajkiran Bagde</b>
APPROVED BY Marketing DEPT. :=		
		<b>Mr. Hemant Kale</b>
APPROVED BY FINANCE DEPT. :=		
APPROVED BY SAP :=		

NOTE:-(1) The information above must be as per GST registration.  
(2) \*These fields are mandatory.

# Waste Audit

27

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Background reference image Polina Tankilevitch on pexels

## 5. Waste Audit

Waste is an inevitable part of our lives. Over the years as the awareness about waste management techniques has given a rise to rethink how the waste can be avoided from being sent to the landfills. The audit provides an approximation of the types of waste generated, location of waste collections, disposal techniques used, waste segregation methodologies adopted, waste management strategies that are and implemented in addition to the newer ways the can be adopted aiming to make the premise clean and sustainable. Here sustainable refers to a broader aspect to analyse whether the current techniques are having positive or negative effect on the stakeholders of the premises.

### 5.1 Waste produced

The types of waste collected in the campus are as follows. These are separated before processing and not given to the local Corporation. The details of the quantity and type of waste are as follows.

S. No.	Type of waste	Source and quantity	Current Disposal method	Can be treated/ recycled?	Methodology
1	Solid waste	Toilets–Biodegradable waste of 20kg per week	Led in the storm water drains	Yes	TREATED - Small biogas plant can be proposed in open space
2	E-waste	Computers - Non-biodegradable waste as per the annual year usage	Donated	Yes	CONTINUE - with the current practice
4	Dry waste in form of leaves	Open space & plantations, papers - Non biodegradable waste of 6kg per week	Vermi-Composting	Yes	CONTINUE - with the current practice
4	Liquid waste	Toilets, washbasins – Around 200 – 250 litres per week during general times and 50 litres at present	Led to the storm water drain	Yes	TREATED - Waste water treatment plant
5.	Vegetable waste	Around 12 to 15 kg of uncooked vegetable waste from Boys Hostel mess	Vermi-Composting	Yes	CONTINUE - with the current practice
6.	Liquid waste	Laboratories, AC and wetlands	Various systems	Yes	CONTINUE - with the current practice

*Table 7: Summary of the types of waste produced in the premises*

### 5.1.2 Bins summary

There are 15 Dustbins in the premise made up of plastic-polymeric material with volume of 7 litres (small) and of plastic material. Around 10 are present in Ground floor and 5 in the First floor of each Building.

## 5.2 Waste handling

Quantification wise as per Interview and survey it was found that the Solid, Dry leaves collected is approximately 60 kg per week. The liquid and hazardous waste (septic tanks) is approximately 200 litres per week. The waste produced on campus is segregated. The staffs are very well trained and do an excellent job. **We observed the concern and dedication the entire Team shows towards the Institute management aspect. We highly appreciate these efforts and way of working. Some excellent measure undertaken are Composting and Weed-O-Friend' strategy.**

(The following notes are provided by the Institute for technical inputs of the process)

### 5.2.1 Composting

*The process involves turning these left-over in to organic manure by microbial digestion. This project is supported by M/s NCS Green Earth, Hingna with whom Institute have signed MOU in September 2019.*

*To initiate the plan, an unused shed attached to new boys hostel having 125 Sq. feet (approx.) has been identified to carry out composting activity. Two different horizontal compartments of 20 Sq. feet's were fabricated for spread of kitchen waste and Over this, a microbial solution 'Quick Break' developed by NCS Green Earth was sprinkled twice or thrice a week (depending on quantity of waste). The speciality of this method is, it does not create pungent odour while digestion and catalyse the process in 7 to 8 weeks. Experimental trials are in progress to generate a database for quantitative and qualitative analysis of compost from both the raw materials.*

### 5.2.2 On spot weed control through 'Weed-O-Friend' strategy

*As mentioned earlier, LIT Campus is having widespread area with vegetation and is studded with enormous weeds which are difficult to control. Although periodical maintenance is carried out in regular intervals to clean-up the campus, nevertheless, needs a provision of hefty funds in university budget every year. The basic objective*

*of this route is to curtail the expenditure and treat the weeds and unwanted vegetation 'on spot' by spraying the microbial solution over it. To execute this, NCS Green Earth has developed a Weed-O-Friend strategy to control the weeds organically and convert it into compost on spot.*

*To implement the plan on trial basis, an area about (30 X 20 F approx.) has been identified nearby composing chamber which is usually dense with weeds. Using brush cutter, the weeds were cutted and a heap of waste biomass was made. Subsequently, the microbial solution was sprinkled over the heap to convert into manure on spot twice a week as displayed in the photographic images. The average time expected to convert the biomass into organic manure is about two months from the date of cutting.*

### Summary

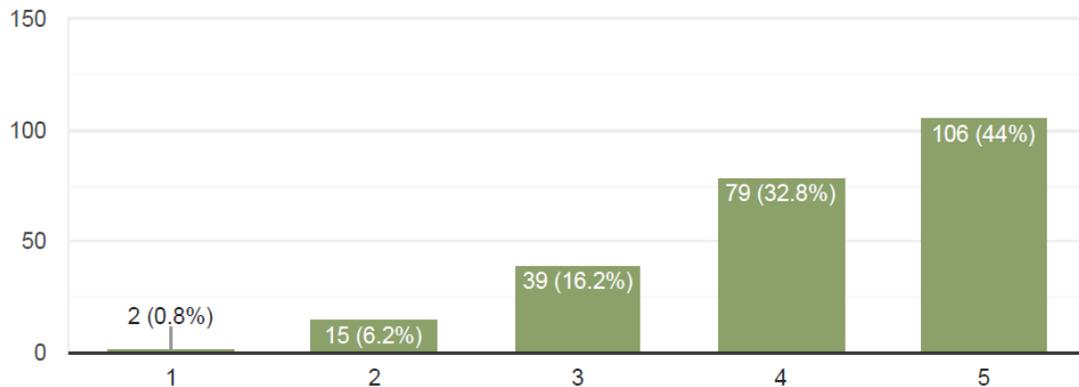
- 1** The **first route** of microbial digestion methodology for turning food waste from hostel mess to organic compost has been successfully implemented at LIT premises with a capacity of 150 Kg (approx.) per month. It is noteworthy that due to pandemic situation, the hostel mess is closed from last few months. To mitigate, currently the vegetable waste is procured from one of the known restaurants of city.
- 2** The **second route** of controlling weeds along with improving soil fertility vis a vis generating compost is quite promising under win-win situation. The experimental trials are in progress at different locations at LIT campus from last couple of months.
- 3** Studies are in pipeline to analyse the Carbon: Nitrogen ratio and other nutrients from the compost generated as such from both the routes.

## 5.3 Waste management

The Institute reuses the papers. It was informed newspapers were given in bulk to Raddi and not to Municipal Corporation **thereby not adding to landfill site**. Ample measures are taken to maintain hygiene. **No smell problem or health related issues due to the waste are there**. There are adequate numbers of bins present in all parts of building. **The waste does not pollute the ground or surface water**. The wastes from toilets are discharged to main drains through underground covered channels (Safety Tanks) thus avoiding any incident. **There is no problem of air pollution from waste as informed.**

## 5.4 Survey Results

An online survey was conducted to analyse the views about the Waste management practices adopted in Institute, following is the result received.



*Figure 5: Waste management practices in Institute*

There were mixed responses received the equal also the highest was for **rating 5 (Excellent) for 44%** and **rating 4 (Very good) at 33%**

## 5.5 Recommendations for a Sustainable Habitat

The following practice can be adopted for further up gradation.

- a) **Zero Waste** - The Institute can undertake a zero organic waste protocol. The following practices can be adopted as part of the same. The food waste generated by the students and staffs are taken by them to their own home, so that minimum waste is generated inside the premises.
- b) **Incinerators** - The Incinerators should be installed in Girls toilets for disposal of sanitary napkins
- c) **Twin Dual Litter Dustbin Bins** - There should be more number of dual litter dustbins at various locations in areas such as Canteen, open spaces. This would inculcate the awareness of waste segregation among students.

# Site investigation and data collection



*Storage of vegetable waste & weeds encapsulated with soil*



*Spraying of 'Quick Break' solution on organic waste to convert into Manure at Composting Centre*



*Composting Centre*

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