



# MAHARISHI MARKANDESHWAR (DEEMED TO BE UNIVERSITY), MULLANA, AMBALA HARYANA ENVIRONMENTAL AUDIT



Prepared by:

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Environmental Audit

## ENVIRONMENTAL AUDIT

MM(DU) conducted a Pre-Environmental Audit of its campus and facilities in 2019. The university (Internal Environmental Audit Team) evaluated environmental issues and is formulating an implementation plan to raise environmental awareness.

The present audit is a pre-audit to collect the details required for external auditing and Pre-audit activities. The pre-audit activities include the following.

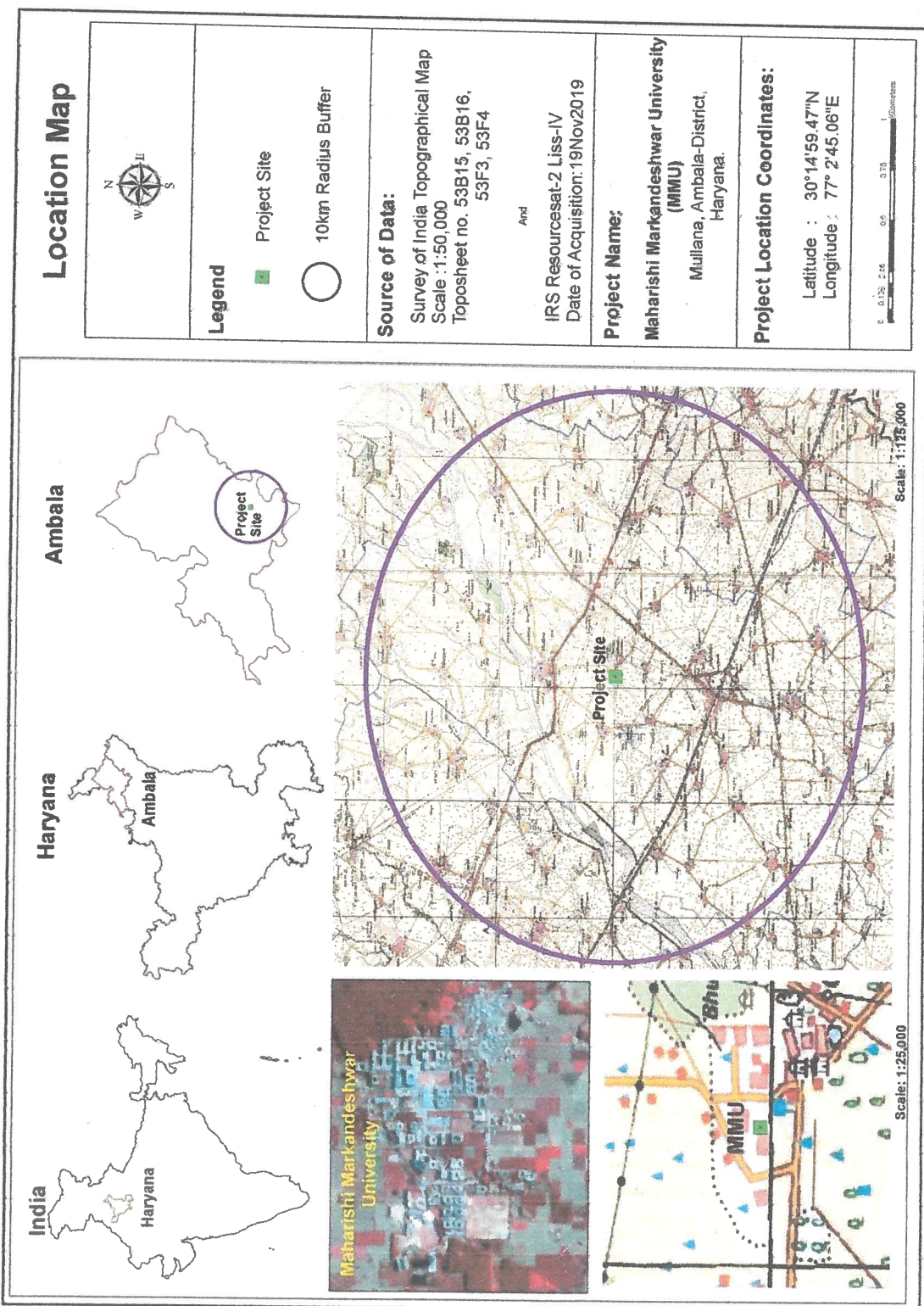
1. The institute area/division that are to be audited, need to be determined and selected.
2. The auditee was informed of the date of the audit enabled them to adjust and become a part to the concept.
3. The audit plan was designed in such a way that it accommodated changes based on information gathered during the audit and effective use of resources.
4. Environmental Audit Committee and assignment of responsibility were established.
5. The chosen working papers were collected. This facilitated the auditor's investigations on the sites.
6. The background information on the facility including the facility' organization, layout and processes, and the relevant regulations and standards, were collected.

### ONSITE AUDIT ACTIVITIES:

#### The onsite audit includes

1. The opening meeting is the first step between the Environmental Audit team and Estate Department. In this meeting the purpose of audit, the procedure and the time schedule were discussed.
2. Site inspection is the second step for onsite activity. In this step the audit team discovered matters which are important to the audit, but which were not identified at the planning stage.
3. Onsite phase of the audit developed a working understanding of how the facility manages the activities that influence the environment.
4. If there is one works assessed strengths and weaknesses of the auditee's management controls and risks associated with their failure were established.
5. Gathering audit evidence i.e. collecting data and information.
6. Communicated with the staff of the auditee to obtain most information.
7. Evaluated the audit evidence against the objectives established for the audit.

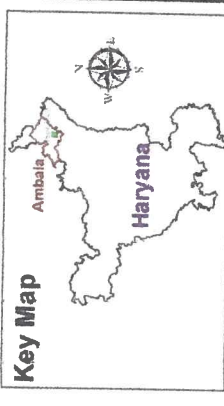




Map 1: Location Map MM(DU)



**Environment sensitivity Map**



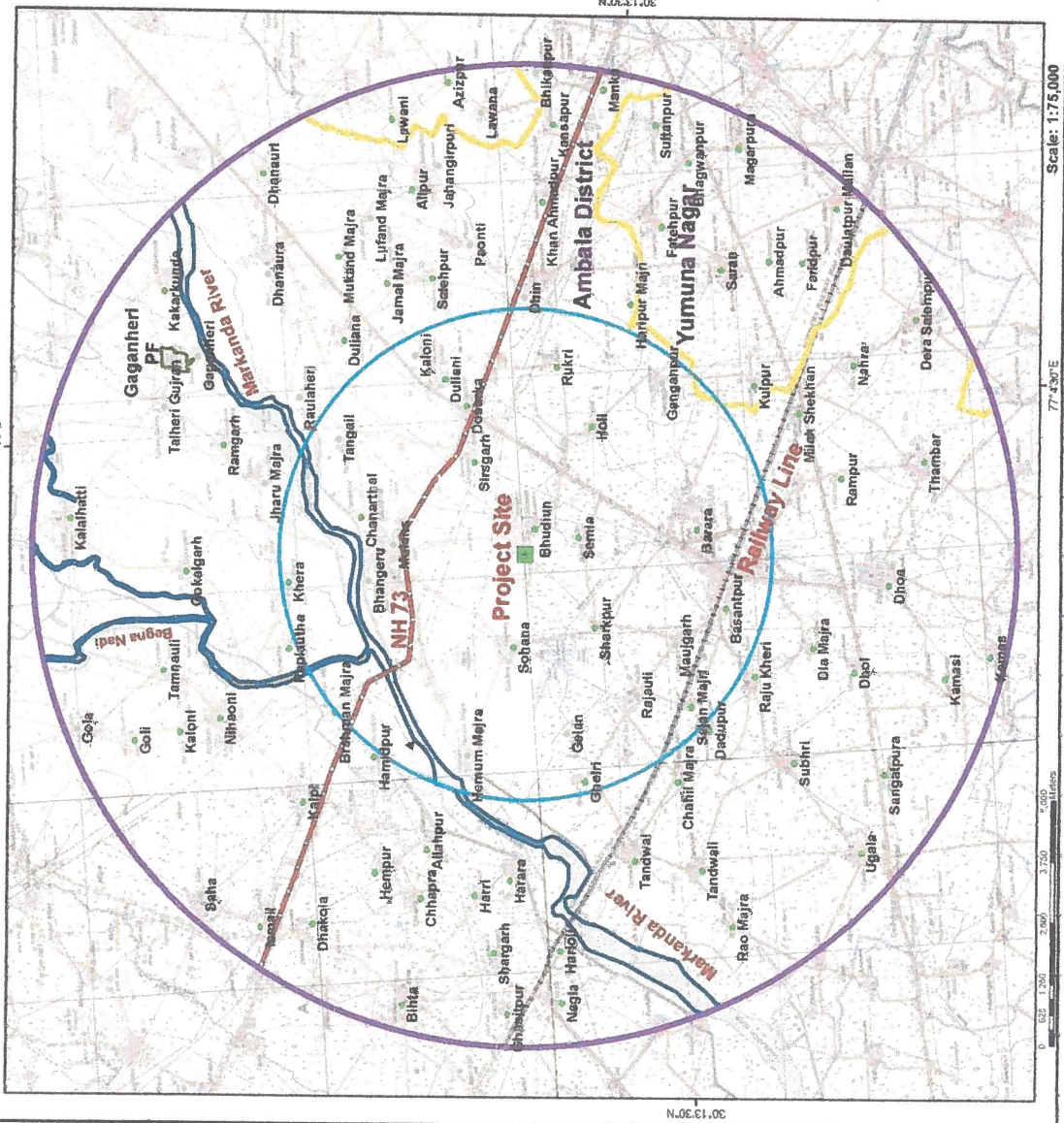
**Legend**

	Project Site
	Village Name
	District Boundary
	National Highway
	Railway Line
	River
	Forest
	5km Radius Buffer
	10km Radius Buffer

**Source of Data:**  
Survey of India Topographical Map  
Scale : 1:50,000  
Toposheet no. 53B15, 53B16,  
53F3, 53F4

**Project Name:**  
Maharshi Markandeshwar University  
(MMU)  
Mullana, Ambala-District,  
Haryana.

**Project Location Coordinates:**  
Latitude : 30° 14' 59.47" N  
Longitude : 77° 2' 45.06" E

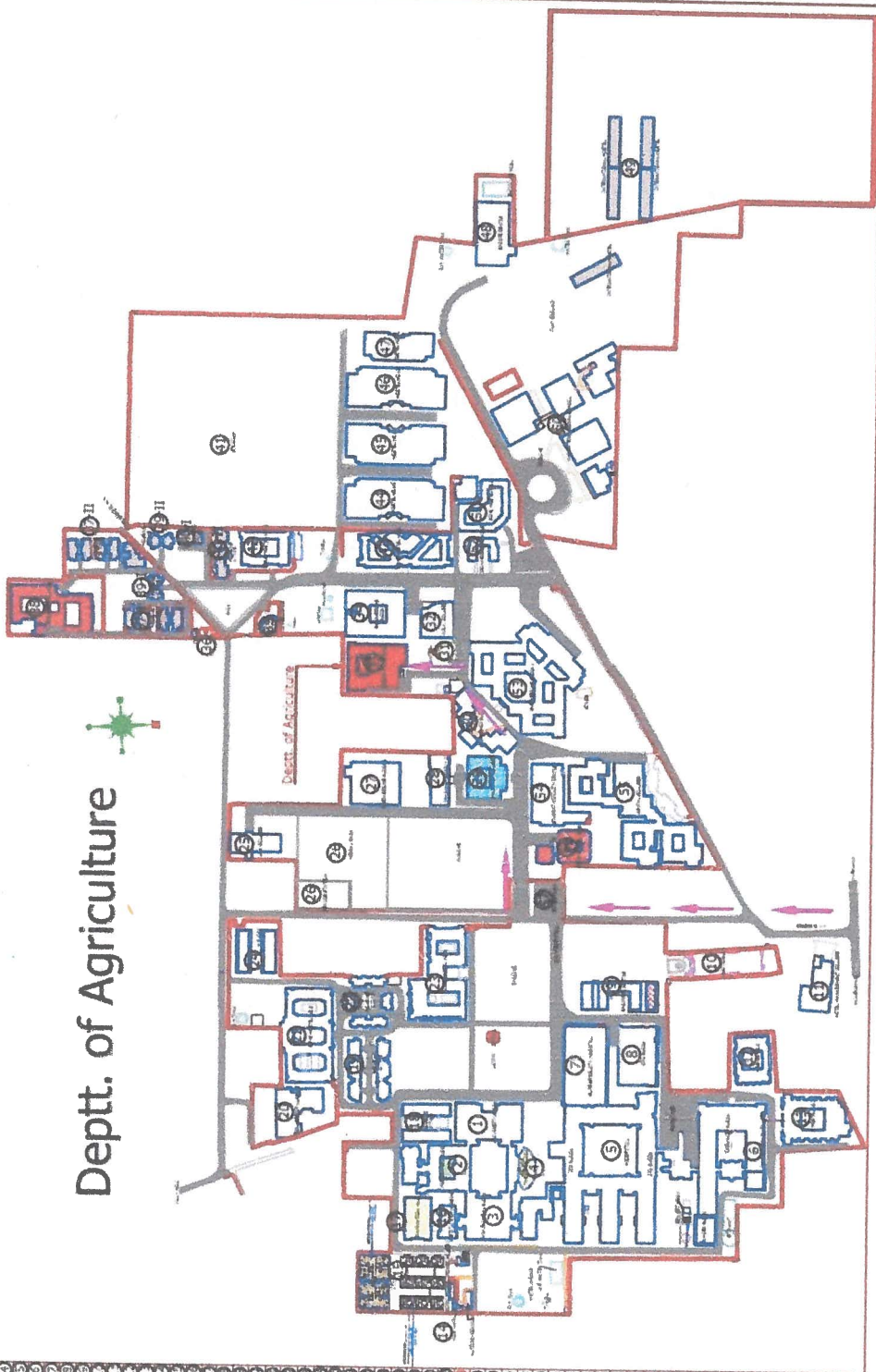


**Map 2: 5 & 10 Km Environment Sensitivity Map of MM(DU)**



# MAHARISHI MARKANDESHWAR (DEEMED TO BE UNIVERSITY)

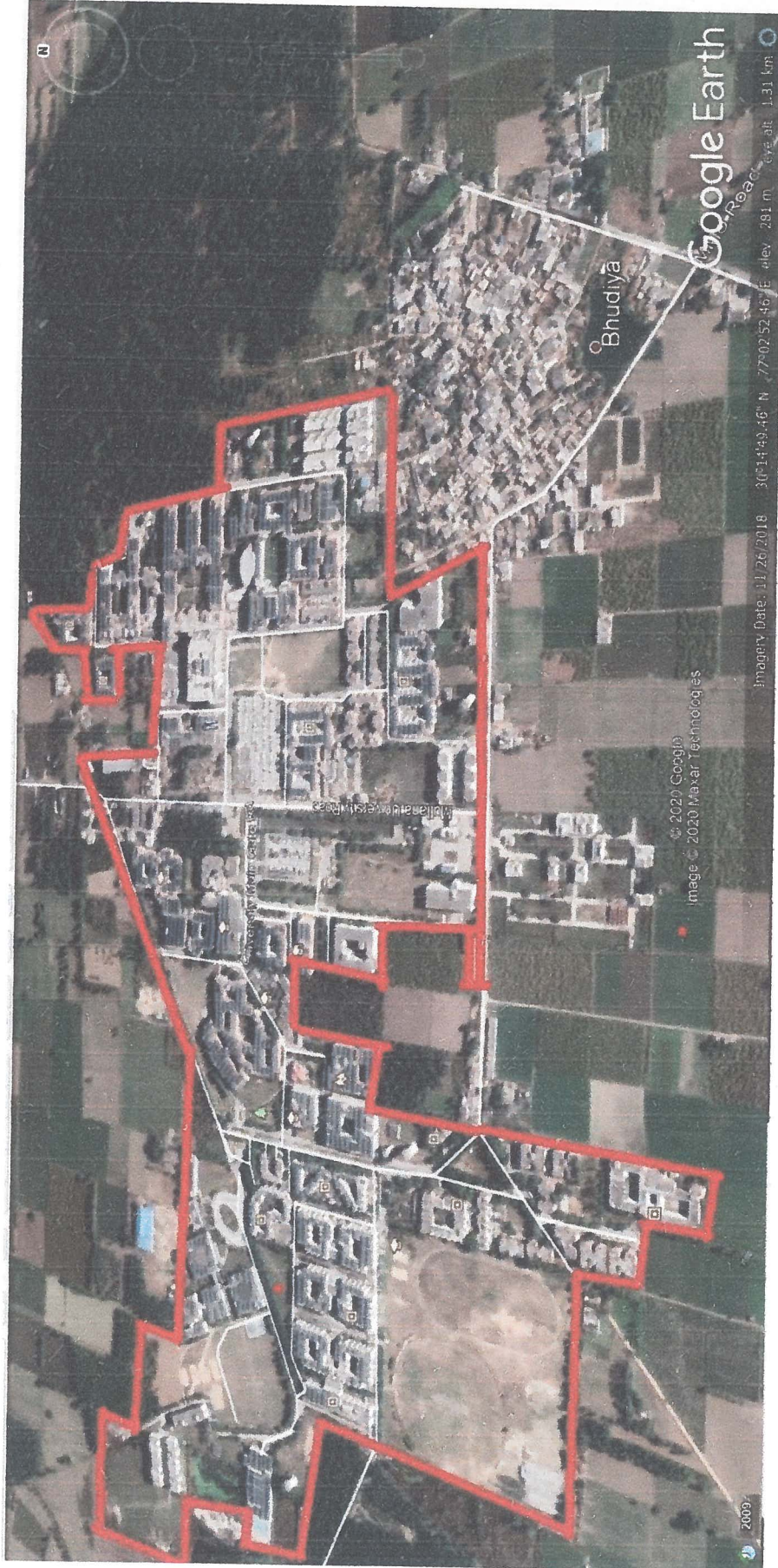
Deptt. of Agriculture



S No	LEGEND
1	UNIVERSITY BLOCK
2	PHI CLINICAL BLOCK
3	PHI CLINICAL BLOCK
4	LECTURE THEATRE BLOCK
5	PCO BLOCK
6	CASUALTY BLOCK
7	SUPER-SPECIALITY HOSPITAL
8	PCO BLOCK
9	PCO BLOCK
10	PCO BLOCK
11	PCO BLOCK
12	HOTEL MANAGEMENT COLLEGE
13	POSTEL NO 7
14	POSTEL NO 9
15	POSTEL NO 10
16	POSTEL NO 11
17	POSTEL NO 12
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50	POSTEL NO 45
51	POSTEL NO 46
52	POSTEL NO 47
53	POSTEL NO 48
54	POSTEL NO 49
55	POSTEL NO 50
56	POSTEL NO 51
57	POSTEL NO 52

Map 3: Layout map of MM(DU)





**Map 4: Google Image Map of MM(DU), Mullana**



**Land use/ Land Cover Map**

**Key Map**

Satellite Map



Scale: 1:15,000



**Legend**



MMU

Road

Building Blocks

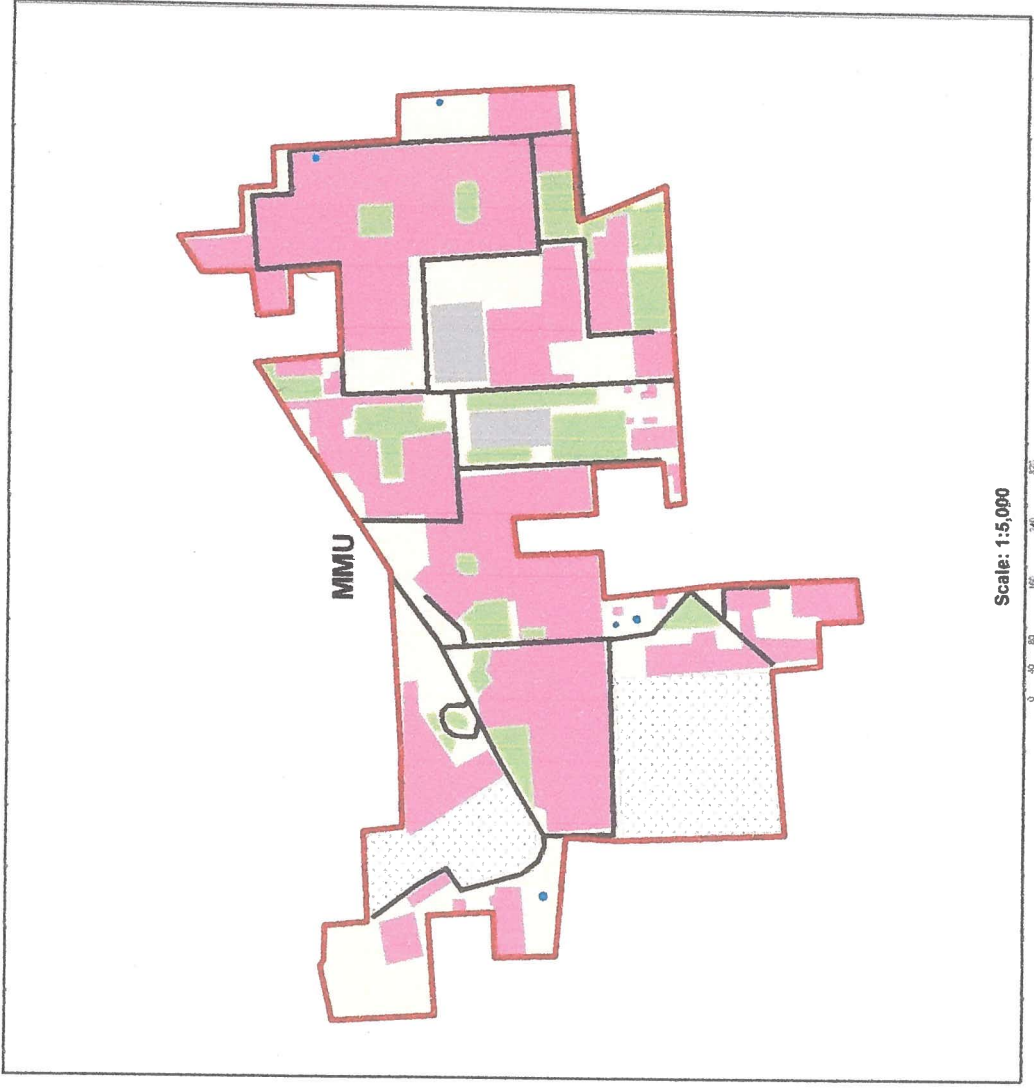
Green Belt Area

Play Ground

Water Tank

Open Land

Parking Area



MMU

Scale: 1:5,000



**Project Name:**  
Maharishi Markandeshwar University  
(MMU)  
Mullana, Ambala-District,  
Haryana.

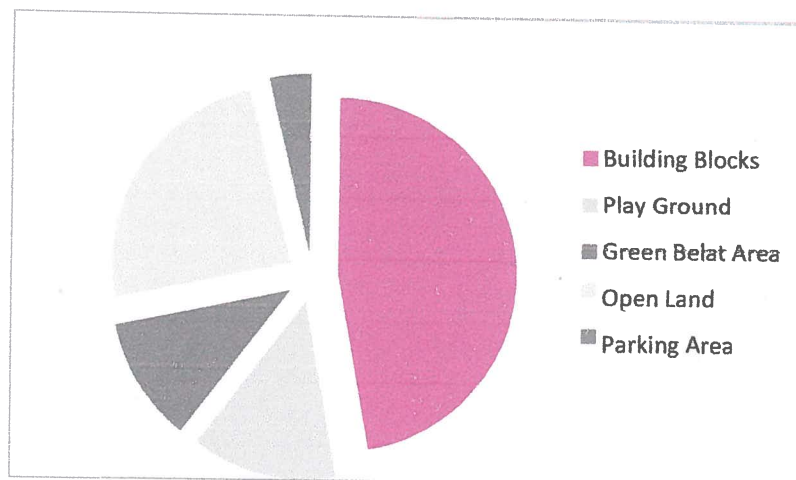
**Project Location Coordinates:**  
Latitude : 30°14'59.47"N  
Longitude : 77° 2'45.06"E

Map 5: Land use map of MM(DDU)



**TABLE 1. LAND USE/ LAND COVER CLASSIFICATION**

S.No.	Class	Area in Ha	Percentage
1	Building Blocks	25	47.17
2	Play Ground	7	13.21
3	Green Belt Area	6	11.32
4	Open Land	13	24.53
5	Parking Area	2	3.77
Total		53	100



**Figure 1. Graphical Presentation of Land Use/ Land Cover classification**

**PROCEDURE FOLLOWED:**

One team was formed consisting of two members under the guidance of Mrs. Daksha Gupta, both the groups collected data on the assigned topics. The assigned topics were as follows.

1. Identification of emission sources
2. Analysis of water usage
3. Analysis of waste generation and disposal
4. Identification of plant species

All the data were united and based on these a report was formulated.

Based on our assessment, the different sources of carbon-dioxide emitted to our campus are:

1. 82 Vehicles
2. 16 DG sets
3. Electric Motors
4. Refrigerators
5. Air conditioners





## 6. RO water Plants

- I. Total number of Vehicles (Ambulances and college busses) and other institutional vehicles for officers are 82, approx.400 no. of private vehicles. There are 300 number of bikes and scooters in the MM(DU) campus, which in turn proves us that these vehicles may contribute to high carbon-dioxide emission. There are 450 refrigerators, 400 No. of air conditioners in the MM(DU) campus. The students, teaching and non-teaching staff and the visitors also contribute to carbon-dioxide emission.
- II. Analysis of water usage of the MM(DU) campus possesses many water outlets. There are total 2890 toilets in hostels, 650 in staff rooms and 108.
- III. Analysis of waste generation and disposal wastes cannot be avoided in any environment. Wastes can be classified as biodegradable and non-biodegradable wastes. Biodegradable wastes include food wastes; which can be easily decomposed by the bacteria in soil. But non-biodegradable wastes are those which cannot be degraded by any micro-organism and remain as such for many years.
  1. **Canteen:** The food waste generated from the canteen is collected and given to the in-house vermicomposting unit. Plastic waste is generally less generated from the canteen. The plastic waste kept at different blocks of the campus
  2. **Library:** The most generated waste is paper waste. It is taken for recycling.
  3. **Store:** Not much waste is generated. But the paper waste and plastic covers are collected, separated and kept at blocks of the vermicompost compound wall.
  4. **Office:** Paper waste generated are recycled and reused.
  5. **Garden:** Plastic and paper waste is comparatively less. Fallen leaves are collected and used in vermicomposting unit
  6. **Auditorium:** The wastes are collected after each programed and dumbled it.
  7. **Bathroom:** The wastes are collected and burned in an incinerator behind the convent.
  8. **Classrooms:** Paper wastes are collected in the waste basket and recycled.
  9. **Laboratory:** The broken glass wastes and the useless instruments are disposed for recycling after thorough washing.
  10. **University Premises:** Plastic waste generated is usually less. But paper waste is generated in a larger amount.



## INITIATIVES TAKEN BY THE UNIVERSITY TO MAKE THE CAMPUS ECO- FRIENDLY

D.G. sets are the direct emission source of pollutants. Therefore low sulphur diesel is used as per the norms. However the use of LPG in canteen & hostel kitchen and limited movement of vehicles are the other sources of emissions in the MM(DU) campus.

**TABLE 2: DG SETS USED**

S. No.	Particular	KVA
1.	Oxygen Plant	500+200+200
2.	Mortuary	320
3.	L.T plant AC	200
4.	Hostel no-6	200+200
5.	SSB	1000+500+200
6.	MBA	500+320
7.	Temple	320
8.	Hostel no- 13	320
9.	Hostel no- 13	200
10.	PG Hostel- 15	35
11.	School	200



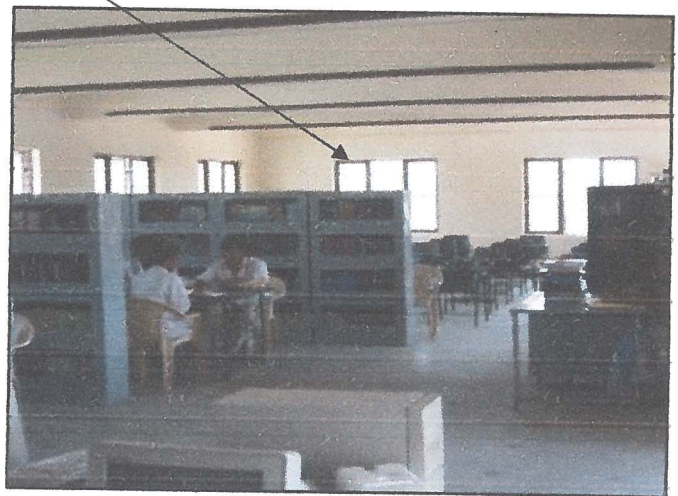
**DG Sets**



**CFL's & LED's**



**Large windows**

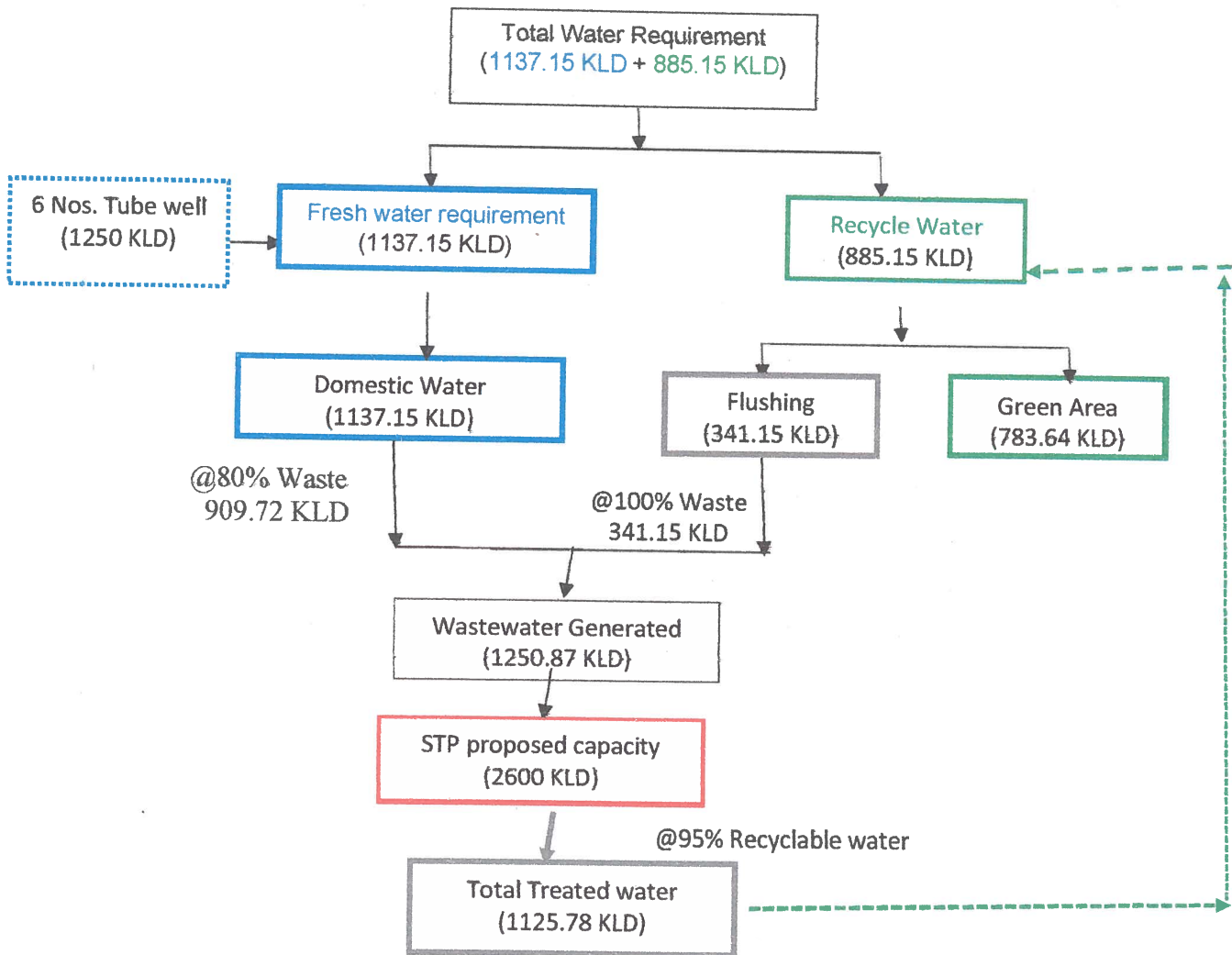


**FIGURE 2: DG SETS , CFL's & LED's and LARGE WINDOWS**



**WATER MANAGEMENT:**

- Fresh water requirement of MM(DU) campus is max 1137.15 KLD and the requirement for treated/ recycled water is 885.15 KLD.
- The water demand is met through 4 numbers of Bore wells installed within the campus, harvested rainwater and tankers supply from available sources. Total 1137.15KLD water is extracted from the bore-wells.



**FIGURE 3: WATER BALANCE**



**TABLE 3: WATER REQUIREMENT**

S.No.	Particulars	Occupancy	Rate of water demand	Total Water Requirement	Water Requirement (KLD)	
				(KLD)	Domestic	Flushing
					(Fresh Water)	(Recycled Water)
1	Hospital	940	450	423	296.1	88.83
2	OPD	2000	45	90	63	18.9
	Students	6700	45	301.5	211.05	63.315
3	Residence	300	135	40.5	28.35	8.505
4	Hostel	5000	135	675	472.5	141.75
5	Floating population (Staff)	2000	45	90	63	18.9
6	Visitor	300	15	4.5	3.15	0.945
<b>Total</b>					<b>1137.15</b>	<b>341.15</b>
<b>Green Area</b>			181400.00 Sq.m.	4.32 l/sq.m.		<b>783.64</b>

- Treated water is used for Horticulture= 783.64 KLD
- Therefore, total recycled water = 600 KLD
- Storm Water Collection structures are designed in accordance with the Indian Standard (IS 14961:2001) BIS guidelines for rainwater harvesting by roof water collection system.
- In this system, roof top forms the catchment.
- Roofing of the tank is painted with non-toxic paints.
- Storage tanks are made using RCC structure lined with water proofing material.
- This water is used within the campus other than drinking purpose such as for maintaining the garden within the premises by vertical water sprinkling, moping etc.
- Storm water collection tanks are located at different places in the campus with the total capacity of 250 KL.
- Total capacity for storage of harvested rainwater is 250 KLD.



- The rainwater collected from the roof top area is conveyed into the rainwater harvesting system consisting of de-silting cum filter chamber, oil and grease separator and pits for recharge into ground aquifer.

## WATER HARVESTING

### Rainwater Harvesting System

There are 12 Rainwater Harvesting collection points followed by 2 storage tanks of capacities 15000 and 25000 litres.

**TABLE 4: RAINWATER HARVESTING AREA**

S.No.	Details	Values
1	Roof top Area (m <sup>2</sup> )	152875
2	Green/Open Land Area (m <sup>2</sup> )	188400
3	Road/Paved area(m <sup>2</sup> )	109795
4	Average Annual rainfall for Ambala District (Source: CGWA Distt. Ambala)	1.076 m (1076 mm)
5	Co-efficient of evaporation, spillage and first flush wastage	0.8
6	Runoff coefficient for roof top (0.7-0.9)	0.8
7	Runoff coefficient for paved area (0.5-0.7)	0.6
8	Runoff coefficient for open land (0.3-0.6)	0.3

The rainwater harvesting done from the Rooftop area, Green Area, Paved Area.

**TABLE 5: RAINWATER HARVESTED**

S.No.	Details	Calculation	Rainfall Runoff (m <sup>3</sup> /Annum)	Rainfall Harvested @70% Fraction (m <sup>3</sup> )
1	Roof top Area	152875x1.076x0.8	131594.8	92116.36
<b>TOTAL</b>				92116.36

Total available rainwater for year = 92116.36 KLY

Considering water available for one day = **252.34 KLD**

Available rainwater harvesting tank capacity: **250 KLD**



1. The wastewater generated from the campus is treated in Sewage Treatment Plant having, there are 02 (Two) STPs of capacity 2.6 MLD installed within the premises.
2. The installed STP in the campus for treatment of domestic effluents and the treated water will be reused in flushing, cleaning and gardening purpose once the water is treated according to the standards.
3. The S.T.P is of modular construction and the treatment process consists of four stages:

**Stage 1: Primary Treatment**

Inlet chamber, Oil & grease, collection cum pumping sump

**Stage 2: Secondary or Biological Treatment**

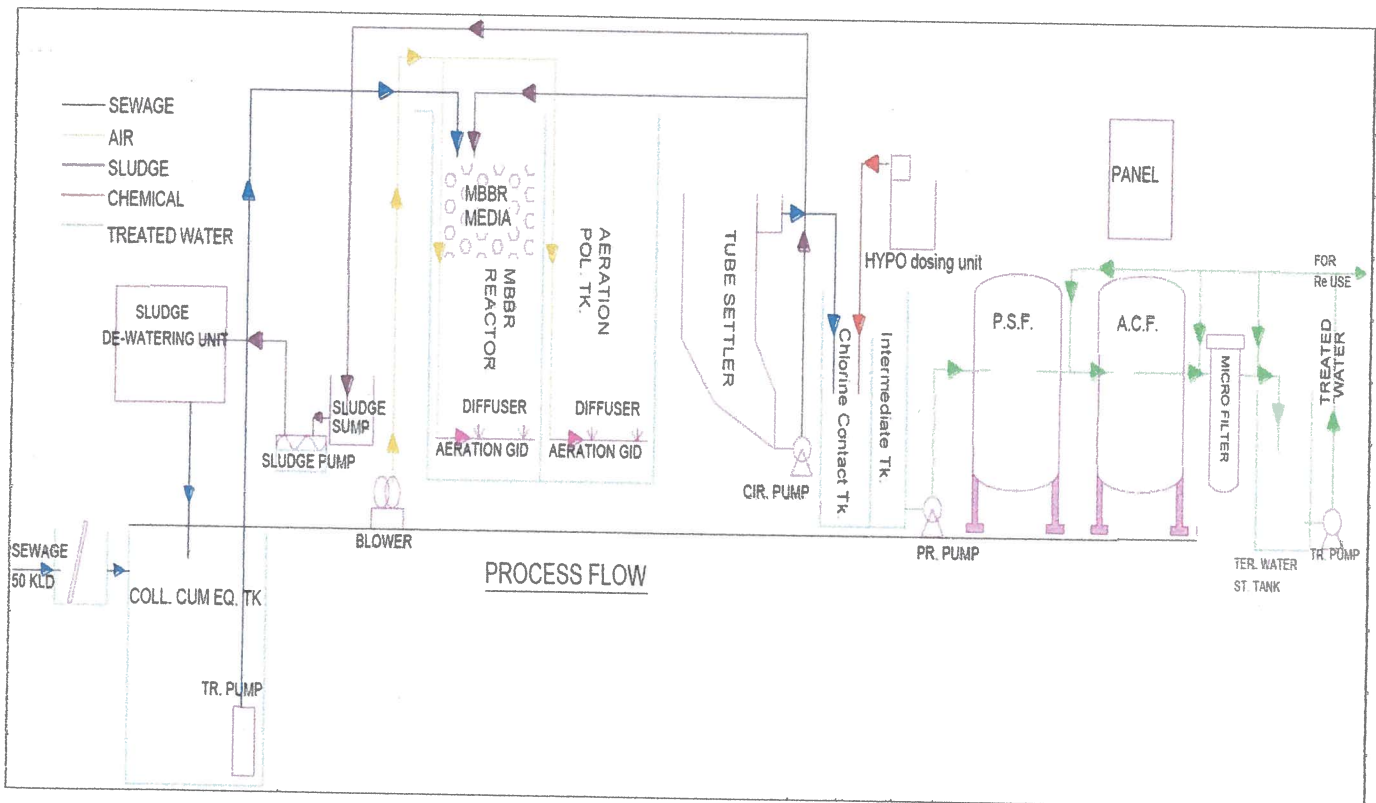
M.B.B.R Systems, Secondary Clarifier

**Stage 3: Tertiary Treatment**

Treated Water Tank, Pressure Sand Filter, Activated Carbon Filter

**Stage 4: Sludge Treatment**

Sludge Bed



**FIGURE 4: FLOW DIAGRAM OF SEWAGE TREATMENT PLANT**



The process units along with their brief purpose to be used for the treatment of the wastewater are given in the following table:

**TABLE 6: UNIT PROCESSES**

S.NO.	PROCESS UNIT	BRIEF PURPOSE
1.	Inlet Chamber	Provided before the collection sump to take care of the turbulence in incoming flow.
2.	Oil & grease	Remove oil & grease.
3.	Collection tank	Collect water.
4.	Blowers & Diffused Aeration System	For supplying air in the aeration tank.
5.	Clarifier	For separation of bio solids.
6.	Treated Water Tank	To store the treated effluent for further polishing
7.	Pressure Sand Filter	For removing the fine biomass escaping the tube settler.
8.	Pressure Activated Carbon Filter	For removing orders & color.
9.	Polyelectrolyte Dosing System	For thickening of the sludge.
10.	Sludge bed	For all-weather dewatering of the sludge.

## **EFFORTS FOR CARBON NEUTRALITY**

The carbon neutrality or having a net zero carbon footprint refers to achieving net zero carbon emissions by balancing carbon released with an equivalent sequestered or offset method. Simply, carbon neutral means removing as much carbon dioxide from the atmosphere as we put in.

### **Carbon emission processes in the campus:**

There are no direct carbon emission processes or activities in the campus except the use of LPG in canteen & hostel kitchen and limited movement of vehicles. The use of electricity, water and stationery are resulting in the carbon emission indirectly.

- The major sources of direct carbon emission are from the petrol/diesel driven





vehicles, human breathing, consumption of LPG, waste disposal and indirect sources are electricity, paper/stationary, etc.

- MM(DU) premises includes educational institute, well equipped hospital, boys and girls hostel for students, residence for institutional staff and other hospital staffs.

#### **University Carbon Offsetting Initiatives:**

##### **1. Reducing the use of electrical energy:**

- Solar water heaters are widely used in hostels for supplying hot water.
- Photo voltaic cells/ solar panel are used for electricity generation.

##### **2. Reducing the use of stationery**

- Communication to the faculty through conventional paper circulars has been almost replaced with the use of e-mail service or text message.
- Whole campus has the Wi-Fi accessibility.
- Admission to the campus through on-line portal is initiated.

##### **3. Increasing-vegetation on the campus:**

- MM(DU) is situated in a lush green environment.
- Every building in the Campus is surrounded by trees and lawns.
- Well planned plantation of wide varieties of trees and shrubs decorate the campus and the campus looks beautiful.
- Plantation programmes are undertaken on the campus to increase the number of plants.
- Varieties of plant species are used in the campus for the development of green belt.
- Total green belt area measuring **1,88,400** Sq.mtr all over the campus with varieties of species.

#### **HAZARDOUS WASTE MANAGEMENT:**

##### ***Sources of hazardous waste generation:***

Waste oils (HSD) from DG sets, damaged CFL's, empty paint boxes & Laboratory waste.

##### ***Categories of hazardous waste:***

- Contaminated broken glassware like test tubes, beakers, pipettes.



- Left over chemicals.
- Spilled chemicals
- Used nutrient media in Biotechnology, Nursing, medical college, Microbiology Lab.
- The total amount of waste generated from different sources such as canteen, laboratories, administrative departments, spent oil from DG sets and hostels.
- The waste from canteen kitchen & some amount of municipal waste is used for animal feeding or go through the process of vermicomposting which is used as manure with the campus.
- Polythene bags are totally banned in the state of Haryana thus other non-decomposable are separated before disposing the organic wastes.
- Biomedical waste from the hospitals are segregated in the color-coded bins and given to Authorized operator of Common Bio Medical Waste Treatment Facility.
- Colored dustbins are kept for easy segregation of the waste from the campus.
- Organic waste from garden is swept & collected in a pit and used as manure in the garden.
- The E-waste like fans, lights, ACs, etc. are handed to the authorized E-waste recyclers to make the best out of it.
- The municipal waste from the campus is segregated at the sources and handled with care to ensure that the “**The clean and green**” environment is maintained.
- The trash from girls’ and boys’ hostel is segregated and collected daily from door to door to ensure clean and hygienic atmosphere within hostel building.
- Safe, ventilated and secure place is developed for storage of bio medical waste in Color coded containers as per **Biomedical Waste Management Rules, 2016**.
- Estimated quantity of the municipal waste shall be approx. 650Kg/day. The solid waste generation is mostly from hospital in the form of biomedical waste which will be handed over to Enviro Engineers Haryana, authorized by the Haryana State Pollution Control Board for the compliance of Biomedical Waste Management Rules, 2016.





**FIGURE 5: SEGREGATION OF WASTE IN COLOR CODED BINS**

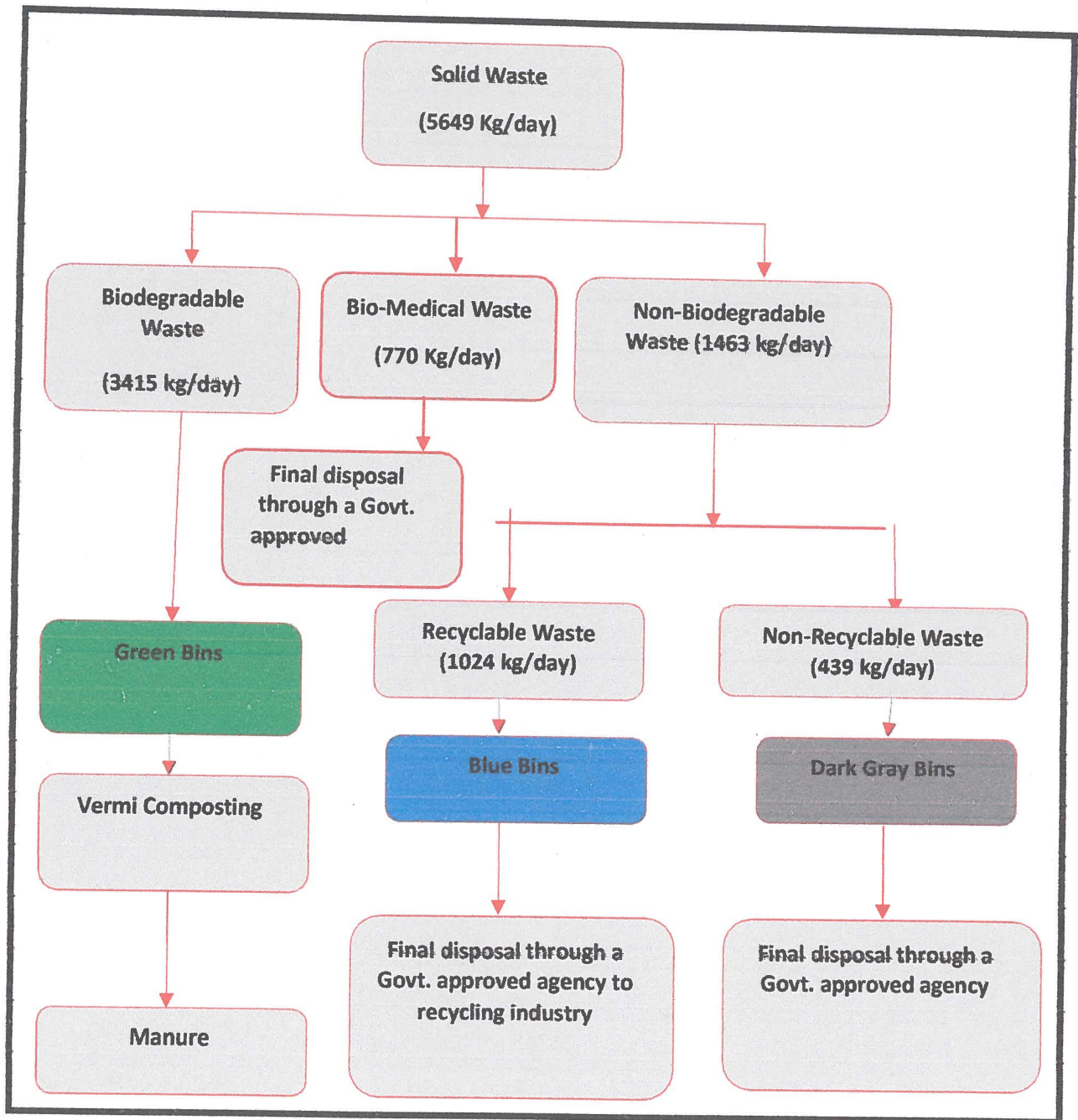
282 dustbins are used all over the campus. At every place two dustbins red and blue are provided for the purpose of segregation of waste at the source. Red dustbin is for wet waste i.e. food, vegetables etc. and Blue dustbin is for dry waste i.e. plastic, glass and paper waste.

**TABLE 7: WASTE GENERATION**

S.No.	Particulars	Occupancy	Rate of Waste Generated (Kg/Cap/Day)	Waste Generated (Kg)
1	Hospital	940	0.5	470
2	OPD	2000	0.15	300
3	Students	6700	0.25	1675
4	Residence	300	0.5	150
5	Hostel	5000	0.5	2500
6	Floating population (Staff)	2000	0.25	500
7	Visitor	300	0.15	45
	Green Area	<b>44.82 Acre</b>	0.2kg/acre/day	<b>8.96</b>
<b>Total</b>				<b>5648.96</b> <b>~ 5649 KG</b>

(Source: For Waste Collection, Chapter 3, Table 3.6, Page no. 49, Central Public Health & Environment Engineering Organization, Ministry of Urban Development, (Government of India, May 2000)

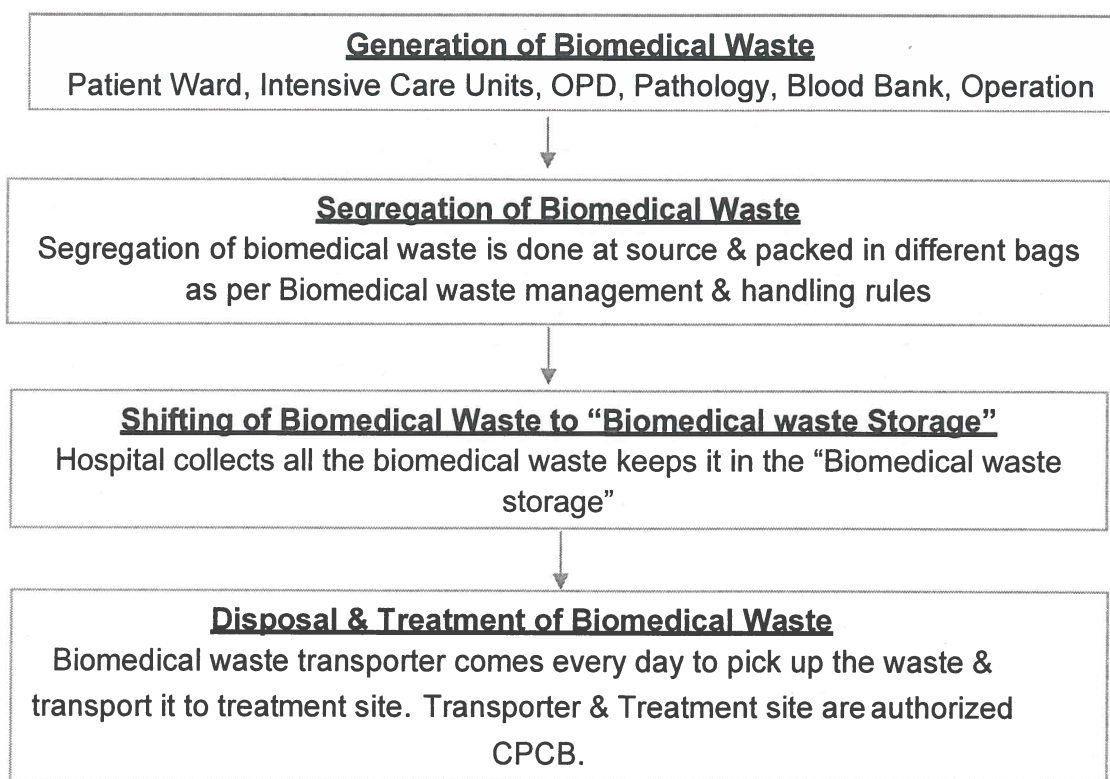




**FIGURE 6: SOLID WASTE MANAGEMENT SCHEME DURING OPERATION PHASE**



## BIOMEDICAL WASTE MANAGEMENT



**FIGURE 7: CLASSIFICATION OF GENERATED WASTE IN CAMPUS**

### **E-WASTE MANAGEMENT:**

Non-working computers, monitors and printers are discarded and scrapped on a systematic basis.

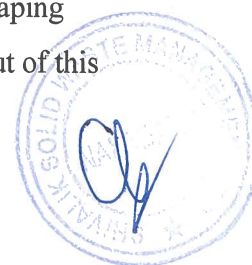
- Obsolete Computers, printers and other equipments used for Information Communication Tools (ICT) are donated to charitable organizations if they are in working condition.
- Computers, Printers and other ICT equipments which cannot be used are sold to vendors who do the recycling.

### **Various initiatives taken by the university to make the campus eco-friendly:**

- Cleanliness Drive
- Tree plantation at a regular interval

### **PLANTATION:**

Out of total campus area of 451071.30 sq.m. area earmarked for green belt and landscaping is 188400 Sq.mtr. There are total 33410 no. of plants of 156 species in the campus. Out of this



3646 trees, 577 are shrubs, 11966 are herbs and remaining 221 are climbers. Out of 3646 trees, 210 trees are present in the botanical garden. 33410 plants in MM(DU) Mullana contribute to the Oxygen supply that people utilize.

**TABLE 8: IDENTIFICATION OF PLANT SPECIES IN THE MM(DU), MULLANA CAMPUS**

S.No.	Scientific Name	Common Name
1	<i>Polyalthia longifolia</i>	Ashoka
2	<i>Acoelorrhaphe wrightii</i>	Everglades palms
3	<i>Terminalia arjuna</i>	Arjuna
4	<i>Dalbergia sissoo</i>	Shisham
5	<i>Borassus flabellifer</i>	Tal
6	<i>Ficus benamina</i>	Weeping fig
7	<i>Phyllanthus emblica</i>	Amla
8	<i>Terminalia chebula</i>	Harad
9	<i>Delonix regia</i>	Gulmohar
10	<i>Thuja compacta</i>	Green morpankhi
11	<i>Duranta spp.</i>	
12	<i>Celtis australis</i>	Khirk
13	<i>Eucalyptus spp.</i>	
14	<i>Plumeria pudica</i>	Wild plumeria
15	<i>Hibiscus rosa-sinensis</i>	China rose
16	<i>Ipomoea carnea</i>	Bush morning glory
17	<i>Cassia fistula</i>	Amaltas
18	<i>Ailanthus spp.</i>	
19	<i>Plumeria alba</i>	white frangipani
20	<i>Rosa indica</i>	Rosa indica
21	<i>Cascabela thevetia</i>	Peeli Kaner
22	<i>Catharanthus roseus</i>	Bright eyes
23	<i>Combretum indicum</i>	Rangoon creeper
24	<i>Lilium spp.</i>	
25	<i>Dracaena trifasciata</i>	Snake plant
26	<i>Melaleuca viminalis</i>	Weeping bottlebrush

The other variety includes ornamental flowering trees like Amaltas, Golmohar, Arjuna, Bottlebrush, etc. Being situated in the village area, the MM(DU) is devoid of various atmospheric pollutants from vehicles as well as by other external means.

- Tree plantation activity is regularly undertaken in the campus. The campus has a comforting lush green environment. The university lawns are well maintained, and gardeners are appointed to take good care of the greenery of the campus.

Apart from the above plantations, lawns are being maintained in front of many departments in MM(DU)



campus with flower pots and seasonal. Both sides of large lawns are planted with rows of trees and whole campus is surrounded by canopy of trees.

**FIGURE 8: GARDENS IN THE MM(DU) CAMPUS**



### **SAFETY AUDIT:**

Main hazards identified for the project include hazards pertaining to fires in buildings and diesel storage areas, earthquakes and LPG leakage and an ERP pertaining to these has been described in the report.

### **EMERGENCY PREPAREDNESS:**

- Fire Alarm and Fire Fighting
- Personal Protective Equipment
- Communication System
- Training
- Emergency Control Centre
- Sand buckets was placed on each floor of commercial offices.

### **ECO CLUB- THE ENVIRONMENTAL CLUB**

The idea behind creation of an environmental club is to sensitize the students about eco-friendly activities and encourage them to work with ecology-economy balance in mind.

The club meets between two to four times per month

### **INSTITUTE SOCIAL RESPONSIBILITY**

The NSS volunteers at MM(DU) are involved in a wide spectrum of activities such as

- Conducting health camps in rural areas
- Spreading awareness towards Swachh Bharat Abhiyaan, SWADHAR Greh and Digital India
- Planting trees
- Organizing Blood Donation Camps
- Advocacy on community health
- Organizing Nukkad Nataks to spread information on Social and Environmental issues.

