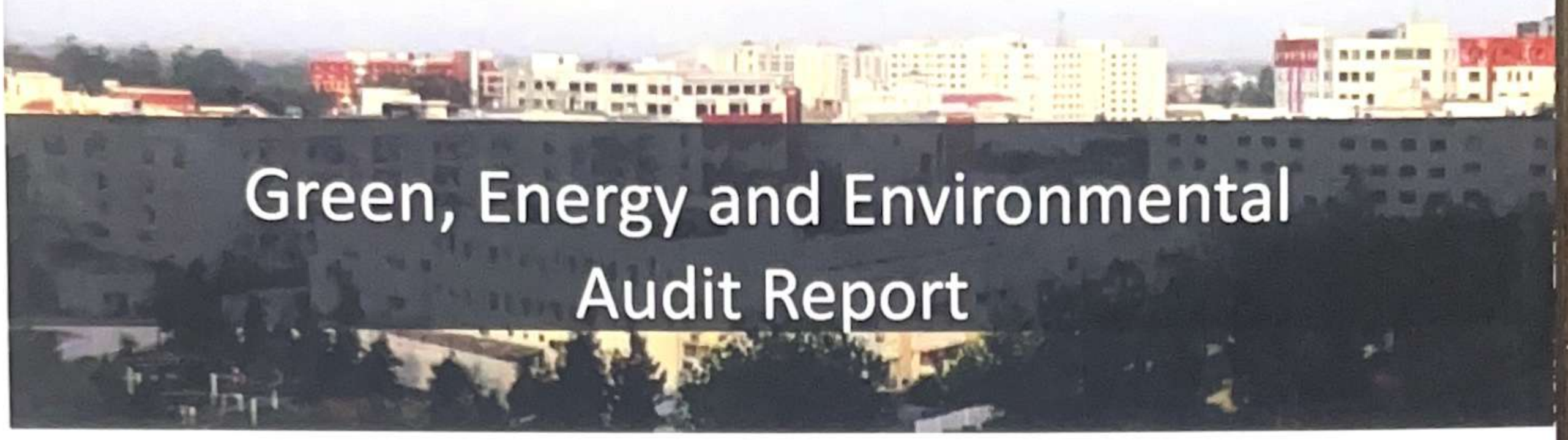
TEERTHANKER MAHAVEER UNIVERSITY



Green, Energy and Environmental Audit Report

Date: 22nd October 2021

Client: Teerthanker Mahaveer University
Prepared by: GreenTree Global

Intent

This report is developed for the Teerthanker Mahaveer University in Moradabad. It identifies energy, water and resource conservation measures along with information related to the ways of implementing the identified measures in order to make the campus environmental friendly and safe for the occupants.

Acknowledgement

GreenTree Building Energy Pvt Ltd express it's gratitude to Teerthanker Mahaveer University for their constant support during from the audit till the preparation of this report.

GreenTree appreciate the active support from the university staff and the team member would also take this opportunity to thank the site staff for their coordination & co-operation in helping, understand and gather information during the site visit.

Disclaimer

The report has been prepared for Teerthanker Mahaveer University, Moradabad. The information represented in the report is prepared based on information obtained from various sources, the data available to us, parameters observed at the site, and discussions held with the campus's relevant officials.

The detailed Information and data analysis presented in this report are valid as on the site's date of visit and study period. The work presented represents our best efforts and judgments based on the information available when this report was prepared. GreenTree makes no assurances as to the accuracy of any such information or any conclusions based thereon.

The observations made in this report are only an indication of the facility's performance based on our assessment. They should not be considered as a comment on the functioning of the facility. The observation is purely based on the data recorded at that point of time.

GreenTree is not responsible for the reader's use of, or reliance upon, the report, nor any decisions based on the report. Readers of the report are advised that they assume all liabilities incurred by them, or third parties, due to their reliance on the report or the data, information, findings, and opinions contained in the report.

Executive Summary

A nation's growth starts from its educational institutions, where the ecology is thought as a prime factor of development associated with the environment. A clean and healthy environment aids effective learning and provides a conducive learning environment. Nowadays, educational institutions are becoming more sensitive to environmental factors as more concepts are being introduced to make them eco-friendly. To preserve the campus environment, various viewpoints are applied by several educational institutes to solve their environmental problems, such as the promotion of energy savings measures, usage of re-cycled water, water-use reduction, rainwater harvesting, etc. The activities pursued by colleges and universities can create a variety of adverse environmental impacts.

The report aims to identify the scope for improvement and recommend implementable and economically viable solutions in achieving the most optimized utilization of energy and water on the campus. Suppose self-inquiry is a natural and necessary outgrowth of quality education. In that case, it could also be stated that institutional self-inquiry is a natural and necessary outgrowth of a quality educational institution. Therefore, it is imperative that the college evaluate its own contributions toward a sustainable future.

In Teerthanker Mahaveer University, Moradabad the audit process involved initial discussion with management to clarify policies, activities, records, and the cooperation of staff and students in the implementation of mitigation measures. This was followed by interaction with staffs, review of records, observation of practices, and observable outcomes. In addition, the approach ensured that the management and staff are active participants in the green auditing process in the college.

The baseline data prepared for the university will be a useful tool for campus greening, resource management, planning of future projects, and a document for implementation of sustainable development of the university. Existing data will allow the university to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize future projects. We expect that the management will be committed to implementing the green audit recommendations.

Recommendation for the establishment of "Core Management Team" on campus to ensure that the provisions as suggested and advised in the audit report are actualized or their potential is realized thoroughly, we further suggest constituting a CORE MANAGEMENT TEAM on campus, comprising senior administrative officers, staff members, teachers, and student ambassadors. The team will be responsible for overseeing the implementation of the identified measures, which will imperative to its success on the ground.

Proposed core team members will include:

- University owner and members from the management
- Staff members responsible for university facilities
- Student ambassadors as a support team

The team will, thus, be responsible for:

- Identifying specific objectives
- Developing a GREEN CAMPUS ACTION PLAN
- Communicating the plan to other student bodies
- Implement conservation measures
- Motivate partner or sister university campuses.

Abbreviation

LED	Light Emitting Diode
PV	Photo Voltaic
ODP	Ozone Depleting Potential
GWP	Global Warming Potential
CFL	Compact Fluorescent Lamp
CPCB	Central Pollution Control Board
STP	Sewage Treatment Plant
ETP	Effluent Treatment Plant
DG	Diesel Generator
NBC	National Building Code
EPI	Energy Performance Indicator

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1. About the University

Teerthanker Mahaveer University is located on National Highway-24, Moradabad. The University stands committed to the ideals of Lord Mahaveer - Right Philosophy, Right Knowledge, and Right Conduct in all the spheres of activity and aspires to be recognized as the ultimate destination for world class education. The multi-disciplinary University offers career oriented programmes at all levels i.e. UG, PG and Doctoral degrees across diverse streams which includes

1. Medical
2. Dental
3. Pharmacy
4. Nursing
5. Paramedical Sciences
6. Physiotherapy,
7. Hospital Administration,
8. Physical Education,
9. Management,
10. Engineering,
11. Law,
12. Fine Arts,
13. Jain Studies, and
14. Agriculture to meet rising aspirations of the youth.

FIGURE 1: ARIAL VIEW OF UNIVERSITY

TABLE 1: PROJECT DESCRIPTION

Building Category	Educational
Name of the Building	Teerthanker Mahaveer University, Moradabad
Total plot area as per site	140 acre
Building Occupancy	13000 ppl approx.
Teaching Staff	816
Non Tech-Staff	806
Students	8723
Hospital	800 bed

Education at TMU is not just about books and classrooms but also about overall personality development and honing special skills. It provides an environment conducive to teaching and learning adequately supported by innovative academic and research programmes and practices. The University has 61 Departments and every Department has state of the art classrooms, laboratories, internet connectivity, computer centre, library, Wi-Fi facility, play grounds, open theatre, health centre, bank, Cafeteria, post office, food court, hostels, guest house etc. The teaching faculties are dynamic, caring and friendly. Academic & curricular sessions are regularly complemented with sports and other socio-cultural activities like film screening, musical performances, art festivals, debates, intra-University fetes, sports tournaments, walkathons etc. Teerthanker Mahaveer University offers a vibrant campus life and one of the safest and most secure academic environments. The Campus has a vast scenic landscape with lakes, forests, hillocks and flower and fruit gardens offering a serene and tranquil backdrop. The groves of trees, fragrance of flora, calls of flocks of birds, etc. ease away the drudgery of academics, thereby relaxing and rejuvenating a student's mind.

The University has well qualified and experienced faculty, state-of-the-art laboratories and research facilities, well planned residential space along with a great ecosystem for extra and co-curricular activities. With the availability of these important building blocks of a top-notch institution, TMU enjoys a unique position to facilitate the all-round development of students to help them acquire the ability of lifelong learning and to make them competent professionals as well as good human beings.

2. Introduction

In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one. Buildings in the education sector contribute to over 230 million tons of CO2 emissions per annum approximately in India. The need for water, land and resources are growing enormously as more educational and institutional developments are underway to accommodate the ever-burgeoning population of India. There is growing interest in many up and coming universities today, to frame practical strategies for resource savings, conservation and waste reduction to make centers of learning deliver excellence in terms of sustainable green campuses and sustainable communities, at large.

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues. Green Audit is the most efficient and ecological way to manage environmental problems. It is a kind of professional care which is the responsibility of each individual who is the part of economic, financial, social, and environmental factor. It is necessary to conduct a green audit on college campuses because students become aware of the green audit, its advantages to saving the planet and they become good citizens of our country. Thus, green auditing becomes necessary at the college level.

Green Audit is a process to investigating, identification, quantification, recording, reporting and analysis of components related to environmental diversity of institute which will have an impact on the eco-friendly atmosphere. Green auditing will thus help in preserving the rich floral and faunal diversity in and around the campus; garnering interest and creating awareness among the stakeholders in future. Green and Environmental Auditing is not a fault-finding exercise, but an approach to identify energy, water and resource-saving opportunities and scope for performance improvement.

The Green, Energy & Environmental Audit for Teerthanker Mahaveer University focuses on

- Identification of Green measures implemented and areas of improvement outlining actions that can be implemented
- Increase environmental awareness throughout campus
- To document the waste disposal system & estimate the water & Energy requirements of the University
- To report the expenditure on green initiatives during the last five-year
- To collect baseline data of environmental parameters and resolve the environmental issues.
- Identify areas for further, more rigorous study

FIGURE 2: FOCUS AREA OF GREEN AUDIT

3. Approach & Methodology

During the study, the entire building was visited and studied in detail. The audit involved collection of data, physical inspection of the campus ,observation and review of the documentation and data analysis covering all major energy, water, and resource-consuming sections to realistically assess losses and potential for savings. The study focussed on improving energy, water and resource use efficiency and identifying saving opportunities.

The aim of this auditing report is to help the institution set environmental examples for the community and to educate the young learners. A pre-audit meeting provided an opportunity to reinforce the scope and objectives of the audit, and discussions were held on the practicalities associated with the audit. This meeting was an important prerequisite for the green audit because it was the first opportunity to meet the concerned university personnel for audit and deal with any concerns. The major areas of study are broadly categorized into:

- Electrical Systems
- Air conditioners,
- Lighting and Fan
- Solar PV installation
- Water consumption
- Waste generating indicators
- Health indicators
- Transportation
- Training & awareness

4. Land Use Analysis

Land use refers to man's activities and the various uses which are carried on and derived from land. The whole campus is interspersed with scattered trees making it a picturesque landscape suitable for a wide spectrum of flora and fauna. The Academic Departments and residential quarters/hostels have come up over the area which were highlands or in gradually filled lowlands. The present study revealed that the TMU campus has a total of 140 acres of land of which 19 acres existed as a part of the main campus and are developed in phases. The TMU campus occupy an area of 121 acres under open area which includes landscape area & Open Area (78 acre approx.) , STP/RWH Tank (0.64 acre), Internal roads along with Pathways & Parking (22.44 acres approx.), Farming land (3 acre) , Playgrounds (14 acres), Amphitheatre (2.68 acre), Helipad (0.24 acre) etc.

Organized plantations in the campus are mainly along the internal roads, around guest House/hostel, residential quarters and in the lawn areas. The large STP/ RWH Tank (0.64 acre) is a home to a wide diversity of fauna.

Few Key points highlighting the project features are listed below

- The project has close to 38 acres of land under open area & landscape plan
- The Project uses natural topology of the site to manage rain water and directly it to the RWH tank
- Landscape area includes diversity in species.
- In house farming gives an health & organic options for seasonal vegetables and pulses.
- The project used organic fertilizer for all the agriculture and horticulture area obtained from in-house vermicomposting & direct composting
- Landscape area are well maintained on site.
- The project includes facilities for basic amenities like ATM, Bank, Stationary Store, Cafeteria, Salon, and Temple etc. Within the campus. Helping in reducing the CO2 footprint from the campus
- The project has facilities like Gym, indoor and outdoor gaming which helps student to relax and rejuvenate.

FIGURE 3: ARIAL VIEW OF COLLEGE CAMPUS

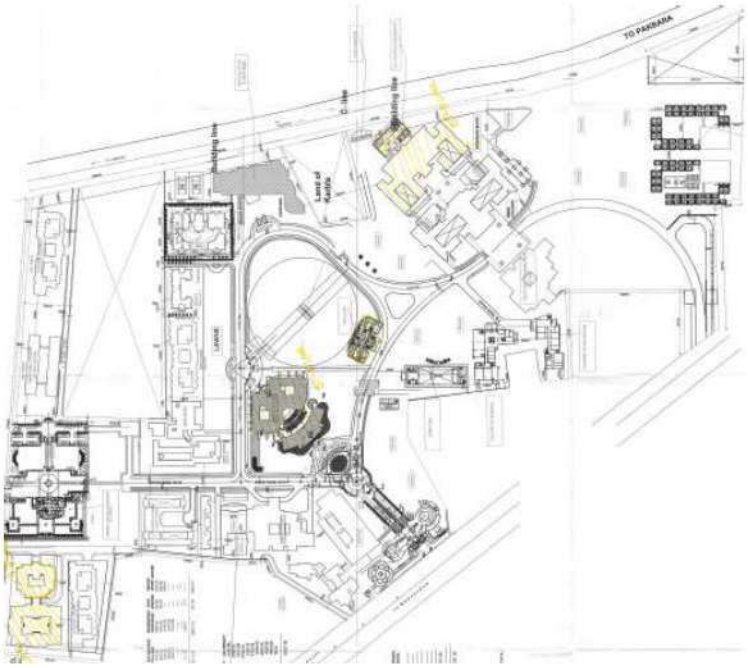


FIGURE 4: UNIVERSITY SITE PLAN

FIGURE 5: FARMING LAND

Note: Area bifurcation is taken from Google earth, Deviation is expected from actual area

TABLE 2 : PROJECT LAND USE

Description	ACRE
Site Area	140
Built upGround Coverage	19
Landscape & Open Area	78
Playground	14
Hardscape area	25.36
Water Bodies	0.64
Farming	3

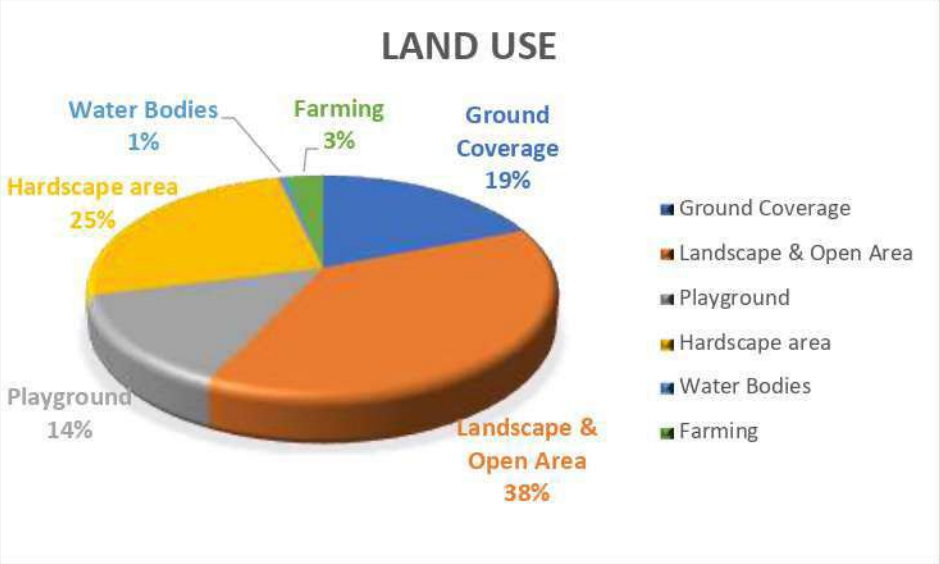


FIGURE 6: SITE LAND USE

Built-up Area Analysis:

The built up ground coverage area of 19% (i.e 77869.94 m2) consists of the following regions as stated below for land consumption.

TABLE 3: BUILT-UP AREA

S.No	Name of Building	Configuration	Built-up Area (sq.m)
1	Pharmacy College	G+4F	6585.2
2	Nursing college	G+7F	20638.69
3	Dental College	G+7F	15696.66
4	Engg. College	G+4F	25115.47
5	Agriculture	G+3F	4375.57
6	Management	G+4F	6924
7	LAW	G+4F	3880

8	Medical College & Administration Block	G+5F	20317.13
9	Automobile workshop	G	1087
10	Eng. Workshop	G+5F	31771.32
11	Examination Cell	G+3F	5648.83
12	Hospital	G+6F	26850.42
13	Hospital Block A/B/C	G+3F	9686.53
14	Hospital D Block	G+3F	13895.34
15	Chancellor's Residence	G+1F	1325.48
16	Faculty Residence Block-1	G+3F	2966.64
17	Faculty Residence Block-2	G+3F	2966.64
18	Faculty Residence Block-3	G+3F	3460.3
19	Faculty Residence Block-4	G+3F	1315.76
20	Faculty Residence Block-5	G+3F	3640.3
21	Faculty Residence Block-6	G+3F	3707.86
22	Faculty Residence Block-7	G+3F	3707.86
23	Medical U.G Girls Hostel	G+2F	7038.49
24	New Hostel (Boys)	G+7F	41274
25	Medical Boys Hostel	G+4F	26590.428
26	Girls Hostel	G+7F	18720.72
27	Medical P.G Girls Hostel	G+3F	2363.25
28	Indoor Sports Complex	G+2F	6750.32
29	Pavilion	G+6F	4067
Total			322367.208

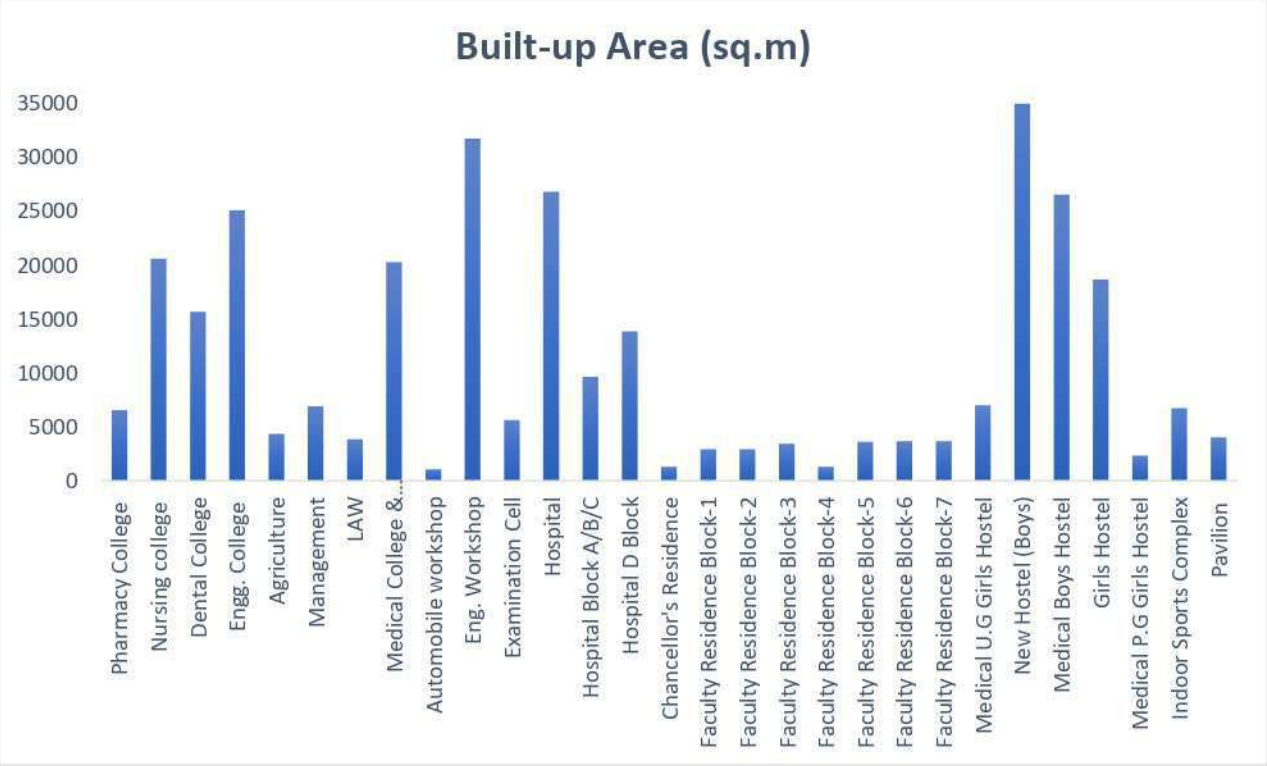


FIGURE 7: BLOCK WISE BUILT-UP AREA

Observation & Suggestions:

- Grass paver can be used for internal parking area, whenever considering for re-development of open parking area
- Diesel power equipment are used for maintenance purpose, this should be replace with electric equipment at the end of life.
- Electrical power vehicles can be promoted in the project, by providing preferred parking and charging facility
- Dedicated bicycle lane & parking can be planned to promote inside the campus
- Spill prevention plan should be made and followed specially for the fuel station area
- Landscape area also includes some un-attended spaces which are used for scrap storage. Eg. Area ahead of helipad
- Future plans of construction and activities should be based on the Landscape plan.

5. Weather Data

Moradabad has warm and temperate climate. The average annual temperature in Moradabad is 24.1 °C (75.4 °F). The annual rainfall is 1093 mm (43.0 inch).Most precipitation falls in July, with an average of 326 mm (12.8 inch). With an average of 31.6 °C (88.9 °F), May is the warmest month. In January, the average temperature is 13.8 °C (56.8 °F). It is the lowest average temperature of the whole year. The precipitation varies 322 mm (13 inch) between the driest month and the wettest month. The average temperatures vary during the year by 17.8 °C (32.0 °F.)

WEATHER BY MONTH // WEATHER AVERAGES MORADABAD

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	13.8 °C (56.8) °F	17.2 °C (63) °F	22.6 °C (72.8) °F	28.9 °C (84) °F	31.6 °C (88.9) °F	31.5 °C (88.7) °F	28.7 °C (83.7) °F	28.1 °C (82.5) °F	27.1 °C (80.8) °F	24.4 °C (75.9) °F	20 °C (68) °F	15.4 °C (59.7) °F
Min. Temperature °C (°F)	8.2 °C (46.8) °F	11.1 °C (52) °F	15.4 °C (59.6) °F	20.9 °C (69.7) °F	24.6 °C (76.2) °F	26.4 °C (79.5) °F	25.8 °C (78.4) °F	25.4 °C (77.6) °F	23.6 °C (74.6) °F	18.6 °C (65.5) °F	13.8 °C (56.9) °F	9.5 °C (49.1) °F
Max. Temperature °C (°F)	20.2 °C (68.4) °F	23.8 °C (74.8) °F	29.9 °C (85.9) °F	36.4 °C (97.5) °F	38.2 °C (100.8) °F	36.5 °C (97.8) °F	32.3 °C (90.1) °F	31.5 °C (88.8) °F	31.1 °C (88.1) °F	30.4 °C (86.8) °F	26.8 °C (80.3) °F	22.1 °C (71.8) °F
Precipitation / Rainfall mm (in)	25 (1)	40 (1.6)	27 (1.1)	14 (0.6)	21 (0.8)	127 (5)	326 (12.8)	300 (11.8)	169 (6.7)	27 (1.1)	4 (0.2)	13 (0.5)
Humidity(%)	71%	63%	48%	31%	38%	54%	80%	83%	81%	67%	61%	67%
Rainy days (d)	2	3	3	2	4	8	18	18	11	2	1	1
avg. Sun hours (hours)	7.7	9.2	10.6	11.5	12.0	11.2	8.8	8.6	8.9	9.7	9.4	8.3

FIGURE 8: MORADABAD WEATHER DATA

CLIMATOLOGICAL TABLE

PERIOD: 1981-2010

Month	Mean Temperature(°C)		Mean Total Rainfall (mm)	Mean Number of Rainy Days	Mean Number of days with			
	Daily Minimum	Daily Maximum			HAIL	Thunder	FOG	SQUALL
Jan	7.9	19.9	17.2	1.2	0.0	0.1	8.2	0.0
Feb	10.8	23.9	24.5	1.8	0.2	0.1	2.3	0.0
Mar	15.7	29.7	9.2	0.8	0.2	0.0	0.0	0.0
Apr	21.2	36.1	7.0	0.8	0.0	0.1	0.0	0.0
May	24.4	38.9	25.2	1.8	0.2	0.5	0.1	0.0
Jun	26.1	37.7	85.3	4.7	0.0	0.2	0.0	0.0
Jul	25.6	33.7	277.3	9.4	0.0	0.0	0.0	0.0
Aug	25.2	32.8	265.1	9.8	0.0	0.0	0.0	0.0
Sep	24.0	31.8	168.9	6.6	0.0	0.0	0.2	0.0
Oct	19.5	30.9	36.4	1.3	0.0	0.0	1.3	0.0
Nov	14.2	27.1	3.1	0.4	0.0	0.0	3.3	0.0
Dec	9.5	22.5	7.3	0.6	0.0	0.0	8.9	0.0
Annual	18.7	30.4	926.5	39.1	0.6	0.9	24.3	0.0

FIGURE 9: ANNUAL AVERAGE WEATHER DATA

Air Quality

There are six AQI categories, namely Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe. The proposed AQI will consider eight pollutants (PM10, PM2.5, NO2, SO2, CO, O3, NH3, and Pb) for which short-term (up to 24-hourly averaging period) National Ambient Air Quality Standards are prescribed. Based on the measured ambient concentrations, corresponding standards and likely health impact, a sub-index is calculated for each of these pollutants.

AQI Category (Range)	PM_{10} (24hr)	$PM_{2.5}$ (24hr)	NO_2 (24hr)	O_3 (8hr)	CO (8hr)	SO_2 (24hr)	NH_3 (24hr)	Pb (24hr)
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.5-1.0
Moderately polluted (101-200)	101-250	61-90	81-180	101-168	2.1-10	81-380	401-800	1.1-2.0
Poor (201-300)	251-350	91-120	181-280	169-208	10-17	381-800	801-1200	2.1-3.0
Very poor (301-400)	351-430	121-250	281-400	209-748	17-34	801-1600	1200-1800	3.1-3.5
Severe (401-500)	430+	250+	400+	748+	34+	1600+	1800+	3.5+

FIGURE 10: AIR QUALITY INDICATOR

The guideline stipulates that PM2.5 not exceed 5 µg/m3 annual mean, or 15 µg/m3 24-hour mean; and that PM10 not exceed 15 µg/m3 annual mean, or 45 µg/m3 24-hour mean.For ozone (O3), the guidelines suggest values no higher than 100 µg/m3 for an 8-hour mean and 60 µg/m3 peak season mean. For nitrogen dioxide (NO2), the guidelines set 10 µg/m3 for the annual mean or 25 µg/m3 for a 24-hours mean for sulphur dioxide (SO2), the guidelines stipulate concentrations not exceeding 40 µg/m3 24-hour mean. For carbon monoxide concentrations not exceeding 4 mg/m3 24-hour mean. In terms of health effects, the guideline states that PM2.5 concentration of 10 is the lowest level at which total, cardiopulmonary and lung cancer mortality have been shown to increase with more than 95% confidence in response to long-term exposure to PM2.5

The ambient air quality data for Moradabad shows that there are highly polluted particles in ambient air; AQI for SO2 & NOX parameters are within the range of Indian living standards, there are a number of factors responsible for this cleanliness, calmness and serenity in this area. However PM2.5 & PM10 are highly above the recommended value primarily due to Population growth, Urbanization, needs and rapid increase in energy consumption are major driving force of air pollution in large cities like Moradabad. The primary causes of outdoor air pollution are solid, liquid particles called aerosols & gases from vehicles emissions, construction activities, factories, burning stubble & fossil fuels and wildfire, etc. Main causes of indoor air pollution are harmful gases from cooking fuels (such as wood, crop wastes, charcoal, coal and dung), damp, mould smoke, chemicals from cleaning materials, etc. The consequences of pollution have led to poor urban air quality in Moradabad.

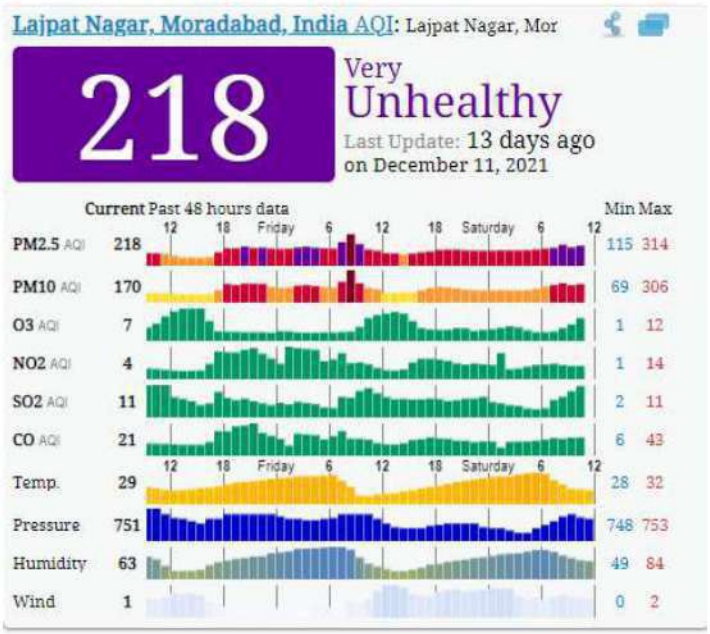


FIGURE 11: AIR QUALITY INDEX MORADABAD

Observations & Suggestions:

- The observed air quality is unhealthy in Moradabad, hence proposed air filtration to eliminate PM2.5 & PM10 is recommended
- Use of Mask should be promoted during Winter season
- Air purifier must be used for critical areas

6. Environmental & Green Policy

TMU University is committed to managing its estates in accordance with responsibilities to the environment. These responsibilities shall be demonstrated within the following areas as a minimum. The policy shall be reviewed annually or as per requirement.

- Tobacco-Free premises: The university administration should take measures to make the premises totally tobacco-free. No tobacco products shall be allowed inside the University campus & within 25 feet from all the entrance of the building
- Purchasing: In purchasing its services, materials, equipment, and consumable items, the university will, where possible, purchase items produced in ways that do the least environmental harm, which is not supplied with excessive packaging; which are benign or at least harmless in their effect on the environment. Where possible, preference will be given to local or regional suppliers to maximize the university input to the local community and reduce environmental impact due to transportation.
- Cleaning: The University shall use cleaning products based on environmental considerations as well as cost and suitability. It will monitor its working practices with a view to administering dosages so as to reduce the risk of over-concentration and excess residue of unused cleaning mixtures finding their way into piped waste disposal systems.
- Waste Disposal and Re-cycling: The University should seek to minimize its generation of waste by reduction of purchased materials where this does not compromise its primary functions or by re-use of materials within or outside the university campus. Where reduction or re-use is not feasible, materials will be re-cycled wherever possible.
- Energy: The University is environmentally responsible for its use of energy and will therefore consider the sources, type, origin, and destination of energy input and output throughout the university. This will require careful monitoring of consumption, the elimination of excessive or unnecessary use, and an ongoing program of energy conservation.
- New Build and Building Refurbishment: The University will ensure that whenever new construction or refurbishment, work is planned and executed in a manner that reflects environmentally-responsible approaches defined by the National Building Code-2016.
- Green Travel Plan: The University actively promotes the use of public transport, walking, and cycling. The university owns vehicles and requires staff where possible to use public transport when on University assignments. This plan is regularly reviewed. The travel of students shall also be encouraged through public transport for those who are not using shared university buses for commuting to and from the university.
- Food Policy: The university will ensure that decisions pertaining to the purchase of food, together with the use and disposal of plastic crockery/cutlery, should at all times include environmental implications as well as such factors as cost and nutritional value.
- Environmental Rules and Guidelines: The University is committed to ensuring compliance with extant pollution control and other applicable environmental guidelines.
- Water Use: The University intends to promote the optimization of water use by avoidance of wastage, treatment, and re-use of black water for other possible uses.
- The university also commits to a Plastic-free environment on university premises.
- Awareness program to promote environmental & sustainability related issues.

7. Water Audit

Based on the annual theoretical water consumption details, it is observed that 50 % of total annual water consumption is in Hostels /Residents due to the 24-hour stay of use which is followed by Hospital & floating Occupant during daytime students and faculty members.

The project uses ground water to meet the required water demand on daily basis. Used water is treated in STP for reuse in landscaping/ irrigation. Due to varying water requirement for landscaping & irrigation the project has constructed reusable water tank to accumulate STP treated water and rain water. The project contour is planned such a way that the total site rain off gets collected in the same storage tank during rainy season. Apart from this the project also has recharge pits to recharging the underground aquifers. Storage tank is cleaned period, the maintenance of water distribution system is planned annually.

Water Distribution System And uses Of Waste Water

(From 1-April-2020 To 30-october-2021)

1.Water demand:-

Particulars	Unit	Liter/Day	Total
Beds in hospital	1000	450Lt/Bed	450000Lt.
Internal residential public	5000	135lt/Person	675000Lt.
Floating Public	7000	30Lt/Person	210000Lt.
Total water	**Supply**	**Per day**	**1335000Lt.**

2.Water Treatment By (1.5MLD)S.T.P

Waste Water Generation is 80% of Total Supply

(1335000Lt.)=1068000Lt/Day

3. Treated Water Used :-

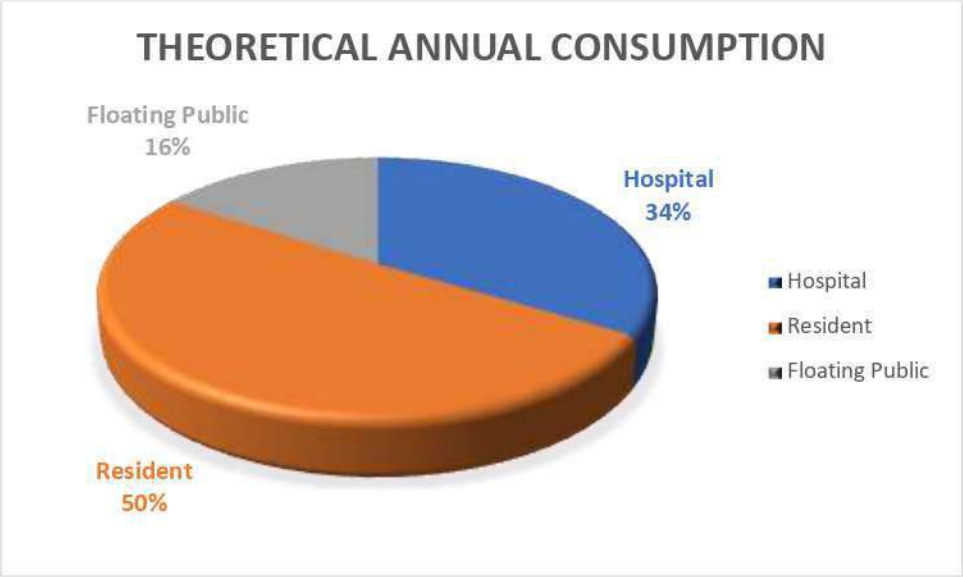
(A). In horticulture (Plants and Green Grounds):- (600000Lt/Day)

(B). In Agriculture :- (400000Lt/Day)

Not:- Used of Water is Variable(Due to different Weather Condition).

To Maintain This Variation We Used (1Cr. Lt) Resiavor.

FIGURE 12: WATER CALCULATION



The maximum conservation opportunities lie in these areas. Special attention should be given to Hostels, and there should be regular water leak audits conducted, and reports should be documented. As presently data for extraction of water is not available, it is recommended that all input sources of water should be metered and the consumption pattern should be reviewed daily/weekly and monthly, and any significant deviation in consumption should be immediately addressed.

Drinking Water Quality Test Report

Water quality testing is important because it identifies contaminants and prevents waterborne diseases. Drinking or using contaminated water can result in severe illness or death. That is why it is important to ensure that drinking water is safe, clean and free from bacteria and disease. The parameters for water quality are determined by the intended use. Work in the area of water quality tends to be focused on water that is treated for human consumption, or in the environment.

The project includes RO system to conditioned the extracted ground water and make it suitable for drinking, Period water quality test is carried out to confirm the water quality.

The following is a list of indicators often measured by situational category:

- Alkalinity
- Color of water
- pHvalue
- Taste and odor (geosmin, 2-Methylisoborneol (MIB),etc.)
- Dissolved metals and salts (sodium, chloride, potassium, calcium, manganese, magnesium) Microorganisms such as fecal coliform bacteria (Escherichia coli), Cryptosporidium, and Giardia lamblia; see Bacteriological wateranalysis
- Dissolved metals and metalloids (lead, mercury, arsenic,etc.)
- Dissolved organics: colored dissolved organic matter (CDOM), dissolved organic carbon(DOC) Heavy metals

FIGURE 13: GROUND WATER EXTRACTION HAND PUMP

FIGURE 14: RO SYSTEM AT BUILDING TERRACE

FIGURE 15: DRINKING WATER FACILITY

TMU HOSPITAL

(Associated Hospital with Teerthanker Mahaveer Medical College & Research Centre)
Delhi Road Moradabad – 244001(UP)

Department of Microbiology

Date – 23-07-2021

Bacteriological Analysis of Drinking Water

Sampling Data

Locality	:	Teerthanker Mahaveer University
Place	:	New Hospital Building
Sample Site	:	RO Plant -2
Source	:	Direct RO Supply
Sender	:	Mr. Ashish Jain
Sample Taken By	:	Mr. Sandeep Kumar & Ms. Ayushi Jain (MSc. Student)
Date of Sample Collected	:	21 July 2021

Result Interpretation

Method of Analysis	:	Multiple tubes Method
Date of Reporting	:	23-07-2021
Result(MPN)	:	**0 in 100 ml .. esting Water**
Organism Isolated	:	No Growth after 48 hrs. of Incubation.
Drinking Water is	:	Excellent
Action should be taken	:	Nil

Most Probable Number of Coliform (Reference Values)

Presumptive coli form count per 100ml of water

Quality of Water	MPN Coliform Value in 100 ml	Quality of Water	MPN Coliform Value in 100 ml
Excellent	0	Suspicious	4-9
Satisfactory	1-3	Unsatisfactory	≥ 10

Signature of Technician

Signature of Microbiologist

Copy To

FIGURE 16: DRINKING WATER QUALITY TEST REPORT

FIGURE 17: WASH BASIN FAUCET

Observations:

S.No.		Yes/No	Recommendations
1	Is there any benchmark for water use	No	The benchmark should be prepared for improvement on the basis of NBC-2016 and fixing targets for improvement. The consumption of water should be adjusted as per variation in occupancy whenever there is any change in occupancy is envisaged.
2	Is consumption of water as per NBC-2016 standard for the use of water as applicable	DNA	Water should be metered and monitored to verify the same
3	Is water use monitored and recorded?	No	Install Water meters at all source of water inlet to site , Establish procedures so that a staff member is responsible for reading your meter daily, analysing water use, and knows what to do if water use changes unexpectedly. Record the data.
4	Does any water conservation opportunities identified	Yes	Based on visual inspection, all treated water from STP is used for irrigation with standard 2-4 inch pipes, at some places the pipes have been directly used for irrigation. Even PVC pipes are commonly used. Flow fixtures installed in Hostel canteen, Admin Block toilet seems to be a high flow fixtures. therefore an water audit is recommended
5	Are there any signs, posters, or stickers on college premises to encourage and remind students to report leaks?	No	Public awareness slogans and posters should be used through the campus to promote energy conservation
6	Is there any system in place where checking during special drives for pipes, taps or cisterns etc	No	There should be a written periodical program for addressing any type of leaks in water lines
7	Is management team to review water use?	No	Establish a water management team and meet regularly to review use and identify water-saving opportunities. Consider involving administrative staff, and even parents, visitors, and volunteers.
8	Have you developed a water management plan?	No	Use the results of this checklist and your water audit to develop a water action plan, set goals for water savings, and promote this throughout the university.
9	Have you installed sub-meters in high water using areas?	No	There are no sub-meters installed in high water using areas to monitor regularly water usage and identify any problems

S.No.	Observation/Parameters	Yes/No	Recommendations
	Amenities		
1	Are water-efficient showers installed in toilets?	NA	Currently, no toilets/ washrooms in the university have the facility of showers installed. The university may consider installing flow regulators to reduce flow to at least 9L/min in the future. Also, the university can consider having shower timers by restricting the time of shower used by students through awareness and displaying stickers and bills and regular briefing through concerned members of staff if they install showers in future.
2	Are the taps in hand basins water-efficient?	No	University can consider installing flow regulators to reduce flow to at least 4.5L/min: If taps are used only for hand washing, consider a flow rate as low as 1.7L/min for super efficiency in future renovations.
3	Do cleaners hose down amenity areas?	No	If you must use a hose, ensure it has a water-efficient trigger nozzle.
4	Does your college have single flush toilets?	Yes	consider replacing single flush toilets with 6/3L or 4.5/3 L dual flush models
5	Does your college have dual flush toilets?	Yes	All the office buildings in the university have dual flush toilets installed.
6	Do you have a single tank on the wall or a urinal flusherette system?	Yes	Ask the maintenance staff to check the flow rate and flush timing. Overtime wear will cause excessive flush volumes. Insert flow regulators into valve bodies to reduce flow.
7	Does your college have any cyclic flushing urinals?	No	Still considering replacement with manually flushing urinals, automatic sensor units, or ultra-low-flow or waterless urinals for Gents toilet.
S.No.	**Observation/Parameters**	**Yes/No**	**Recommendations**
	Canteen, Mess, Hand Wash Area		
1	Are taps in kitchens water efficient?	No	If No, install 7.5L/min flow restrictors on kitchen/art room sinks. Tip: Pre-rinse spray nozzles in kitchens can use less than 6L/minute and make it easier to rinse and clean dishes.
2	Do Kitchens have water-efficient dishwashers?	No	Consider using a water-efficient model dishwasher. You will save money through water and energy savings.
3	Do staff leave taps run while they are cooking and cleaning? **DNA: Data not available**	No	Still, install stickers to remind staff to turn off taps. Consider installing sensor taps.
	Outdoor areas		

1	Has appropriate staff completed the Water Conservation training	Yes	Water conservation training & workshops are conducted time to time for university staff. Records of training shall be maintained.
2	Do campus sub-meter irrigation water supply?	No	Consider installing sub-meters to determine water use and identify any leaks, and monitor regularly.
3	Are you watering on your allocated watering days?	No	If No, make sure you are watering on your allocated watering days. Make a schedule of watering
4	Do you improve your soils?	Yes	Improving soil quality can improve plant growth and water retention. Organic fertilizer is used on campus. Fertilizer from vermicomposting is used.
5	Do you use an alternate water source to irrigate your landscape?	Yes	STP treated water is also used for irrigation
6	Do you have water-wise /Water-efficient Plants in your garden?	Yes	A lot of native species have been planted, thereby reducing the water requirements.
7	Is your irrigation system Water-wise?	Yes	Only staff is to be educated that they should be careful to ensure that water is not falling on hardscape.
8	Do you have mulch on your garden beds?	No	Use water-wise mulch to reduce evaporation and save water.
9	Do you have under-utilized areas of lawn in your landscape?	Yes	Consider replacing lawn in these areas with water-wise gardens to reduce water use.
Training and Awareness			
1	Whether staff, in general, are aware of the importance and need for water conservation	Yes	The awareness should be created amongst all maintenance and operation staff. The training record is available.
2	Whether there are training modules/sessions for the training of staff on a topic of the importance of water conservation.	Yes	Regular training should be conducted. Training Record is also available.
3	Whether there is a program for sensitizing students through workshop/seminars to educate them regarding the scarcity of water and its conservation	Yes	Water conservation training & workshops are conducted time to time for Students. Records of training shall be maintained.
4	Whether there is a program in a place to involve students in water conservation targets.	Yes	Students are actively involved towards sustainability goals of the campus.

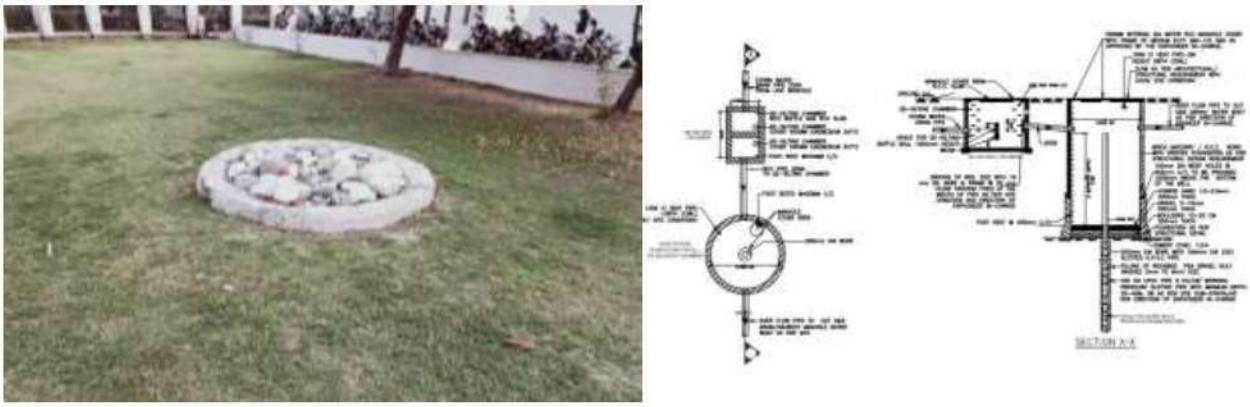


FIGURE 18: RAIN WATER HARVESTING PIT

FIGURE 19: SEWAGE TREATMENT PLANT

FIGURE 20: STP TREATED WATER & RAIN WATER STORAGE TANK (CAPACITY: 1 CR. LIT)

FIGURE 21: ETP FOR TREATING HOSPITAL LIQUID WASTE

Water Quality of Sewage Treatment Plant (SBR Technology)		
Parameters	**Inlet**	**After ACF**
$BOD_5$20	300-350 mg/L	< 12 mg/L
COD	600-800 mg/L	< 143mg/L
TSS	300 mg/L	<70 mg/L
Oil & Grease	20-30 mg/L	<10 mg/l

Water Quality of Effluent Treatment Plant (Physico Chemical Technology)		
Parameters	**Inlet**	**After ACF**
$BOD_5$20	300-350 mg/L	< 16 mg/L
COD	600-800 mg/L	< 140 mg/L

FIGURE 22: WATER QUALITY TEST REPORT - STP & ETP

FIGURE 23: WATER LOGGING IN LANDSCAPE

FIGURE 24: USE OF PVC PIPES FOR LANDSCAPING IRRIGATION

FIGURE 25: USE OF SPRINKLERS FOR LANDSCAPE

Bench Marking as per NBC-2016

S. No.	Type of Use	Per Capita -Litres per Day-As per NBC-2005	Total Daily requirement-Litres- Best Practice
1	Day Time use	45	30
2	Hostel Stay	135	135
3	Visitors	15	30
4	Hospitals	450	450

ACTION STEPS – Design and Construction	
A	Reduce water consumption through efficient fixtures and plumbing design.
1	Efficient plumbing design. Two stack system design
2	Sub-metering of water for separate uses.-Borewell, Landscaping, Labs
3	Efficient fixtures such as low flow taps, showerheads, and toilets, and Waterless urinals as per applicability in Gents Toilet
4	Efficient appliances for catering and other uses with specified water efficiency standards
5	Re-cycle water using Grey Water systems. Being done re-cycled water data be maintained
6	Rainwater is stored in common storage tanks and is used inside premises for landscaping
7	Landscaping and site layout is designed to avoid run-off. Design documentation is required for establishing zero run-offs from premises during rain based on rainfall patterns
8	Automatic shut-off of the pump should be installed so that there is no wastage of water and energy
9	Log Book for running of the pump to be maintained
10	Check leakage through internal audits-Weekly
OPERATION & MAINTENANCE	
1	Once the building is operational, further reductions in water use can still be made depending on how efficiently the building is run. Efficient fixtures and fittings reduce the amount of flow of water; however, it is equally important that water use is periodically assessed or audited to detect wastage caused either by the users or due to leakage. This will also help the building management in devising appropriate strategies for water conservation.
2	Campus do not have actual metered data to know exactly how much water is being consumed by them. Such organizations hence normally end up spending more on energy on bore well water as in this case and pose a threat to sustainability through wastage of water. The record of extraction/consumption/ STP is prepared.
3	Such existing and even new buildings of campuses can reduce their water consumption simply and inexpensively by auditing water use and identifying appropriate water-saving measures
4	Install push-button type individual manual urinal flushing system
5	Repair, replace leaking taps

Plant species	Plant factor
Lawns	1
Native grass	0.45
Existing native trees	0
Newly planted native shrubs	0.3
Newly planted exotic shrubs	0.9
Newly planted native trees	0.15
Newly planted exotic trees	1.65

FIGURE 26: PLANT FACTOR FOR VARIOUS SPECIES

Type of irrigation system	Efficiency (%)
Flood	65
Furrow	80
Sprinkler	85
Drip	90

FIGURE 27: IRRIGATION SYSTEM EFFICIENCY

RECOMMENDATIONS FOR PLANNING SUCCESSFUL WATER MANAGEMENT

- Water management plans must be part of an integrated approach that examines how changes in water use will impact all other areas of operation.
- Water conservation involves two distinct areas: technical and human. The technical side includes collecting data from water audits and installing water-efficient fixtures and procedures. The human side involves changing behaviours and expectations about water usage and "the way things should be done." Both areas must be addressed for a water conservation program to succeed.
- A water conservation plan depends on accurate data. Before water-saving measures are implemented, a thorough water audit should be conducted to determine where water is being used. Then, water use can be monitored to track conservation progress.
- A successful water conservation plan follows a logical sequence of events. Implementation should be conducted in phases, starting with the most obvious and lowest-cost options.
- An effective plan examines not just how much water is being used, but how it is used and by whom. When analysing a water audit, ask the next question: "Can this process be done as well or better using less water?"
- The quality of water needed should be matched with the application. Many commercial, institutional, and industrial applications do not require the use of potable water. Whenever possible, substitute re-cycled water used in one process for use in another.
- The true cost of water must be considered when conducting a cost analysis. The true cost of water is the amount of the energy PLUS the expense to heat, cool, treat, pump, and dispose of/discharge the water.
- Life-cycle costing is the key to evaluating water conservation options. Don't just calculate the initial investment. Many conservation retrofits that appear to be prohibitively expensive are actually very cost-effective when amortized over the life of the equipment.

8. Energy Audit

Energy cannot be seen, but we know it is there because we can see its effects in the forms of heat, light, and power. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability and, thus, requires no explanation for its inclusion in the assessment. An old incandescent bulb uses approximately 60W to 100W, while an energy-efficient light-emitting diode (LED) uses only less than 10 W. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is, therefore, essential that any environmentally responsible institution examines its energy use practices. LED use also has a peculiar advantage towards the environment that LEDs do no use any mercury as is the case of CFLs or Fluorescent tubes.

Months	Billed (KVA)	Actual Demand (KVA)	Units (kWh)	Power Factor	DG Consumption (litres)	Equivalent Electricity consumption (kWh)	RE Generation (kWh)	Built-Up Area (Sq.m)	EPI (without RE)	EPI (with RE)
Jan-20	1188.6	1186.6	493395	0.99	48677	461846.52	75582	322367.2	16.22	11.66
Feb-20	1201.8	1201.8	391485	0.99			119242			
Mar-20	982.2	982	426150	0.99			146944			
Apr-20	742.8	742.8	163275	0.99			146815			
May-20	912.6	912.6	358275	1			151098			
Jun-20	1050	1050	419820	1			135561			
Jul-20	1107.6	1107.6	463975	1			121957			
Aug-20	1274.4	1274.4	574680	1			112032			
Sep-20	1239.6	1239.6	539115	1			137566			
Oct-20	2250	830.4	277245	0.97			131812			
Nov-20	2250	507	210315	0.91			100164			
Dec-20	2250	894	448140	0.98			91190			
Jan-21	2250	958.8	406830	0.99	63785	605187.43	74656	322367.2	20.26	15.47
Feb-21	2250	915.6	244725	0.98			112439			
Mar-21	2250	863.4	341130	0.98			149004			
Apr-21	2250	984	411825	0.99			155619			
May-21	2250	912.6	427800	0.99			130045			
Jun-21	2250	1412.4	583950	0.99			131692			
Jul-21	2250	1928.4	773415	0.99			120616			
Aug-21	2250	1876.2	726030	0.98			141950			
Sep-21	2250	1900.8	730350	0.98			152140			
Oct-21	2250	1765.8	580215	0.99			164586			
Nov-21	2250	894	253140	0.98			122793			

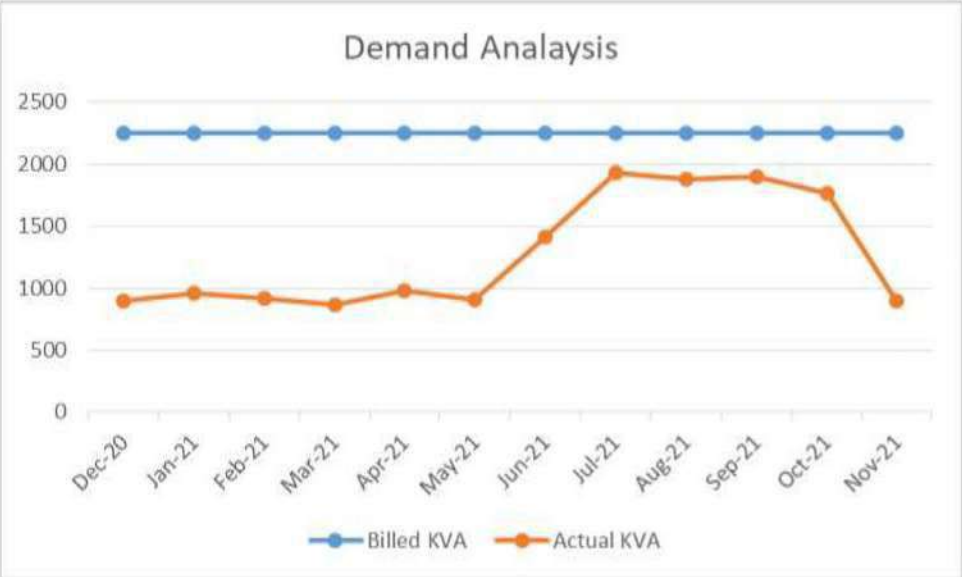


FIGURE 28: DEMAND ANALYSIS

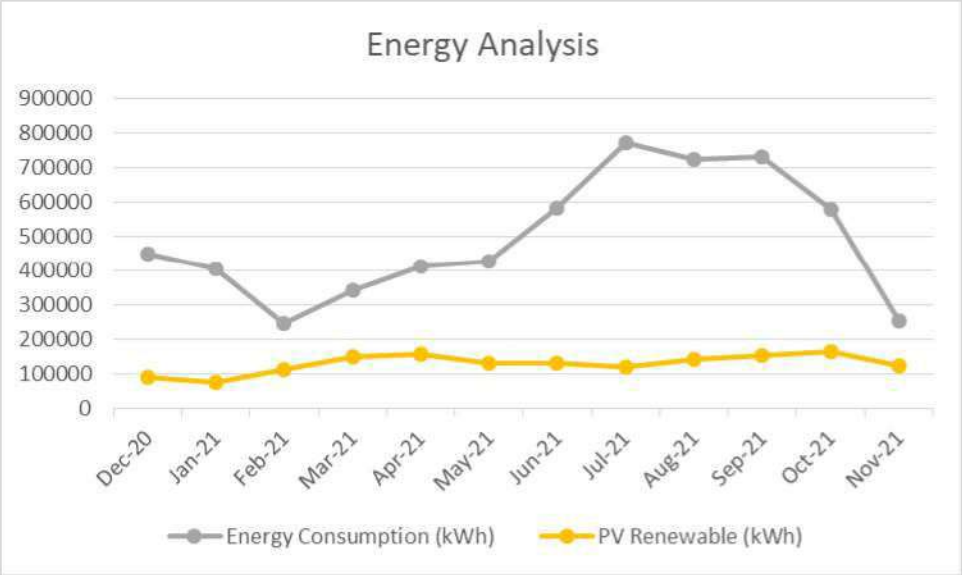


FIGURE 29: ENERGY ANALYSIS

Observation & Suggestions:

Based on annual energy analysis it was found that the EPI of the University was 11.66 in 2020 probably due to COVID, EPI of 2021 can be considered as much better indicator of present energy consumption scenario at the university.

Renewable energy capacity has been upgraded from 1MW to 1.25 MW due to which sharp increase in the generation can be seen in Oct & Nov -21.

Data for all major energy end use should be separately monitored.

All source of energy consumption on site should be separately monitored.

Contract demand of 3000 KVA can be revised, if the campus has no future plan for expansion

9. Renewable Energy

The University has upgraded form 1 MW to 1.25 MW rooftop Solar PV system. The system can generate energy on-site through the Green Energy route. Estimated generation potential of the system is sufficient to offset 30% of annual energy consumption of the project & potential for CO_2 footprint reduction to the extent of 1477 MT annually.

RESULTS

Print Results

1,738,597 kWh/Year*

Month	Solar Radiation (kWh / m² / day)	AC Energy (kWh)	Value ($)
January	3.92	113,727	N/A
February	5.13	131,415	N/A
March	6.13	167,946	N/A
April	6.81	175,570	N/A
May	6.75	178,775	N/A
June	5.91	153,391	N/A
July	4.94	136,822	N/A
August	5.17	145,199	N/A
September	5.39	144,318	N/A
October	5.52	151,819	N/A
November	4.54	122,569	N/A
December	3.98	117,045	N/A
Annual	5.35	1,738,596	0

FIGURE 30: ESTIMATED ENERGY GENERATION FORM 1.25 MW SYSTEM

FIGURE 31: SOLAR PV PLANT

10. Waste Management Audit

Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities, which can cause health problems. Plastic bags and discarded ropes and strings can be very dangerous to birds and other animals.

This indicator addresses waste production and disposal, plastic waste, paper waste, food waste, and re-cycling. Solid waste can be divided into two categories:

10.1. General waste and Hazardous waste

General wastes include what is usually thrown away in homes and schools, such as garbage, paper, tins, and glass bottles. Hazardous waste is waste that is likely to be a threat to health or the environment, like cleaning chemicals and petrol. Unscientific landfills may contain harmful contaminants that leach into soil and water supplies and produce greenhouse gases contributing to global climate change.

Furthermore, solid waste often includes wasted material resources that could otherwise be channelled into better service through re-cycling, repair, and re-use. Thus, the minimization of solid waste is essential to a sustainable campus. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems. It is therefore essential that any environmentally responsible institution examine its waste processing practices.

Solid Waste Management: Solid waste form Kitchen/ Mess is taken away by local cattle breeder on daily basis, Landscape waste and other organic waste are composted by using direct composting method & vermicompost. Extra waste is removed weekly through the truck and disposed of in municipal waste collection points

Liquid Waste Management: University Liquid waste are channel through pipes to STP where its treated and reused for irrigation

Bio-Medical Waste Management: The University has a tie-up with waste recycler for bio-medical waste

E-Waste: The old computers are sold back to the vendor, which is again put to beneficial use by repairing, and it is a good sustainable practice.

Key Boards and mouse: Computer paraphernalia which becomes un-serviceable are also disposed of. It is required to be ensured that vendor dealing with E-waste is authorized to collect E-waste.

Hazardous Waste: Lead Acid Cell Batteries are returned to Vendors for re-cycling of lead and other constituents.

Fluorescent tubes: Fluorescent tubes are handed over to a Junk dealer who in turn should send them to local re-cycling units. Storage of fluorescent tubes in college should be as per recommended practice.

Waste Mobil oil: Waste oil is stored and used for lubricating door hinges and oiling shuttering material.

11. Green Campus Management Audit

Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree absorbs up to 48 pounds of carbon dioxide from the atmosphere and releases it as oxygen. The amount of oxygen that a single tree produces is enough to provide one day's supply of oxygen for people. Trees on-campus impact our mental health as well; studies have shown that trees greatly reduce stress, which a huge deal is considering many students are under some amount of stress.

11.1. Types of waste generated on campus

For safe handling and management of hazardous waste in an environmentally sound manner, Govt. of India has notified the Hazardous Waste (Management & Handling) Rules, 1989, under the Environment (Protection) Act, 1986. However, these Rules were suppressed with re notification of the Hazardous Wastes (Management, Handling and Trans boundary Movement) Rules, 2008. Under the said Rules, hazardous waste has been defined as those wastes which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances, and shall include wastes as specified in Schedules of the Rules.

- Solid waste- Extra waste is removed weekly through the truck and disposed of in municipal waste collection points
- Dry leaves - Used in college for making manure/composite
- Canteen waste - Used for feeding animals in locality
- Liquid waste - Preserved and used in college
- Glass
- Unused equipment - Returned to vendors through the sale
- Napkins - Handling not established
- Plastic waste - Segregated and removed

Methods of managing waste generated on campus

- Direct Composting
- Re-cycling
- Re-using

FIGURE 32: DEDICATED DUST BIN FOR DIFFERENT WASTE

FIGURE 33: CLEANING EQUIPMENTS

12. Health Audit, Food procurement and Disposal

There are no health issues experienced by staff and students by virtue of their presence in campus. However Indoor air quality need to be maintained to avoid any health issue to the occupant.

Food is prepared in Canteen/Mess, and any food waste that is generated is picked up by local cattle breeder. Vegetable and other multiple grain are grown within the campus, agriculture and landscape waste used in direct composting for conversion of this waste into useful organic fertilizer.

13. Custodial chemical use

Chemicals for the one-year requirement are used in labs and stored in a separate store. The store requires to be ventilated, and hazard analysis should be done through Material Specification Data Sheet and record should be maintained. Proper ventilation with hoods should be designed.

FIGURE 34: CLEANING CHEMICALS

14. Transportation

Most students are using shared transport, which is sustainable. Students are using Buses and Shared auto as the university has arranged buses for their students and staff. The consumption of HSD by buses is monitored for optimized consumption. Teaching and Non-Teaching faculty is also sensitized for using pooled transportation for working towards sustainability and reducing resource use and encouragement of resource conservation. The college is dedicated to provide its students and staff all the comfort and convenience to help them to achieve their targets. The students are encouraged to use cycles, two wheelers rather than four wheelers which leads to fuel saving and also the contribution of pollutants to atmosphere is less.

15. Procurement process

The university has a procurement team well training regarding the procurement of goods and services that are sustainable. All the purchases made by the university are made in a way that optimized utilization of natural resources is possible. Some of the procurement policies include: -

1. Paper with re-cycled content
2. AC's with Zero ODP Refrigerant
3. Environment-friendly housekeeping chemicals
4. Paints, adhesives, sealants with the recommended percentage of a volatile organic compound.

16. CPCB Guidelines

The exhaust of DG Sets is required to be raised as per CPCB requirements.

FIGURE 35: DG EXHAUST

17. Paper use and Printing Goals

There are efforts already directed through the use of E-Books for reducing the use of paper. Instructions to staff and students to resort to printing only if it is absolutely unavoidable is given.

Papers with re-cycled content is being purchased.

17.1. Paper use and Printing Goals

- Distribute memos, reports, purchase orders, and brochures electronically. Research electronic Purchase Orders for small amounts of money and "electronic signatures" for larger Pos
- Encourage re-use of scrap paper for printing and note-taking. Larger printers should have one dedicated tray for the re-use of scrap paper.
- Print on letterhead paper only as needed; use electronic letterhead whenever possible
- Network all printing to shared copiers/printers and eliminate stand-alone printers where possible
- Discourage reckless printing and copying by requiring the use of an account/password
- Promote a 'Think before you Print' culture
- Desktop drafting and editing of documents
- Reduce default margin settings
- Use toner-saving fonts (e.g., EcoFont) or smaller-sized fonts
- Single-spaced formatting on all documents - Include the "think before you print" message in the "green" PR Campaign
- Encourage increased use of Blackboard as a paper-free resource
- Training and Adherence - Distribute (an) email(s) with detailed instructions, including "screenshots" on how to change settings on computers, copiers, faxes, printers
- Establish duplex (two-sided) copying and printing as standard
- hase-out meeting handouts and distribute/project them electronically (this needs to be better defined).
- Digitize forms and administrative processes. Continue replacing paper-based processes and administration.
- Widespread adoption of print management / print-saving software (eg. GreenPrint). Identify volunteers (including Sustainability Council and VP for Finance and Admin) to participate in a 30-day trial to explore the benefits (savings, functionality, and ease of use) of GreenPrint Software. Find ways to test this in student labs & other high-volume print areas
- Double-sided student assignments as standard (with electronic submission, grading & return)
- Faxes: phase out fax machines, utilize computer faxing, end-use of fax cover pages
- Increase electronic archiving and record-keeping (this needs to be better defined and targets identified; work with Purchasing, Personnel, Academic Department, and/or Student Records to be determined)

E-Library

- Present E-Library book percentage in numbers 100 %
- Total e-Books: 6588 Nos
- Total Hard Copy: 6588

The e-books have the advantage of being used by multiple students/ faculty simultaneously and thus create a better impact on sustainability in contrary to hard copies that can be read by only one person at a time.

The following recommendations are made:

- Use of E-books is promoted for students and faculty members, especially in the present COVID situation.
- Training on sustainability should be provided.
- Adaption is promoted, considering it to be a new normal.

18. Training and awareness program

The college is regularly conducting awareness programs for students and faculty members.

टीएमयू में प्लास्टिक वेस्ट फ्री इंडिया पर प्रतियोगिता

मुरादाबाद। तीर्थंकर महावीर यूनिवर्सिटी के कॉलेज ऑफ नर्सिंग में स्वच्छता पखवाड़ा के तहत प्लास्टिक वेस्ट कलेक्शन और निबंध प्रतियोगिता का आयोजन किया गया। निबंध प्रतियोगिता के अंतर्गत छात्र-छात्राओं ने प्लास्टिक वेस्ट फ्री इंडिया विषय पर निबंध लिखे। इसमें एएनएम प्रथम वर्ष की फरहा और बीएससी तृतीय वर्ष की मनीषा ने प्रथम, एएनएम प्रथम वर्ष की भावना और जीएनएम द्वितीय वर्ष की कृतिका ने द्वितीय, जीएनएम फर्स्ट ईयर की अर्शी और बीएससी फर्स्ट ईयर की अनुराधा ने तृतीय स्थान प्राप्त किया। प्लास्टिक वेस्ट कलेक्शन प्रतियोगिता में 15 सदस्यों की 5 टीमें बनाई जिन्हें यूनिवर्सिटी में बिखरे वेस्ट प्लास्टिक को इकट्ठा करके एक निश्चित स्थान पर रखने को कहा गया। वेस्ट प्लास्टिक कलेक्शन प्रतियोगिता में ग्रुप 4 एएनएम प्रथम वर्ष ने प्रथम, ग्रुप 5 बीएससी फर्स्ट ईयर ने द्वितीय और ग्रुप 3 जीएनएम तृतीय वर्ष ने तृतीय स्थान प्राप्त किया। अंत में सभी विजेताओं को पुरस्कार और प्रमाण पत्र भी दिए गए। इस मौके पर कॉलेज के प्राचार्य प्रो. श्रीनाथ कुलकर्णी, प्रभु जॉन, लिंगाराजू, श्रीमती दिव्यांशी, श्रीमती हेमलता आदि मौजूद रहे।

प्लास्टिक वेस्ट कलेक्शन और निबंध प्रतियोगिता में फरहा और मनीषा अव्वल

टीएमयू में प्लास्टिक वेस्ट फ्री इंडिया पर प्रतियोगिता

डेव-ओपस में

छात्रों ने प्लास्टिक वेस्ट फ्री इंडिया विषय पर लिखे निबंध

नर्सिंग कॉलेज ने दिए स्वस्थ रहने के टिप्स

शाह टाइम्स ब्यूरो

मुरादाबाद। तीर्थंकर महावीर यूनिवर्सिटी के नर्सिंग कॉलेज की ओर से प्रिंसिपल श्रीनाथ के कुलकर्णी के निर्देश पर ग्राम मोड़ीजट, अमरोहा के प्राथमिक विद्यालय में जांच शिविर का शुभारम्भ अमरोहा के बेसिक शिक्षा अधिकारी श्री सत्यवीर सिंह ने बतौर मुख्य अतिथि किया। सरस्वती वंदना के बाद छात्र-छात्राओं ने नुक्कड़ नाटक-हेल्थ इज वेल्थ के जरिए लोगों को व्यक्तिगत स्वच्छता, दाँतों की सफाई, हाथ धोने के तरीके और हाथ न धोने से होने वाली बीमा. रियों से बचने के नाटक के जरिए टिप्स दिए, तो वहीं जांच शिविर के जरिए 33 ग्रामीणों और 48 स्कूली बच्चों की निशुल्क शुगर, ब्लड प्रेशर ,वजन आदि जांच कर स्वस्थ रहने की सलाह दी गयी। इससे पूर्व नर्सिंग कॉलेज के प्रोफेसर प्रभु जॉन ने प्राथमिक विद्यालय की अध्यापिका श्रीमती मंजू को तुलसी का पौधा भेंट किया। संचालन अमन प्रीत कौर और आरिशा ने किया। नुक्कड़ नाटक में मुख्य भूमिका आँचल, अर्जुन, आरती, गुंजन तिवारी, डिम्पी पांडेय, कुमारी मोनिका, चंचल, आकांक्षा, दीपाली, गुलाम नाजिया, हेमा इलियाजर आदि ने नुक्कड़ नाटक की जरिए स्वस्थ जिंदगी जीने के गुर बताए। अंत में छात्र-छात्राओं को उपहार के रूप में स्टेशनरी किट भी वितरित किए गए। नर्सिंग कॉलेज की ओर से श्रीमती नीशू के अलावा बीएससी नर्सिंग फाइनल ईयर के मेहराज, हेमा इलाईजर, काजल, अरिशा आदि मौजूद रहे।

FIGURE 36: AWARENESS PROGRAM

18.1. Green Campus Initiatives

1. Restricted entry of vehicle: only vehicle owned by university/ staff is allowed to enter the university campus. Separate parking within the site boundary is provided for other private vehicles

FIGURE 37: PARKING WITHIN UNIVERSITY CAMPUS

FIGURE 38: DEDICATED PARKING FOR PRIVATE VEHICLES

2. The University has in-house electric vehicles for technical & non-technical staffs

FIGURE 39: ELECTRICAL VEHICLE FOR IN-HOUSE USE

3. The University has dedicated pathway for pedestrian

FIGURE 40: DEDICATED PEDESTRIAN PATHWAY

4. Huge landscape area with variety of plants and trees species

FIGURE 41: LANDSCAPE AREA WITH PLANTS & TREES

19. Governance

Through the enactment of the Environmental and Green Policy and its circulation to all stakeholders, sustainability can be achieved. The results are regularly required to be verified at annual intervals. These can be managed through internal or external audits.

20. Disposal of Fluorescent tubes

Consumer Level:

As per the present observed practice at the consumer level in the society at large, often, the used lamps are collected by the kabari from the households and collectively handed over to the glass recyclers for the recovery of glass material.

This is all operative in a highly unorganized sector. It has also been observed that the used lamps are thrown in the garbage bins and finally into the municipal garbage dumpsites, contaminating air, water, and soil. Most of the used lamps are broken either at transit solid waste bins (provided by local civic authority) or broken during the transport to the final disposal site. A portion of the mercury, in vapor form, is released into the air, whereas the rest of the mercury is released onto the soil with the further possibility of getting into the surface and/or groundwater bodies through the leachate from the soil.

CONSUMER LEVEL –

Handling of Used/Broken Fluorescent Lamps (FLs): The consumers may handle and dispose of the used lamps as described below:

Domestic Consumers: The consumer must ensure that (s)he does not throw used lamps in the general trash bin but hands them over (in a properly packed form) to a kabari (an individual) or a collection agency identified by an authorized Lamp Re-cycling Unit for proper re-cycle / disposal of used FLs.

The used intact FLs may be stored either in the same boxes in which new lamps are brought or other boxes of similar size. They should be stored upright. The due precaution may be taken while packing more than one used lamp so as not cause the possibility of breakage during storage and transportation.

Even the broken FLs, after due clean-up, may be handed over for safe re-cycling and disposal.

Here are some guidelines for cleaning up a broken CFL:

1. Open a window and leave the room (restrict access) for at least 15 minutes. If you have fans, place the fans in the windows and blow the air out of the room. Note: If the room has no windows, open all doors to the room and windows outside the room and use fans to move the air out of the room and to the open windows.
2. Remove all materials you can without using a vacuum cleaner
3. Wear disposable rubber gloves, if available (do not use your bare hands) • Carefully scoop up the fragments and powder with stiff paper or cardboard
4. Wipe the area clean with a damp paper towel or disposable wet wipe
5. Sticky tape (such as duct tape) can be used to pick up small pieces and powder
6. Place all clean-up materials in a plastic bag and seal it, and then place in a second sealed plastic bag, dispose it properly and wash your hands after disposing of the bags.

7. The first time you vacuum the area where the bulb was broken, remove the vacuum bag once done cleaning the area (or empty and wipe the canister) and put the bag

and/or vacuum debris, as well as the cleaning materials, in two sealed plastic bags in the outdoor trash or protected outdoor location for normal disposal.

Consumer Awareness: All the consumers, individual domestic consumers, and bulk consumers (offices, institutions, large residential complexes, etc.) should get fully aware of the potential health impact of mercury-bearing lamps through audio-visual media and the product leaflets. The precautions to be taken while cleaning up the broken FLs should also be known to the consumers. As a part of such awareness programs, the consumers, even at the individual level, are expected to participate actively with constructive suggestions and provide feedback for the overall success of mercury management in the fluorescent lamp

Collection: The collection of used lamps may be done mainly in two ways: (i) Collection of the used lamp (FLs) from bulk consumers may either be arranged by the management of the above set-up (institutions, etc.) for direct disposal to LRU or by the LRU which may arrange to pick up used lamps from such collection sites through an identified collection agency. (ii) Collection of used lamps (FLs) from the individual domestic consumer may be arranged by the LRU, either through kabaris (individuals appointed for the purpose by LRU) or an identified collection agency for the door to door pickup.

Transportation: (i) The Handler (e.g., Kabari or representative of LRU) of used FLs in transit should take care of the selection of proper vehicles and carriage so as to minimize breakage of used FLs. (ii) There should not be any intermediate transfer of materials in the transit stage. The collected, used FLs should be straight transported to the LRF for further processing. (iii) The Handler should be trained to take care of mercury spills, if any, that take place en route the journey to LRU.

21. Refrigerant used in Air conditioners

The project uses refrigerant which has zero ODP & low GWP

Refrigerant	Global Warming Poetential	Ozone Depletion Potential
R 22	1810	Medium
R 410A	2088	Nil
R 32	675	Nil
R 134A	1430	Nil
R 290	3	Nil
R 600A	3	Nil

FIGURE 42: REFRIGERANT GWP & ODP

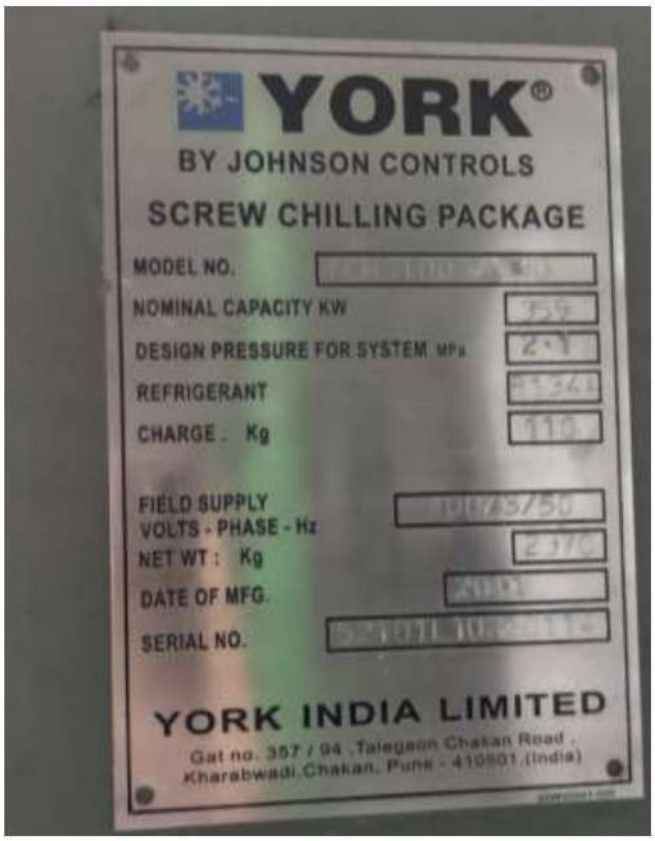


FIGURE 43: CHILLER R-134A REFRIGERANT

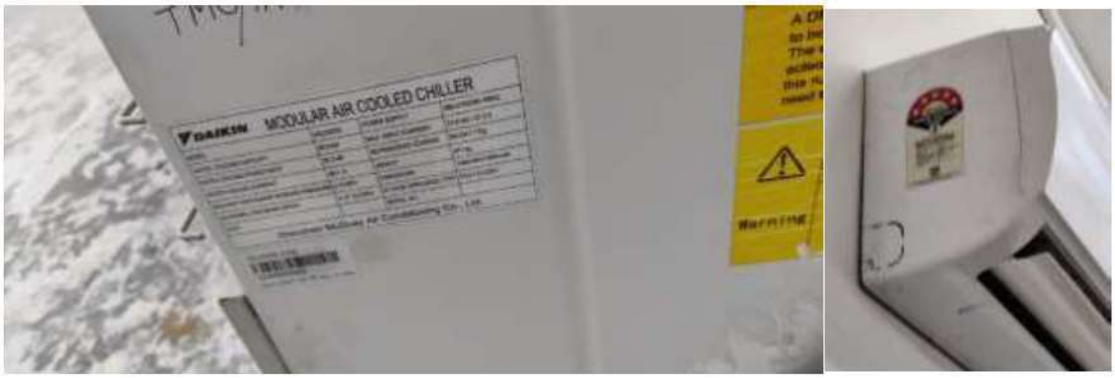


FIGURE 44: HVAC SYSTEM -R410A REFRIGERANT

Recommendations

1. Purchase policy include purchase of Air conditioners with refrigerants for which GWP is low, and ODP is nil.
2. Life cycle cost should be considered for making a decision about the purchase of Air Conditioners.
3. All AC's that were procured more than eight years ago should be replaced with best in class energy efficient Air Conditioners after taking into consideration Life Cycle Cost.

22. Eco Friendly House keeping Materials

Eliminate exposure to prohibited substances that can lead to long term health effects either through respiration / direct contact.

Mandatory Requirement Manufacturer to provide Material Safety Data Sheet (MSDS) for the products.

The MSDS should have the following details:

1. Chemical Identify
2. Manufacturer's Information
3. Hazardous ingredients / Identify information
4. Physical, Chemical characteristics
5. Fire and explosion hazard data
6. Reactivity data
7. Health hazard data
8. Precautions of safe handling and use
9. Control measures
10. Emergency and first aid procedures

23. General Purpose Cleaner

Eco-friendly housekeeping materials are recommended to be used for all cleaning applications. Green Pro or any similar Indian standard should be procured in the future, and records of such procurement should be documented for future references.

The cleaning material may be required for the following applications and also maybe some other in addition to these.

1. Glass Cleaners
2. Bathroom Cleaners
3. Disinfectants and Sanitizers
4. Cleaner/Degreasers
5. Carpet and Upholstery Cleaners
6. Floor Cleaners
7. Liquid Hand Soap
8. Furniture Polish

24. Fire Safety

No halon-based fire extinguishers have been used. It is recommended that if a fire suppression system is to be used for any fire extinguishing system, only clean agents with minimum environmental impact should be installed.

25. Canteen Waste handling Practice

There are no signs provided in Mess and Cafeteria for avoiding food wastage and take food as per requirement, and there should not be any food wastage. These signages are required to be provided in all areas where food is served or consumed.

1. All Hostel Mess
2. Canteen
3. Cafeteria

26. Sustainability development

Sustainable development should always be practiced in all activities of the university.

For the design of any new future construction, the following points should be given consideration and weightage:

1. Siting, form, and design of the building
2. External Development and Landscape
3. Envelope optimization
4. Shading of Building
5. Cool Roof practices
6. Sustainable Material
7. Water and Waste management
8. Building Services Optimization

The following construction practices should be followed for future construction

The framework for sustainable construction practices includes the following issues:

1. Pre-construction prerequisites;
2. Planning for sustainable construction; demolition.
3. Planning, monitoring, and control of environmental descriptors;
4. Sustainable work execution procedures;
5. Effective use of water;
6. Construction waste management;
7. Post-construction closeout;
8. Alternative use, de-construction, dismantling
9. Procurement Policy
10. Contractual Obligations towards Sustainable Construction
11. Identification of Sustainability Issues During Construction
12. Construction methods review and impact on sustainability
13. Consideration of environmental impact assessment
14. Considerations to social impact assessment
15. Prevention and management of construction accidents
16. Establishing Energy Consumption Data
17. Collection, Analysis, Documentation System and
18. Creating Benchmarks
19. Monitoring of performance of management systems and
20. Location of Infrastructure for Labourers
21. Providing fire and life safety measures during construction

Recommendation

Following are some of the key recommendations for improving campus environment:

- An environmental policy document has to be prepared with all the recommendations.
- A frequent visit should be conducted to ensure that the generated waste is measured, monitored and recorded regularly and information should be made available to administration.
- The solid waste should be reused or recycled at maximum possible places.

- Install a water meter to record & monitor water usage inside the campus
- Use flow efficient fixtures or install aerator to reduce the water fixtures flow rate
- Promote use of sprinklers and drip irrigation for landscape area
- Use signage's for creating awareness about green policy and features of the project
- Use separate dustbin for wet & dry waste
- Use different dustbins for different waste inside the campus & building blocks

Annexure A - Site Photographs

FIGURE 45: ENERGY EFFICIENT EQUIPMENT'S

FIGURE 46: FARMING

FIGURE 47: LED STREET LIGHT

FIGURE 48: ENERGY METER AT ROOM LEVEL

FIGURE 49: FAUNA AT SITE

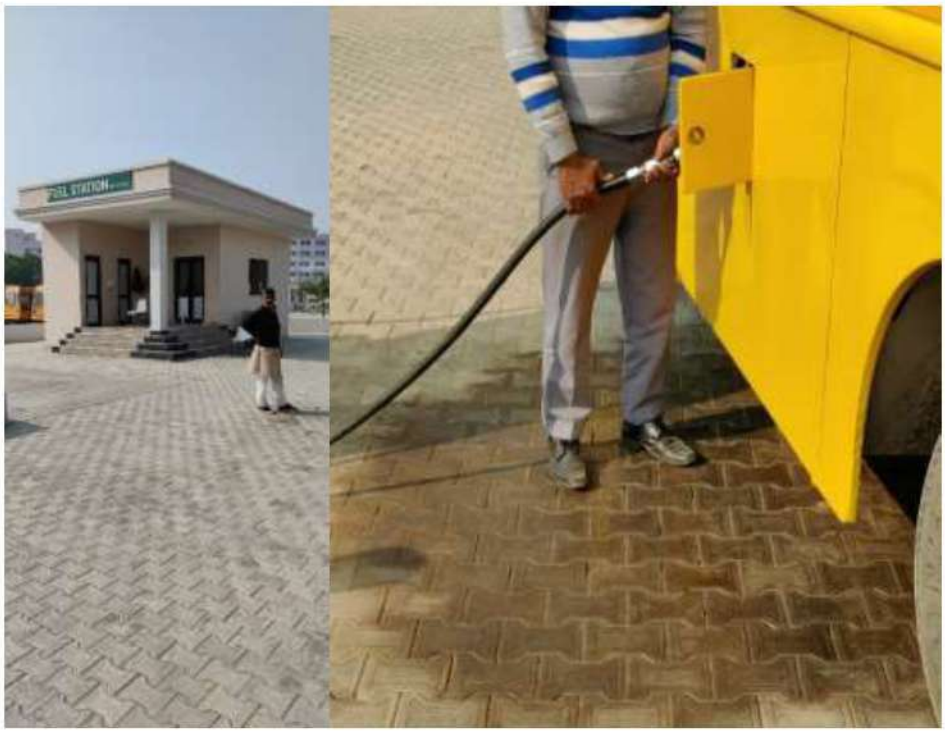


FIGURE 50: FUEL STATION

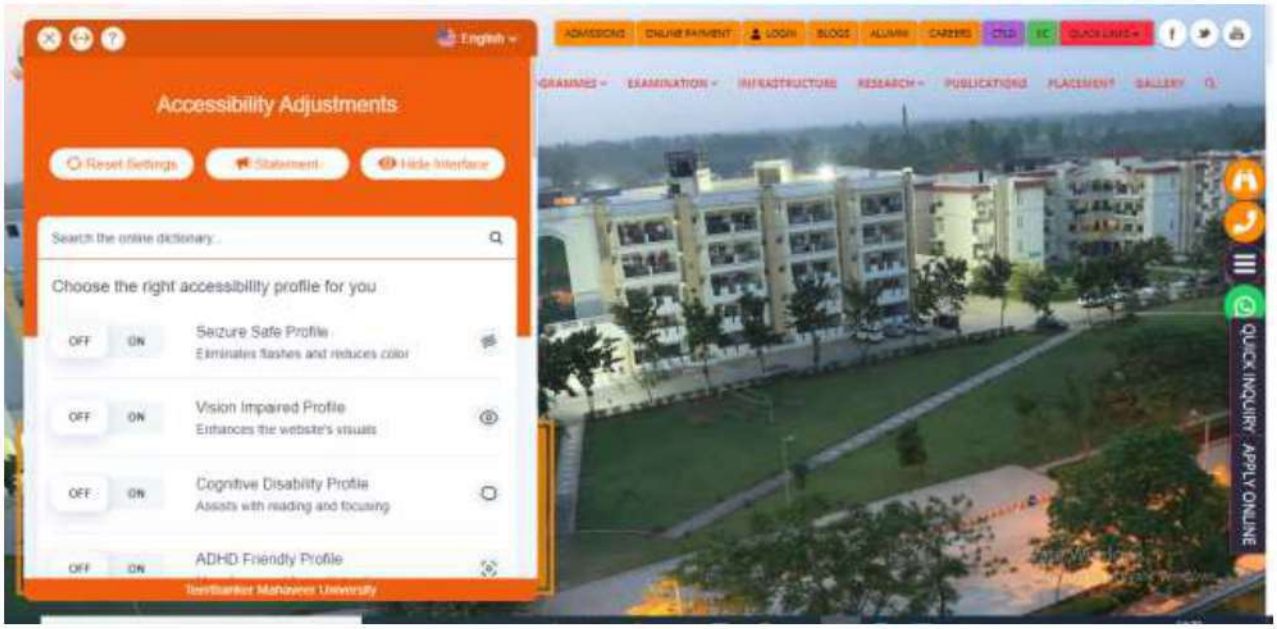


FIGURE 51: DESIGN FOR DIFFERENTLY ABLED

FIGURE 52: GAS METER

FIGURE 53: COLLECTED CANTEEN WASTE

FIGURE 54: AMPHITHEATRE

FIGURE 55: NO SMOKING SIGNAGE

FIGURE 56: FTL TUBE IN LIBRARY

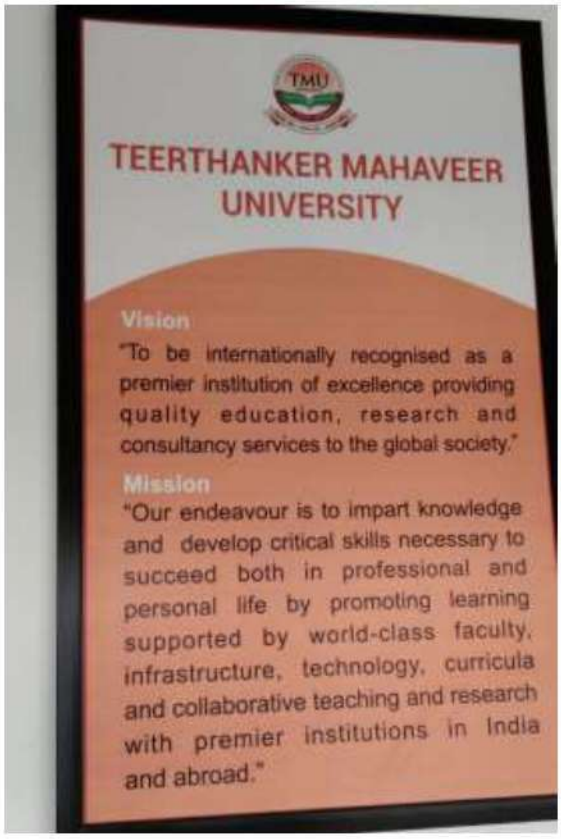


FIGURE 57: UNIVERSITY MISSION & VISION

FIGURE 58: EXHAUST FAN IN TOILETS

FIGURE 59: SIGN BOARD

FIGURE 60: DENOTATION FOR ELECTRICAL LINE

FIGURE 61: CRICKET PLAYGROUND

FIGURE 62: GYM

FIGURE 63: INDOOR GAMES COURT

FIGURE 64: PLAYGROUND

FIGURE 65L HELIPAD AREA

FIGURE 66: DIESEL EQUIPMENT FOR LAWN MOWER

FIGURE 67: IN-HOUSE FARMING

FIGURE 68: UNATTENDED LANDSCAPE AREA

FIGURE 69: USE OF SPRINKLERS FOR LANDSCAPE

FIGURE 70: ROOFTOP SOLAR PV SYSTEM

FIGURE 71: FLORAL DIVERSITY

FIGURE 72: VIEW OF FLORA FROM BUILDING INTERIOR

FIGURE 73: AUDITORIUM

FIGURE 74: BASIC AMENTITIES : MEDICAL STORE

FIGURE 75: BASIC AMENTITIES: TEA STALL

FIGURE 76: BASIC AMENITIES : BANK

FIGURE 77: WASTE COLLECTION

FIGURE 78: CLEANING EQUIPMENTS

FIGURE 79: FRESH AIR GRILL -STAIRCASE

FIGURE 80: FRESH AIR FAN

FIGURE 81: COOLING TOWER-HOSPITAL BLOCK

FIGURE 82: ROOF PAINTED WITH WHITE PAINT

FIGURE 83: MOTOR NAME PLATE

Appendix B- NAAC

Criterion VII – Institutional Values and Best Practices (100)			
Environmental Consciousness and Sustainability			
Metric No.		**Weightage**	**Description**
7.1.2	The Institution has facilities for alternate sources of energy and energy conservation measures 1. Solar energy ✓ 2. Biogas plant ✓ 3. Wheeling to the Grid ✓ 4. Sensor-based energy conservation ✓ 5. Use of LED bulbs/ power efficient equipment ✓	5	The project includes the following features Solar PV plant & energy efficient equipment, Please follow the given link below for details • Renewable Energy • Annexure A - Site Photographs
7.1.3	Describe the facilities in the Institution for the management of the following types of degradable and non-degradable waste (within 500 words)	4	General waste and Hazardous waste
7.1.4	Water conservation facilities available in the Institution: 1. Rain water harvesting ✓ 2. Bore well /Open well recharge ✓ 3. Construction of tanks and bunds ✓ 4. Waste water recycling ✓ 5. Maintenance of water bodies and distribution system in the campus ✓	4	Water Audit
7.1.5	Green campus initiatives include 1. Restricted entry of automobiles ✓ 2. Use of Bicycles/ Battery powered vehicles ✓ 3. Pedestrian Friendly pathways ✓ 4. Ban on use of Plastic ✓ 5. Landscaping with trees and plants ✓	4	• Green Campus Initiatives • Environmental & Green Policy
7.1.6	Quality audits on environment and energy are regularly undertaken by the institution 1. Green audit ✓ 2. Energy audit ✓ 3. Environment audit ✓ 4. Clean and green campus recognitions/awards ✓ 5. Beyond the campus environmental promotional activities ✓	5	• Green & environmental • Training and awareness program
7.1.7	The Institution has disabled-friendly, barrier free environment 1. Built environment with ramps/lifts for easy access to classrooms. ✓ 2. Disabled-friendly washrooms ✓ 3. Signage including tactile path, lights, display boards and signposts ✓	4	Annexure A - Site Photographs

	4.	Assistive technology and facilities for persons with disabilities (Divyangjan) accessible website, screen-reading software, mechanized equipment	✓		
	5.	Provision for enquiry and information : Human assistance, reader, scribe, soft copies of reading material, screen reading	✓		

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