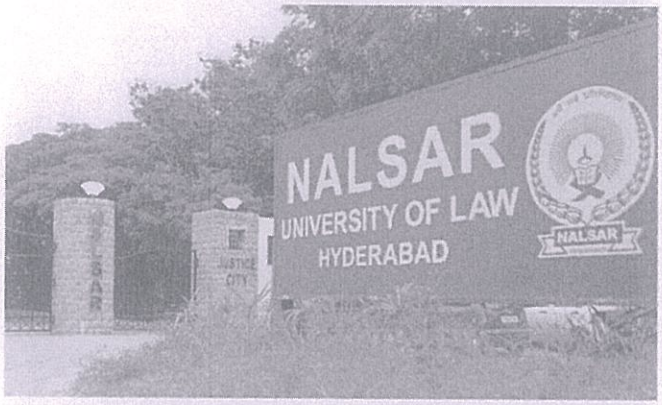
Green Audit Report

(2021-22)

of

NALSAR University of Law



Submitted to

NALSAR University of Law

Justice City, Shameerpet, Malkajgiri-Medchal District
Hyderabad, Telangana

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September 2021

NALSAR UNIVERSITY OF LAW HYDERABAD

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ACKNOWLEDGEMENTS

DevGreen Energy Consulting places on record its sincere gratitude to the management of NALSAR University of Law for awarding this prestigious project of Green Audit of NALSAR University of Law, Justice City, Shameerpet, Hyderabad, Malkajgiri-Medchal District, Telangana.

In this regard, we sincerely thank:

Prof. Faizan Mustafa, Vice-Chancellor, NALSAR University of Law, Hyderabad; and

Prof. Balakista Reddy, Registrar, NALSAR University of Law, Hyderabad

The involvement of the management of NALSAR and their commitment to Environmental Sustainability is clearly demonstrated in every stage of the Green Audit by the way of full cooperation and involvement of all the concerned persons of the University.

We thank Sri Reddy, Chief Engineer, NALSAR University of Law, Hyderabad for providing the necessary support.

Our thanks are due to Sri Koteswara Rao, Assistant Manager, Engineering Department for coordinating the study, providing the valuable information, and extending the support.

We also thank the other staff of Engineering Department and other Sections of the University.

We sincerely hope that the Green Audit Study will facilitate and contribute to a sustainable environment.

Sobhanbabu PRK

Chief Executive Officer

DevGreen Energy Consulting

1.0 INTRODUCTION

1.1 Green Audit

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of an institute. It aims to analyse environmental practices within and outside of the concerned place, which will have an impact on the eco-friendly atmosphere.

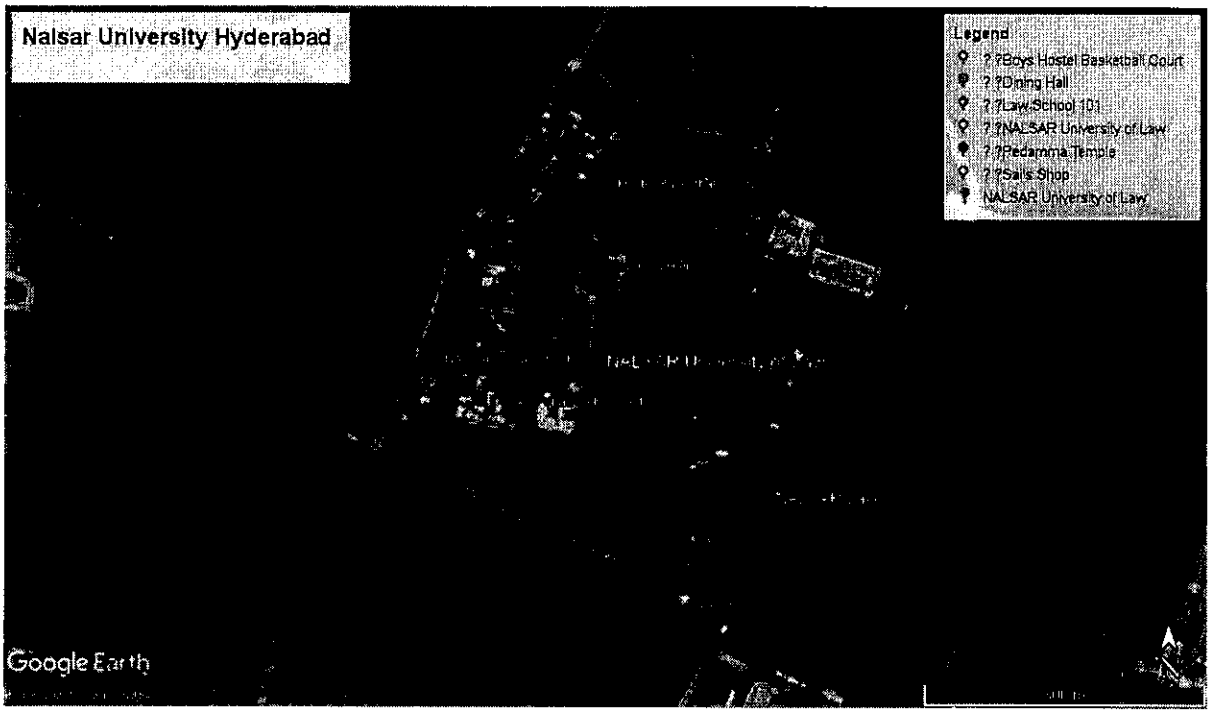
Green audit is a valuable means for an institute to determine how and where they are using the most energy or water or other resources; the institute can then consider how to implement changes and make savings. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus it is imperative that the institute evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric CO_2 from the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through carbon footprint reduction measures.

1.2 A Brief About NALSAR University of Law

The National Academy of Legal Studies and Research (NALSAR) was established in the year 1998 by a Statute of the State of Andhra Pradesh. Since its inception, the University has been home to vital conversations on law and justice. Using law as an instrument of social change, the University has supported crusades for land rights, disability empowerment and against moral policing and hate speech. NALSAR is committed to the creation of an ethical legal culture, which protects and promotes the rule of law.

Laid over 55 acres, the NALSAR campus is a mix of architecture and stunning landscaping. The campus has its variety of trees, sprawling laws, and tastefully designed architecture—to a wildlife resort. The campus boasts of spacious dining halls, residential complexes (one each for men and women), a stadium, tennis lawns and even a small pond of its own.



With students admitted from all over the country and faculty drawn from home and abroad, NALSAR is counted amongst the top law schools of the country.

The University has the mandate of providing comprehensive legal education at all levels and award degrees or diplomas to successful candidates. The undergraduate, post graduate, and doctoral programs have been designed to enable students, depending on their inclination, to either opt for niche specializations or inter-disciplinary breadth.

The various Courses offered by the University are:

S. No.	Course	Duration
1	BA LLB (Honours)	5 years
2	LLM	1 year
3	MBA	2 years

In addition to these degrees, the University offers a range of highly specialized diploma courses.

With the objective of deep learning in niche areas, NALSAR has set up a number of research centres. The centres have been mandated to research on their domain areas, which would inform policy, strengthen teaching, and where required fuel advocacy. The various centres of the NALSAR University are:

S. No.	Centre Name
1	Centre for Air and Space Law
2	Centre for Constitutional Law, Public Policy and Good Governance
3	Centre for Corporate Governance
4	Centre for Disability Studies
5	Centre for Family Law
6	Centre for Legal Philosophy and Justice Education
7	Centre of Excellence for Economics and Finance
8	Dr. S. P. Chatterjee Centre for Environmental Law Studies
9	M K Nambyar SAARCLAW Centre for Advanced Legal Studies
10	N. C. Banerjee Centre for Intellectual Property Rights Studies

They have provided support to doctoral fellows researching in their area of specialisation; along with providing education and training to legal interns from different parts of the country.

The students and faculty strength of the University are as follows:

S. No.	Category	Strength
1	No. of Students	850
2	No. of Faculty	45

3	No. of Non-Teaching Staff	120

1.3 NALSAR – A Green Campus

NALSAR is a green campus with approximately 30% of constructed area and remaining about 70% is green.

The campus has taken several initiatives to make the campus eco-friendly and these are:

- Energy conservation
- Utilization of Renewable energy
- Water harvesting
- Efforts for Carbon Neutrality
- Plantations
- Hazardous waste management
- E-waste management

1.3 Objectives of the Green Audit

This is the first attempt to conduct Green Audit of this University campus.

The main objective of the green audit is to promote the Environment Management and Conservation in the NALSAR University Campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies, and standards. The specific objectives are:

- To monitor the energy consumption pattern in the University
- To assess the quality of water, water sources, consumption, and treatment
- To quantify the liquid and solid waste generation and management plans in the campus
- To advise resource conservation & management plan to the University covering energy, water, soil, etc.
- Provide a database for corrective actions and future plans
- To assess whether extracurricular activities of the University support the collection, recovery, reuse, and recycling of solid waste
- To identify the gap areas and suggest measures to improve the Green Campus status of the University

The above efforts are explained in the following sections.

1.4 Methodology Adopted

The methodology adopted by DevGreen Energy for conducting the Green Audit has the following key components:

- *Preparatory Work*

  Preparatory work involved preparation & finalization of data collection formats, formulation & finalization of strategy/ methodology, finalization of the field study schedule in consultation with the University, and finalization of Green Audit team.

- *Data Collection*

  It involved collection of design/ technical data of various equipment, gadgets, appliances, their inventory, energy bills, historical data collection, etc. prior to the field visit.

- *On-site Survey*

  Field study was conducted for five days by the Green Audit team to assess and ascertain the current status of various components like energy, water, waste management practices, soil, etc. Verification of information/ data gathered during the previous stage by direct/ physical survey.

- *Focus Group Discussions*

  The focus group discussions were held with the management and other key personnel from various Departments, Groups, Sections of the University such as the Engineering Department, Library, Administration, Canteen, students, non-teaching staff, and focusing on various aspects of the Green Audit.

- *Data Analysis*

  The data gathered from the above tasks has been compiled, analysed for baselines assessment, awareness on environmental sustainability, resources conservation, identify gap areas.

- *Report Preparation, Submission & Discussions*

  The report consisting of data gathered, verified, measured during the various stages of the Green Audit, observations, analysis, gap areas and recommendations

for improvement is prepared. The findings were discussed with the concerned key personnel and any comments, suggestions, observations were noted.

- *Submission of Final Green Audit Report*

  Based on the discussions, the Green Audit report was finalized and submitted to the NALSAR University of Law.

1.5 Timeframe

The Green Audit was conducted during August and September 2021.

1.6 About DevGreen Energy Consulting

DevGreen Energy Consulting is a leading technical consulting and advisory firm established in the year 2013 with a mission to provide sustainable, innovative, and knowledge solutions to core sectors thereby contribute to clean/ green energy, energy security, increase in profitability of businesses, enhanced livelihood of rural poor, improvement in global and local environmental quality, and climate change mitigation. Towards meeting these goals, DevGreen provides advisory in the areas of energy efficiency, renewable energy, rural energy access, MSME clusters development, and cleaner production/ waste minimization to clients in a highly focused manner.

DevGreen has qualified and experienced professionals from energy efficiency, renewable energy, and environment sectors. Our professionals have field research and industry experience backed with robust domain knowledge and expertise through which we support sustainable solutions, which are business centric. The team draws experts from technology, policy, finance, social, and management background with strong domain experience in energy and environmental issues. Its professionals have extensive experience of working on complex and challenging.

DevGreen empowers businesses through knowledge solutions and emphasize on being trusted long-term partner in steering businesses towards sustainable profits.
DevGreen assists a wide array of clients: multilateral and bi-lateral agencies, international organizations, Central & State governments, public sector, corporate/ private sector, foundations, NGOs, and communities to formulate and implement innovative and sustainable strategies.

The Green Audit team of DevGreen Energy Consulting is headed by Mr. Sobhanbabu PRK, M.Tech (Chemical Engineering), IIT Bombay with 30 years of experience in energy efficiency, clean/ green energy, sustainable development, cleaner production, and waste minimization. He received advanced international training as Green Productivity Facilitator by Asia Productivity Organization (APO), Japan and also received trained on various energy & environmental aspects internationally.

2.0 ENERGY AUDIT

2.1 Power Supply & Distribution

The NALSAR University of Law receives the power supply from the Southern Power Distribution Company Limited (TSSPDCL). The contract maximum demand (CMD) of the facility is 200 KVA and the supply voltage is 11 kV. The power supply information is summarised below in Table 1:

Table 1: *Power Supply Details*

S. No.	Item	Description
1	Consumer No.	MCL898
2	Present Contracted maximum demand (CMD), KVA	200
3	Supply Voltage, kV	11
4	Category	2
5	Energy charges, Rs./kWh	7.80
6	ToD Charges, Rs/kWh	1.00
6	Demand Charges, Normal, Rs/KVA/month	390
7	Demand Charges, Penal, Rs/KVA/month	780

The University has got the approval/ sanction of enhancement of CMD by TSSPDCL from the present level of 200 to 350 KVA and the required works are underway. As per the NALSAR University, the works will be completed by the end of September 2021 and the enhanced CMD will be applicable from October 2021.

The power through CTPT and VCB panel is distributed to six nos. of Transformers. The details of Transformers such as rating, supply areas, capacitor Banks, and DG Sets are summarised below in Table 2:

Table 2: *Transformers, DG Sets, Capacitors Details*

S. No.	Transformer	Rating KVA	Power Supply Areas	DG Sets KVA	Capacitors Installed
1	Transformer 1	315	• Admin Building • Academic Building • SARC Law Building • MBA Building	• 200 • 63	20 KVAR

			• IPR Building • Class Rooms • Library • Dining Hall • Class 4 Quarters • RO Plant		
2	Transformer 2	250	• Boys Hostels 1, 2, 3, 4 & 5 • Stadium	315	10 KVAR x 4 nos.
3	Transformer 3	315	• Girls Hostels 1, 2, 3, 4, 5 • Boys Hostel 6 • VC Residence • University Guest House • Faculty Quarters • Convention Centre • STP Plant	315	10 KVAR x 4 nos.
4	Transformer 4	315	• Auditorium	315	10 KVAR x 4 nos.
5	Transformer 5 (New) *(to be energized)*	315	• Boys Hostel 7 (Lifts & other loads)	315	10 KVAR x 4 nos.
6	Transformer 6 (New) *(to be energized)*	315	• Girls' Hostel 6	200 KVA x 2 nos.	10 KVAR x 4 nos.

- Transformer 1 supplies power to Class-IV Quarters with single phase power supply. There are total 12 nos. of Class-IV Quarters.
- There are three numbers of Faculty Quarters (A, B, C Blocks)
- The Capacitors are installed at each panel are manually operated for maintaining power factor.

2.2 Solar Rooftop Power Plant as Green Power for Captive Consumption

The NALSAR University has installed a solar rooftop power project of 200 kW (DC), which is green power. The project was implemented by Telangana State Renewable Energy Development Corporation (TSREDCO) on Net Metering basis in July 2018. The solar plant

generates up to 24,000 kWh per month. The monthly solar energy generation is monitored, as per the NALSAR University.

As can be seen from the electricity bills, about 10,000-15,000 units per month generated by solar rooftop project are adjusted in the total grid electricity consumption as the solar project is net metering project.

2.3 DG Sets as Standby to Grid Power

There are a total five (5) DG sets as standby to grid power comprising of four nos. of 315 KVA and one 63 KVA rated capacity. The sets are used in the event of power shut down/failure.

Logbooks are maintained for all DG sets and details like date of operation, on & off time, voltage, current, hours of operation, energy generation, and diesel consumption are recorded. The details of DG Sets and supply areas are given in Table 1.1 above. All the DG Sets are of Cummins make.

As can be seen from the Table 1.1, two DG sets comprising of one 200 KVA & one 63 KVA are standby to grid power and cater to the areas of Transformer 1 supply areas. During power shutdown, 200 KVA Transformer is operated; however, if the load is less during night or otherwise, 63KVA is operated.

The specific energy generation ratio (SEGR) is estimated to be in the range of 3.00 to 3.50 kWh/Litre, which is satisfactory considering the less operational hours and low load on the DG sets. The SEGR is expected to increase and reach optimum level once the operational hours or load on DG sets increase. As per the records and log book data, the annual HSD bill for DG sets is Rs5.00 Lakh.

2.4 Energy Consumption

The present monthly energy consumption varies in the range of 60,000 kWh (off-peak season) to 1,00,000 kWh (peak season) per month and the average is 80,000 kWh per month. Thus, the annual electrical energy consumption works out to be 10 Lakh kWh per annum. However, the consumption is expected to increase by 10-15% once the new Boys Hostel 6 (construction completed) and Boys Hostel 7 (to be completed by end September 2021) are operational.

However, during the Covid-19 period, the electricity consumption reduced significantly to 15,000 to 27,000 units per month before adjusting net metering units as the hostels were closed and off line classes were changed to online.

The energy consuming equipment/ gadgets of the facility are:

- Split Air conditioners
- Submersible Pumps
- Water circulation Pumps
- Ceiling Fans
- Blowers
- Interior Lights
- Street Lights
- Geysers
- Computers
- Printers
- Photocopying machines
- Projectors
- Lifts
- STP Plant Blowers & Pumps
- RO Plant Pumps
- Kitchen equipment like mixi, grinders, etc.

Solar street lights were replaced with LED street lights due to high maintenance cost, battery problems, and frequent failures of solar street lights.

2.5 CNG

CNG is the fuel used in the kitchen for cooking of food.

2.6 Energy Conservation Initiatives Taken by NALSAR for making the Campus Green

The NALSAR University has been emphasizing energy conservation, energy efficiency, and energy savings in the campus by implementing various energy conservation technologies, practices, and measures, which are given below:

- All the buildings in NALSAR campus are structured in such as a way that sufficient natural lighting and ventilation is available in all the rooms and buildings without using much lights, fans, air conditioners
- Roof was constructed by using appropriate thermal insulation material as per Energy Conservation Building Code (ECBC)
- Most of the buildings including Library, Dining Hall, Boys Hotels 1, 2 & 6, Girls Hostels 1 & 2, and Street Lights have energy-efficient LED lights of appropriate Wattage
- Further, NALSAR has planned replacement of lights with LED lights in Boys Hostels 3, 4, 5 and Girls' Hostels 3, 4, 5 in 2-3 months
- Replacement of remaining lights in the campus with energy-efficient LED lights are underway
- Solar Rooftop Power Project of 200 kW has been commissioned in 2018, which generates substantial amount of green energy (24,000 kWh per month) substituting the grid power to the extent
- Solar water heaters have been installed and used for hot water generation in the hostels, guest house, convention centre, and other facilities. This measure has reduced the grid power consumption of the campus substantially

The above measures have helped not only reducing grid power consumption but also reducing carbon footprint and GHG emissions in a substantial way.

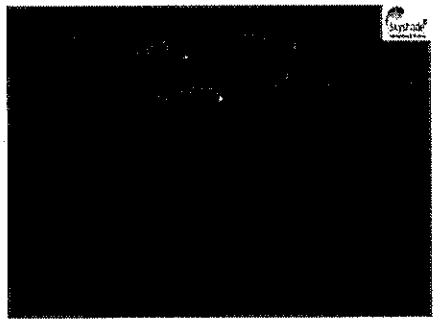
2.7 Recommendations for Energy Savings & Conservation

The site survey and study conducted at the premises shows that there is scope for reducing the energy consumption by adopting the following measures/ schemes/ practices:

1) Presently, non-LED lights like Fluorescent Tube Lights (FTL) and CFLs of different Wattage are used in boys' hostels (3, 4, 5) and girls' hostels (3, 4, 5), office buildings, buildings' exterior lighting, DG Sets rooms, and other locations. It is suggested to replace these fixtures with energy-efficient LED lighting to reduce lighting energy consumption of these buildings/ areas by about 50%.

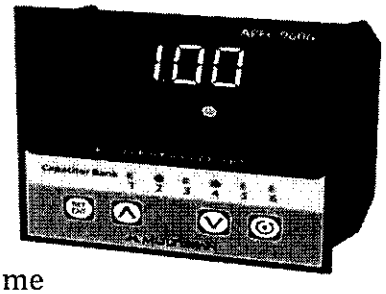
2) Stadium has a total of 35 Sodium vapour lamps (20 nos. of 125 W; and 15 nos. of 250 W). These SV lamps should be replaced with suitable wattage of energy-efficient LED lights.

3) It is suggested to implement Day lighting solutions where possible to reduce lighting energy consumption during day time. The lighting energy consumption will reduce by 30% with Day Lighting solutions.



4) Automatic power factor controller (APFC) may be installed for all distribution panels at each Transformer to maintain near unity power factor. AT present, power factor is maintained manually by switching on/off the capacitor panels. As the power load differs between night and day hours, the APFC helps maintaining the unity power throughout the day thereby reducing energy bill.

5) It is suggested to install Heat Pumps for hot water generation in all the boys' and girls' hostels in place of electrical geysers. Heat Pumps reduce electrical energy consumption by 30-40% compared to electrical geysers and provide hot water up to 60°C.



As Solar Water Heating system is provided in some hostels, which effectively supply hot water during the day, it is suggested to integrate the heat pump with solar hot water system so that continuous supply of hot water for 24 hours per day is assured.

6) Presently, the split air conditioners are 1.5 TR, 2 TR, 5.5 TR capacity and 3 Star Rating. It is suggested to replace these with energy efficient Air Conditioners of 5 Star Rating in a phased manner to reduce the energy consumption by 5 to 7%.

7) It is suggested to install Energy Saver for all Air Conditioners to save energy by 35%. The Air Conditioner Power Savers are based on Thermal Saturation Point.

The problem with relying on the present system of thermostat in Air conditioners is that it works by sensing the room temperature and operates compressor based on that, but it does not consider the energy levels in the air conditioner. Post the thermal saturation point, the air conditioner already has enough stored energy to remove the heat from the room and any excess electricity used by the compressor goes waste. An air conditioner works by compressing and condensing refrigerant gas to a high-pressure liquid, which then moves to a low-pressure area and absorbs the heat from the air in the room to convert back into gas. In an oversized air conditioner, the heat coming from the room is not sufficient to convert low-pressure liquid to back to gas and thus it goes back in the compressor as a liquid. The electricity then used by the compressor goes waste as the refrigerant is already in liquid form. Technically the point at which the liquid absorbs heat and still does not change to gas, neither does it change its temperature is called Thermal Saturation Point. The Power Savers based on Thermal Saturation Point detect occurrence of this state and switch off the compressor. This avoids wastage of electricity by the compressor. The payback period is 1 to 2 years depending on the size of the AC.

8) It is suggested to replace the old in-efficient ceiling fans with super-efficient ceiling fans which consume 35W in place of 60-80W conventional ceiling fans thereby reducing the fans consumption by 50%. Considering the large number of ceiling fans in the campus, it may be considered on priority basis. EESL, Government of India may be approached for undertaking this project under ESCO model.

9) The University may conduct in-house programs, campaigns, awareness raising programs in the campus on energy conservation by inviting experts. This will help raising energy conservation awareness and upgrade the knowledge to reduce energy consumption. The NALSAR University may also nominate students for external programs on energy conservation and clean energy. The posters on energy conservation may displayed in different locations, especially in hostels, offices to raise awareness and reduce energy wastage. This will inculcate the culture of energy conservation in the campus.

10) It is suggested to maintain a logbook to monitor and record energy generation by solar rooftop plant on daily & monthly basis. This would help monitor the energy generation and thereby tracking the performance of the solar rooftop plant and take necessary action immediately, if the performance drops.

11) The University may prepare a plan to replace the existing diesel buses, cars, other vehicles with E-vehicles and make necessary provisions for charging stations, etc. The concerned department of government of India may be consulted for assistance in this regard.

3.0 WATER MANAGEMENT

3.1 Water Supply & Distribution

The Nalsar University campus meets its water requirement by (i) ground water as well as (ii) Manjira water with ground water accounting for the major share of total water consumption of the campus.

Normally, two nos. of submersible bore well pumps are operated for a total combined duration of 12 to 15 hours per day to meet the requirement. However, during summer, four nos. of bore wells are operated to meet the increased water consumption. The raw water consumption is estimated to be 1,000 kLPD (kilo Litres per day).

The University has permission to use maximum 1,000 units of Manjira water per month. However, when water consumption exceeds 1,000 units in summer during the months of February, March, and April, the Manjira water consumption increases and hence the University pays additional charges for excess water usage above 1,000 units. The Manjira water is supplied to the campus by a 6-inch line.

There is an underground sump of 3 Lakh Litres capacity to store ground water and Manjira water. The water from the underground sump is pumped to an overhead tank (OHT) of 1.00 Lakh litres from where the water is pumped to hostels, offices, staff quarters, and other buildings for toilets etc.

The campus has an R.O plant with Raw water feed flow of 4,000 Litres per hour (LPH) consisting of two numbers of each 2,000 Litres capacity and RO water generation capacity is 2,000 LPH to meet the drinking water requirements of the campus. The RO water is stored in two storage tanks of each 5,000 Litres (total storage capacity 10,000 Litres) and supplied to all hostels, quarters, offices, class rooms, kitchen, dining hall, etc. to meet drinking water requirements. The total RO water consumption is estimated to be approximately 15,000 Litres per day. The reject water from the RO plant is collected in an underground sump and used for watering the plants, gardening, and lawn maintenance. The sources of water, water drawl/ consumption quantity, water treatment adopted, and water utilization are summarized in Table 3 below:

Table 3: *Sources of Water, Treatment, and Management*

S. No.	Parameter	Description
1	Source(s) of Water for the University	Ground water and Manjira water
2	Major Source of Water	Ground water
3	No. of Bore Well Pumps Installed	4 nos.
4	Type of Bore Well Pumps Installed	Submersible
5	Motor Rating of Bore Well Pumps, HP	5 HP
6	No. of Bore Well Pumps Operated in a day (normal)	2 nos.
7	Total combined Hours of operation of the 2 pumps per day	15 hours/day
8	Quantity of water drawl	1,000 KL/day
9	*No. of Bore Well Pumps Operated during summer#* *(Middle of February, March, & April)*	4 nos.
10	Permission for Manjira Water	1,000 units/ month
11	Underground Water Storage Sump Capacity	3.00 Lakh Litres
RO PLANT		
12	RO Plant	Yes
13	No. of RO Plants	2 nos. *(New Plant in operation; old plant not operational)*
14	Feed Flow Rate	4,000 LPH
15	Permeate Flow Rate/ Output	2,000 LPH
16	Reject water	1,950 LPH
17	System Recovery	50%
18	Source of Feed Water	Bore Water
19	TDS of RO water	<100 ppm
20	RO water usage	Drinking water for all Hostels & Buildings
21	RO water consumption	15 kL per day
22	RO Plant Operational hours per day	8 to 10 hours/day
23	RO Water Storage Tank Capacity	10,000 Litres *(2nos. of 5,000 Litres)*

 # The campus is closed for vacation in May & June and November & December

The old RO Plant is operated only when new RO plant is under maintenance or when demand for RO water increases and cannot be met by the new RO Plant, especially during summer.

3.2 Water Quality & Testing

The bore water, Manjira water and RO water samples are tested in a reputed Laboratory, twice in a year at the time of beginning of a semester and the reports are filed. Further, as and when request comes from students, faculty or staff, tests will be conducted to check water quality. The water samples are collected from each floor of Girls' & Boys Hostels, Dining Hall, Administrative Block Cafeteria, Academic Block, MBA Block, Seminar Hall, Library, etc. and tests are conducted externally by an authorized & certified laboratory. The results of biological and physico-chemical tests conducted on drinking water samples are presented in the Table 4 below:

Table 4: *Test Results of Water Quality*

S. No.	Test Carried Out	Result	Test Method
Test: Bacteriological **Sample:** Drinking Water from Girls' Hostels, Dining Hall, Boys Hostels, etc.			
1	Total Coli form (MPN/100ml)	Absent	IS:1622-1981
2	Faecal Coli form (MPN/100ml)	Absent	IS:1622-1981
3	E.Coli in 100 ml of sample	Absent	IS:1622-1981
Test: Physico-Chemical[2] **Sample:** Drinking water			
1	Odour	Agreeable	-
2	Taste	Agreeable	-
3	Turbidity	0.1	IS:3025(Part10)-1984
4	pH Value	7.85	IS:3025(Part11)-1983
5	Total Dissolved Solids	347	IS:3025(Part16)-1984
6	Total Hardness as $CaCO_3$	240	IS:3025(Part21)-2009
7	Calcium as C^{++}	51	IS:3025(Part40)-1991
8	Magnesium as Mg^{++}	27	IS:3025(Part46)-1994
9	Total Alkalinity as $CaCO_3$	200	IS:3025(Part23)-1986

10	Chloride as Cl^+	38	IS:3025(Part32)-1988
11	Total Iron as Fe	0.27	IS:3025(Part53)-2003
12	Nitrate as $NO3^-$	01	IS:3025(Part34)-1988
13	Sulphate as $SO4^-$	03	IS:3025(Part24)-1986
14	Fluoride as F^-	0.10	IS:3025(Part60)-2008

[1]*The drinking water confirms to IS10500-2012 (Second Revision), Drinking Water Specification*

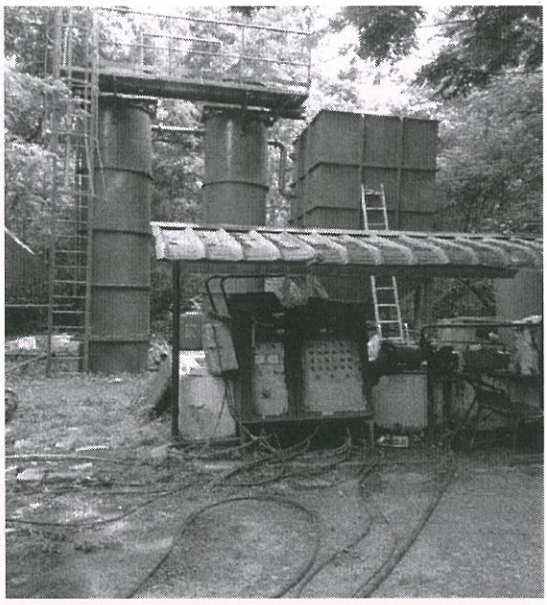
[2]*The other parameters of drinking water as per the Physico-Chemical Test (1 to 14) are also within the limits for safe drinking water*

3.3 Waste Water Generation, Treatment & Management

The sources of waste water are student hostels, toilets, canteen, dining hall, buildings, faculty rooms, faculty/ staff quarters, offices, etc.

The waste water generated from the above sources is collected and treated in STP, the details of which are furnished below:

3.3.1 STP



The waste water generated from the above sources in the campus is stored in an underground sump of 1.00 Lakh Litre capacity. The waste water from the sump is pumped to the STP (MBBR technology) of 150 kLPD capacity. The treated water is pumped by a 3 HP pump to a 30KL storage tank and used for watering the plantations, gardening, etc. The sludge generated is dried and disposed-off. The STP plant comprises four numbers of blowers (10HP) and two numbers of monoblock pumps (3HP). The STP is taken for maintenance & cleaning every three months. The waste water sources, quantity of waste water, treatment adopted, and recycle/ reuse of treated water are summarized below in Table 5:

Table 5: *Waste Water Sources, Treatment, Recycle, Reuse*

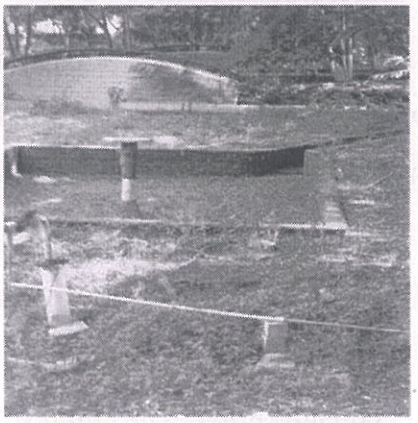
S. No.	Parameter	Description
1	Sources of Waste Water	• Hostels, canteen, dining halls, buildings, toilets, labs • RO reject water
2	STP capacity	150 LPD
3	Technology of STP	MBBR
4	Use of STP Treated water	Gardening, plantations
5	Quantity of RO Reject water	1,950 LPH 20,000 LPD
6	Use of RO Reject water	Gardening, plantations
7	Leaking taps, if any	No

3.4 Initiatives Taken by NALSAR for Water Conservation & Management to make the Campus Green

3.4.1 Water harvesting

The University has emphasized on maximum utilization of rain water for harvesting by the percolation wells made in the campus.

The necessary structures were created to divert the rain water in to the rain water harvesting pets. Check dam construction is not possible as per the condition of the site because there are under rocks.



There are two rain water harvesting pits in the campus near the bore wells for ground water recharge. Further, there is a natural storm water pond of 700 meters perimeter and 4 to 5meter depth, where storm water is stored for ground water recharge. The pond has fish and other aqua life. The over flow from this water pond goes to Shameerpet Lake. Water conservation measures adopted by the University are highlighted below in Table 6:

Table 6: *Water Conservation Measures*

S. No.	Parameter	Description
1	Rain water harvesting (RWH) available in the campus	Yes
2	No. of RWH pits	2 nos.
2	Natural storm water pond	Yes
3	Roof rain water harvesting	Not available
4	Type of taps used in toilets	Normal/ standard
5	Whether sensor type taps are used?	No
6	Whether drip system provided for watering the plantations?	Available, but limited to a few areas. In other areas, normal system is in use.
7	Whether flow meters are installed for monitoring raw water consumption	No
8	Type of flush in toilets	Normal/ standard

3.4.2 Sewage Water Treatment, Recycle and Reuse

Sewerage Treatment Plant is installed (described in Section 3.3.1) for recycling the water and the recycled water is used for gardening purpose.

3.5 Recommendations for Water Conservation and management

The water sources are safe for consumption from contamination as can be seen from the various tests conducted.

The University has been making sincere efforts for conservation of water as explained above. However, the campus will benefit by adopting the following measures towards further water conservation and costs.

1) It is recommended to make provisions to collect the rain water from the roofs of all the buildings of the campus by laying pipelines and channels and send the rain water to the rain water harvesting pits. This will help recharging the ground water considerably. The quantity of water that can be collected is substantial considering the large roof area of the buildings. It will further reduce water drawl from bore wells as well as Manjira water consumption.

It should be noted that approximately 3,000 Litres of water can be harvested for every M^2 area of the roof of a building. Since the roof area of the buildings is huge and extends to thousands of M^2, the water harvesting potential is huge.

2) It is suggested to adopt drip irrigation for gardening, plantations, and lawns where it is presently not used. Drip irrigation saves nearly 70-80% of water for gardening purposes. By adopting this measure, the STP treated water and RO reject water will suffice for plantation and gardening purposes and no ground water is required.

3) It is suggested to use pressure taps/ spray taps in wash rooms in place of standard taps. This will reduce water consumption in toilets/ wash rooms by about 80%. As a long term measure, sensor based taps may be installed for reducing water consumption. Reduction in water consumption in wash rooms/ toilers will not only reduce bore water/ Manjira water consumption, it will reduce waste water generation, hence STP treatment costs will reduce.

4) Digital water meters may be installed for bore wells for monitoring the water drawl and consumption on daily basis and the same may be recorded in log books.

5) Water conservation posters may be displayed in the campus to create awareness among students and staff. The students may be nominated for any external programs or experts may be invited to the campus.

6) Recycle and reuse of STP treated water and RO reject water should be enhanced for gardening and plantations so that the need for fresh ground water is reduced to the minimum.

(7.1.3+ 7.1.6)

4.0 WASTE MANAGEMENT

Waste management is vital for maintaining eco-friendly campus. Its collection, management, treatment is a big challenge. In the University, different types of waste are generated, as below:

- Solid organic waste from dining hall, kitchen
- Green waste from gardens, plantations and lawns
- E-waste from Computer Laboratories and Offices
- Paper waste from Library, Examination Hall
- Bio-medical waste from Clinic

The different types of solid waste generated in the campus, their particulars such as description of waste, generation quantity, and disposal method are summarized below in Table 7:

Table 7: *Different Types of Waste Generated and their Disposal*

S. No.	Type of Waste	Particulars	Quantity	Disposal Method
1	Solid Organic Waste	Cooked food waste from dining hall and uncooked waste from kitchens	600-800 kg/day	Collected by outsiders for animal food
2	Green Waste	Green garden waste such as green leaves, stems, branches, woody material, etc.	300-400 kg/day	Collected and disposed-off
3	Paper Waste	Paper waste from Library (old newspapers, Magazines, Parcels) and Examination Halls	1,250 kg/year	Direct selling to vendors through tendering
4	E-Waste	Damaged desktops, laptops, printers, cartridges, routers, switches, keyboards, projectors, electrical & electronic parts	2-3 kg/month	Reuse after refurbishment, repairs, upgradation of gadgets; Disposal by buyback arrangement

5	Plastic Waste	Pens, Refills, Plastic water bottles, wrappers, etc.	Negligible	Direct selling to scrap dealers
6	Bio-Medical Waste	Clinic waste, expired medicines, syringes, cotton, bandages, etc.	10 kg/day	Collected by M/s GJ Multiclave (Ind) Pvt. Ltd. for further treatment

4.1 E-Waste

The University has different electronic systems as listed below in Table 6.

Table 6: Electronic Items/ Gadgets in the campus

S. No.	Items	Inventory
1	Desktop Computers	100
2	Laptops to Admin	80
3	Laptops to students	15
4	Printers	70
5	Small Printers	10
6	Wi-fi access points	120
7	Data Servers	2
8	Televisions	50
9	Keyboards, routers, etc.	150
10	Photocopying machines	10

There are two Computer Labs, one Opac Lab, and two Data Servers.

The University has adopted a sound strategy to reduce and manage E-waste generation in the campus and it consists of:

- Upgradation & refurbishment of systems from time to time and using them thereby extending the life of gadgets
- Refurbishment of projectors and other gadgets for utilization
- Development of a fully equipped workshop, which undertakes refurbishment and repair of electronic items for utilization
- Refilling of cartridges
- Disposal of obsolete items under buyback arrangement with vendors.

The total E-waste generated is about 2-3 kg/month.

4.2 Paper Waste

The sources of paper waste are normally Library and Examination Centre.

The campus has a Library. In order to reduce paper waste, the Library has upgraded to digital Library where possible and has digital/ online databases, digital library, etc. There are books and magazines but there has been an overall effort towards digitization. This has considerably reduced the paper waste.

Further, Examination Section is not generating any solid waste for the past 2 years as it is paper-less and exams are conducted on-line. Prior to Covid, the paper waste generated was disposed-off once in 7 years by calling tenders.

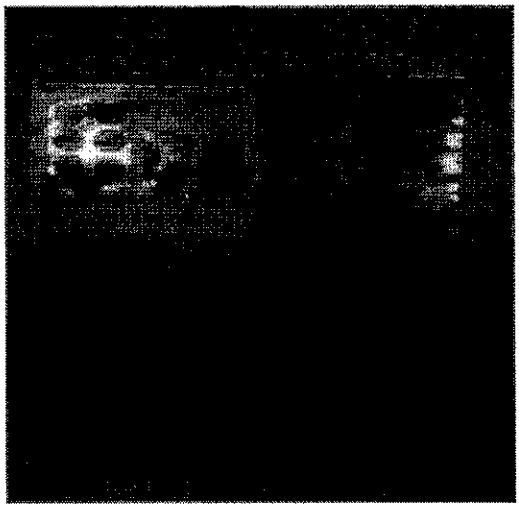
The details of paper waste are summarized below in Table 7:

Table 7: *Paper Waste*

S. No.	Paper Waste	Inventory	Method of Disposal
1	Old Newspapers	1,250 kg/year	Disposed once in a year through tendering
2	Magazines		
3	Parcels		

4.3 Bio-Medical Waste

It is generated in the clinic inside the campus. The waste is picked up by M/s GJ Multiclave (Ind) Pvt. Ltd., twice in a week (Monday and Friday). The waste is segregated and collected in three different bins of Yellow, Red, and Blue before it is being picked by the agency. The waste includes syringes, IV sets, gloves, plasters, masks, needles, vials, scissors, etc. It is noted that the medical waste is finally incinerated at a common facility by the company.



4.4 Solid Organic Waste

The kitchen and dining hall generate about 600-800 kg/day solid organic waste, which includes cooked food from dining halls and uncooked vegetables, etc. from the kitchen. In addition to this, about 300-400 kg of green garden waste is generated in the campus. Hence the total solid organic waste generated amounts to 1,000-1,500 kg/day. Presently, it is picked up by outsiders as animal food.

4.5 Recommendations for Waste Treatment

1) It is suggested to install an anaerobic digestion (Bio-methanation) based Biogas plant for treating the solid organic waste & green waste generated in the campus. A biogas plant of 200M^3/day capacity may be installed that can treat 1,000-1,500 kg food waste, solid organic waste, and green garden waste generated from plantations and lawns. The Biogas generated has a good calorific value and can be used as clean/ green fuel for cooking, heating, and hot water generation in the kitchen thereby reduce the CNG consumption and CNG bill. The bio-manure is a by-product of the Biogas plant, which produces about 300-500 kg/day bio-manure and can be used within the campus as bio-fertilizers for plantations, lawns, gardens, etc. Hence Biogas plant is an excellent zero-waste green technology for the University. A number of institutions, schools, colleges, dairy farms, poultry farms, townships, and industries have installed biogas plants and successfully managed the waste in an environmentally sustainable basis.

2) To encourage elimination of use of plastics in the campus, the University may promote biodegradable materials as alternative. Efforts should be made to make the plastic-free campus.

3) Recycle and reuse of different wastes should be emphasized to reduce waste generation in the campus.

5.0 HORTICULTURE (71.5+7:1.6)

5.1 Trees & Plantations

Continuous and consistent efforts are being made by the University for planting trees within the campus every semester; and as of now, approximately 5,000 trees have been planted and campus has green lawn of area 2,000 sq.m.

The campus is immensely diverse with a variety of tree species. Most of these tree species are naturally grown while others were planted in different periods of time. The trees and plants of the University have increased the quality of life, not only the institute's fraternity but also the people around the university in terms of contributing to environment improving air quality, conservation of water, preserving soil. Many spices of birds are dependent on these trees mainly for food and shelter. Thus, the University has been playing a significant role in maintaining the environment of the surrounding areas.

The University campus houses a large variety and population of trees and plants which helps in conservation of soil, water, air and other valuable natural resources and reduces pollution.

Some of the plants are:

- Asoka
- Bamboo
- Cactus
- Coconut
- Guava
- Henna
- Indian Banyan
- Teak
- Sappota
- Papaya
- Neem
- Mango Tree

- Lemon
- Subabul

The University is giving priority for the growth of diverse range and type of plantations, trees, and gardens by ensuring adequate supply of water.

Further, the campus is rich with plants and trees, and a lake which act as sinks and reservoirs of carbon and help the campus green with good air quality.

5.2 Observations & Recommendations on Horticulture

It is observed that, there are a number of "Subabul" (Leucaena Leucocephala) trees in the NALSAR campus. The disadvantages of the subabul trees are as follows:

- Subabul tree produces large number of seed, which get dispersed very fast by wind. This will lead to formation of thick and deep jungle in a short time inside the campus. This does not allow the growth of other plants.
- Subabul tree requires enormous amount of water for its growth and draws ground water thereby severely reducing the availability of ground water for other useful purposes of the campus
- Subabul trees have toxin in leaves called "mimosine", which causes severe allergic problems in human beings and also effect animals
- Subabul tree trunks and branches are very brittle and trees will be toppled down with high winds, which may damage nearby buildings, structures, vehicles, and cause injuries or death to human beings, animals, etc. thus causing serious damages to properties and human life.
- Its thick and deep foliage doesn't allow the sunlight to come down thereby not allowing the ground soil to get dried fast. This will lead to severe mosquito nuisance causing serious diseases like malaria, dengue, etc.
- Due to the damp ground, a lot of insects breeding will develop, eventually causing frog nuisance and attracting snakes. There are poisonous snakes in the campus which pose problems to the safety of students, faculty, staff and others.

- The large number of subabul trees in the campus has also led to monkey menace in the campus, threatening the people and causing damage to the structures in the campus.

In view of the above problems associated with the subabul trees, the University may take a decision to remove these wild trees in the campus.

5.3 Green Belt Development

The green belt is developed in the whole campus around all the buildings, electric sub-stations, and also outside the campus.

The general considerations involved while developing the green belt are following:

- Generally, local/native fast growing trees are planted
- Planting of trees is undertaken in appropriate encircling rows around the project site
- The trees are protected by plantation of non-palatable shrub species to avoid browsing by animals; and
- The plantation is developed at a spacing of 2.5 x 2.5 m and about a minimum 100 trees per hectare are planted.

6.0 NOISE POLLUTION

6.1 Noise Pollution

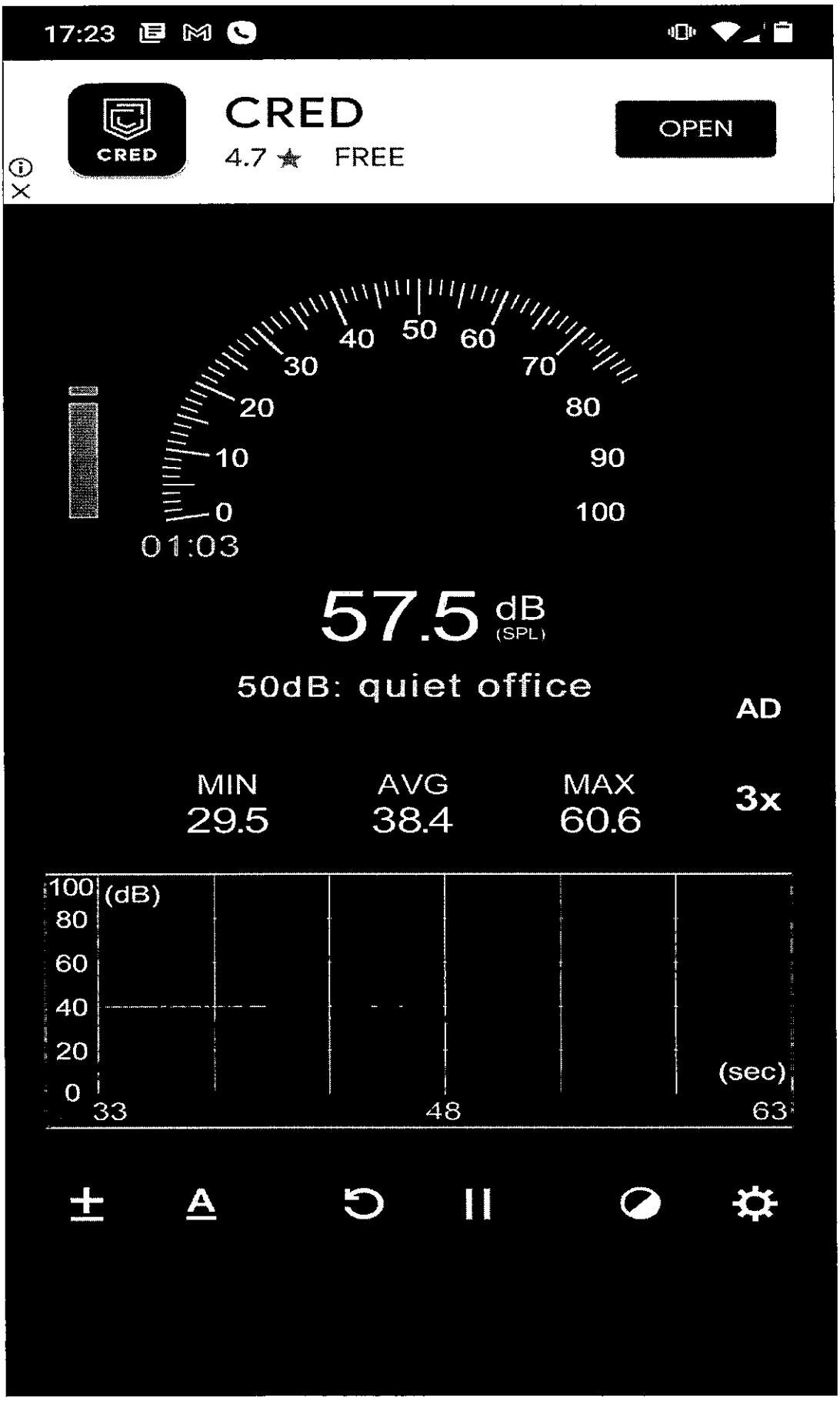
The human ear is constantly being assailed by man-made sounds from all sides, and there remain few places in populous areas where relative quiet prevails. Loudness is the strength of sensation of sound perceived by the individual. It is measured in terms of Decibels. Just audible sound is about 10 dB, a whisper about 20 dB, library place 30 dB, normal conversation about 35-60 dB, heavy street traffic 60-0 dB, boiler factories 120 dB, jet planes during take-off is about 150 dB, rocket engine about 180 dB. The loudest sound a person can stand without much discomfort is about 80 dB. Sounds beyond 80 dB can be safely regarded as Pollutant as it harms hearing system. The WHO has fixed 45 dB as the safe noise level for a city. For international standards a noise level up to 65 dB is considered tolerate. Frequency is defined as the number of vibration per second. It is denoted as Hertz(Hz).

6.2 Noise Levels in NALSAR Campus

The University campus is quite and there is no noise pollution noted. The detailed study of the operations and the activities of the campus clearly indicate that the noise levels are low and within the limits.

As per the Factories Act 1948, the Permissible Exposures in cases of continuous noise is 90 dBA for 8 hours per day. No exposure in excess of 115 shall be permitted.

The noise levels were measured inside the NALSAR campus at different important locations. At each spot, the measurements were taken for 60 seconds during day time and noted down the measurements. A screen shot of the measurements of noise taken is appended in Annexure 2. The minimum dB recorded was 29.5, maximum 0.6 and the average was 38.4. Hence it can be concluded that the noise levels in the campus are well within the stipulated range of safe noise levels.


17:23
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57.5 dB (SPL)
50dB: quiet office
AD
MIN
29.5
AVG
38.4
MAX
60.6
3x
100
80
60
40
20
0
(dB)
(sec)
33
48
63

7.0 SOIL

The contamination of soil can happen for a variety of reasons as explained below:

- Extensive use and disposal of chemicals on soil
- Discharge of untreated waste water
- Dumping of Construction debris and waste

It is observed from the field survey conducted at the NALSAR campus that the there is no contamination of soil due to the above activities. There are no chemicals used in the campus and the biomedical wastes are disposed-off through a third party authorized agency, which collects the waste from the campus and treats it in a common facility. No hazardous waste or medical waste is dumped on the soil. The waste water is treated in STP and used for gardening purposes. The debris or waste from construction activities is loaded on trucks by the external parties and no waste is dumped on the soil.

The quality of soil can also be gauged from the fact that the ground water is the major source of water for internal consumption in the campus and has no harmful contamination. The pH, total hardness, calcium, magnesium, and chlorides of ground water are within the permissible limits reflecting the quality of soil also in a way.

8.0 AIR

Air is one of the essential elements for sustainability of life on this planet. This is most often polluted by humans along with water. Hence air quality requires to be monitored regularly to check the status.

At NALSAR, due to excellent greenery, trees & plantations within the campus as well as outside and due to absence of any industrial activity or any other activity that cause air pollution, the air quality is good

The current Air Quality Index near the campus at Shameerpet Lake is as follows:

Parameter	Value	AQI	Comment
NO_2	14.03 µg/m^3	AQI 17	Good
O_3	41.51 µg/m^3	AQI 41	Good
$PM_{2.5}$	16.4 µg/m^3	AQI 16	Good
SO_2	17.29 µg/m^3	AQI 17	Good
PM_{10}	76.2 µg/m^3	AQI 76	Satisfactory

The NALSAR University makes all efforts required to keep the quality of air clean always. In this regard, the University uses new vehicles by replacing old vehicles.

Further, the campus is rich with plants and trees, and a lake which act as sinks and reservoirs of carbon and help the campus green with good air quality.

Annexure 1- Details of Electrical Loads

S. No.	Load Description	Rating Watts	Nos.	Total Load kW
1) CONVENTION CENTRE				
1	Air Conditioners, 2 TR	1,900	36	68.4
2	Instant Geysers, 5L	4,500	24	108.0
3	Exhaust Blowers	2,250	2	4.5
4	Door Air Curtains	1,500	1	1.5
5	Lights	20	144	2.9
6	Ceiling Fans	80	60	4.8
7	Wall mounted fans	60	20	1.2
8	LED Tube Lights	40	12	0.5
9	Air Conditioners, 2TR	1,900	2	3.8
10	LED Lights	11	40	0.4
11	UPS	10,000	1	10.0
12	Computers	140	30	4.2
13	TVs	80	24	1.9
14	Water cooler, 200L	240	1	0.2
15	Deep Freezers, 230L	220	2	0.4
16	Tube Lights, 40W	40	60	2.4
17	Sound System	10,000	1	10.0
	Total- Convention Centre	**-**	**460**	**225.2**
2) CONVENTION CENTRE FACULTY QUARTERS				
1	Tube Lights, 40W	40	10	0.4
2	Ceiling Fans	80	8	0.6
	Total- Faculty Quarters	**-**	**18.0**	**1.0**
3) MAIN GATE				
1	LED Street Lights	120	21	2.5
2	Name Board CFL Lights	11	9	0.1
3	Security Room Tube Lights	40	4	0.2
4	UPS for CCTV	5,000	1	5.0
5	TVs	80	1	0.1

	Total- Main Gate	-	**36**	**7.9**
4) AUDITORIUM				
1	Fall Ceiling Fluorescent Lights	20	30	0.6
2	LED Lights- Outside	120	10	1.2
3	Stage / Focus Lights	1,500	18	27.0
4	LED Colouring Lamps	80	48	3.8
5	UPS	20,000	1	20.0
6	Projector	250	1	0.3
7	Sound System	50,000	1	50.0
8	Outdoor Area Tube Lights	40	30	1.2
9	LED Lamps	20	15	0.3
10	Air Conditioners, 2TR	1,900	6	11.4
11	Air Conditioners, 5.5TR	6,000	14	84.0
12	Screen Rolling Motors	2,250	1	2.25
13	Wall Lights	600	3	1.8
	Total- Auditorium	-	**178**	**203.8**
5) MESS/ DINING HALL				
1	LED Tube Lights	20	48	1.0
2	Tube Lights, 40W	40	10	0.4
3	Ceiling Fans	80	3	0.2
4	Ceiling Fans	80	44	3.5
5	Grinders, 5HP	3,750	3	11.3
6	Grinder, 3 HP	750	1	0.8
7	Deep Freezer, 500L	300	2	0.6
8	Water cooler, 200L	240	1	0.2
9	Water cooler, 400L	400	1	0.4
10	Exhaust Fans	3,750	2	7.5
11	Air Curtains	1,500	1	1.5
12	Microwave, Mixi, Juicer	3,000	1	3.0
	Total- Mess/ Dining Hall	-	**117**	**30.4**
6) LIBRARY				
1	Air conditioners, 2TR	1,900	1	1.9
2	Zerox M/c	4,000	1	4.0

3	Zerox M/c	1,000	1	1.0
4	Server	10,000	1	10.0
5	UPS	10,000	1	10.0
6	Inverter	1,400	1	1.4
7	Fountain	2,250	2	4.5
8	Tube Lights,40W, LED	40	273	10.9
9	LED Lights	11	41	0.5
10	Ceiling Fans	80	106	8.5
11	Computers	140	2	0.3
	Total- Library	**-**	**430**	**52.9**
7) INTERNET CENTRE				
1	Air conditioners, 2TR	1,900	2	3.8
2	Lights	36	18	0.6
3	Computers	140	10	1.4
4	Servers	10,000	3	30.0
5	UPS	10,000	1	10.0
	Total- Internet Centre	**-**	**34**	**45.8**
8) MBA BLOCK				
1	Air conditioners, 5.5TR	6,000	4	24.0
2	Air conditioner, 3TR	3,500	1	3.5
3	Air conditioner, 2TR	1,900	6	11.4
4	Projectors	250	3	0.8
5	LED Lights	30	15	0.5
6	Zerox M, small	1,000	1	1.0
7	Sound System	5,000	1	5.0
8	Computers	140	6	0.8
9	LED Lights	10	3	0.03
	Total- MBA Block	**-**	**40**	**47.0**
9) IPR BUILDING				
1	Air conditioners, 2TR	1,900	3	5.7
2	Zerox M/c	4,000	1	4.0
3	Zerox M/c	1,000	1	1.0
4	LED Tube Lights	40	138	5.5
5	Ceiling Fans	80	22	1.8

6	Projector	250	1	0.3
7	Sound System	5,000	1	5.0
8	Computers	140	8	1.1
	Total- IPR Building	**-**	**175**	**24.4**
10) SARC LAW BUILDING				
1	Air conditioner, 5.5TR	6,000	6	36.0
2	Network Racks	5,000	1	5.0
3	Air conditioners, 2TR	1,900	12	22.8
4	Tube Lights	40	56	2.2
5	Ceiling Fans	80	18	1.4
6	Lift	3,750	1	3.8
7	Outside Lights (Conventional)	22	40	0.9
8	Ceiling Fans	80	36	2.9
9	Tube Lights	40	62	2.5
10	Sound System	5,000	1	5.0
	Total- SARC Law Building	**-**	**233**	**82.5**
11) MBA CLASS ROOMS				
1	Air conditioners, 2TR	1,900	36	68.4
2	Tube Lights	40	192	7.7
3	Ceiling Fans	80	72	5.8
4	Sound System	5,000	6	30.0
5	Projectors	250	6	1.5
	Total- MBA Class Rooms	**-**	**312**	**113.3**
12) ACADEMIC BLOCK				
1	Air conditioners, 2TR	1,900	24	45.6
2	Tube Lights	40	144	5.8
3	Ceiling Fans	80	48	3.8
4	Sound System	5,000	4	20.0
5	Projectors	250	4	1.0
	Total- Academic Blocks	**-**	**224**	**76.2**
13) FACULTY ROOMS				
1	Tube Lights	40	360	14.4
2	Ceiling Fans	80	45	3.6

3	Computers	140	45	6.3
4	Air conditioners, 2TR	1,900	7	13.3
5	Lights	22	60	1.3
6	Lights	40	12	0.5
7	Exhaust Fans	600	4	2.4
	Total- Faculty Rooms	**-**	**533**	**41.8**
14) STP PLANT				
1	Blowers	7,500	4	30.0
2	Monoblock Pumps	2,250	2	4.5
3	Treated water pump	2,250	1	2.3
	Total- STP Plant		**7**	**36.8**
15) RO PLANT & RAW WATER				
1	RO Pump1	7,500	1	7.5
2	RO Booster Pump2	2,250	1	2.3
3	RO Reject Water Pump	2,250	1	2.3
3	Raw Water Pump	5,250	1	5.3
4	Submersible Borewell Pumps	3,750	4	15.0
	Total- Raw Water & RO	**-**	**8**	**32.3**
	Sub-Total	**-**	**-**	**1,021**
16) MISCELLANEOUS LOADS				
1	Miscellaneous Loads	-	-	204
	Total- Miscellaneous	**-**	**-**	**204**
	GRAND TOTAL- LOAD	**-**	**-**	**1,225**