

ENVIRONMENTAL AUDIT REPORT
2017-18



Submitted to
GREEN CAMPUS COMMITTEE

**THE IIS UNIVERSITY,
SFS, GURUKUL MARG,
MAN SAROVAR, NEW SANGANER ROAD,
JAIPUR-302020**

Registrar
IIS (deemed to be University)
Mansarovar, Jaipur-302020



THE IIS UNIVERSITY

deemed to be a university under section 3 of UGC Act., 1956

Certificate of completion of Environmental Audit

This is to certify that an Environmental Audit has been conducted at The IIS University, Jaipur campus during the period of 07th to 23rd December 2017. The audit was conducted to check the compliance of the Green campus policy of the University and suggest measure for further improvement in the Environmental Quality. During the course of audit, a systematic evaluation of various systems was carried out by verification of the documents and monitoring and analysis of various parameters of Air, Water, Wastewater and Noise in the campus.

The audit report is submitted to the management of IIS University, Jaipur for further action.

(Er. Anand Lal Mathur)

(Dr. Charu Jhamaria)

(Er. A.K. Gupta)

(Dr. Shelja K. Juneja)

(Dr. Varsha Goyal)

(Mr. Umesh Kumar Parashar)

The IIS University, Jaipur
ENVIRONMENTAL AUDIT REPORT
2017-18

Facility Audited

Location of Audit	IIS University, Jaipur
Geo Location	26.8413° N, 75.7700° E
Audit Duration	7-23 December 2017

Audit Committee

Name	Designation
Dr. Shelja K. Juneja	Internal Member
Dr. Charu Jhamaria	Internal Member
Dr. Varsha Goyal	Internal Member
Er. A.K. Gupta	Internal Member
Mr. Umesh Kumar Parashar	Internal Member
Er. Anand Lal Mathur Retired Chief Environment Engineer. Rajasthan State Pollution Control Board, Jaipur	External Member

Charu Jhamaria
Shelja

Shy

Umesh

Er. A.K. Gupta

Anand Lal Mathur

Executive Summary

The Environmental audit was conducted as per the environmental policy of the IIS University, Jaipur. An Environment Audit was conducted in the campus between 07th to 23rd December 2017. The audit was conducted with an aim to evaluate the efficiency/working of various management practices of the University. For this purpose systematic evaluation of various systems was carried out using questionnaire, verification of the documents and monitoring and analysis of various parameters of Air, Water, Wastewater and Noise. The audit team has the following observations:

1. The campus has a variety of plant species including certain Air pollution tolerant Plant species.
2. The air quality in the campus is satisfactory. The concentration of gaseous pollutants monitored during audit were found to be under permissible limit whereas concentration of Particulate matter (RSPM, SPM and PM₁₀) was found to be slightly higher as compared to the permissible limits prescribed by Central Pollution Control Board (CPCB).
3. The concentrations of particulate matter and gaseous pollutants were found to be within limits in indoor Environment where maximum time is spent by students
4. The Noise levels were within the limits prescribed by CPCB whereas ambient noise levels are found to be slightly high as compared to the standards prescribed by CPCB for silent Zones.
5. The potable water quality was found to be good.
6. The solid waste generated in the campus is efficiently segregated and sustainably managed
7. Ground water is being recharged and waste RO water is reused as a part of water conservation
8. University has deployed numerous measures for improving energy efficiency including renewable Solar PV system, Solar water heating systems in the hostels and use of LED bulbs in the campus.
9. Approximately 43% energy demand of the campus is met by these captive systems.
10. There is regular and monitoring and efforts are made for Continuous improvement in Energy conservation

Green features of the campus

- i) Natural ventilation due to superior building design and elevation.
- ii) Ample daylight usage in campus as most of the classroom/facilities is in the North portion of the building
- iii) Dedicated energy efficiency measures are adopted like,
 - Use of LED lights
 - Use of Star rated equipments

Dr. Kamalini

[Signature]

[Signature]

[Signature]

[Signature]

INTRODUCTION

An Environment /Green Audit of IIS University Campus, Jaipur was conducted during 07th to 23rd December 2017 by the aforesaid team constituted by the management of IIS University, Jaipur for first hand assessment of the status of performance of key parameters contributing to Environment and sustainability.

1. Environmental/Green Audit

A Green/Environmental audit is a method of evaluation intended to identify gaps (Strengths and weakness) in the implementation of environmental compliance and management system, along with related corrective actions. It involves systematic identification, quantification, recording, reporting and analyses of Environmental components of any organization with an aim to attain environment-friendly sustainable development. It is a systematic, independent, objective and documented process for gathering facts in order to identify areas for improvement and ensure you have best practice processes in place. At institutional level, a proper formulation and implementation of Environmental Management System would help to attain sustainable development and lead to healthy learning Environment. Environmental Audit is a part of checking the compliance of the Environmental policy of the institute which would lead to resource conservation and sustainability. Thus it is imperative that IIS University, Jaipur evaluate its own status on environmental sustainability and contributes toward a sustainable future.

2. Objectives of the green Audit

1. To document the floral diversity of the University.
2. To evaluate the waste management systems of the campus
3. To record the air quality (ambient and indoor) parameter of the University.
4. To record the sound levels in and around the campus
5. To check the water quality of ground water and potable water utilized in the campus
6. To check the efficacy of water purification systems used at the campus



3. Methodology

The main aim to conduct the Green audit of the University is to ensure that, the practices followed in the campus are in accordance with the Green Policy adopted by the institution for a sustainable future.

3.1.1. The basis of evaluation has been drawn from ISO 14001 testaments for the purpose of assessment where the objectives were decided and the activities were planned prior to conducting the audit activities.

3.1.2 The audit activity were conducted as per the following methodology

- i. Collection of data on various parameters with the help of a questionnaire/verification of documents.
- ii. Physical inspection was conducted for the facilities to be audited
- iii. Sampling and analysis of air and water samples was done using equipments available in the institute.
- iv. Noise level monitoring was done using Sound level meter.

4. Floristic diversity of the campus

The campus has abundant plant varieties of shrubs and trees. The plant nursery in the campus is well maintained with various saplings which are planted in and around the campus. The Floral diversity of the campus was studied and an inventory for the same was prepared as given in the

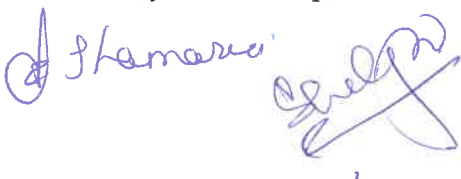


Table 1. In addition to the list of plants mentioned below, a significantly large number of trees were found flourishing/ lining the boundary wall of the campus.

Table 1: Flora present in the Campus

S.NO.	COMMON NAME	BOTANICAL NAME
1	Arjun	<i>Terminalia arjuna</i>
2	Ashoka	<i>Saracaasocas</i> (Roxb.) Willd.
3	BaraMassi / SadaBahar	<i>Catharanthusroseus</i> (L.) G.Don.
4	Bindweed	<i>Convolvulus</i>
5	Bottle palm	<i>Hyophorbelagenicaulis</i>
6	Bottlebrush	<i>Callistemon</i> spp.
7	Chia	<i>Salvia hispanica</i> L.
8	Dog flower / Snapdragon	<i>Antirrhinum majus</i> L.
9	Flamevine	<i>Pyrostegiavenusta</i> Miers
10	Golden duranta	<i>Durantarepens</i> L.
11	Good luck plant	<i>Cordyline</i>
12	Guava	<i>Psidiumguajava</i>
113	Gulab	<i>Rosa indica</i> L.
14	Gulmohar	<i>Delonixregia</i>
15	Jhinja / Katmauli	<i>Bauhinia racemosa</i> Lam.
16	Kachnar	<i>Bauhinia retusa</i>
17	Kantelichaulai	<i>Amaranthusspinosus</i> L.
18	Kassod	<i>Cassia siamea</i> Lam.
19	Kharto / Changeri	<i>Oxalis corniculata</i> L.
20	Mango	<i>Mangiferaindica</i> L.
21	Marigold	<i>Tageteserecta</i> L.
22	Mayla / Ratanjyoti	<i>Jatropha gossypiiifolia</i> L.
23	Nagdamani	<i>Crinum asiaticum</i> L.
24	Neem	<i>Azadirachtaindica</i>
25	Orchid tree	<i>Bauhinia variegata</i> L.
26	Pachpatti	<i>Ipomoea cairica</i> (L.) Sweet
27	Papaya	<i>Carica papaya</i> L.
28	Peelikaner	<i>Thevetiaperuviana</i> (Pers.) K. Schum.
29	Peepal	<i>Ficus religiosa</i> L.
30	Pittapapra	<i>Fumaria</i>
31	Pyaj	<i>Allium cepa</i> L.
32	Rohida	<i>Tecomellaundulata</i>
33	Saptaparni	<i>Alstonia</i>
34	Sarson	<i>Brassica campestris</i> L.
35	Skyblueclustervine	<i>Jacquemontiapentantha</i> (Jacq.) G. Don.
36	Subalpine larkspur	<i>Delphinium</i>

Table 2: Medicinal Plants

S.NO	COMMON NAME	BOTANICAL NAME
1	Kala Datura	<i>Datura innoxia</i>
2	Shyama Tulsi	<i>Ocimum sanctum</i>
3	Giloy	<i>Tinospora cordifolia</i>
4	Hadjod	<i>Cissus quadrangularis</i>
5	Ashwagandha,	<i>Withania somnifera</i>
6	Gwarpatha	<i>Aloe vera</i>

Handwritten signatures and marks at the bottom left of the page.

Handwritten signature at the bottom center of the page.

Handwritten signature and marks at the bottom right of the page.

7	Patharchur	<i>Bryophyllum pinnatum</i>
8	Lemongrass	<i>Cymbopogon citratus</i>
9	Rati	<i>Abrus precatorius</i>
10	Damabel	<i>Tylophora indica</i>
11	Adusa	<i>Adhatoda vasica</i>
12	Anjeer	<i>Ficus carica</i>
13	Sinduri	<i>Bixa orellana</i>
14	Sarpagandha	<i>Rauwolfia serpentina</i>
15	Swarna Patri	<i>Cassia angustifolia</i>
16	Karanj	<i>Pongamia pinnata</i>

Couple of Pictures depicting Green Cover in the Campus



Picture 1: *Mangifera indica* L



Picture 2: *Callistemon* spp.



Picture 3: *Hyophorbelagenicaulis*

Shamara

→

→

→

→

5. Waste management Practices

5.1 Different types of waste generated daily in the campus

To understand the solid waste management practices, quantification of waste generated in the campus was carried out during the audit period of 7 days. The solid waste in the campus was segregated in four major categories; Food waste, Garden waste, Plastic waste and Paper waste and weighed separately. The quantity of paper waste generated annually was calculated by the stock registers of various departments. The results obtained are shown in Tables 3 and 4 below:

Table 3: Quantities of Waste Generated in the Campus

Days	Food waste (gm per person/day including hostel occupants & staff)	Garden waste (kg)	Plastic waste (kg)	Paper waste (kg)	Miscellaneous waste (kg)	Total waste (kg)
1.	500	-	2.33	3.6	3	24.83
2.	340	4	6.3	13.2	2	45.3
3.	445	5.5	8.1	7.9	2	39.5
4.	250	6.2	4	6	1	38.4
5.	440	4.7	6.6	9.6	2	42.9
6.	380	6.75	7.86	5.77	1	32.76
7.	265	6.70	10.4	4.96	2	37.570
Total	2620	33.85	45.59	51.03	13	261.26

Table 4: Annual Paper Waste Generated

Types of unused paper waste	Weight
Books	1200 kg
Carton waste	320 kg
Copies	920 kg
Examination waste	3000 kg
File paper/ Newspaper	1520 kg
Total	6960 kg

A. Kamara

[Handwritten signature]

[Handwritten signature]

5.2 Solid Waste management practices adopted by the University

While auditing the waste management systems of the University, the audit team had the following observations.

OBSERVATIONS

- a) The bio-degradable (peels of vegetables) waste from the hostel mess and canteen is being converted into manure using proper technique of Vermicomposting.
- b) Food waste generated in the hostel and canteen is disposed to the municipal
- c) The waste generated from experimental animals and microbiological cultures used for research work is handed over to a the firm Instromedex (India) Pvt. Ltd. Jaipur for being incinerated.
- d) Litter waste from the campus garden is converted into compost in compost pits.
- e) The used answer books are been sent for pulping as a part of recycling of the paper waste.
- f) The used one sided printed sheets are being utilized for printing on the other side as well.
- g) During functions like fresher's party, farewell party, thank you party and faculty get together, steel utensils are utilized and wherever required biodegradable utensils are used in place of plastic utensils.
- h) Plastic waste is sold out for recycling.
- i) E Waste in the campus is managed sustainably. As a policy of the university to manage waste sustainably, most computers, batteries and other electronic goods are procured in buy-back mode and as a result the old machines are invariably taken back by the vendors leaving no e-waste. Wherever possible, the old processors in computers are upgraded by installing higher version of the processors and further used for the purpose of data entry and other such official work to reduce replacement and generation of e-waste. The low configured computers are donated to sister institutions for being used by initial learners





Picture 4: Collection of solid waste in the campus

[Handwritten signature]



Picture 5: Segregation of waste



Picture 6: Vermicompost Unit

[Handwritten signature]

[Handwritten signature]

[Handwritten signature]

[Handwritten signature]

6. Water Management Practices

6.1 Source of water

The main source of water in the campus is groundwater which is being extracted by one bore well.

OBSERVATIONS

a) The university has a rain water harvesting structure for conserving the rain water. It consists of two bore wells with depth of 100 feet and 130 feet respectively for underground water recharge. The system consists of pipes of 6" diameter each for water inflow during rains.

b) The groundwater is recharged during the rainy season.

c) Entire water demand of the campus, including the hostel, is met with by the groundwater. Thus there is no requirement for sourcing water from outside for utilizing in the campus.

d) For prevention of wastage of water and electricity, the storage tanks are equipped with sensors to prevent overflow (Picture 7)



Signature

Picture 7: Water Storage tank with sensor for RWH System

e) Waste water from RO is collected in tank for further utilization in watering of green cover within the campus.

6.2 Water Quality evaluation of ground and Potable Water

There is total 10 number of water coolers installed in the campus for potable water where the supplied water is purified using RO disinfection system.

OBSERAVATIONS

The water samples were collected from the bore well (source) as well as from various locations (various blocks) of the University.

For the purpose of assessing the efficacy of existing water purification system water quality, monitoring and analysis of water samples for various parameters was conducted; water sample were collected from the different points as shown in the Table 4 below. The water sample-analyses were carried out during 7-23 December 2017 for the purpose of Environmental Audit. The average results indicate that the water supplied in the campus was found to be suitable for drinking with reference to the guidelines issued by IS 10050 for potable water. The results are shown in Table 5

Handwritten signatures and initials in blue ink at the bottom of the page.

**Table 5: Analysis of water samples for evaluating efficiency
of water purification system**

S. No.	Parameter	Method of analysis	Ground water (source)	Block A (water cooler at 4 th floor)	Block D (water cooler at 3 rd floor)	Admn. block	Hostel	Permissible limit (IS 10050)
1	pH	pH meter	7.2	7.2	7.3	7.2	7.3	7-8
2	EC μ S/cm	EC Meter	256	182	184	191	186	
3.	Total hardness mg/l (as CaCO ₃)	Titrimetric method	348	262	258	289	211	600
4	TDS mg/l	TDS Meter	669	98	102	105	102	100
5.	Nitrate mg/l	PDA method	0.25	0.06	0.08	0.05	0.09	45
6.	Coliform count	MPN method	ND	ND	ND	ND	ND	nil

7. Air Quality Monitoring and Analysis

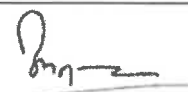
The ambient and indoor air quality in the campus was evaluated as prescribed by Central Pollution Control Board, New Delhi. Sampling and analysis was done as per the details given in **Table 6**:

7.1 Ambient Air quality Monitoring

The ambient air sampling and analysis was carried out as per the scheme given in Table 6

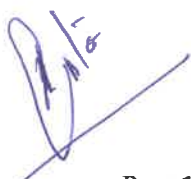
Table 6: Ambient Air Quality Monitoring Scheme

S. No.	Parameter	Equipment	Sampling Duration	Method of Analysis
1.	Respirable and Suspended Particulate matter	Respirable Dust sampler (Envirotech RDS 460 BL)	8 Hours	Gravimetric
2.	Fine Particulate Matter (PM ₁)	Fine PM sampler (Envirotech APM 5774)	12 hours	Gravimetric
3	Sulphur di-oxide	Gaseous Attachment (Envirotech APM 411)	12 hours	Improved West and Gaeke Method
4.	Nitrogen di-oxide		12 hours	Jacob & Hochheiser modified
5	Ozone		12 hours	Potassium Iodide Method











Picture 8: PM₁ Sampler placed at the main gate

OBSERVATIONS

The average ambient air quality in the University campus is shown in **Table 7**. The institute is located amidst residential colony therefore ambient air quality was monitored near the entrance and back gate for peak ambient quality measurements. The results of monitoring indicate that the concentration of suspended particulate matter at various locations of the campus was slightly higher when compared with the standards prescribed by the Central pollution Control Board, New Delhi whereas the concentration of gaseous pollutants was found to be under the permissible limits. The possible reason for higher levels of SPM can be attributed to location of the campus in a residential area with large area covered with buildings.

Table 7: Ambient Air Quality in the University Campus

Parameters	Location		NAAQS*
	Front Gate	Back Gate	
PM ₁ (µg/m ³)	72	68	60**(PM _{2.5})
SPM(µg/m ³)	352	268	200
RSPM(µg/m ³)	152	148	100
SO ₂ (µg/m ³)	10	28	80
NO ₂ (µg/m ³)	32	48	60
O ₃ (µg/m ³)	63	78	180

*National ambient Air Quality Standard

** PM_{2.5} or < (since any standards for PM₁ are not prescribed by CPCB, standards for PM_{2.5} have been considered)

A. Kamal

Shelga

Shelga

Shelga

7.2 Indoor Air quality Monitoring

The indoor air quality has a significant effect on the human health. Students in the university spend almost 6 hours indoors while attending their classes. Thus the indoor air quality monitoring was conducted in the class rooms and canteen during the audit period. The indoor air quality parameters were analyzed as per the details given in Tables 8 and 9 that follow:

Table 8: Indoor Air Quality Monitoring Scheme

Parameters	Equipment	Method of Analysis
RSPM($\mu\text{g}/\text{m}^3$)	Handy Sampler (Envirotech APM 801)	Gravimetric
SPM($\mu\text{g}/\text{m}^3$)		
NO ₂ ($\mu\text{g}/\text{m}^3$)		Jacob & Hochheiser modified

Table 9: Indoor Air quality in the campus

Parameters/ Location	A Block (Class rooms on 1 st Floor)	A Block (Class rooms on 4 th Floor)	Canteen
RSPM($\mu\text{g}/\text{m}^3$)	29	21	42
SPM($\mu\text{g}/\text{m}^3$)	32	23	56
NO ₂ ($\mu\text{g}/\text{m}^3$)	6	4	12

OBSERVATIONS

The concentration of air quality parameters in the indoor air as shown in table 9 indicates good air quality as per the WHO guidelines.

8. Noise Level Monitoring:

OBSERVATIONS

The results of monitoring indicated that the levels of noise exceed the permissible limits (50dB) prescribed by CPCB for Sensitive areas during day time.

The level of noise in and around the University campus was monitored during the audit period using Sound level meter (Envirotech SLM 100). The results obtained are shown in **Table 10**.

Table 10: Noise level in the campus

Location	Observed Noise Level dB (A) leq	Permissible limit for sensitive zones during Day time dB (A) leq
Main Gate	78	50
Back Gate	63	
Canteen	60	
Play Ground	57	

9. Energy Requirement of the University

The total average annual electrical energy requirement of the University campus is 215982 kwh. Out of the total annual requirement, 91130 kwh is met by solar energy generation established and operated within the campus and the balance by the supply from JVVNL.

For efficient power consumption, solar heaters are installed in the hostels and LED lights are used in the University campus. Advisory are issued time to time for steps to be taken for energy conservation like switching off the lights and fans when not required and regular maintenance of electrical equipments for improving energy efficiency.



Picture 9: Solar panels

10. Resource conservation

In accordance with the UN sustainable development goal for the year 2030, the following resources conservation measures are being implemented in the university.

10.1 Rain water Harvesting

The campus has two rainwater harvesting units which help in recharging the ground water during the rains.

10.2 Paper Conservation

To minimize the generation of paper waste and conserve paper, the following strategies have been adopted in the University:

- Circulation of notices, duties and other important information through e-mail
- Submission of e-assignments by the students and uploading study material on the e-portal "Metacampus".
- Students are encouraged to print their Dissertation and PhD thesis on both the faces/sides of the paper.
- Research is being done by the students at PG and PhD level in the field encompassing scientific methods of paper waste utilization

Handwritten signatures and initials in blue ink.

Handwritten signature in blue ink.

10.3 RO Reject management

The waste water from the RO system is collected in an underground tank and utilized for maintaining the green cover in the campus. This helps in reducing stress on the underground water resources.



Picture 10: RO Unit

10.4 Paper Conservation

To minimize the generation of paper waste and conserve paper, the following strategies have been adopted in the University:

- Circulation of notices, duties and other important information through e-mail
- Submission of e-assignments by the students and uploading study material on the e-portal “Metacampus”.
- Students are encouraged to print their Dissertation and PhD thesis on both the faces/sides of the paper.
- Research is being done by the students at PG and PhD level in the fields relating scientific methods of paper waste utilization.

11. Recommendations

1. In addition to the existing green cover, “planting and growing of specially selected air pollution tolerant plant species”, need be carried in and around the campus for improving ambient air quality.
2. Increase green cover around the campus for reducing noise levels in the campus.
3. All resource conservation practices described above should continue and implemented effectively.

12. Inferences and Scope

During the process of “Environmental Audit”, the audit team carried out extensive consultation with all the key personnel over wide range of issues related to Environmental aspects. The audit team has identified few observations for making the campus premise more environmental friendly. Certain recommendations are also offered with observations for University management to initiate actions.

The audit team is of the opinion that, the overall maintenance of the campus of IIS University is quiet good from environmental perspective. The management should however, provide adequate manpower and money for the maintenance of the “Environment-Friendly Character” of the campus on sustained basis by way of implementing the recommendations as above for improving continuously the air quality within the campus, reduction of noise levels and increasing the green cover employing suitable techniques for developing terrace garden and vertical garden along the walls.

Registrar
IIS (deemed to be University)
Mansarovar, Jaipur-302029