



Institute for Excellence in Higher Education (IEHE), Bhopal

An Autonomous Institute established by Govt. of M.P.

(College with Potential for Excellence Status Conferred by UGC)

Continuously Re-accredited by NAAC as 'A' Graded Institute in the Third Cycle



GREEN AUDIT REPORT

INSTITUTE FOR EXCELLENCE IN HIGHER EDUCATION BHOPAL, MADHYA PRADESH

**Address: Kaliyasot Dam, Kolar road Post Box No. : 588, Post Office Ravishankar Nagar
Bhopal – 462016**

Phone No.: 0755-2492433, 0755-2492460

E-Mail: iehebhupal@mp.gov.in

Website: iehe.ac.in

IEHE, BHOPAL(MP)

o/c

TABLE OF CONTENTS

Contents

Green Audit Team _____	1
Introduction _____	2
About IEHE _____	3
Mission, Vision and Objective _____	4
Goals of Green Audit _____	5
Geographical Location & Greenery Status of IEHE _____	6
Details of Trees & Plants of IEHE _____	11
Infrastructure of IEHE _____	16
Roof Top Solar Panels _____	23
Biodegradable solid waste disposal/Treatment infrastructure _____	24
Energy Management _____	25
Water and Soil Quality assessment _____	27
Waste Management & Air Quality _____	31
Carbon Footprint analysis _____	35
Suggestions & Recommendations _____	36
Conclusion _____	37

GREEN AUDIT REPORT, IEHE (BHOPAL)

Green Audit Team

Dr., Ajay Kumar Bhardwaj, Professor, Department of Biotechnology, IEHE, Bhopal

A. Bhardwaj

Plant Identification Team

Dr., Ranjana Varma, Professor & Head, Department of Biotechnology, IEHE, Bhopal

R. Varma

Dr. Nasreen Siddiqui, Retd. Professor, Botany

N. Siddiqui

Dr. Madhuri Modak, Retd. Professor, Botany

Dr. Ravi Upadhyay, Professor, Botany

Dr., Shubhada Diwan, Guest Faculty

Shubhada

Dr., Pratima Sharma, Guest Faculty

Pratima

Ms., Jyoti Khare, Guest Faculty

Jyoti

Support Team

Dr., Ruchira Chaudhary, Professor, Department of Biotechnology, IEHE, Bhopal

R. Chaudhary

Dr. Hari Krishn Garg, Professor, Department of Biotechnology, IEHE, Bhopal

Water/Soil quality testing Team

Dr. Anjali Acharya, Professor, Deptt. Of Chemistry

A. Acharya

Dr. Pratima Sharma, Guest faculty, Department of Biotechnology

Pratima

Payal Sharma, M.Sc. Student, Deptt. Of Biotechnology

Payal

Chetana Gayakwad, M.Sc. Student, Deptt. Of Biotechnology

Chetana

Zirha Saleem, M.Sc. Student, Deptt. Of Biotechnology

Zirha

Nikita Kadu, M.Sc. Student, Deptt. Of Biotechnology

Nikita Kadu

Sonam Doriya, M.Sc. Student, Deptt. Of Biotechnology

Sonam

Utkrisht Sahani, M.Sc. Student, Deptt. Of Biotechnology

Utkrisht

Shivani Prajapati, M.Sc. Student, Deptt. Of Biotechnology

Shivani

Pooja Prajapati, M.Sc. Student, Deptt. Of Biotechnology

Pooja

Muskan Talreja, M.Sc. Student, Deptt. Of Biotechnology

Muskan

Amarshi Bohre, M.Sc. Student, Deptt. Of Biotechnology

Amarshi

Rashi Rathi B.Sc. IIIrd Year Student of Biotechnology

Rashi

Waste management/Infrastructure/Carbon footprint calculation Team

Vishwajeet Yadav, BA Geography Ist Year

Harshvardhan Rai, BA Geography Ist Year

Jatin Chaurasiya, BA Geography Ist Year

Abhishek Lodhi, BA Geography Ist Year

Note: We acknowledge and appreciate the support given by Madhya Pradesh State Electronic Development Corporation, Bhopal, Government Soil Testing Laboratory, Bhopal and MP Pollution Control Board Bhopal for Geographical location analysis, Soil testing and Air quality status respectively.

GREEN AUDIT REPORT, IEHE (BHOPAL)

Introduction:

The concept of Eco Campus has been implemented in educational institutions to link them to the sustainable development process due to the use of natural resources and waste discharge from the environment there. Waste reduction plan for educational institution is mandatory to maintain the cleanliness of the institute campus. Green auditing of the institute is required to be done to ascertain the environmental performance of the educational institutions and to convert the educational campus into eco-campus. Through green audit, an institution gets a direction as to improve the environmental conditions. The Green Audit also covers the current status of green cover, energy conservation, use of renewable sources, groundwater and available water status, rainwater harvesting, carbon neutrality efforts, tree plantation, hazardous waste management and e-waste management. Hence the objective of Green Audit is to analyze the environmental practices within and outside the Institute campus, which will have an impact on the environment friendly environment. Green audit can be defined as the systematic identification, quantification, recording, reporting and analysis of components of an institution's environment.

This is the first attempt to conduct green audit of this institute campus. The audit mainly focuses on green indicators such as existing green cover, energy consumption in the form of electricity and fossil fuels, soil and air/water quality, vegetation, waste management practices and carbon foot print of the campus etc. Survey has been done for existing campus resources, resource consumption patterns of students and staff in the college. In order to assess the quality of water and soil, samples of water and soil were collected from different locations of the college campus and its parameters were analyzed. The collected data was grouped, tabulated and analyzed. Finally, a report on the environmental issue of the campus is documented along with the strengths, weaknesses and suggestions of the institute on the environmental management plan.

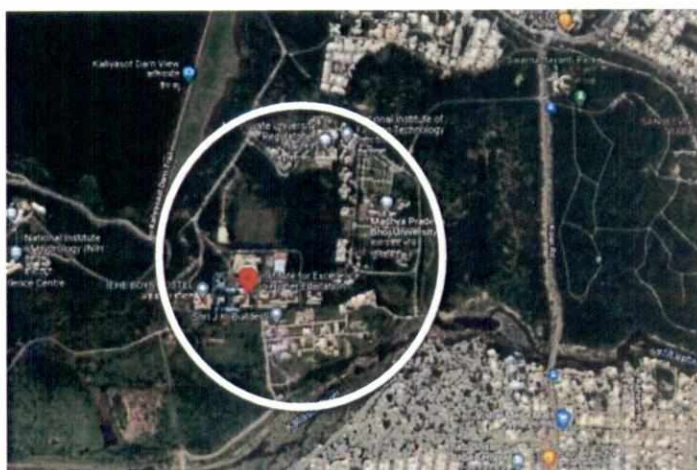
Green audits can be a useful tool for an organization to determine its use of energy, water or other resources and make decisions about how to implement changes and conserve the environment of campus. It can also be used to determine the type and amount of waste, as well as for a recycling project or to improve a waste reduction plan. Health awareness can be created and environmental awareness, values and ethics can be promoted through green auditing. It helps the staff and students of the institute to better understand the impact of green practices on campus. It provides opportunities for the development of ownership, personal and social responsibility for students and teachers.

The findings of this report show that the Institute has performed quite well on sustainability issues over the years. The Institute considers the environmental impacts of most of its operations and makes a concerted effort to act in an environmentally responsible manner. The recommendations of this report highlight several ways in which the institute can improve its operations and work towards becoming a better institution on the principle of sustainable development.

GREEN AUDIT REPORT, IEHE (BHOPAL)

About IEHE

Institute for Excellence in Higher Education is an 'A' grade state level academy, envisioned to be a centre for academic excellence by the Govt. of Madhya Pradesh since its inception in 1995. Located in a lush green valley adjacent to Kaliasot Dam on Kolar road, Bhopal, this educational oasis enjoys a pride of place among the premier Institutions of the country. It is autonomous in academic, administrative & financial matters which have enhanced its credibility as a catalyst of progressive and incremental changes setting new benchmarks for other institutions of the state to redefine the limits of growth and development in Higher Education. Through an array of well-structured Post-Graduate Courses, Honours Courses in Science, Arts & Commerce, and short term Vocational Courses that synergize conventional and contemporary realms of knowledge, the curriculum is industry integrated and globally embrative. With the pivotal focus on the integrated development of students through the inculcation of moral and spiritual values the Institute is housed in a sprawling campus with state-of-the art facilities like well-equipped laboratories, digitalized library, ICT enabled services etc. which provide a congenial academic ambience for empowered and diverse learners. An ideal teacher-student ratio, robust track record of placements, effective and transparent Continuous Comprehensive Evaluation (CCE) scheme with its regular round of Seminars, Presentations, Group Discussions, Pedagogical Innovations and Visionary Leadership make the Institute a virtual 'Excellence in Action'.



The catalytic role played in transforming the students into potential human capital makes the Institute a vibrant and sought after centre for holistic development with aspirants thronging it from across the length and breadth of the country. The significant milestones like Accreditation by NAAC in 'A' grade in 2004, Reaccreditation in highest A Grade by NAAC in Jan 2011, followed by third cycle of Re-accreditation by NAAC with 'A' Grade in 2016, the prestigious conferment of 'College with Potential for Excellence (CPE)' status in March 2010, embankment on 2nd phase of CPE status spanning between 2014-2019, recognition as a nodal centre for CEQUIC (Cluster for Enhancing Quality through Innovation and Collaboration) - a scheme initiated in 2014 by the Government of Madhya Pradesh to realize international standards in research and teaching through qualitative changes, are some of the monumental achievements of the Institute.

GREEN AUDIT REPORT, IEHE (BHOPAL)

Vision, Mission & Objective

Vision

To accelerate excellence in higher education of global level.

Mission

The institute envisions to serve as a center for excellence in higher education to empower students to achieve global competence with state-of-the-art approach and to enhance knowledge base through innovative and interactive approaches; nurture analytical activities by seminal strategies; improve research environment with cutting edge technologies and latest infrastructure; facilitate mental, moral and physical development; imbining cultural, ethical and social values in all the stake holders; increase soft skills and hands on experience for job viability options; create accessibility and equity to cater to aspiring learners from all layers of society.

Objectives

- ✓ To provide a model of excellence worth being followed by the institutions engaged in higher education.
- ✓ To nurture the innate talents of the students and to encourage originality and creativity in their approach towards learning.
- ✓ To enable the students to realize their potential through live-projects, presentations, seminars, co-curricular and extra-curricular activities.
- ✓ To create an awareness for social and environmental issues.
- ✓ Enhancing the academic excellence with potential strategies and cognitive approach.
- ✓ Improving equity and accessibility in attainment of higher education
- ✓ Enhancing employability options and building career prospects.
- ✓ Imbining cutting edge technologies to be at par with international standards.
- ✓ Catering the needs of students for physical and mental health.
- ✓ Achieving excellence in examination through online system by providing quality technology assistance.

GREEN AUDIT REPORT, IEHE (BHOPAL)

Goals of Green Audit

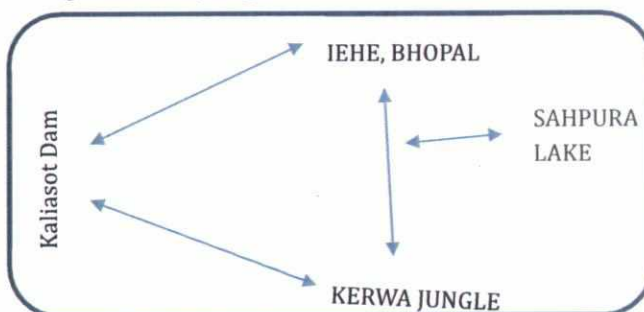
- ❖ To create a green campus
- ❖ Identification and documentation of green practices followed by the Institute.
- ❖ More efficient resource management
- ❖ To provide basis for improved sustainability
- ❖ Identify strength and weakness in green practices.
- ❖ To enable waste management through reduction of waste generation, solid-waste and water recycling
- ❖ Empower the organizations to frame a better environmental performance
- ❖ Point out the prevailing and forthcoming complications
- ❖ Analyze and suggest solution for problems identified.
- ❖ Assess facility of different types of waste management.
- ❖ Increase environmental awareness throughout campus
- ❖ Identify and assess environmental risk.
- ❖ Developing environmental ethics and value systems in staff & students.
- ❖ Motivates staff for optimized sustainable use of available resources.
- ❖ Long-term goal of the green audit is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

GREEN AUDIT REPORT, IEHE (BHOPAL)

Geographical location & Greenery status of IEHE

Geographical Location

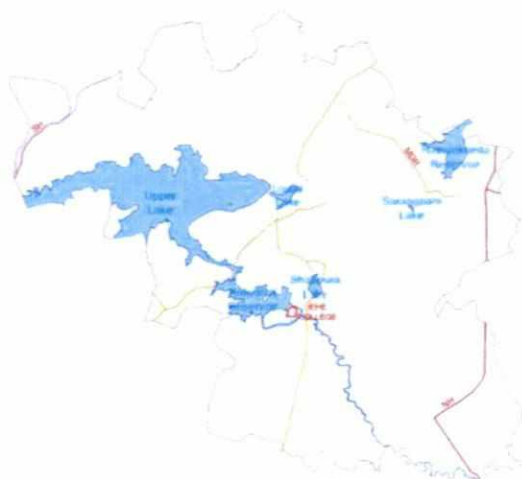
Water resources are essential for existence and development of Global community. Institute for Excellence in Higher Education is located in a lush green valley adjacent to Kaliyasot Dam on Kolar Road, Bhopal (Dam co-ordinates: Latitude 23°12'3" N and Longitude 77°24'29" E at the slope of Water and Land Management Institute Hill. Presence of water and forest provide a hostage platform for biodiversity. The buildup area is 19201.33 sq.mt. The location of IEHE allows to maintain a clean environment and biodiversity in its campus and surrounding.



IEHE always look to counter every environmental issue. Forrest surrounding of the institute and water reservoir effects visual sensitivity. Apex geography of IEHE hosts apex variety. Open area of the institute's campus which is about 2029.6 sq.mt. provide chances for natural water harvesting within the campus. Water availability is moderate due to Kaliyasot Dam and lake in surrounding. Dam has gross storage capacity of 35.387 m.cu. with live storage of 34.41 m.cu. Range include 295-649 m. with hillocks, waterbodies a multitude of vegetation, grasslands and geographical formations.



PHYSICAL LOCATION OF IEHE



GREEN AUDIT REPORT, IEHE (BHOPAL)

GEOGRAPHICAL LOCATION IN GOOGLE EARTH



GREEN AUDIT REPORT, IEHE (BHOPAL)



MP State Electronics Development Corporation (MPSeDC) provided us the map with Greenery status of Institute for excellence in higher Education, Bhopal at scale of 1:1,000

Layout Map of Institute for Excellence in Higher Education College (IEHE) Bhopal, M.P



GREEN AUDIT REPORT, IEHE (BHOPAL)

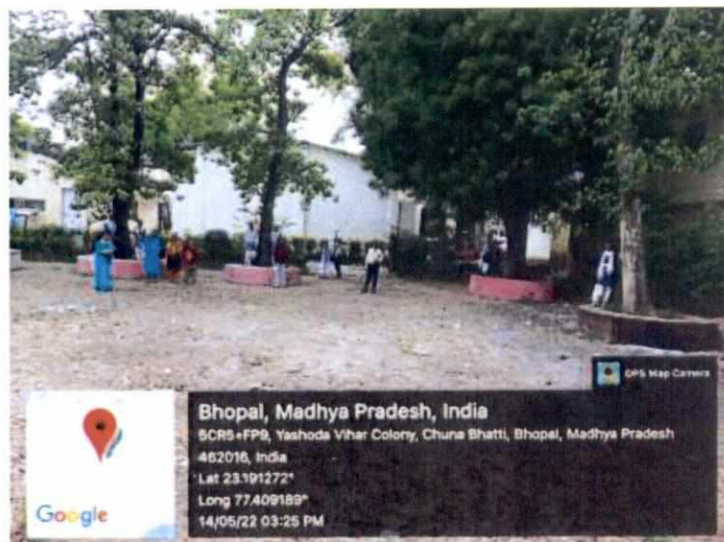


GREEN AUDIT REPORT, IEHE (BHOPAL)

S.No	Category	Area(Sq.m)
1	Built Up	19201.33
2	Green Land	83859.25
3	Road	11585.74
4	Sport Ground	21878.08
5	Open Area	2029.26
6	Gourd Room	17.40
7	Basketball Court	585.84
8	College Gate	32.68
Total Area		139189.59

GREEN AUDIT REPORT, IEHE (BHOPAL)

Details of Trees and Plants in Campus



GREEN AUDIT REPORT, IEHE (BHOPAL)

TREES & PLANTS

SN	BOTANICAL NAME	COMMON NAME	FAMILY	HABIT
1.	<i>Abutilon indicum</i>	Kanghi	Malvaceae	Herb
2.	<i>Acacia catechu</i>	Kattha, kher	Mimosaceae	Tree
3.	<i>Achyranthes aspera</i>	Apamarg	Amaranthaceae	Shrub
4.	<i>Adenium obesum</i>	Desert rose	Apocynaceae	Shrub
5.	<i>Aegle marmelos</i>	Bel	Rutaceae	Tree
6.	<i>Aerva lanata</i> ^{Can Zoiden}	Gorakhbuti	Amaranthaceae	Herb
7.	<i>Ageratum conyzoides</i>	Visadoori	Asteraceae	Herb
8.	<i>Ailanthus excelsa</i>	Mahanimb	Simaroubaceae	Tree
9.	<i>Albizia procera</i>	Safed siris	Caesalpiniaceae	Tree
10.	<i>Allium cepa</i>	Pyaj	Liliaceae	Herb
11.	<i>Allium sativum</i>	Lahsun	Liliaceae	Herb
12.	<i>Aloe vera</i>	Ghrithumari	Liliaceae	Herb
13.	<i>Alstonia scholaris</i>	Saptaparna, chhatwan	Apocynaceae	Tree
14.	<i>Altenanthera spp.</i>	Gudari saag	Amaranthaceae	Herb
15.	<i>Amaranthus spp.</i>	Chaulai	Amaranthaceae	Herb
16.	<i>Anagallis arvensis</i>	Krishnaneel	Primulaceae	Herb
17.	<i>Annona squamosa</i>	Sugar apple	Annonaceae	Tree
18.	<i>Anogeissus pendula</i>	Dhok, Dhauk, Kardhai, Dhonk, Dhau, and Dhoy	Combretaceae	Tree
19.	<i>Araucaria spp.</i>	Monkey puzzle tree, Christmas tree	Araucariaceae	Tree
20.	<i>Asclepias curassavica</i>	Haldi kumkum	Apocynaceae	Herb
21.	<i>Asparagus racemosus</i>	Satavar	Liliaceae	Creepers
22.	<i>Azadirachta indica</i>	Neem	Meliaceae	Tree
23.	<i>Bamboosa indica</i>	Bans	Poaceae	Herb
24.	<i>Bambusa guangxiensis</i>	Chinees dwarf bamboo	Poaceae	Herb
25.	<i>Bambusa ventricosa</i>	Budha bans	Poaceae	Herb
26.	<i>Barleria prionitis</i> ^B	Koranti	Acanthaceae	Herb
27.	<i>Bauhinia purpurea</i>	Kaniar	Caesalpiniaceae	Tree
28.	<i>Bauhinia variegata</i>	Kachnar	Caesalpiniaceae	Tree
29.	<i>Bixa orillana</i> ^e	Sindoor	Bixineae	Tree
30.	<i>Blainvillea acmella</i>	Para cress flower, dholu fuladu	Asteraceae	Herb
31.	<i>Blumea lacera</i>	Kukkuradru, kukundara	Asteraceae	Herb
32.	<i>Boerhavia diffusa</i>	Snathikari, punarnava	Nyctaginaceae	Herb
33.	<i>Bombax ceiba</i>	Cotton tree	Malvaceae	Tree
34.	<i>Bryophyllum nudum</i>	Alligator plant, Patharchatta	Crassulaceae	Herb
35.	<i>Bryophyllum pinnatum</i>	Patharchur	Crassulaceae	Succulent
36.	<i>Buchnanania axillaris</i>	Cuddapah almond	Anacardiaceae	Tree

* Prionitis

GREEN AUDIT REPORT, IEHE (BHOPAL)

SN	BOTANICAL NAME	COMMON NAME	FAMILY	HABIT
37.	<i>Butea monosperma</i>	Palash	Papilionaceae	Tree
38.	<i>Calotropis gigantia</i>	Lal madar	Asclepiadaceae	Shrub/Tree
39.	<i>Calotropis procera</i>	Madar	Asclepiadaceae	Shrub/Tree
40.	<i>Canna indica</i>	Bajarbattu	Cannaceae	Herb/Shrub
41.	<i>Casculata reflexa</i>	Amarbel or akashabela	Casculataceae	Creeper
42.	<i>Cassia fistula</i>	Amaltaas	Caesalpinaceae	Tree
43.	<i>Cassia siamia</i>	Seemia , kassod	Caesalpinaceae	Tree
44.	<i>Catharanthus roseus</i>	Sadabahar	Apocynaceae	Shrub
45.	<i>Ceiba pentandra</i>	Saphed semal	Bombaceae	Tree
46.	<i>Celastrus paniculata</i>	Jyotishmati, mal-kangani	Celastraceae	Swoody Liana
47.	<i>Celosia argentic</i>	Lal murga	Amaranthaceae	Herb
48.	<i>Cestrum nocturnum</i>	Rat-ki-rani	Saolanaceae	Herb
49.	<i>Chlorophytum tuberosum</i>	Safed-musli	Liliaceae	Herb
50.	<i>Cissus grandragulosis</i>	Veld grape, adamant creeper, or devil's backbone	Vitaceae	Herb
51.	<i>Citrullus spp.</i>	Colocynth	Cucurbitaceae	Creeper
52.	<i>Citrus lemon</i>	Nibu	Rutaceae	Shrub
53.	<i>Clerodendrum spp.</i>	Glorybower, bagflower and bleeding-heart	Verbinaceae	Tree
54.	<i>Cocculus hirsutus</i>	Patalgaruni, Broom Creeper, Jal jamani	Menispermaceae	Climber
55.	<i>Commelina benghalensis</i>	Kanchara	Commelinaceae	Shrub
56.	<i>Convolvulus spp.</i>	Shankhpushpi	Convolvulaceae	Shrub
57.	<i>Crinum asiaticum</i>	Giant crinum lily, spider lily	Amaryllidaceae	Herb
58.	<i>Crosandra spp.</i>	Baijanti	Acanthaceae	Herb
59.	<i>Cuphea spp</i>	Khesari	Lythraceae	Herb
60.	<i>Curcuma longa</i>	Turmeric, curcumin	Zingiberaceae	Herb
61.	<i>Cynodon dactylon</i>	Dhub, dobri, dru	Poaceae	Herb
62.	<i>Cyperus rotundus</i>	Baranagarmotha	Cyperaceae	Herb
63.	<i>Dalbergia sisso</i>	Sheesam	Papillionaceae	Tree
64.	<i>Datura metel</i>	Black datura	Saolanaceae	Shrub
65.	<i>Delonix regia</i>	Gulmohar	Caesalpinaceae	Tree
66.	<i>Dendonia viscosa</i>	Purple hop bush	Sapindaceae	Shrub
67.	<i>Duranta erecta</i>	Nilkanta	Verbinaceae	Shrub
68.	<i>Eclipta alba</i>	Bhringraj	Asteraceae	Herb
69.	<i>Eragrostis spp.</i>	Canegrass	Poaceae	Herb
70.	<i>Eucalyptus globulus</i>	Nilgiri	Myrtaceae	Tree

50. *quadrangularis*
 *66 *Dodonea*

GREEN AUDIT REPORT, IEHE (BHOPAL)

SN	BOTANICAL NAME	COMMON NAME	FAMILY	HABIT
71.	<i>Eugenia gambo</i>	Jambul	Myrtaceae	Tree
72.	<i>Euphorbia hirta</i>	Dudhi	Euphorbiaceae	Herb
73.	<i>Euphorbia pulcherima</i>	Lalpata	Euphorbiaceae	Tree
74.	<i>Euphorbia tirucalli</i>	Saptala	Euphorbiaceae	Shrub
75.	<i>Ficus benghalensis</i>	Bargad	Moraceae	Tree
76.	<i>Ficus benjamina</i>	Pukar	Moraceae	Tree
77.	<i>Ficus carica</i>	Anjeer	Moraceae	Tree
78.	<i>Ficus hispida</i>	Gobla, katguleriya, kathgular	Moraceae	Tree
79.	<i>Ficus hispida</i>	Capper tree	Moraceae	Tree
80.	<i>Ficus racemosa</i>	Gular	Moraceae	Tree
81.	<i>Ficus religiosa</i>	Peepal	Moraceae	Tree
82.	<i>Gardenia latifolia</i>	Papda	Rubiaceae	Tree
83.	<i>Gomphrena celosioides</i>	Chanchi	Amaranthaceae	Herb
84.	<i>Hamelia patens</i>	Firecracker bush	Rubiaceae	Shrub
85.	<i>Helicteres isora</i>	Indian screw tree	Malvaceae	Tree
86.	<i>Hibiscus rosa-sinensis</i>	Gudhal	Malvaceae	Shrub
87.	<i>Hosta spp.</i>	Hosta	Asparagaceae	Herb
88.	<i>Indigofera tinctoria</i>	Neel, adbhaghghar	Papilionaceae	Herb
89.	<i>Jasminum multiflorum</i>	Kunda	Coliaceae	Shrub
90.	<i>Jatropha gossypifolia</i>	Ratanjyot	Euphorbiaceae	Shrub
91.	<i>Justicia brandegeana</i>	Shrimp plantbeargrass	Acanthaceae	Herb
92.	<i>Lagerstroemia parviflora</i>	Bakli, sida	Lytheracea	Tree
93.	<i>Lantana camara</i>	Raimuniya, saptrangi	Verbinaceae	Shrub
94.	<i>Lepidium sativum</i>	Garden cress	Brassicaceae	Herb
95.	<i>Leucaena leucocephala</i>	Shoo babool	Caesalpinaceae	Shrub
96.	<i>Madhuca longifolia</i>	Mahua	Sapotaceae	Tree
97.	<i>Mangifera indica</i>	Aam	Anacardiaceae	Tree
98.	<i>Moringa oleifera</i>	Sahjan	Moringaceae	Tree
99.	<i>Musa paradisiaca</i>	Kela/keli	Musaceae	Herb/Shrub
100.	<i>Neolamarckia cadamba</i>	Kadam, kadamb	Rubiaceae	Tree
101.	<i>Nicotiana spp.</i>	Ban tamaku	Saolanaceae	Herb/ Shrub
102.	<i>Nyctanthes arboristis</i>	Harsinghar	Nyctanthaceae	Tree
103.	<i>Ocimum basilicum</i>	Ram tulsi	Lamiaceae	Shrub
104.	<i>Ocimum sanctum</i>	Tulsi	Lamiaceae	Shrub
105.	<i>Oxalis corniculata</i>	Amrulsak, Anboti, Chuka tripati	Oxalidaceae	Herb
106.	<i>Oxalis spp. latifolia</i>	Amrulsak, Anboti, Chuka tripati	Oxalidaceae	Herb
107.	<i>Parthenium hysterophorus</i>	Gajar ghas	Asteraceae	Herb

GREEN AUDIT REPORT, IEHE (BHOPAL)

SN	BOTANICAL NAME	COMMON NAME	FAMILY	HABIT
108.	<i>Pentas spp. lanceolata</i>	Egyptian star cluster	Rubiaceae	Herb
109.	<i>Phoenix acaulis</i>	Dwarf date palm	Arecaceae	Tree
110.	<i>Phyllanthus emblica</i>	Amla, aonla	Euphorbiaceae	Tree
111.	<i>Pilea cadierei</i>	Aluminium plant	Urticaceae	Herb
112.	<i>Piper betle</i>	Pan	Piperaceae	Creeper
113.	<i>Pithecellobium dulce</i>	Jangal jilebee	Caesalpinaceae	Tree
114.	<i>Plumaria alba</i>	Chameli, Gul-e-chin	Apocynaceae	Tree
115.	<i>Plumbago zeylanica</i>	Chitrak, cheeta	Plumbaginaceae	Herb
116.	<i>Plumeria pudica</i>	Nagpatti	Apocynaceae	Herb
117.	<i>Plumeria rubra</i>	Golenchi, champa	Apocynaceae	Tree
118.	<i>Polyalthia superosa</i>	Asok	Annonaceae	Tree
119.	<i>Polyscias spp.</i>	Arelia	Araliaceae	Shrub
120.	<i>Pongamia pinnata</i>	Aranj, dithouri, karuaini	Papillionaceae	Tree
121.	<i>Pongamia</i>	Karanj	Leguminosae	Tree
122.	<i>Psidium guajava</i>	Amrud	Myrtaceae	Tree
123.	<i>Putranjiva roxburghii</i>	Putranjiva	Euphorbiaceae	Tree
124.	<i>Quisqualis spp.</i>	Madhumalti	Combretaceae	Herb
125.	<i>Ricinus communis</i>	Arandi	Euphorbiaceae	Tree/Shrub
126.	<i>Rosa indica</i>	Gulab	Rosaceae	Shrub
127.	<i>Roystonea regia</i>	Royal palm	Palmaceae	Tree
128.	<i>Russetia equisetiformis</i>	Rasili	Scrophulariaceae	Shrub
129.	<i>Sanatalum album</i>	Chandan	Santalaceae	Tree
130.	<i>Scoparia dulcis</i>	Brahmi	Scrophulariaceae	Shrub
131.	<i>Senna tora</i>	Charota, chakvad, chakavat	Caesalpinaceae	Shrub
132.	<i>Sida cordata</i>	Flannelweed	Malvaceae	Shrub
133.	<i>Stellaria Media</i>	Chickweed	Caryophyllaceae	Herb
134.	<i>Tabernimontana divaricata</i>	Chandni	Apocynaceae	Shrub/Tree
135.	<i>Tamarindus indica</i>	Imli	Caesalpinaceae	Tree
136.	<i>Terminalia catappa</i>	Indian almond	Combretaceae	Tree
137.	<i>Thespepsia populnea</i>	Tulip tree	Malvaceae	Tree
138.	<i>Thuja occidentalis</i>	Arbor vitae	Cupressaceae	Shrub
139.	<i>Trianthema portulacastrum</i>	Santhi, patharchatta	Aizoaceae	Herb
140.	<i>Tridax procumbens</i>	Kanphuli, kumra	Asteraceae	Herb
141.	<i>Trigonella foenum-graecum</i>	Methi	Papillionaceae	Herb
142.	<i>Vernonia cineria</i>	Sahadevi	Asteraceae	Herb
143.	<i>Vitex negundo</i>	Indrani, nirgunthi	Verbinaceae	Tree
144.	<i>Zizyphus mauriliana</i>	Indian jujube, Indian plum	Rhamnaceae	Tree

GREEN AUDIT REPORT, IEHE (BHOPAL)

INFRASTRUCTURE OF IEHE

Old Administrative Block



Science Block



GREEN AUDIT REPORT, IEHE (BHOPAL)

Library Block



New Academic Block



GREEN AUDIT REPORT, IEHE (BHOPAL)



Girl's Hostel



Vocational Cell

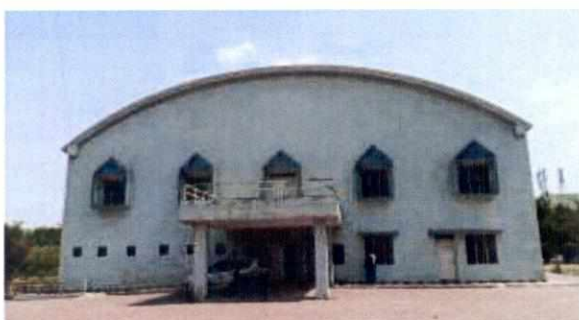


GREEN AUDIT REPORT, IEHE (BHOPAL)

Boy's Hostel



Sports Complex



GREEN AUDIT REPORT, IEHE (BHOPAL)

Canteen



Newly constructed Administrative Block



Newly constructed Academic Block Block



GREEN AUDIT REPORT, IEHE (BHOPAL)

Play Ground



Student's Parking Area



Botanical Garden with Green house & Vermicomposting Pit



GREEN AUDIT REPORT, IEHE (BHOPAL)

Glimpses of Old plants in Campus



GREEN AUDIT REPORT, IEHE (BHOPAL)

Roof Top Solar Panels



DETAILS OF ROOF TOP SOLAR PANEL FOR ELECTRICITY GENERATION /WATER HEATING

SN	LACATED AT	NO. OF PANELS	CAPACITY	USED FOR
1.	Library	50	10 KVA	Library but not functional
2.	Girls Hostel	50	10 KVA	Girls hostel but not functional
3.	Girls Hostel	15	5 KVA	Girls hostel for water heating
4.	New Academic Block	89+45	50 KVA	Grid based solar energy

GREEN AUDIT REPORT, IEHE (BHOPAL)

Biodegradable Solid waste Disposal/Treatment Infrastructure

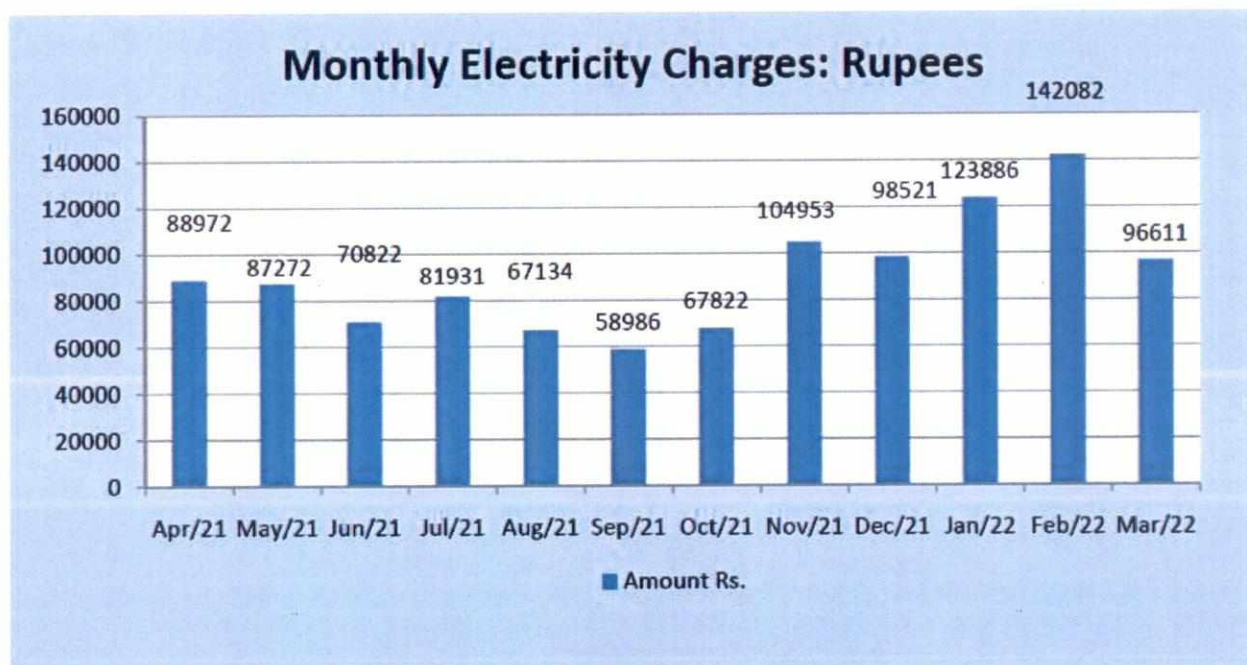


DETAILS OF SEWAGE DISPOSAL INFRASTRUCTURE

SN	DESCRIPTION	CAPACITY	USED FOR
1.	NADEP Composting pit at Boys Hostel	2 of 72 cubic feet	Boys Hostel waste
2.	NADEP Composting pit at Girls Hostel	2 of 72 cubic feet	Girls Hostel waste
3.	NADEP Composting in front of Girls Hostel	1 of 72 cubic feet	Academic block waste
4.	Vermicomposting pit in Science Block	3 chambers	Green waste of Institute

GREEN AUDIT REPORT, IEHE (BHOPAL)

Energy Management



MONTHS	APR-21	MAY-21	JUN-21	JUL-21	AUG-21	SEPT-21
AMOUNT	88972	87272	70822	81931	67134	58986

MONTHS	OCT-21	NOV-21	DEC-21	JAN-22	FEB-22	MAR-22
AMOUNT	67822	104953	98521	123886	142082	96611

GREEN AUDIT REPORT, IEHE (BHOPAL)

Institute of Excellence for Higher Education Bhopal Total Load is 473.214 KW.

FOLLOWING TABLE SHOWS THE DETAILS OF INSTALLED LOAD IN KW

Location / Building Wise	Lighting Load	Fan Load	Air condition Load	Miscellaneous Load	Connected Total in (KW)	Future Expansion 5%	Total Load (KW)
Boys Hostel	3.42	7.87	-----	17	28.29	1.4145	29.7045
Girls Hostel	8.76	7.93	-----	21.85	38.54	1.927	40.467
Examination Cell	1.54	0.95	12.23	13.38	28.1	1.405	29.505
Chemistry Building	18.34	19.72	26.33	108.95	173.09	8.6545	182.007
Library	5.89	4.22	4.8	9.43	24.34	1.217	25.557
ICT Cell	16.78	18.88	14.88	33.44	83.98	4.199	88.179
Diploma Statistical	0.36	0.59	-----	8.17	9.12	0.456	9.576
Physical Education	2.89	1.58	-----	0.27	4.74	0.237	4.977
Canteen	0.24	0.8	-----	2.08	3.12	0.156	3.276
UGC Cell New	4.16	4.76	-----	2.24	11.16	0.558	11.718
Director Office	2.93	2.52	13.54	8.02	27.01	1.3505	28.3605
Admin Block New	1.38	1.72	-----		3.1	0.155	3.255
Outdoor	3.27	0.32	-----	12.25	15.84	0.792	16.632
Total Load	69.96	71.61	71.78	237.08	450.43	22.5215	473.214

GREEN AUDIT REPORT, IEHE (BHOPAL)

WATER & SOIL QUALITY ASSESSMENT

Water samples from five different locations were collected and analyzed for its quality parameters. The samples include five tube well water which are the main water source of the college campus and six tap water samples which is used for canteen and drinking water cum cooler systems. The samples were collected, preserved and analyzed for various physio-chemical parameters by students of Biotechnology under the guidance of Dr. Anjali Acharya, Professor, Department of Chemistry IEHE. The major parameters analyzed include dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity. The results are presented in the following Table. The results are comparable with the values of drinking water standards prescribed by different agencies.



Samples from Water purifiers installed at (Sample-1(Boys Hostel), Sample-2(New Academic Block), Sample-3(Science Block), Sample-4(Girls Hostel), Sample-5(Directors office)

RESULTS OF WATER QUALITY

PARAMETER	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5	STANDARD VALUE
Dissolved Oxygen (mg/l)	0.5	0.8	0.6	1	0.4	0.5-1 mg/l
Biological Oxygen Demand(BOD)	1.8	2.6	2	3.6	1.1	2-8 mg/l
Chemical Oxygen Demand(COD)	185	30	56	104	25	20-200 mg/l
Acidity (mg/l)	6.7	6.5	6.4	6.3	6.8	
Alkalinity (mg/l)	560	566	565	570	580	600
Chloride (mg/l)	99	101	100	96	94	
Hardness (Total)	300-450	300-450	300-450	300-450	300-450	600 mg/l
Conductivity (μ s)	220	240	280	250	252	
pH	9.075	6.999	9.432	9.568	6.99	6.5-9.2
Fluoride (mg/l)	1	0.8	1.1	1.2	0.9	1.5
Iron (mg/l)	1	0.8	1.1	1.2	0.9	1
Ammonia (mg/l)	32.4	32.6	32.5	33	32.7	-
Phosphate	2.6	3	2.8	2.7	2.6	-
Total Dissolved Solids (ppm)	60	98	84	82	77	
Salinity (ppm)	148	162	154	124	122	
Total coliform (CFU)	102	65	95	104	55	30-300
Qualitative analysis of Coliform	Gas production & colour change	Negligible Gas production & colour change	Gas production, Turbidity & colour change	Gas production & colour change	Negligible Turbidity & colour change	
OVERALL QUALITY	SATISFACTORY	GOOD	SATISFACTORY	SATISFACTORY	GOOD	

Alarming Situation is denoted by Red colour

GREEN AUDIT REPORT, IEHE (BHOPAL)

Samples from Water source installed at (Sample-1(Science Block), Sample-2(New Academic Block), Sample-3(Boys Hostel), Sample-4(Girls Hostel), Sample-5(New Director Office)

RESULTS OF WATER QUALITY

PARAMETER	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5	STANDARD VALUE
Dissolved Oxygen (mg/l)	0.6	0.7	0.8	0.6	0.6	0.5-1 mg/l
Biological Oxygen Demand(BOD)	1.8	1.9	2	2.1	2.2	2-8 mg/l
Chemical Oxygen Demand(COD)	185	2828	56	104	25	20-200 mg/l
Acidity (mg/l)	6.8	6.4	6.5	6.2	6.8	
Alkalinity (mg/l)	599	598	568	569	575	600
Chloride (mg/l)	8999	101	92	93	92	
Hardness (Total)	300-450	300-450	300-450	300-450	300-450	600 mg/l
Conductivity (µs)	222	248	278	255	262	
pH	9.1	8.5	6.9	9.2	7.5	6.5-9.2
Fluoride (mg/l)	1.2	0.8	0.8	1.5	1.2	1.5
Iron (mg/l)	1.2	0.8	0.7	1.5	1.3	1
Ammonia (mg/l)	32.5	31	31.6	32.5	32.5	-
Phosphate	-	-	-	-	-	-
Total Dissolved Solids (ppm)	72	102	94	88	79	
Salinity (ppm)	128	122	134	136	124	
Total coliform (CFU)	52	54	52	59	53	30-300
Qualitative analysis of Coliform	Negligible Gas production & colour change	Negligible Gas production & colour change	Negligible Gas production & colour change	Negligible Gas production & colour change	Negligible Gas production & colour change	
OVERALL QUALITY	GOOD	GOOD	GOOD	GOOD	GOOD	

GREEN AUDIT REPORT, IEHE (BHOPAL)

RESULTS OF WATER QUALITY

WATER MANAGEMENT		
PARAMETER	RESPONSE	REMARKS
Source of water	Tube well	
No of Tube wells	08	02 not functional
No of motors used	06	
Horse power – Motor	3-4	
Depth of well –Total	120-180 ft.	
Water level	120	
Number of water tanks	57	
Quantity of water pumped every day	15000 lt	
Any water wastage/why?	Yes Due to open taps/Leakage/ Overflow of storage tanks	
Water usage for gardening	Yes	
Waste water sources	Sewage	
Any wastewater treatment for lab water	No	
Rain water harvest available?	Yes, introduced in new construction	
Any leaky taps	Nil, Regularly repaired	
Amount of water lost per day	500 lt	
Are there any signs reminding peoples to turn off the water?	Yes	

GREEN AUDIT REPORT, IEHE (BHOPAL)

Soil Quality

Soil samples were collected from five locations of the campus and analysed for the basic parameters. The results are tabulated and presented in following table

RESULTS OF SOIL QUALITY						
PARAMETER	LOCATION 1	LOCATION 2	LOCATION 3	LOCATION 4	LOCATION 5	Standard value
pH	7.26	7.44	7.1	7.23	6.95	<6.5 = Acidic 6.5-8.5 = Normal >8.5 Alkali
EC (mm/cm)	0.31	0.35	0.48	0.56	0.51	<1 = Normal 1-3 = Medium >3 Harmful
OC (%)	0.60	0.30	0.45	0.30	0.15	<0.5 = Less 0.5-0.75 = Medium >0.75 High
N (kg/h)	225	142	191	142	71	<280 = Less 280-560 = Medium >560 High
P (kg/h)	13	9	5	9	5	<10 = Less 10-25 = Medium >25 High
K (kg/h)	210	198	156	187	140	<120 = Less 120-280 = Medium >280 High
S (ppm)	22	13	18	15	11	<10 = Less >10 = Optimum
Zn (ppm)	0.59	0.45	0.52	0.55	0.37	<0.6 = Less >0.6 = Optimum
Fe (ppm)	5.10	4.98	4.70	4.50	4.25	<4.5 = Less >4.5 = Optimum
Mn (ppm)	4.50	4.01	3.56	4.01	3.88	<2 = Less >2 = Optimum
Cu (ppm)	1.20	0.98	0.49	0.87	0.75	<0.2 = Less >0.2 = Optimum
B (ppm)	0.89	1.56	0.76	0.59	0.97	<0.5 = Less >0.5 = Optimum

Abbreviation: pH (Hydrogen ion Concentration), EC (Estimated Carbon), OC (Organic Carbon), N (Nitrogen), P (Phosphorus), K (Potassium), S (Sulphur), Zn (Zinc), Fe (Iron), Mn (Manganese), Cu (Copper), B (Boron)

Samples of soils were collected from (Sample-1 (Botanical Garden- Science Block), Sample-2 (Girls Hostel), Sample-3 (Near Football Ground), Sample-4 (Sports Complex Block), Sample-5 (New Director Office))

Note: Above test was carried out at Government Soil Testing Laboratory, Bhopal

GREEN AUDIT REPORT, IEHE (BHOPAL)

Waste Management

Waste management is important for an ecofriendly campus. In a college different types of wastes are generated, its collection and management are very challenging. The following data provide the details of the waste generated and the disposal method adopted by the Institute.

Total number of stakeholders in the Institute: 3501

Total number of building (Administrative Building, Academic Block, canteen, office, Sports complex, library, Boys Hostel, Girls Hostel etc.): 11

WASTE GENERATED IN INSTITUTE AND ITS DISPOSAL

TYPE OF WASTE	PARTICULAR	DISPOSAL METHOD
E-Waste	Computers, electrical and electronic parts	Direct selling
Plastic waste	Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc	Direct selling
Solid wastes	Damaged furniture, paper waste, paper plates, food wastes	Reuse after maintenance energy conversion through composting
Chemical wastes	Laboratory waste	Neutralise with water
Waste water	Washing, urinals, bathrooms	Soak pits
Glass waste	Broken glass wares from the labs	Direct selling
Sanitary Napkin	-	Napkin Incinerators

Air Quality (As per report 2016-18 of Central Laboratory Pollution Control Board, Bhopal)

Air Quality

RESULTS OF SOIL QUALITY

ANALYTES	1 st Year	2 nd Year
Particulate matter (PM 10)	102	187
Particulate matter (PM 2.5)	75	41
Sulphur di oxide (SO ₂)	Below Detection Limit	Below Detection Limit
Nitrogen oxides(NO _x)	17.9	19.9
Ozone	28.7	11.0
Ammonia	4.15	BDL
B(a)P	ND	ND

Values in g/m³ except B(a)P which is in ng/m³

Less vehicle, Less transport, Less anthropogenic activity and silent area

GREEN AUDIT REPORT, IEHE (BHOPAL)

Per day waste generation



GREEN AUDIT REPORT, IEHE (BHOPAL)

Approximate Quantity of Waste Generated Per Day

CLASSIFICATION OF WASTE GENERATED				
SN	BIODEGRADABLE	NON-BIODEGRADABLE	HAZARDOUS	OTHER
Administrative Building				
<1Kg	1 kg	60 gm	-	-
2-10Kg	-	-	-	-
>10Kg	-	-	-	-
Academic Block				
<1Kg	750gm	200gm	-	-
2-10Kg				
>10Kg				
Canteen				
<1Kg			-	
2-10Kg	8 Kg	2Kg		
>10Kg				
Office				
<1Kg	700gm	40gm		
2-10Kg				
>10Kg				
Sports complex				
<1Kg	200gm	20gm		
2-10Kg				
>10Kg				
Library				
<1Kg	240gm	30gm		
2-10Kg				
>10Kg				
Boys Hostel				
<1Kg		350gm	-	
2-10Kg	5 Kg			
>10Kg				
Girls Hostel				

GREEN AUDIT REPORT, IEHE (BHOPAL)

<1Kg		250gm	50gm
2-10Kg	5 Kg		
>10Kg			
EXAMINATION CELL			
<1Kg		150 gm	
2-10Kg	4 kg		
>10Kg			
Laboratories			
<1Kg		500 gm	50gm
2-10Kg	4 kg		
>10Kg			

Biomedical waste management:

The Biotechnology department uses ethidium bromide in very small amount for DNA visualization. The chemical, which is used on agarose gels, is placed in a designated foil and buried in the soil. As per SOP said down by Harvard Environmental Health and Safety Services, the stock solutions or buffers with trace amounts of ethidium bromide (<0.01 % by weight) are disposed off in drain. However, quantities larger than 0.5 µg/ml are placed into a ziploc bag, properly sealed and disposed of as a part of routine waste pickup.

The department takes utmost care in discarding samples carrying pathogen or biomedical waste. Whenever hematological experiments are conducted, needles, syringes and cotton swabs containing blood daubs are first incinerated and then disposed off. Glass slides are soaked and wiped with 100% alcohol before reuse.

The sewer samples, when assayed for qualitative and quantitative estimation, are discarded in green areas and the glass wares are autoclaved at 15 pounds of pressure at 121°C. At this temperature and pressure, saturated steam destroys all vegetative cells and endospores within 10-12 minutes. It renders the glassware free of yeast, molds, bacteria or virus, if any.

Campus farming

The institute has started a novel venture of cultivation of vegetables in Girls Hostel campus. In addition, Organic medicinal plant garden is also properly maintained in the campus.

Routine Green Practices

Every year Institute celebrates World Environment Day 5 June, World Water Day 22 March, World Earth day 22 April and Ozone Day 16 September in the campus. The main focus of these programs was to provide awareness to the students about the importance of the environment, its conservation and sustainable use of environmental resources. The programmes are conducted through seminars, poster presentation, quiz competition debates etc. Under the aegis of Nature club of the Institute volunteered by NCC and NSS as well awareness programme were organized.

GREEN AUDIT REPORT, IEHE (BHOPAL)

Carbon Foot Print Analysis

- | | |
|---|---|
| 1. Total number of vehicles used by the stakeholders of the college | : 1565 |
| 2. Number of cycles used | : 06 |
| 3. No: of two wheelers used | : 1500 |
| Average distance travelled | : 10 km |
| Average quantity of fuel used | : ½ Ltr |
| 4. No: of cars used | : 115 |
| Average distance travelled | : 25 km/21 km |
| Average quantity of fuel used | : 1 Ltr |
| 5. No. of persons using public transportation | : 520 |
| 6. No. of persons using college conveyance | : ---- |
| 7. No: of generators used per day | : nil |
| 8. Amount of fuel used | : nil |
| 9. No: of LPG cylinders used in canteen/ Labs | : 8 |
| 10. Use of any other fossil fuels in the college | : Nil |
| 11. Any suggestion to reduce the use of fuel | : Pooling of
Vehicles, Use of City bus till institute campus |

GREEN AUDIT REPORT, IEHE (BHOPAL)

SUGGESTIONS AND RECOMMENDATIONS

From the green audit following are the conclusions, which can be taken for improvement in the campus.

- An environmental policy document has to be prepared with all the recommendations and current practice carried by IEHE.
- 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 reduced/reused or recycled at maximum possible places.
- Install a water meter to record water usage in the college IEHE premises.
- All departments generate paper waste.
- Especially, academic/administrative/Exam section is using more one sided paper for printing and writing is good practices.
- Food waste generated in campus is mostly from dining areas. The food waste is diverted to nearby NADEP Composting pit which is a good practice.
- E- waste should be segregated, handled and disposed properly in an eco-friendly manner.
- Reducing the use of one-time use plastic bottles, cups, folders, pens, bouquets, decorative items will be useful to solve the problem of plastic pollution to some extent.
- Rainwater harvesting from rooftop to recharge the ground water level table must be done on old constructed buildings.
- Few more composting yards to be set up in the campus around the canteen.
- Repair and regenerate the solar panels of Girls hostel and library. It is recommended to install more solar panels on other buildings in campus.

Water Management

- The water sources are safe in terms of contamination.
- The students are taking back the food waste as per the zero waste management strategy of the college. It helped in reducing the consumption of water for washing.
- The wells can be recharged with rainwater from rooftops of old constructed buildings.
- Rainwater for laboratory purposes – Construction of a 10000L rainwater harvesting tank can satisfy the need of laboratory, especially in distillation units where water lost as coolant. The rain water from harvesting tank can be used as source of water as well as coolant for the distillation unit.
- The NSS/NCC/Rotaract club can arrange on regular basis to further strengthen awareness programmes for water conservation among students. There should be a proper monitoring of water consumption pattern in the campus. IEHE can also conduct water quality monitoring during specific intervals.

GREEN AUDIT REPORT, IEHE (BHOPAL)

CONCLUSION

Today, the need of the hour is to contribute our efforts to the ongoing *green revolution*. In order to accomplish that, we ought to start from the basic level i.e., our college campus should be well implanted with **eco-friendly projects**. It demands combined initiatives from the students, faculties, as well as the administrative staff. This approach might demand special investments but when successfully implemented, it'll assist us in adopting sustainable lifestyle.

Here are some tried and tested approaches to make our IEHE cleaner and greener: -

- Segregating recyclable and non-recyclable waste
- Decreasing paper waste
- Installing composting bins
- Setting up solar plants
- Choosing public transportation

Let's get a deeper insight about these ways so that we can go the greener way.

Segregating recyclable and non-recyclable waste

The vast amount of waste that is generated per day must be efficiently segregated before dumping, so that volume of waste is reduced and the recyclable items can be sent to the specific recycling stations. For segregating the waste, separate bins must be provided by the administrative staff. Students should be guided to dispose the recyclable items in the specific bin that is labelled appropriately. It would reduce up to 50% of misdirected waste. In fact, a separate bin for organic waste can also be installed.

Decreasing paper waste

Nowadays, the world is going digital. It's definitely a good move in the direction of conservation of natural resources and keeping the planet cleaner. We must also reduce the use of paper in our college and adopt digital mode through computer classes, digital libraries and online testing programs. Class notes could also be taken electronically.

Installing composting bins

A lot of food waste gets build up in the college, which can be eliminated by installing composting bins. The students must be trained to discard the organic waste in compost bin which will in turn help in reducing the quantity of waste sent to the landfill. In addition to that, our campus will be much cleaner.

Setting up solar plants

We should switch to renewable sources of energy, and setting up of solar plants at college will be a great step in this initiative. There is tremendous requirement of electric power supply and adopting solar plants will help us in turning eco-friendlier.

Choosing public transportation & pooling of vehicles

Students must opt for public transport instead of using private vehicles for daily commute between college and home. Which will save the fuel. Even, stress should be given on using ecofriendly fuel for running vehicles so that the campus is less polluted.