



GREEN AUDIT REPORT FOR BHASKARACHARYA COLLEGE OF APPLIED SCIENCES



Elion Technologies & Consulting Private Limited

307, 3rd Floor, DDA Lal Market, H-Block

Vikas Puri, New Delhi-110018



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Acknowledgment

Elion Technologies and Consulting Pvt Ltd places on record it's thanks to the management of Bhaskaracharya College of Applied Sciences (University of Delhi) for entrusting the task of conducting green audit study.

We acknowledge with gratitude the whole hearted support and cooperation extended by all team members while carrying out the study.



Site Information

Name of College	Bhaskaracharya College of Applied Sciences University of Delhi
College Address	Sector-2, phase1, Dwarka, New Delhi- 110075
Execution Partner	ELION Technologies & Consulting Pvt Ltd
Communication Address	307, 3rd Floor DDA Lal Market H-Block VikasPuri, New Delhi-110018
Date of Audit	28 th April 2023
Year of Audit	2022 - 2023
Audit Participants	Dr. Gunjan Sirohi (Assistant Professor) Dr. Amit Kumar (Assistant Professor)
Total College Area	39408.03 sqm
Total Green Area	28381.26 sqm



Overview of Institute

Bhaskaracharya College of Applied Sciences named after a great mathematician of 12th Century was set up in October, 1995. The college is a constituent college of University of Delhi and is 100% funded by Government of National Territory of Delhi.

The main goal of the institution is to train students in various self-oriented professional courses like Computer Science, Electronics, Instrumentation and Food Technology.

Within a short span of time, our college has achieved remarkable recognition as one of the few excellent institutions in Delhi. The college is housed in a spacious new building sprawled over ten acres at Sector 2, Dwarka, New Delhi. The new college campus has twelve departments out of which ten departments have 3 laboratories each.

In addition to this there is a Conference Room, an Audio-Visual Hall and Library spanning three separate floors, an open-Air Theatre and indoor and outdoor sports facility. In addition to classroom lectures, the course curriculum also includes seminars, industrial tour, project training, etc.

The project training helps in experiencing the working culture in the industry whereas the seminars provide firsthand information and an opportunity to interact with the eminent personalities of industries.

List of courses offered by the institute:

Following are the list of undergraduate courses offered by the institute-

- B.Sc. (Hons.) Biomedical Science
- B.Sc. (Hons.) Botany
- B.Sc. (Hons.) Computer Science
- B.Sc. (Hons.) Chemistry
- B.Sc. (Hons.) Electronics
- B.Sc. (Hons.) Food Technology
- B.Sc. (Hons.) Instrumentation
- B.Sc. (Hons.) Microbiology
- B.Sc. (Hons.) Physics
- B.Sc. (Hons.) Polymer Science
- B.Sc. (Hons.) Zoology



Introduction

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of 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 a college to determine how and where they are using the most energy or water or other resources; the college 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 college 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 CO₂ 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.

Advantages of Green Audit:

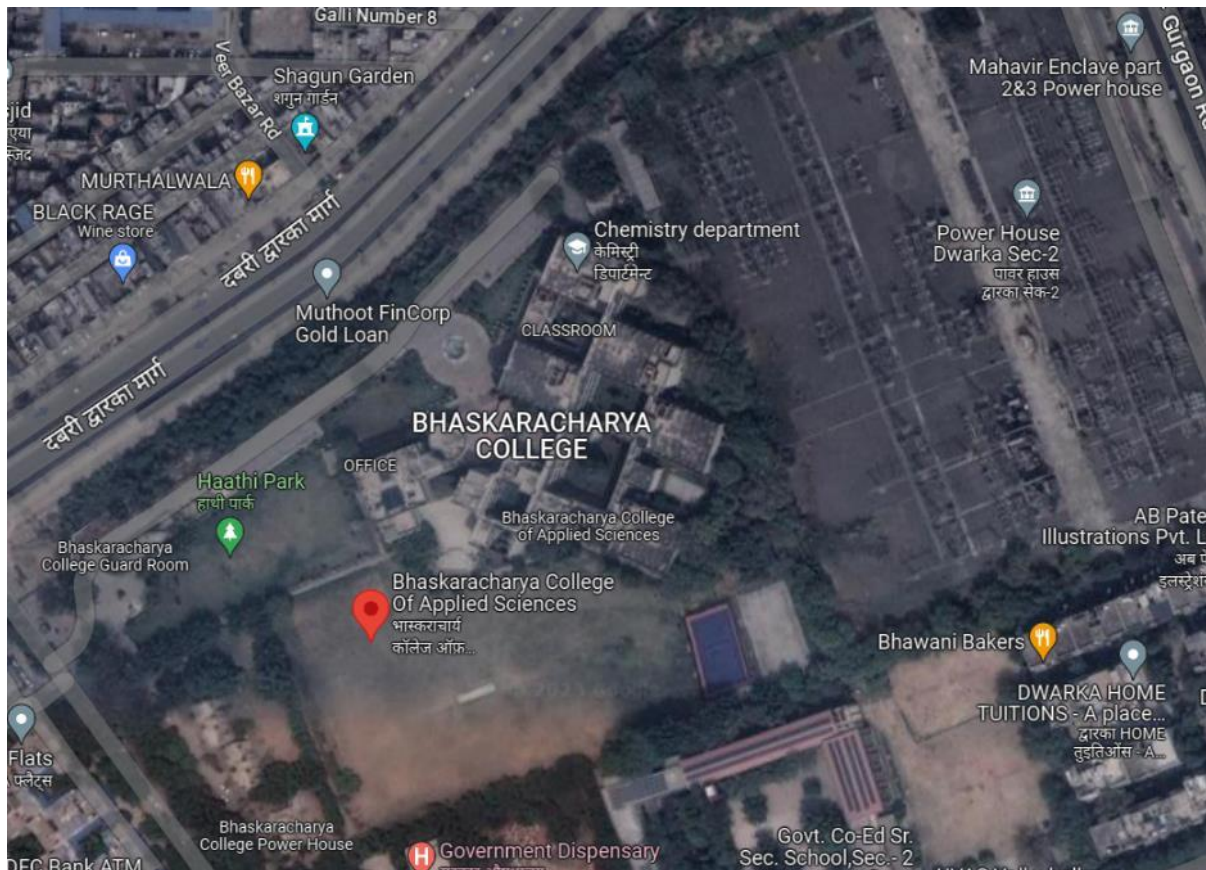
Green Audit is assigned to the Criteria 7 of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India that declares the institutions as Grade A, Grade B or Grade C according to the scores assigned at the time of accreditation. Some main advantages of green Audit are:

- It helps to shield the environment.
- Minimizing the waste and managing the cost.
- Authenticate conformity with the implemented laws.
- Minimizing the energy consumptions and focus on green and clean energy.
- Ambient Environmental Condition.
- Awareness and Training on Sustainability for Students.
- Awareness about environmental guidelines and duties.

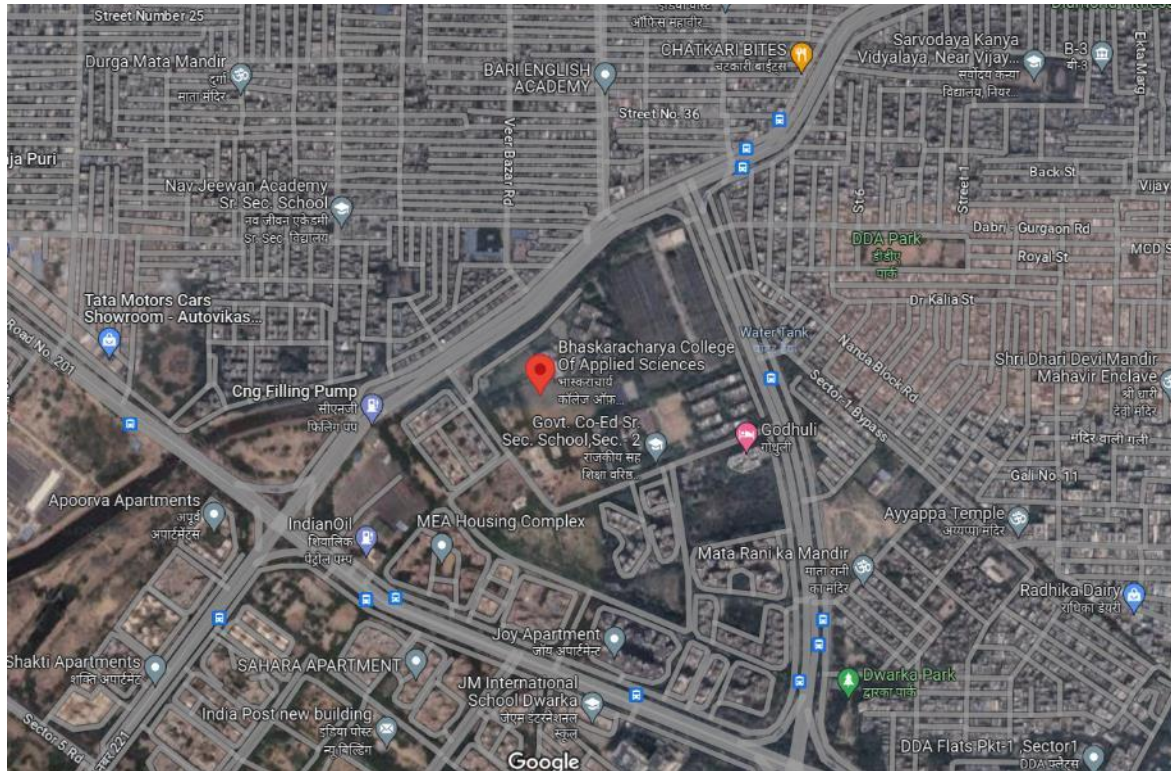


Environment Setting

The land use around the campus is mixed of commercial and agricultural uses. Schools, Restaurants, Commercial warehouses and agricultural farms are present around the campus.



Bhaskaracharya College Of Applied Sciences (University of Delhi)



Location of Bhaskaracharya College of Applied Sciences (University of Delhi)



Site Plan of Bhaskaracharya College of Applied Sciences (University of Delhi)



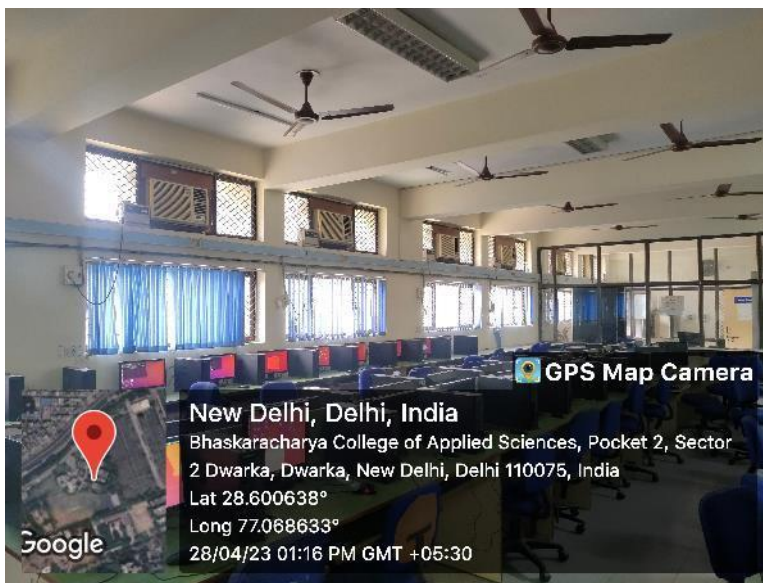
Green Audit

For Green Audit following 13 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.

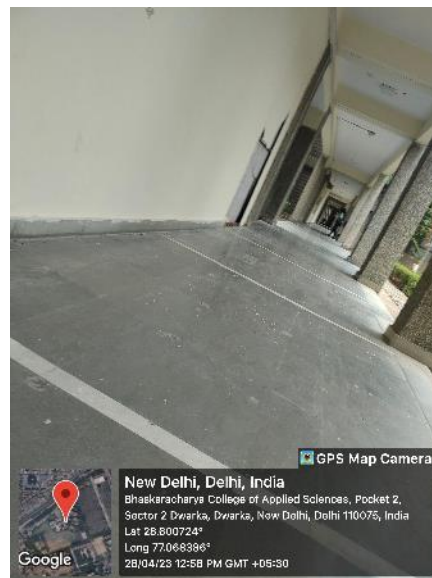
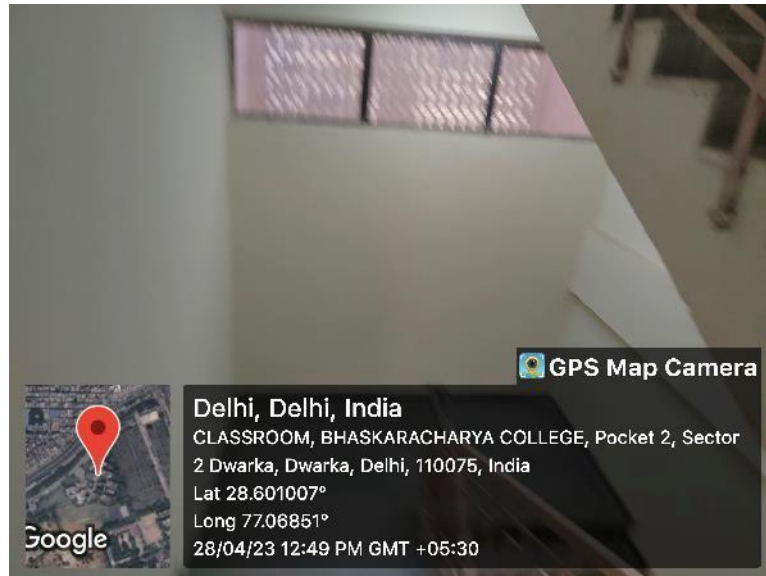
- a) Good Daylight Design and Ventilation
- b) Water Efficiency
- c) Wastewater Management
- d) Indoor Air Quality
- e) Energy Efficiency
- f) On-site Energy Generation
- g) Temperature and Acoustic Control
- h) Paper Waste Management
- i) E-Waste Management
- j) Canteen and Solid Waste Management
- k) Universal Access and Efficient Operation and Maintenance of Building
- l) Green Belt
- m) Green Programs (Green initiatives)

3.1 Good Daylight Design and Ventilation

- a) Corridors are wide with good ceiling height. All the corridors receive good daylight.
- b) Classrooms, Labs and Library have large windows. Adequate daylight is received through the windows during daytime.
- c) Classroom walls, corridors and labs are white-washed, this enhances the daylight received.
- d) Curtains are provided in Labs and staff room windows to avoid glare.
- e) Laboratories and washrooms are provided with exhaust fans to disperse heat, fumes and odors.
- f) Stair cases receive daylight through windows provided at various levels.



Good Daylight in Classrooms and Labs



Daylight in Corridors and Stairs

3.2 Water Efficiency:

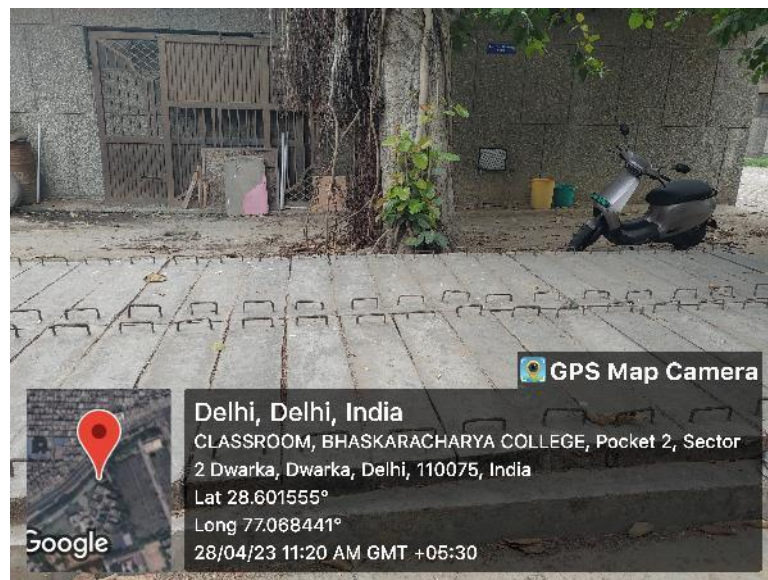
- Jal Board connection is used for water supply in the campus.
- Water from connection is stored in 3 underground tanks of capacity 10KL, 20KL and 20KL each.
- Water coolers are provided for drinking water at every floor and section totally 8 in numbers.
- Normally mops are used for floor cleaning and hose is used for cleaning twice a day.
- Dual flushing system is not provided in the washrooms.



- f) Signages are provided in washrooms emphasizing water conservation.
- g) Water from air conditioning unit is used in watering the plants
- h) Reject water from water purifiers is collected into the sanitary underground water tank.
- i) Rain water harvesting system with rainwater harvesting pits is available.



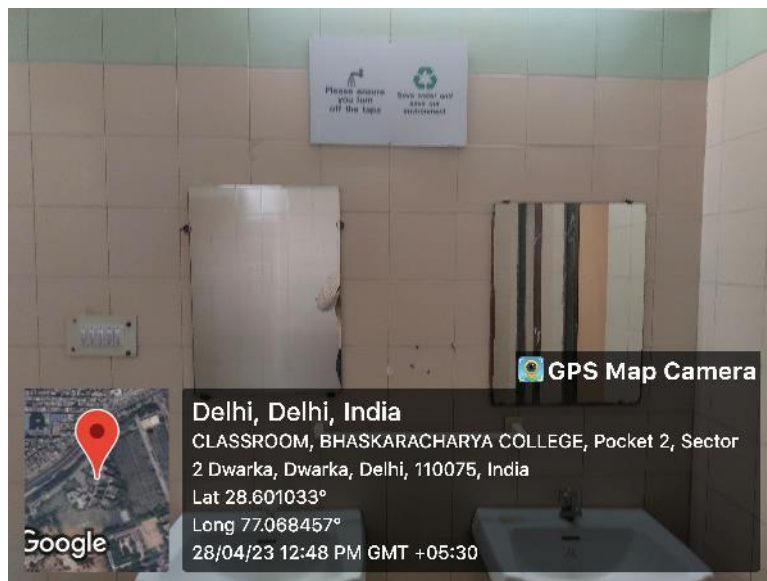
Water Cooler for drinking water



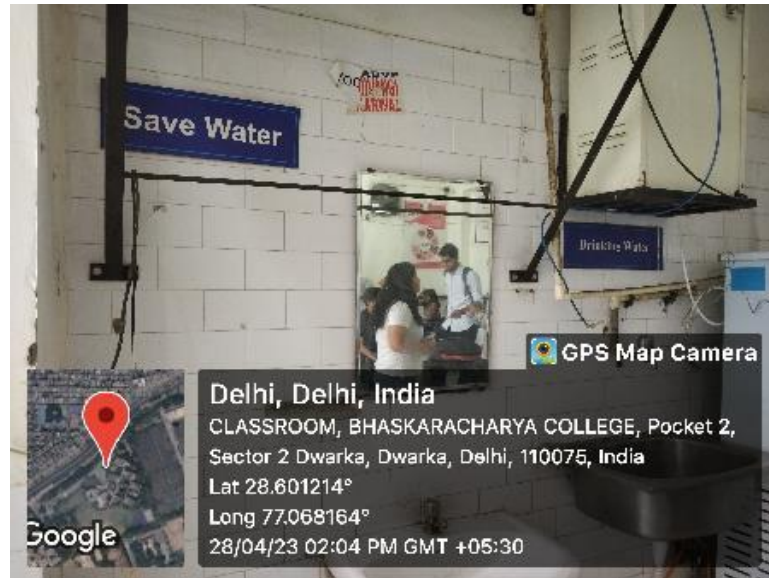
Rainwater Harvesting Pits



RO Plant at terrace



Signages are provided for Save Water



Signages are provided for Save Water



3.3 Wastewater Management:

- a) Waste water is drained off. Waste water from canteen area is sometimes used to water the garden and playground.

3.4 Indoor Air Quality;

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Some common indoor pollutant are listed as below:

- Molds and other allergens – This may arise from water seeping into the building envelope or skin, plumbing leaks, condensation due to improper ventilation, or from ground moisture penetrating a building part.
- Carbon monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels.
- Volatile organic compounds (VOCs) – VOCs are emitted by paints and lacquers, paint strippers, pesticides, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions etc.
- Carbon dioxide – Due to human respiration
- Particulate matter – Due to construction and maintenance activities

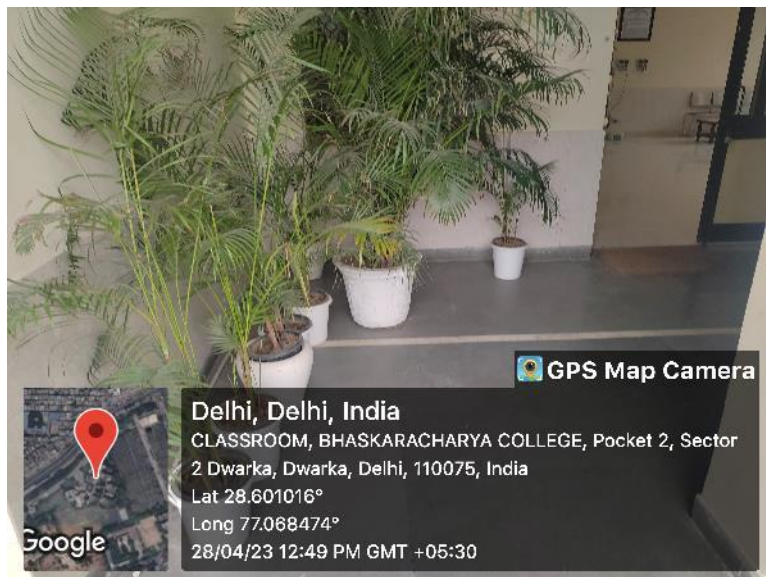
Major observations under indoor air quality are as below:

- a) In classrooms the mode of ventilation is natural (through windows) and is enhanced by fans. Air conditioners are used in some of rooms such as offices, labs, computer labs, computer server room etc.
- b) Heating Ventilation and Air Conditioning (HVAC) system does not exist. Split, Ductable and Windows Air conditioner are used.
- c) Indoor plants are seen in the College. Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits. Refer Annexure 1 for details.
- d) Green belts have been set up in campus area.



Tree Plantation around the boundary wall





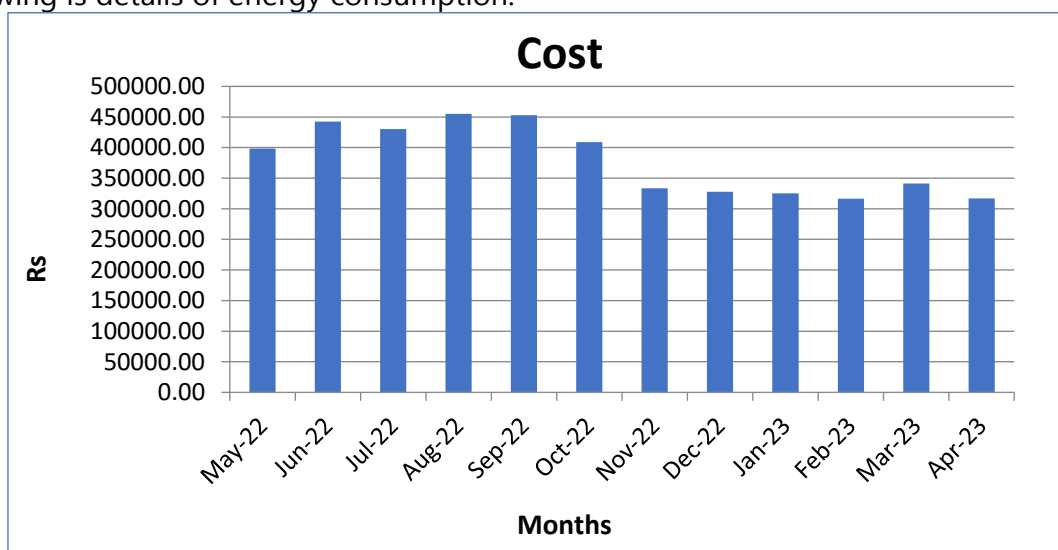
Indoor Plantation

3.5 Energy Efficiency:

Electricity:

Power is supplied by Tata Power Delhi Distribution Limited. The major electricity consuming equipment installed in the campus are Windows and Split AC, Submersible Motor, Motors, RO Plant, Desktop, Printer, Fan, Tube light, LED Bulb etc.

Following is details of energy consumption:





It was observed that:

- a) Conventional Fluorescent tube lights are installed for the majority of area. LED lights are also installed at certain locations such as seminar hall, conference room etc. College is in the process of replacing periodically the dysfunctional conventional tube lights with LED lights.
- b) Campus has air conditioners which are in good working condition.
- c) Solar power plant of 30KW is installed in the campus.



Solar Power Plant



LED Panel Lights in Corridors

3.6 On Site Energy Generation (usage of LPG/ Natural Gas):

- a) Canteen facility is present in campus.
- b) LPG is provided in the canteen for cooking.
- c) Back Up diesel generator of rating 80KVA is present although the running hours of generator is pretty low..

3.7 Temperature and Acoustic Control

- a) White washed rooms & corridors and white/ off-white flooring improve the lighting conditions.
- b) The entire campus has green area.
- c) The campus has done tree plantation all around the boundary walls which helps in reducing temperature.



Tree plantation

3.8 Paper Waste Management:

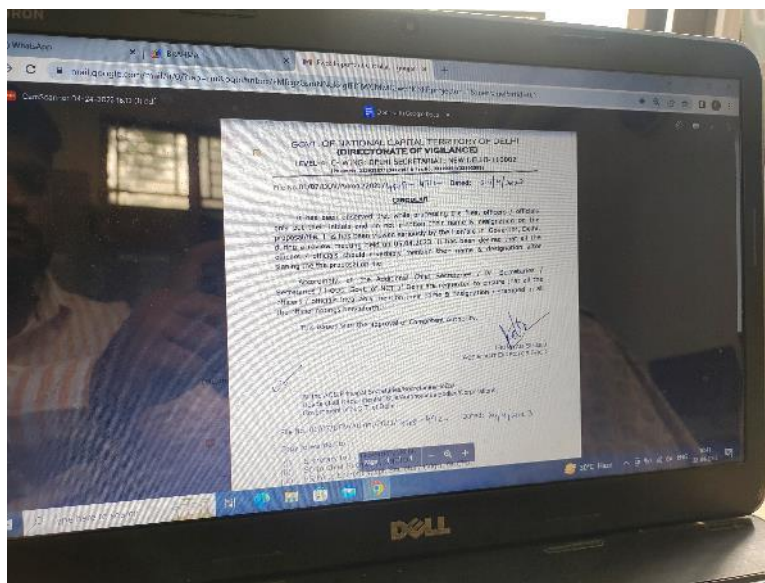
Being academic institution, waste paper is the main solid waste generated in the premises. The College has taken steps to minimize and avoid paper usage.

It was observed that:

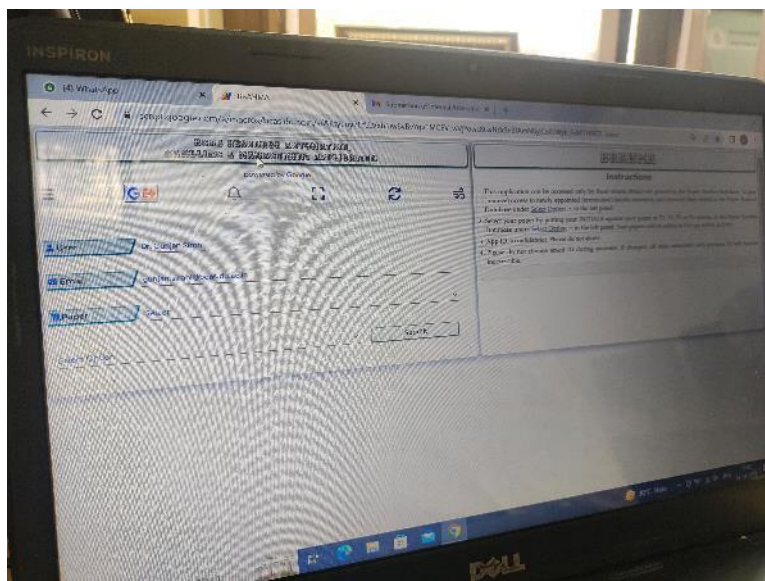
- a) College has its own application called BRAHMA, most of the documentations



- work is done that including attendance, papers, students' data etc.
- b) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy, digitalization (scanning) is practiced.
 - c) Internal notices and communications are through E-mail/Whatsapp.
 - d) Faculty and administration staff uses old papers and envelops for internal usages as rough work, file markers, page separators etc.
 - e) Paper notices are displayed on the notice boards. Most of the storage is I paper store room. After a certain years these papers are given to vendors.
 - f) ERP system is available for attendance and syllabus related data.



Communication Email



BRAHMA Application



3.9 E-Waste Management:

- a) MOU with LAKSHAY Society is signed for disposal of E-waste.

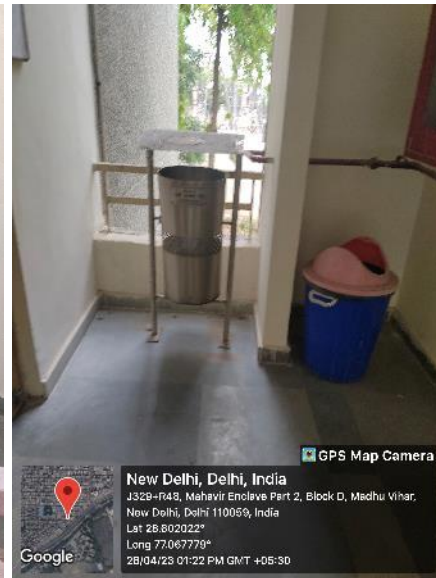


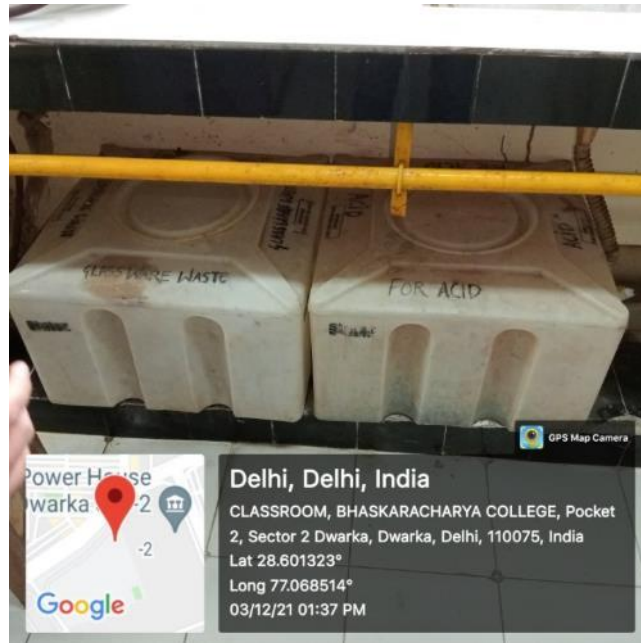
E-waste Collection Bin

3.10 Solid Waste Management:

It was observed that:

- Wet waste and dry waste segregation is practiced in the premises. Separate bins are provided for wet biodegradable and dry recyclable waste.
- Non Hazardous Waste – Daily garbage, canteen waste, carton papers, plastic and civil construction waste generated from premise on regular basis. The regular collection is done by Municipal Corporation for further dispose of at dumping site. There is designated garbage yard inside premise for the same.
- Biodegradable waste is mainly generated in canteen.
- Composting is done for wastes such as tree leaves, grass etc.





Dustbins for every section

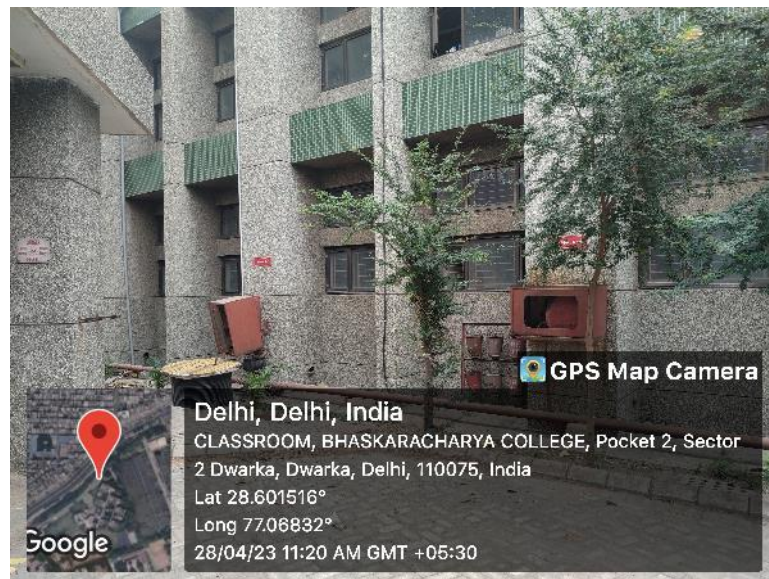
3.11 Universal Access and Efficient Operation and Maintenance of Building:

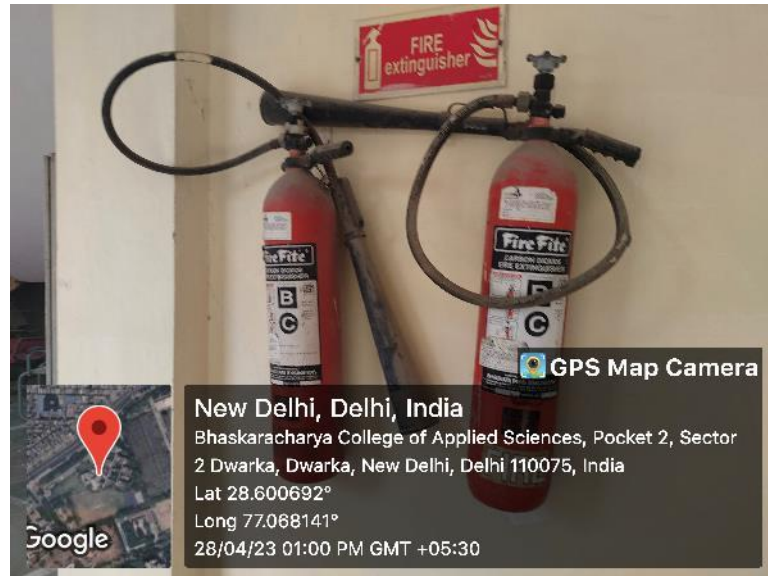
It was observed that:

- a) College is easily accessible. Staircase and ramps are provided for staff and students.
- b) Since the access and staircases are wide and uncluttered, it is possible to have a safe evacuation during emergency.
- c) Fire extinguishers and Fire Hydrants are provided for emergency.
- d) Directional exit signages and floor markings are not present on every floor of the campus, same shall be provided for the fast evacuation.
- e) Regular Fire Safety Trainings shall be given to staff and students on annual basis.
- f) Firefighting equipment's need to checked and maintained properly.



Ramps Provided

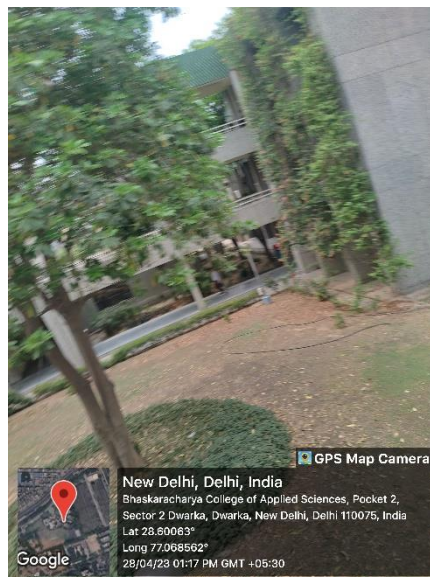




Firefighting installations

3.12 Green belt/ Landscaping:

- a) Large trees and plants are planted in the premises. Plantation also helps maintaining lower temperatures of the area.



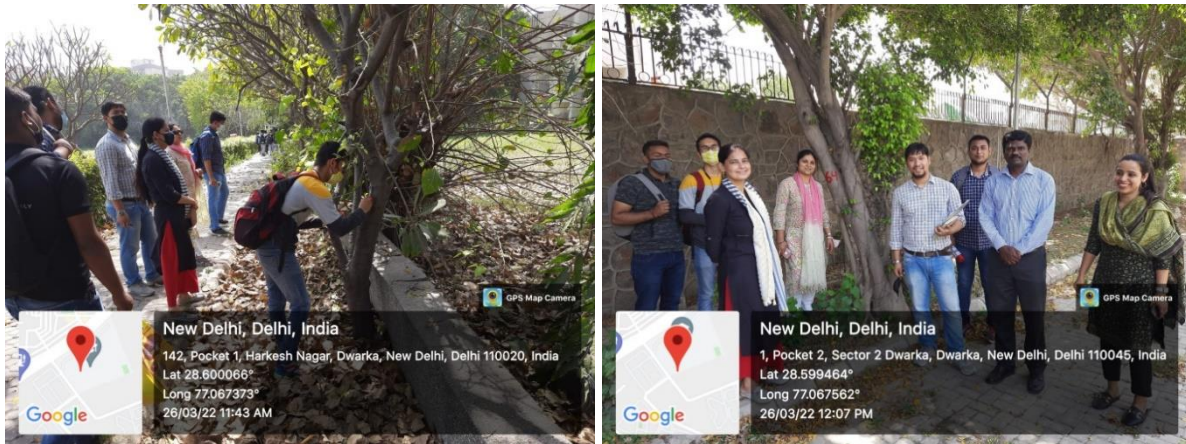




Greenery all around the Campus

3.13 Green Initiatives:

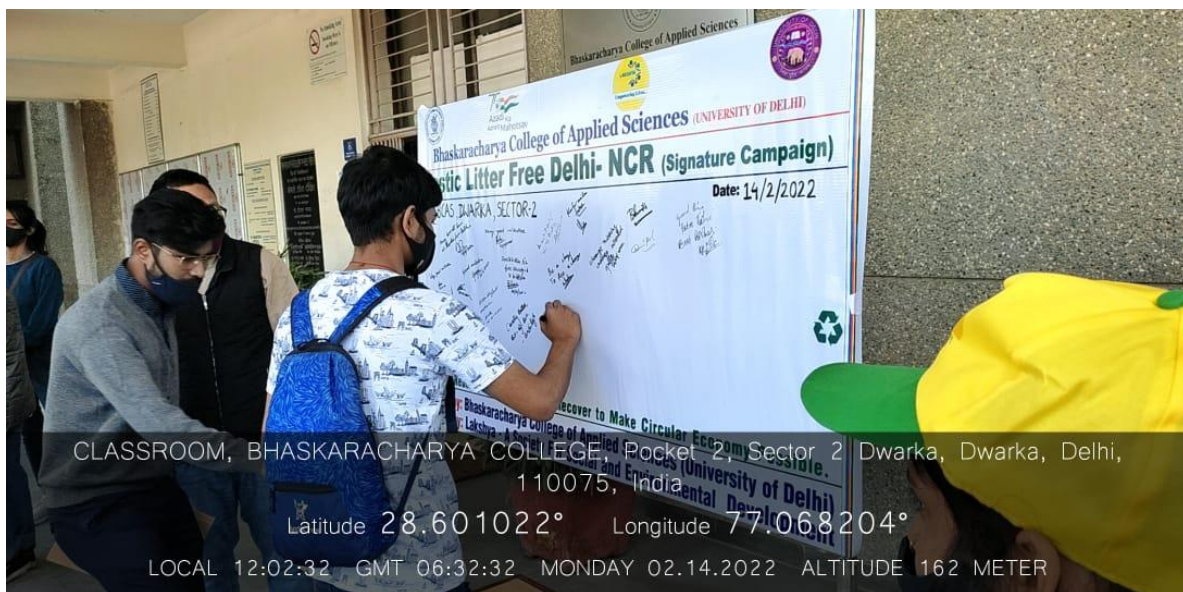
College is regularly celebrating Environment Day, Yoga Day, Earth Day etc.



Tree census 2022 at Bhaskaracharya College of Applied Sciences organized by Eco club in association of Department of Botany



Swachhta and plantation Drive



CLASSROOM, BHASKARACHARYA COLLEGE Pocket 2,my Sector 2 Dwarka, Dwarka, Delhi,
110075, India
Latitude 28.601022° Longitude 77.068204°
LOCAL 12:02:32 GMT 06:32:32 MONDAY 02.14.2022 ALTITUDE 162 METER

Project Parivartan : Stop usage of single Use Plastic



'Youth Expedition-a trip to Yamuna Mission in Mathura' on April 10, 2022



Visited to participate in "Nadi Samvaad" organized by Rashtriya Swabhiman Aandolan &



Yamuna Mission on April 12, 2022 at Taal Katora Stadium, New Delhi



Water body revival activity





Celebrated World Earth Day on April 22, 2022



Eco Club activities and efforts towards awareness for Ban on Single Use Plastic featured in Hindustan Times (HT City).



Participated in the meeting with the minister of Environment, Govt. of NCT Delhi along officials of Delhi Pollution control committee and UN Environment Program to discuss over the awareness programs on single use plastics





सत्यमेव जयते

MGNCRE

महात्मा गांधी राष्ट्रीय ग्रामीण शिक्षा परिषद
Mahatma Gandhi National Council of Rural Education

Department of Higher Education, Ministry of Education, Government of India



Where there is Rural Wellbeing
there is Universal Prosperity

Certificate of Appreciation

Prof. Avneesh Mittal, Professor, BHASKARACHARYA COLLEGE OF APPLIED SCIENCES, South West, Delhi has contributed to the World Environment Day Celebrations June 2022 by facilitating and completing the Green activities on campus. The initiatives taken up under Swachhta Activities were building outdoor classrooms, reinforcing greenery and showcasing the green decisions of the Institution. Mahatma Gandhi National Council of Rural Education congratulates the Institution for its participation and adding impetus to the activities conducted by the faculty members and students.

Date: 20.06.2022
Certi: MG/SAP/WED/N88



B S C Naveen Kumar
MGNCRE World Environment Day 2022
Monitoring Officer



सत्यमेव जयते

MGNCRE

महात्मा गांधी राष्ट्रीय ग्रामीण शिक्षा परिषद
Mahatma Gandhi National Council of Rural Education

Department of Higher Education, Ministry of Education, Government of India



Where there is Rural Wellbeing
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Certificate of Appreciation

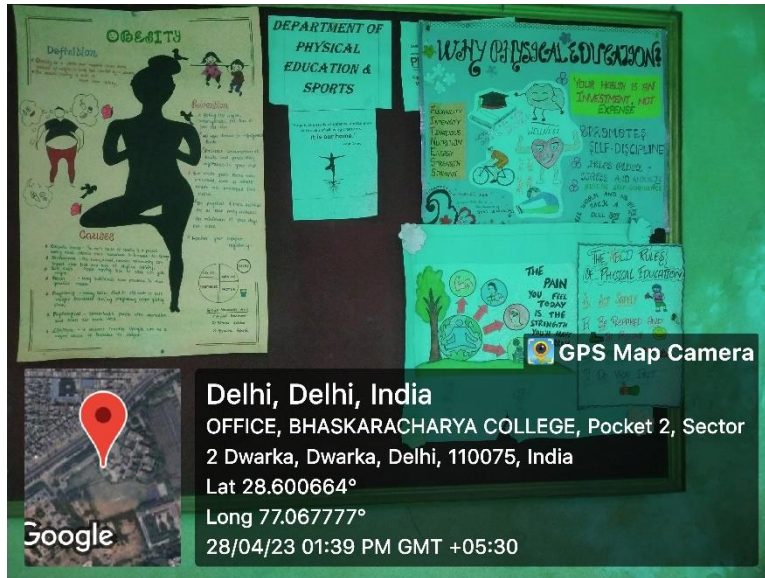
DR. GUNJAN SIROHI, ASSISTANT PROFESSOR, BHASKARACHARYA COLLEGE OF APPLIED SCIENCES, SOUTH WEST, DELHI has contributed to the World Environment Day Celebrations June 2022 as a faculty coordinator by conducting and completing the Green activities on campus. The initiatives taken up under Swachhta Activities were building outdoor classrooms, reinforcing greenery and showcasing the green decisions of the Institution. Mahatma Gandhi National Council of Rural Education appreciates the team work during the activities.

Date: 20.06.2022
Certi: MG/SAP/WED/FC/104



B S C Naveen Kumar
MGNCRE World Environment Day 2022
Monitoring Officer

Certificates of Appreciation



Yoga Day



Recommendations/Suggestions

For Improving Energy Consumption:

- a) Every classroom and lab with central switch board can have a diagram linking location of a tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.
- b) Installation of automatic lights with sensors can be considered.
- c) Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing. Equipment with star rating, using eco-friendly materials; with safe disposal policy to be preferred. Policy of returning equipment at the end of life span to the supplier to be preferred.
- d) For purchasing new electronic appliances, star rating provided by Bureau of Energy Efficiency (BEE) should be considered. The equipment which has maximum star ratings could be purchased, which will consume less energy, ensure environmental sustainability and also operate at low cost.
- e) Control sensors can help to reduce consumption by automatically dimming lights when people are not around, and keeping blinds open to use natural light & reduce energy consumption.
- f) Raise awareness:
 - Encourage students to help in monitoring energy consumption & implement corrective actions
 - Integrate energy education into classroom learning.

Water Conservation:

- a) Provide information on water usage and savings to students/ staff through notices, screen savers in computer labs.
- b) Minimize/ reduce water usage by installing water saving faucets such as pressmatic taps, tap aerators, jet sprays etc.
- c) Installation of waterless urinals can be considered to reduce water consumption.
- d) Water balance diagram can be prepared to quantify the water consumption by installing water meters at key points. Based on data gathered, appropriate measures can be taken to reduce the water consumption.

Paper and other Solid Waste Reduction:

- a) Inventories of all solid waste generated in the premises must be maintained.



- b) Paper usage shall be monitored to understand the impact of digitization in the facility.




Others:

- a) Since each student uses computer lab, the screen savers can be set up for creating environmental awareness. (Ergonomics, water conservation etc.). Short 30 second pop up can be displayed on computer screens when they are on standby mode. Or wallpapers informing students about environment conservation can be created.
- b) Consider detailed energy audit (energy consumption, thermal emission, visual comfort) and water audit.
- c) Adopt environmentally responsible purchasing policy, and work towards creating and implementing a strategy to reduce environmental impact of its purchasing decision.







Annexure 1 – Indoor Gardening Details





Indoor plants are commonly used for their aesthetics benefits but they also have vital role reducing airborne pollution. The right choice of plants can be an excellent way of improving indoor air quality and general health. Local landscape contractor can be contacted for supply and rotation of these plants.

Plants	VOC it removes	Indoor source of VOC's	Plant care
 <p>Aloe Vera</p>	Formaldehyde, Trichloroethylene and Benzene	Chemical based cleaners and paints	Easy to grow with enough sunlight
 <p>Bamboo Plant</p>	Formaldehyde, Trichloroethylene and Benzene	Paints, Plastics, Wood products etc.	Thrives under low light conditions as well as easy to maintain
 <p>Chinese Evergreen</p>	Benzene	Paints	Low maintenance plant that prefers low light conditions.




 <p>English Ivy</p>	<p>Formaldehyde, Benzene, Air borne fecal matter particles</p>	<p>Wood, Paper products, Air borne fecal – matter particles from pests</p>	<p>Easy to maintain</p>
 <p>Janet Craig</p>	<p>Formaldehyde, Benzene and Trichloroethylene</p>	<p>Paints, Plastics, Wood products etc.</p>	<p>Medium to low light tolerant plant. Requires little water for growth.</p>
 <p>Golden Pothos or Devils Ivy</p>	<p>Formaldehyde, Cleanses air</p>	<p>Exhaust fumes, carpeting materials, panelling and furniture products made with particle board</p>	<p>Extremely easy to maintain under low to bright light conditions. Fast growing and grows well under Fluorescent light.</p>
 <p>Mass Cane</p>	<p>Formaldehyde, benzene and trichloroethylene</p>	<p>Paints, Plastics, Wood products etc.</p>	<p>Medium to low light tolerant plant. Requires little water for growth.</p>



 <p>Snake plant</p>	<p>Formaldehyde and trichloroethylene</p>	<p>cooking fuels, wood products, facial tissues, personal care products and waxed papers</p>	<p>Drought resistant and Tolerates a variety Of light conditions. Hard to damage or kill.</p>
 <p>Peace Lily</p>	<p>Formaldehyde, benzene and trichloroethylene</p>	<p>Paints, Plastics, Wood products etc.</p>	<p>Relatively easy to maintain. Survives in low light conditions.</p>
 <p>Red-edged Dracaena</p>	<p>Formaldehyde and trichloroethylene</p>	<p>cooking fuels, wood products, facial tissues, personal care products and waxed papers</p>	<p>Drought resistant and Tolerates a variety of light conditions. Hard to damage or kill.</p>
 <p>Spider Plant</p>	<p>Formaldehyde, benzene, carbon monoxide and xylene</p>	<p>cooking fuels, wood products, Printing</p>	<p>Easy to maintain under medium to bright light condition.</p>



	Purifies indoor air	-	Easy to maintain
Parlor Palm			



Elion Technologies & Consulting Private Limited

Registered Office:

307, 3rd Floor, DDA Lal Market, H-Block

VikasPuri, New Delhi-110018

Phone No: 011-28541888, 9013890526

Email: support@elion.co.in

Website: www.elion.co.in

DISCLAIMER

All information contained in this report is based on the data available and observations made during the audit. All recommendations made in this audit report should be duly evaluated by the management before implementation.

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