

Green Audit Report (2023-24)
of
BABA BANDA SINGH BAHADUR
ENGINEERING COLLEGE



CHANDIGARH ROAD, FATEHGARH SAHIB, PUNJAB-140407

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1. Introduction:

The results and conclusions and suggestions from a thorough green audit carried out at BABA BANDA SINGH BAHADUR ENGINEERING COLLEGE are presented in the report that continues. The audit's goals were to evaluate the institute's environmental impact and spot areas where sustainability may be improved. The audit addressed topics like journeys, disposal of trash, water use, electricity consumption, and general environmental awareness.

OBJECTIVES:

In recent time, the Green Audit of an institution has been becoming a paramount important for self-assessment of the institution which reflects the role of the institution in mitigating the present environmental problems. The college has been putting efforts to keep our environment clean since its inception. Therefore, the purpose of the present green audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out Green Audit are:

- To map the Geographical Location of the college
- To document the floral and faunal diversity of the college
- To record the meteorological parameter of Fatehgarh Sahib where college is situated
- To document the ambient environmental condition of weather, air, water and noise of the college
- To document the waste disposal system
- To estimate the Energy requirements of the college
- To report the expenditure on green initiatives during the last five years

Green Audit Working Team (2023-24):

| Sl No | Name of the Members | Designation |
|-------|---------------------|--|
| 1. | Dr Sanjeev Bhandari | Department of Mechanical Engineering, Incharge Green Audit |
| 2. | Dr Amandeep Singh | Department of Mechanical Engineering |
| 3. | Dr Sanjeev Sharma | Department of Mechanical Engineering |
| 4. | Ms Nitika Rathi | Assistant professor in Agriculture, Engineering Department |
| 5. | Guljeet Singh | HOD Civil Engineering |
| 6. | Dr Nitin Singla | Department of Mechanical Engineering |
| 7. | Surinder Singh | Junior Engineer, Estate Office |

2. Need for Green Audit:

Green audits, also known as environmental audits or sustainability audits, are becoming more and more necessary in today's society for several reasons:

(a) Environmental Impact: Green audits assist in evaluating and reducing an organization's negative environmental impact. They assess variables like energy use, waste production, water use, and emissions, identifying areas that might be improved to lessen environmental harm.

(b) Regulatory Compliance: Businesses must abide by the environmental laws and standards that have been set in many nations. Green audits assist businesses in complying with regulations and avoiding fines or other legal repercussions for non-compliance.



(c) Cost Reduction: Green audits can reveal inefficiencies and wasteful behaviours within a company, opening up chances for cost savings. Businesses can apply methods to save operational costs and boost overall efficiency by analyzing energy usage, resource consumption, and waste management.

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(d) Reputation and Stakeholder Expectations: Consumers and other stakeholders now demand more environmentally conscious company practices. Green audits offer organization transparency and prove its dedication to sustainability, strengthening its reputation and fostering trust among clients, staff, investors, and communities.



(e) Risk Management: Environmental hazards can have serious financial and reputational ramifications for firms, including pollution events, regulatory non-compliance, and supply chain interruptions. By evaluating environmental management systems, ensuring sufficient controls are in place, and putting preventative

measures in place to deal with possible problems, green audits assist in identifying and mitigating these risks.

(f) Continuous Improvement: Green audits encourage a continuing commitment to sustainability rather than being one-time events. Organizations can see trends, set goals, and implement improvement initiatives by routinely evaluating and tracking environmental performance. This iterative process promotes a culture of sustainability and propels long-lasting transformation.

(g) Sustainable Development Goals (SDGs): An international framework for solving urgent environmental and social issues is provided by the Sustainable Development Goals. Organizations can better align their operations with these objectives with the aid of green audits, paving the way for a more just and sustainable future. To evaluate, enhance, and confirm environmental performance, green audits are essential. They allow companies to control risks, comply with rules, cut costs, improve reputations, and support sustainable development.



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3. Methodology for Green Audit:



Audits of an organization's environmental performance and practices are known as "green," "environmental," or "sustainability" audits. They entail assessing the company's influence on the environment, resource usage, waste management, and adherence to environmental legislation. Here is a procedure for

carrying out a green audit:

- (a) Planning:
- (b) Identify audit team and resources:
- (c) Develop an audit plan: Create a detailed plan outlining audit activities, timelines, responsibilities, and communication channels.
- (d) Data Collection:
- (e) Gather information:
- (f) Conduct site visits and interviews:
- (g) Review documentation:
- (h) Evaluation and Analysis:
- (i) Assess environmental impacts:
- (j) Evaluate compliance:
- (k) Identify strengths and weaknesses:
- (l) Quantify results:
- (m) Reporting:
- (n) Prepare an audit report:
- (o) Communicate results:
- (p) Follow-up and Improvement:
- (q) Develop an action plan:
- (r) Monitor progress:
- (s) Continuous improvement:

The methodology adopted to conduct the Green Audit of the Institution had the following components.

3.1. On-site Visit :

The Green Audit Team carried out the five-day field trip. The tour's main goal was to evaluate the Institution's waste management procedures, energy conservation tactics,

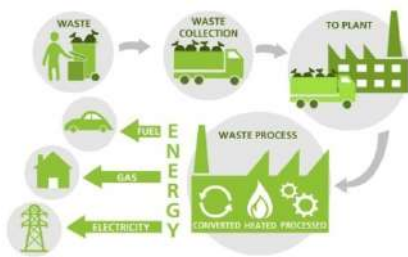
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and other aspects of its green cover. The protocols for sample collection, preservation, and analysis were followed scientifically.

3.2. Focus Group Discussion :

The nature club, staff, and management members participated in focus group discussions on various facets of the green audit. Identification of attitudes and awareness towards environmental issues at the institutional and local levels was the main topic of discussion.



3.3. Energy and waste management Survey:

The audit team evaluated the institute's waste generation, disposal, and treatment facilities as well as its energy usage pattern with the assistance of teachers and students. A comprehensive questionnaire survey method was used to carry out the monitoring.

4. Target Areas of Green Auditing:

Green Energy :

A process for resource management includes a green audit. The actual usefulness of green audits lies in the fact that they are conducted at predetermined intervals and that the results might show improvement or change over time, even though they are individual events. The concept of an eco-campus primarily emphasizes the effective use of energy and water, the reduction of waste output or pollution, and economic efficiency.



These indications are evaluated during the "Green Auditing of this Educational Institute" procedure. In order to reduce emissions, obtain a reliable and affordable energy supply, promote personal responsibility, encourage and improve energy conservation, reduce the institute's energy and water use, reduce waste going to landfills, and

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incorporate environmental considerations into all contracts and services deemed to have significant environmental impacts, Eco-campus focuses on these goals. Water, energy, trash, and green campus are the focus topics for this green audit.

4.1. Energy Consumption:

4.1.1. Lighting: The audit showed that many of the institute's lighting fixtures were ineffective and outdated. It is advised to use natural light whenever possible, add occupancy sensors, and swap out conventional light bulbs for energy-efficient LED ones.

Lets understand
ENERGY MANAGEMENT SYSTEM



4.1.2. Heating, Ventilation, and Air Conditioning (HVAC):

The HVAC systems were discovered to be working less efficiently than necessary. Energy usage can be considerably decreased by switching to energy-efficient HVAC equipment, using programmable thermostats,

and performing routine maintenance.

4.1.3. Energy Awareness: The institute should promote energy conservation practices among employees and students. Campaigns, educational activities, and financial incentives for energy-saving projects can all help achieve this.

Details of Energy consumption

| DESCRIPTION | 2023-24 | 2022-23 | 2021-22 |
|--|---|---|--|
| Total energy generated on campus, including solar and others (in KW) | 600054 (Solar) 12042 (Generator) 612096 (Total) | 633490 (Solar) 4356(Generator) 637846 (Total) | 622593 (Solar) 6610(Generator) 629203(Total) |
| Total energy consumed based on electricity bill (in KW) | 701880 | 611940 | 284505 |

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| Electrical device/items | Number | Power (watt) | Usage time (hr/day) |
|-------------------------|----------|--------------|---------------------|
| Normal Tubelight | 341@40w | 13640 | 10 hours/Day |
| LED Tubelight | 610@20w | 12200 | 10 hours/Day |
| Normal Bulb | 10@100w | 1000 | 10 hours/Day |
| LED Bulb | 157@9w | 1413 | 10 hours/Day |
| Ceiling Fan | 2620@80w | 209600 | 10 hours/Day |
| Wall fan | 121@80w | 9680 | 10 hours/Day |

ELECTRICAL POWER CONSUMPTION AT BBSBEC:

BBSBEC, being one of the largest colleges of Punjab, consumes on an average 1346333 kW-hr per year of electricity only to maintain its volumetric activities throughout the year. The authority keeps on replacing the old filament bulbs, CFL bulbs and tube lights by low energy consuming LED bulbs and LED tubes and bulky high-power consuming fans by energy efficient fans in order to keep the electricity consumption of the college as low as possible.

In addition to making Environmental Studies a very vital subject in our syllabus, BBSBEC, Fatehgarh Sahib has gone a step further by putting that theory into practice. The college has installed three sets of solar panels, one on North Block, other on south block and third on the roof of Bibi Bhani Hostel. The energy from this solar installation is helping offset the institute's daytime peak electricity demand from the grid. BBSBEC with

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the installation of 500 KW solar rooftop plant in collaboration with M/s Optimistic Green Energy Pvt Ltd, was able to **offset 74% of its energy usage from the state grid** thus moving towards a more reliable and greener option and **reducing its carbon footprint**. The following table shows no of solar units generated by the solar plant and units exported to Punjab State Power Corporation Limited board in each month.

| Month | Solar Units Generated | PSPCL Data | | |
|----------|-----------------------|----------------|----------------|----------------------|
| | | Units Imported | Units Exported | Net Units from PSPCL |
| July 22 | 42472 | 92130 | 7845 | 84285 |
| Aug 22 | 43224 | 65055 | 11310 | 53745 |
| Sep.22 | 56392 | 112380 | 9630 | 102750 |
| Oct. 22 | 34640 | 41085 | 15495 | 25590 |
| Nov. 22 | 39144 | 49170 | 23385 | 25785 |
| Dec. 22 | 32576 | 56565 | 0 | 56565 |
| Jan. 23 | 25008 | 57645 | 0 | 57645 |
| Feb. 23 | 42416 | 33720 | 0 | 33720 |
| March 23 | 45320 | 37500 | 0 | 37500 |
| April 23 | 62952 | 15780 | 7170 | 8610 |
| May 23 | 57808 | 66540 | 24345 | 42195 |
| June23 | 42120 | 57135 | 11640 | 45495 |

Following are Geo tagged photographs of Solar Plant on top of Girls Hostel, South Block and Bhai Gurdas Block:

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4.2. Waste Management:

4.2.1. Recycling: Although there were recycling containers all across the campus, the audit showed that there was a lack of effective separation and information about recyclable products. Increased recycling rates can be achieved by upgrading signage, giving clear instructions and implementing a comprehensive recycling education programme.



4.2.2. Composting: The institution can set up a composting system to handle the organic waste produced by Hostel members (Boys & Girls Hostel). Composting can help drastically reduce the quantity of garbage dumped in landfills while also producing beneficial compost for campus landscaping and gardening.

Table: Different types of waste generated in the institute and their disposal

| Types of waste | Particulars | Disposal method |
|----------------|---|---|
| E-Waste | Computers, electrical and electronic parts | Store these in a separate tank, and we can start selling them directly after a certain amount of time. |
| Plastic waste | Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc | Items made of plastic that are only intended to be used once, such as bottles, jars, and bags. Encourage people to use water bottles and other containers that may be reused. Establish distinct recycling containers for plastic garbage, and after a predetermined period of time, we will be able to begin selling the collected recyclables directly. |
| Solid wastes | Paper waste, Damaged furniture, paper plates, | Reuse after maintenance energy conversion. |

| | | |
|-----------------|----------------------------------|---|
| | food wastes | Installing composting systems on a institute campus will allow for the conversion of discarded food into nutrient-dense compost that may be used in the campus landscaping or in community gardens. Another option is for institutions to form partnerships with farmers in the surrounding area to collect food waste. |
| Chemical wastes | Laboratory waste | Water should be used to neutralise. When dealing with hazardous garbage, adhere strictly to all safety regulations. |
| Wastewater | Washing, urinals, bathrooms | Soak pits |
| Glass waste | Broken glass wares from the labs | Glass debris should be kept separate from other recyclable materials and disposed of in containers that are specifically intended for glass recycling. Make sure that you recycle glass in the correct manner by coordinating with the local recycling centers. |
| Sanitary Napkin | - | Napkin Incinerators |

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Pic. (A)

Green waste collection tank for preparation of manure



Pic. (B)

Organic compost prepared in college campus



Pic (C): Waste treatment centre (work in progress)



4.3. Water Usage:

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4.3.1. Water Fixtures: Numerous locations within the institute had outdated and ineffective water fixtures, which caused excessive water use. Water resources can be saved by swapping these fixtures for low-flow models and encouraging staff and students to practice water-saving habits.

Water management table:

| Water Management Tasks | Frequency | Responsible Party |
|--|-------------|---|
| Routine examination of water supplies | Monthly | Green Audit Working Team |
| Testing for drinking water quality | Half-yearly | Do |
| Awareness of water conservation | Half-yearly | Green Audit Working Team & various department |
| Infrastructure for water distribution that needs upkeep and repair | As needed | Caretaker |
| Reporting and analysis of water use | Annually | Green Audit Working Team & Caretaker |
| Learn what causes excessive water consumption. | As needed | Caretaker |

Tabular data detailing the subject at hand:

| SI No | Parameters | Response |
|-------|----------------------------------|---|
| 1 | Source of water | Municipality, Underground, Pond (1500 sqft) & Rain Harvesting Water Note: The ground's water serves as a drinking water supply for around 4,500 people, including students and staff members. |
| 2 | Source of Drinking Water | Ground's water |
| 3 | Any treatment for drinking water | Nil Note: Water purifiers have been installed in 1-2 numbers on each floor and are maintained for 3–4 months afterward. |

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| | | |
|----|---|--|
| 4 | What is the total number of motors that are used? | 02 numbers |
| 5 | What is the total number of water tanks? Capacity of tank | 12 numbers@ 1000 liters each |
| 6 | Tap water | 220 numbers |
| | Quantity of water pumped every day | 18000 liters/per day |
| 7 | Do you waste water, and if so, why? | No |
| 8 | How much water is required for gardening purposes? | 600 liters/per day |
| 9 | How many water coolers are there in total? | 02 |
| 10 | Do you have access to rainwater harvesting? | Yes |
| 11 | The number of units harvested and the total volume of water | 01 number, We have constructed a water canal to connect a institute pond that is 1500 square feet and 5,000 liters of tanks to store rainwater. |
| 12 | Any leaky taps | None |
| 13 | Daily amount of water that is lost. | Not applicable |
| 14 | Is there any kind of plan for the management of water? | Raise public awareness regarding the importance of water conservation, the prevention of pollution, and the implementation of sustainable water management practices. Unambiguous water rights and equitable water allocation regulations should be established to ensure that water is distributed fairly among the many different users. |



MANAGEMENT SYSTEM CONSULTANCY

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| | | |
|-----------|---|----------------------|
| 15 | Have any methods for conserving water been implemented? | Rainwater Harvesting |
|-----------|---|----------------------|



INDUSTRIAL TESTING LABORATORY & CONSULTING HOUSE

(A GOVT. APPROVED TEST HOUSE)

Works & Regd. Office : Ghalori Gate, Patiala (Pb.) 147 001 Ph. 0175-2322224, 2320175, (M) 92164-21540, 92161-21540
Email : Itlchpatiala@gmail.com

November 18, 2019

R.No.: ITL/PW/D/18-11-1

CERTIFICATE OF ANALYSIS

Laboratory Sample No. : ITL/PW/11-19/0701
The Principal,
Collected From : BBSB ENGINEERING COLLEGE,
Fatehgarh Sahib.
Type of sample : Drinking Water
Sample Mark : 1
Sample Date : 07/11/2019

THIS IS TO CERTIFY that the sample has been tested as per IS 10500 Drinking Water Specification for the parameters indicated below:

TEST REPORT

| Sr NO | Parameters | Permissible Limits | Desirable Limits | Results | Methods/Ref. |
|-------|---------------------------------------|--------------------|------------------|-----------|-----------------------|
| 1. | pH Value | 6.5 TO 8.5 | 6.5 TO 8.5 | 7.19 | 3025 (P 11) :1984 |
| 2. | Dissolved Solids | Max. 2000 mg/l | Max. 500 mg/l | 202 mg/l | 3025 (P 16) :1984 |
| 3. | Total alkalinity as CaCO ₃ | Max. 600 mg/l | Max. 200 mg/l | 316 mg/l | 3025 (P 23) :1986 |
| 4. | Chlorides As Cl | Max. 1000 mg/l | Max. 250 mg/l | 20 mg/l | 3025 (P 32) :1988 |
| 5. | Sulphate As SO ₄ | Max. 400 mg/l | Max. 200 mg/l | N.D. | 3025 (P 24) :1986 |
| 6. | Nitrates as NO ₃ | Max. 45 mg/l | Max. 45 mg/l | 11 mg/l | 3025 (P 34) :1988 |
| 7. | Flouride As F | Max. 1.5 mg/l | Max. 1.0 mg/l | 0.6 mg/l | 3025 :1964 |
| 8. | Calcium As Ca | Max. 200 mg/l | Max. 75 mg/l | 75 mg/l | 3025 (P 40) :1991 |
| 9. | Magnesium As Mg | Max. 100 mg/l | Max. 30 mg/l | 22 mg/l | 3025 (P 46) :1991 |
| 10. | Total Hardness As CaCO ₃ | Max. 600 mg/l | Max. 200 mg/l | 268 mg/l | 3025 (P 21) :2009 |
| 11. | Sodium | ----- | ----- | 44 mg/l | 3025 (P 45) :2009 |
| 12. | Potassium | ----- | ----- | 2.0 mg/l | 3025 (P 45) :2009 |
| 13. | Arsenic, mg/l | Max.0.05 mg/l | Max.0.01 mg/l | N.D. | 3025 (P 37) :1988 |
| 14. | Chromium, mg/l | Max.0.05 mg/l | Max.0.05 mg/l | N.D. | 3025 (P 52) :1988 |
| 15. | Cadmium, mg/l | Max. 0.003 mg/l | Max. 0.003 mg/l | N.D. | 3025 (P 41) :1992 |
| 16. | Lead, mg/l | Max.0.01 mg/l | Max.0.01 mg/l | N.D. | 3025 (P 47) :1994 |
| 17. | Iron As Fe | Max. 0.3 mg/l | Max. 0.3 mg/l | 0.07 mg/l | 3025 (P 53) : 2003 |
| 18. | Coliform/ 100 ml | Absent /100 ml | | Absent | 3.3 of IS : 1622:1981 |
| 19. | E.Coli/100 ml | Absent/100 ml | | Absent | 3.4 of IS : 1622:1981 |

Report : The above submitted sample is of Potable Quality w.r.t. above test / results.(Permissible Limits).

Analyst
Analyst

Authorized Signatory
Authorized Signatory

Note : Total liability of the institute is limited to the invoiced amount. Sample consumed/not consumed in testing. All disputes are subjected to Patiala Jurisdiction. *OS, Party asked for the above parameters only.

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4.4. Transportation:

4.4.1. Public Transport: The institute's carbon footprint can be significantly reduced by encouraging employees and students to use public transport. Sustainable transport solutions can be promoted by offering cheap bus passes, encouraging carpooling, and supporting bicycle infrastructure.



4.4.2. Electric Vehicles: To aid in the switch to electric transport, the institute may choose to invest in infrastructure for charging EVs. Additionally, encouraging the use of electric vehicles through awareness programs and incentives can help lower the emissions produced by on-campus transportation.



4.5. Overall Environmental Awareness:

4.5.1. Curriculum Integration: The institution can integrate environmental awareness and sustainability into its curriculum across various subject areas. This strategy will guarantee that students receive instruction and training in environmental stewardship, encouraging sustainable thinking.

| Environmental awareness across different subjects | Parameters | Program time |
|---|--|--------------|
| Language Arts | Discuss texts from literature that are in some way connected to topics concerning the environment, such as conservation or environmental advocacy. Compose poetry or essays that argue for the protection of the environment and use persuasion. Conduct research on a variety of environmental topics, then present your findings. Through various awareness programs, they understand the environmental laws and regulations that apply on the local, national, and international levels. Discuss the roles that governments, NGOs, and people play in the effort to solve environmental problems. Investigate the environmental concerns from both a historical and cultural point of view. | Whole year |
| Arts | Investigate the causes of climate change and possible solutions to the problem. Analyse the impact that human activities have had on different landscapes as well as the distribution of natural resources. Studies should be done on urbanization, logging, and industry's impact on the natural environment. Investigate geographical approaches to resolving environmental issues, such as environmentally responsible land management planning. | Whole year |
| Pure Science | Conduct studies on environmental issues, such as assessing water quality, soil | Half-yearly/ |

| | | |
|--------------------|--|--------------|
| | analysis, power consumption or recycling.To better comprehend environmental patterns and forecasts, consider using mathematical models. Investigate the repercussions of environmental actions on the economy, such as doing cost-benefit analyses for environmentally friendly projects. | each program |
| Bio-Science | Study subjects include ecosystems, biodiversity, and the interconnectedness of all living things. | Whole year |
| Physical Education | Encourage students to develop an appreciation for the natural world by having them participate in outdoor sports and activities. Talk about the significance of physical activity for both one's own health and the health of the environment (for example, taking bike instead of the car). | Whole year |
| NSS | To enhance the amount of green cover and fight deforestation, organizing tree-planting events in local communities and educational institutions is important. To combat littering and to encourage a clean environment, it is important to organize routine clean-up efforts in public places like parks and beaches.To educate both students and members of the general public about environmental issues such as climate change, waste management, renewable energy, and conservation, workshops and seminars should be organized. It should be a priority to create opportunities for individuals to engage with the natural world and develop a sense of ownership over its preservation through participating in hikes and other outdoor activities. To raise awareness about environmental issues and motivate people to take action, you might use social media, posters, and booklets. | Whole year |

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4.5.2. Student Engagement: A culture of sustainability can be promoted among students by supporting student-led projects, creating environmental groups, and holding awareness events and workshops.

METHODOLOGY ADOPTED FOR LAND USE MAPPING

Three types of data that are GPS points, field survey data and Google earth data for Geo referencing have been used in this study. Land use map of the study area have been prepared using the above three types of data with the help of ArcGis Pro software.

DATA PROCESSING AND ANALYSIS

Land use map preparation is executed through the following steps:

Acquisition of data (Location: 30.6435° N, 76.3970° E), Geo-coding and Geo referencing of satellite imageries by extracting the ground control points. Supervised classification was carried out with the aid of ground truth data collected during field survey. Scanning and digitization of maps and editing of all the Georeferenced maps were done using GIS. Data manipulation and analysis and linking the spatial data with the attribute data for creation of topology was carried out using GIS software. Creation of GIS output in the form of land use map showing various land use have been prepared.

Therefore, attempt has been made in this study to map land use for BBSBEC, Fatehgarh Sahib, Punjab with a view to detect the land consumption in the built-up land area using both remote sensing and GIS techniques.

GEOGRAPHICAL LOCATION WITH CAMPUS MAP IN SCALE

The college has a **sprawling pollution-free campus spread over 75 acres** of land in the heart of District Fatehgarh Sahib. Fatehgarh Sahib is a historical place related to the martyrdom of younger sons ‘Sahibzadas’ of Sri Guru Gobind Singh Ji, the tenth Sikh Guru. It has an ideal geographical location with the proximity to the important

Service Provided: Green, Safety, Fire, Environment, Energy Audit and ISO, Information Security, Automotive, NABL, NABH, CSR, Food, Medical Certification and Training

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cities of the region i.e. Chandigarh, Ludhiana and Patiala. The college is located at 5 kms from Sirhind Railway Station, 42 kms from Chandigarh, 65 kms from Ludhiana, 40 kms from Roopnagar & 35 kms from Patiala. The nearest Airport is Chandigarh. Scaled image of college campus is shown in Photo 1. Green color in Map is representing green area. The Google aerial views of College Campus Part1 and Part 2 have been shown in Photo 2 and 3 respectively which are showing different college buildings, sports stadium, hostels and residential areas.



dimension are in meter (m).

Photo 1: Map of College Campus

Service Provided: Green, Safety, Fire, Environment, Energy Audit and ISO, Information Security, Automotive, NABL, NABH, CSR, Food, Medical Certification and Training

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Google Maps Baba Banda Singh Bahadur Engineering College



Photo 2: Aerial View of College Campus (Source Google Earth)

Google Maps Baba Banda Singh Bahadur Engineering College



Photo 3: Aerial View of College Campus Part 2 (Source Google Earth)

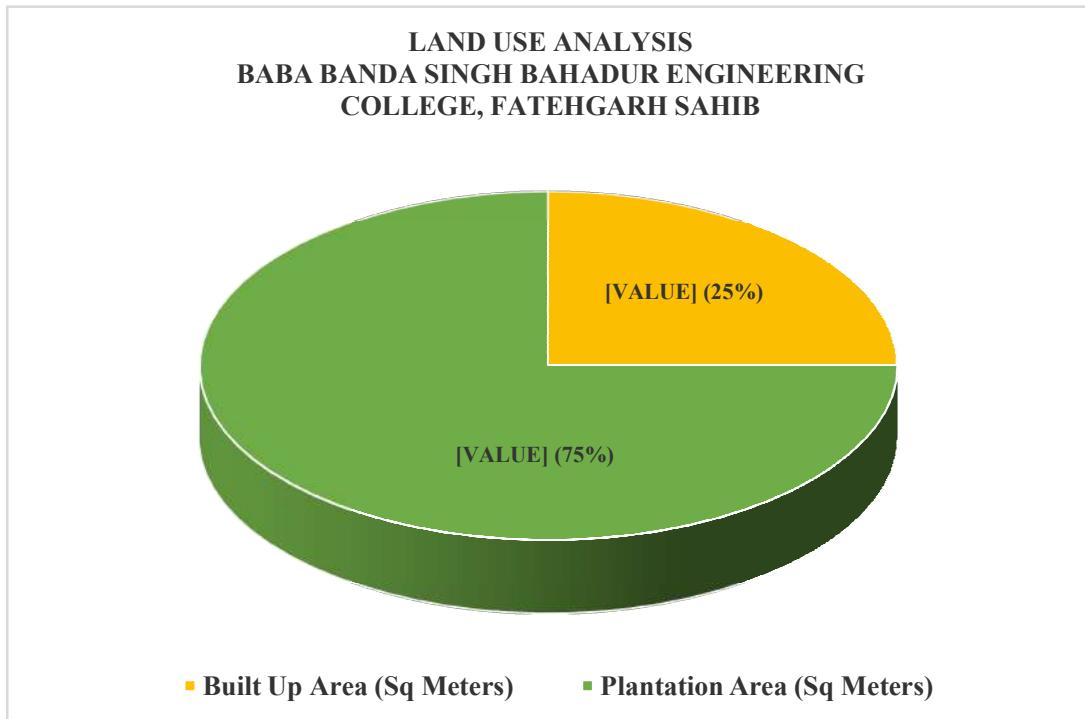
UMA Apartment, Rishi Arobindo Road, Madhyamgram, Kolkata-700130

Mob: 7595069903, Email ID: managementsystemconsultancy@gmail.com

Website: www.managementsystemconsultancy.com

LAND USE DATA OF BBSBEC, FATEGHGARH SAHIB, PUNJAB

| <i>CATEGORIES OF LAND USE</i> | <i>AREA (m²)</i> |
|-------------------------------|-----------------------------|
| PLANTATION AREA | 227635.5 |
| BUILT UP AREA (INCLUDE ROADS) | 75878.5 |
| TOTAL AREA | 303514.0 |



The total area of BBSBEC, Fatehgarh Sahib is 303514 m² out of which the built up area (include Roads) is 25% (i.e 75878.5 m²) and plantation area is 75% (i.e. 227635.5 m²).

LAND USE (BUILT UP AREA) ANALYSIS:

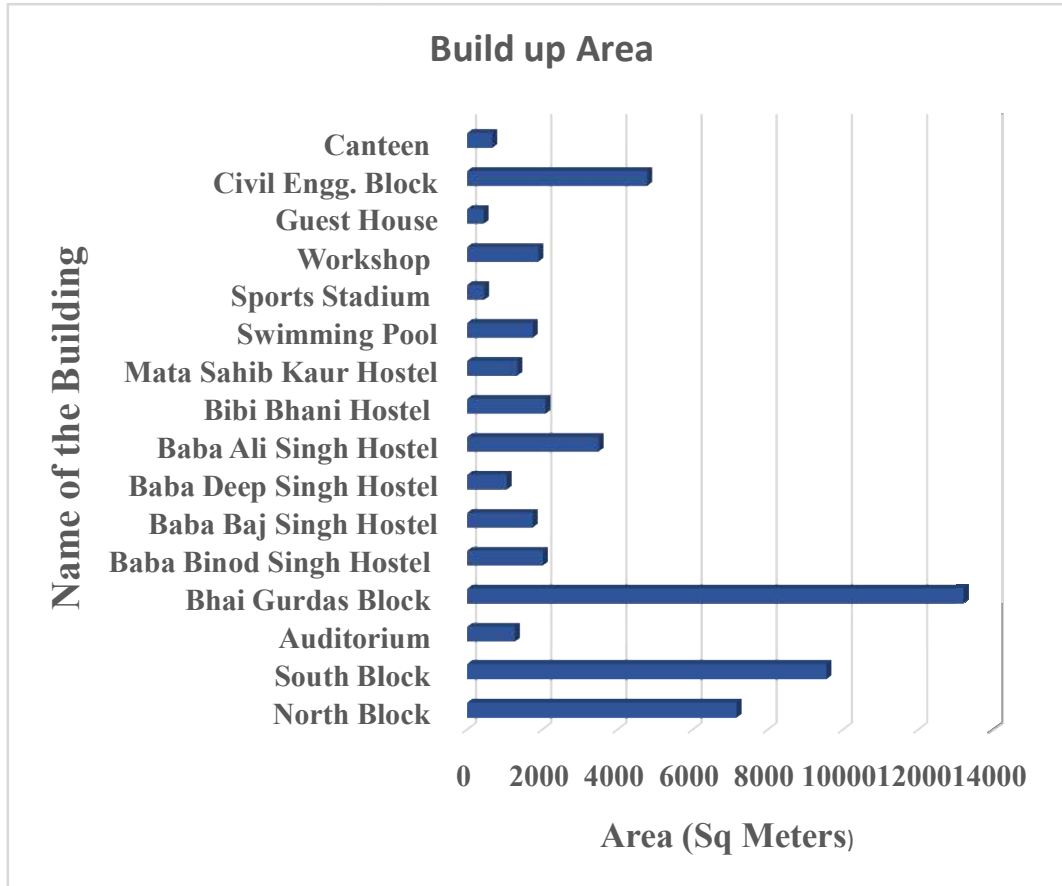
The built up area of 25% (i.e 75878.5 m²) consists of the following regions as stated below for land consumption in built up area of BBSBEC:

The northern region of BBSBEC is densely built up having Main North Block: Bhai Gurdas Administrative Blocks, Civil Engineering Block, Central Workshops, Girls Hostels, Principal's residence, Staff Flats, Swimming Pool, Gymnasium, College Cafeteria and Boys Hostels. The southern region comprises of Main South Block: Auditorium, Faculty Flats, Sports Stadium and Athletic Tracks.

Table: Area occupied by various buildings at BBSBEC, FGS

| Sr No | Name of Building | Number of Floors | Area (m ²) |
|-------|-------------------------|------------------|------------------------|
| 1. | North Block | 03 | 7172 |
| 2. | South Block | 04 | 9563 |
| 3. | Auditorium | 01 | 1278 |
| 4. | Bhai Gurdas Block | 06 | 13197 |
| 5. | Baba Binod Singh Hostel | 04 | 2014 |
| 6. | Baba Baz Singh Hostel | 04 | 1747 |
| 7. | Baba Deep Singh Hostel | 04 | 1056 |
| 8. | Baba Ali Singh Hostel | 07 | 3498 |
| 9. | Bibi Bhani Hostel | 04 | 2085 |
| 10. | Mata Sahib Kaur Hostel | 03 | 1337 |
| 11. | Swimming Pool | 01 | 1747 |
| 12. | Sports Stadium | 01 | 460 |
| 13. | Workshops | 01 | 1895 |
| 14. | Guest House | 01 | 441 |

| | | | |
|-----|-------------------|----|------|
| 15. | Civil Engg. Block | 04 | 4793 |
| 16. | Canteen | 01 | 671 |



FINDINGS:

BBSBEC, which was established in the year 1993, has an eco-friendly environment. It has a long legacy of healthy environmental practices including periodic plantation, their preservation and maintenance. Its land use is such that about 75% of the total area is occupied by open land and plantation that generates a better and sustainable campus environment.

The Land use analysis Report is prepared by Er. Jaspreet Singh, Civil Engineering Department, under the supervision of Prof. Simranpreet Singh, Faculty of the department of Civil Engineering, BBSBEC, Fatehgarh Sahib

AIR QUALITY IN FATEHGARH SAHIB AND BBSBEC:

The ambient air quality data for Fatehgarh Sahib and BBSBEC for the last one year shows that there are very less polluted particles in ambient air; SO₂ & NO_x parameters are within the range of Indian living standards, there are a number of factors responsible for this cleanliness, calmness and serenity in this area. Firstly, population which is most responsible for all the problems and hurdles in smooth living is lowest here of all the districts of Punjab. Secondly, in this area more trees have been planted as compared to other cities. A very beautiful and historical park loaded with a large number and variety of trees known as “Aam Khaas Bhag” is situated here which reminds us the era of great Mughal emperor Jahangir. Furthermore, no air polluting industry is established here not even in a radius of 10 Km of Fatehgarh Sahib area. The NH-1 is also approximately 7-8 kilometres away from the city, which might be responsible for heavy density traffic throughout the year and thus might be causing lot of vehicular emissions as well as a lot of dust emissions due to the movement of vehicular traffic. Therefore, the ambient air quality of Fatehgarh Sahib Area falls in between moderate to rich quality state. The Punjab Pollution Control Board is pondering over the various possibilities to reduce the air pollution for the improvement of ambient air quality with respect to AQI is concerned. However, the annual average value of PM₁₀, SO₂, NO_x in the ambient air quality of Fatehgarh Sahib city falls in the range of 50-62 µg/m³, 3-5 µg/m³, 10-12 µg/m³ for most of the months, as such, the graded response action plan to eradicate the problem

AIR QUALITY DETERMINATION

Satisfactory air quality index (OVERALL=61) in Fatehgarh Sahib, Punjab, India on dated 18th October 2024:

| Parameter | Result (Range) |
|---------------------|--|
| NO ₂ | 25.4 µg/m ³ , AQI 26 Very Good |
| NO | 10.09 µg/m ³ , AQI 10 Good |
| O ₃ | 31.49 µg/m ³ , AQI 31 Good |
| PM _{2.5} | 28.13 µg/m ³ , AQI 28 Good |
| PM ₁₀ | 77.2 µg/m ³ , AQI 79 Satisfactory |
| CO | 35.0 µg/m ³ , AQI 18 |
| Humidity | 56.0 % |
| Barometric Pressure | 1013 millibar or hPa |
| Wind Speed | 10-15 m/s |
| Wind Direction | 28.0013 degrees |
| Sun Rise | 06:28 AM |
| Sun Set | 05:56 PM |
| Moonrise | 07:05 PM |
| Moonset | 07:31 AM |

WEATHER DATA OF FATEHGARH SAHIB AND BBSBEC:

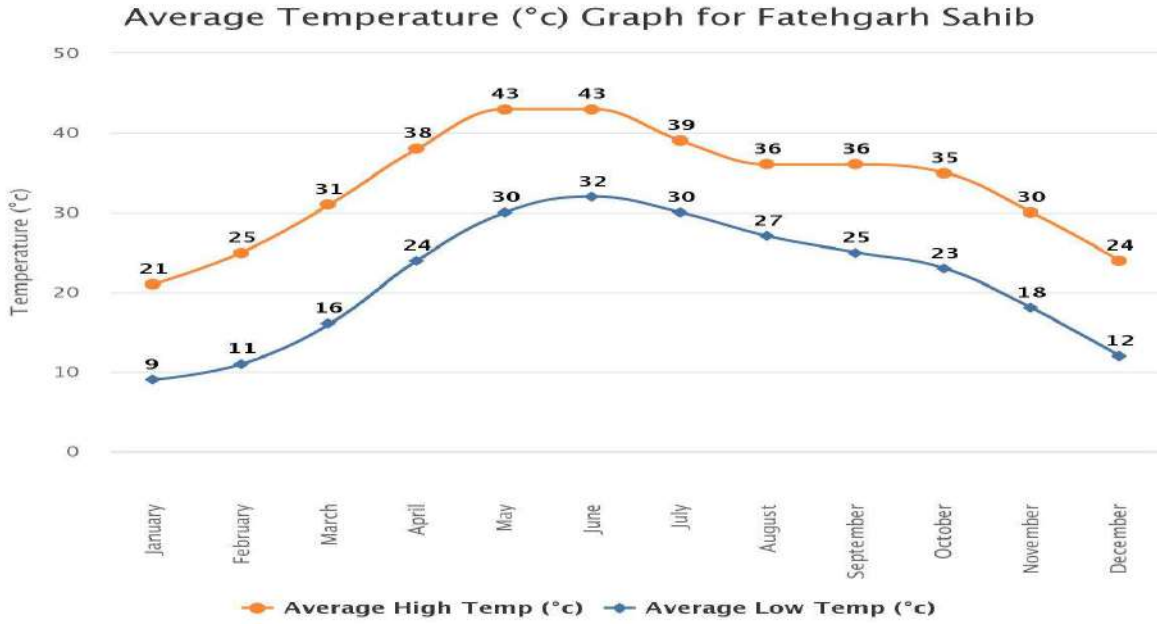
Station: FATEHGARH SAHIB (INDIA (STATIONS NORTH OF LATITUDE 20~N))

Location: 30.6435° N, 76.3970° E

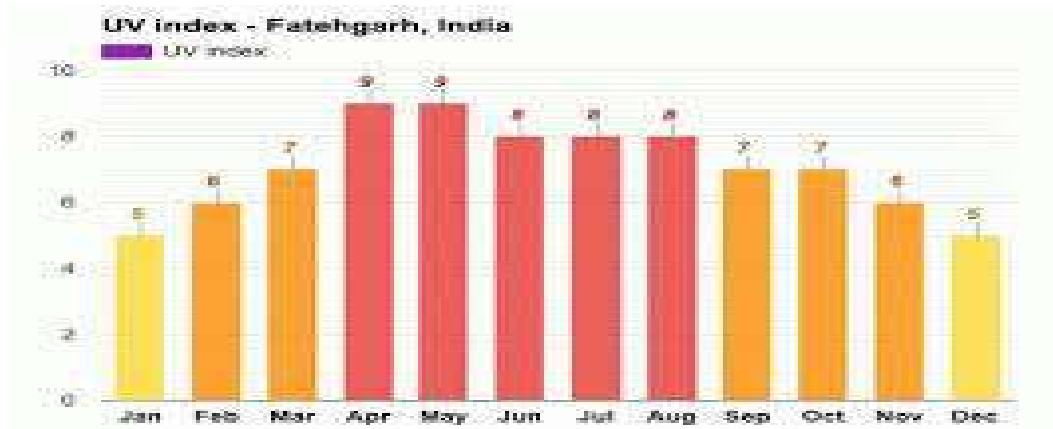
In Fatehgarh Sahib, the climate is warm and temperate. The summers are much rainier than the winters in Fatehgarh Sahib. The average annual temperature in Fatehgarh Sahib is 24.3 °C. and precipitation level is about 770 mm.

The driest month is generally November. There is 4 mm of precipitation in November. The greatest amount of precipitation occurs in July, with an average of 256 mm. With an average of 33.6 °C, June is the warmest month. The lowest average temperatures in the year occur in January, when it is around 13.3 °C. The precipitation varies 252 mm between the driest month and the wettest month. The variation in temperatures throughout the year is 20.3 °C.

WEATHER DATA MONTH WISE FATEHGARH SAHIB



UV INDEX DATA MONTH WISE FATEHGARH SAHIB



The likes of an alluvial plain are strong characteristics of the city of Fatehgarh Sahib and its surroundings. The city does have a Central location in the plan region. The geographical co-ordinate of Fatehgarh Sahib is 30.6435° N, 76.3970° E. The city has an average altitude of 808 feet or 246 meters from the average sea level. The erstwhile land of Fatehgarh Sahib was very much feasible for peanut cultivation with sand dunes. However, a lot of irrigation and environmental changes have made the land more viable for wheat cultivation.

The climatic conditions bear a strong resemblance with the other cities in the northern part of India. The summers are usually very hot and the winters are very cold. The summers are prevalent during the months of April to September with June, July, August till mid September being the hottest months. The winter is prevalent from the month of November till the month of March. There is onset of Monsoon in September and from mid of September till November one experiences the transitional weather.

CLIMATE GRAPH MONTH WISE FATEHGARH SAHIB



NOISE LEVEL IN THE SURROUNDING OF BBSBEC:

The human ear is constantly being assailed by man-made sounds from all sides, and there remain few places in populous areas where relative quiet prevails. There are two basic properties of sound:

- Loudness and
- Frequency.

Loudness is the strength of sensation of sound perceived by the individual. It is measured in terms of Decibels. Just audible sound is about 10 dB, a whisper about 20 dB, library place 30 dB, normal conversation about 35-60 dB, heavy street traffic 60-80 dB, boiler factories 120 dB, jet planes during take-off is about 150 dB, rocket engine about 180 dB. The loudest sound a person can stand without much discomfort is about 80 dB. Sounds beyond 80 dB can be safely regarded as Pollutant as it harms hearing system. The WHO has fixed 45 dB as the safe noise level for a city. For international standards a noise level up to 65 dB is considered tolerate. Loudness is also expressed in sones. One sone equals the loudness of 40 dB sound pressure at 1000 Hz. Frequency is defined as the number of vibrations per second. It is denoted as Hertz (Hz).

MATERIALS, STUDY AREA & METHODS

Noise level meter or noise measuring app, Sound Meter, was used to measure the noise level. Noise test pro detect of any noise, music or sound in your surroundings. It gives the information about maximum, minimum and average decibels.



Figure: Noise Measurement by Sound Meter App

DESCRIPTION OF THE COLLEGE SITE

The site of the BBSBEC is bounded to the North by Jyoti Saroop Gurdwara, commercial properties and Oriental bank of commerce to the East, Chandigarh road with various book stalls, shops, restaurants, hawkers etc., to the South by a side road and to the west by the college back gate road, residential properties. Below photo shows the satellite image of the college site.



Photo: satellite image of the college site

MEASUREMENT PROCEDURE

The noise level was recorded at the different Important Locations of BBSBEC, FATEHGARH SAHIB. At each spot, the measurements were taken for 60 seconds during day time (6 AM- 6 PM) and noted down the measurements. Screen shots of the measurements of noise were taken immediately on the app at the time of 60th second of each measurement.

RESULTS

The results of the experiments at different places have been tabulated in the following table:

Table 1: Measurements of Noise in and around BBSBEC:

| <i>PLACE</i> | <i>MEASUREMENTS</i> | <i>MINIMUM (dBA)</i> | <i>Maximum (dBA)</i> | <i>AVERAGE (dBA)</i> |
|----------------------|---------------------|--------------------------|--------------------------|--------------------------|
| Civil Dept Area | 60 | 55 | 81 | 76 |
| Civil Dept Office | 60 | 50 | 68 | 59 |
| Civil Lab | 60 | 59 | 74 | 70 |
| Canteen | 60 | 74 | 90 | 85 |
| Library | 60 | 51 | 80 | 65 |
| Mechanical Dept Area | 60 | 57 | 84 | 78 |
| Mechanical Lab | 60 | 45 | 89 | 72 |
| CSE Dept Area | 60 | 50 | 81 | 73 |
| CSE Lab | 60 | 70 | 85 | 76 |
| EE Dept Area | 60 | 66 | 87 | 76 |
| EE Lab | 60 | 40 | 87 | 68 |
| ECE Dept. Area | 60 | 63 | 82 | 76 |
| ECE Lab | 60 | 65 | 85 | 78 |
| Principal Office | 60 | 35 | 72 | 62 |
| Auditorium | 60 | 53 | 75 | 71 |
| Workshop | 60 | 66 | 90 | 78 |
| Swimming Pool | 60 | 56 | 86 | 69 |
| Ground 1 | 60 | 59 | 90 | 70 |
| Ground 2 | 60 | 56 | 90 | 68 |
| Generator Room | 60 | 53 | 89 | 75 |
| Gymnasium | 60 | 68 | 82 | 76 |
| Faculty Flats | 60 | 35 | 80 | 69 |
| Staff Flats | 60 | 49 | 71 | 65 |
| Guest House | 60 | 50 | 77 | 67 |
| College Front Gate | 60 | 50.7 | 78.0 | 71.02 |
| College Back Gate | 60 | 54 | 75.93 | 73.56 |
| Boys Hostel | 60 | 54 | 68 | 62 |
| Girls Hostel | 60 | 52 | 90 | 68 |
| Hostel Mess | 60 | 67 | 94 | 86 |

Source: Data collected by final year Students of Department of Civil Engineering. After the study, the measurements of noise have been recorded in and outside of BBSBEC area:

Inside the Campus: 35-90 dBA,

Outside the Campus: 54-93 dBA

5. Green Campus:

5.1. Floral Diversity:

The following are some actions to take into account when setting up a plantation programme at your institute:



- Organise a group of academics, employees, and students who are interested in managing the plantation programme. Assign roles and duties to make the execution go smoothly.

- Consult with local forestry professionals or environmental groups to discover native or adapted tree species that are well-suited to the climate, soil, and goal of the plantation programme. Research and choose suitable tree species.

- To obtain the necessary approvals or permits for planting trees on campus or in the neighborhood, check with the institute administration or other appropriate authorities.

- Look into possible funding options, including grants, sponsorships, or collaborations with nearby companies or environmental organizations. This will aid in defraying the price of buying trees, equipment, and other required supplies.

- Establish the plantation event's date, time, and venue. Plan the delivery of the trees, tools, and equipment to the planting location. Make sure that safety precautions are in place, including appropriate instruction on planting methods and equipment use.

- Promote the planting programme within the campus community by using various communication channels, such as posters, social media, emails, and word-of-mouth, in order to raise awareness and find volunteers. Encourage everyone to volunteer, including alumni, faculty, staff, and students.

- Volunteers should be gathered at the planting site on the appointed planting day. Give them the equipment, instructions, and direction they need to plant trees correctly. Foster a sense of accomplishment and community pride while fostering teamwork.

- Stress the significance of taking care of the freshly planted trees. This could entail routine weeding, mulching, watering, and pest or disease inspection. To guarantee the long-term well-being and survival of the trees, think about setting up a system for volunteers or staff members.

-After the plantation programme, evaluate the impact and accomplishment of the effort. Keep an eye on the trees' growth and survival rate. To determine areas for improvement and to organize upcoming plantation programmes, collect participant and stakeholder input.

5.2. Faunal Diversity:

Studying faunal diversity can increase awareness about environmental challenges and conservation's significance. institutes that are home to a wide variety of animal species may be more likely to adopt environmentally friendly policies and methods of operation to safeguard the campus environment and the people who live there.



Birds Diversity:

A population of birds that is rich in variety is indicative of an ecosystem that is robust and thriving. Seed dispersal, the control of insect populations, and pollination are just a few of the many important functions that different species of birds perform to help maintain ecological equilibrium. They provide a contribution to the campus's general diversity of flora and fauna.

Table: Common and Scientific names of birds and animals

| S.No | Common Name | Scientific Name |
|------|---------------|--------------------------|
| 1. | Common Myna | Acridotheres Tristis |
| 2. | Bank Myna | Acridotheres Ginginianus |
| 3. | House Sparrow | Passer Domesticus |

| | | |
|-----|-------------------|----------------------------|
| 4. | House Crow | Corvus Splendens |
| 5. | Cuckoo | Cuculidae |
| 6. | Snake | Naja Naja |
| 7. | Yellow Wasp | Ropalidia Marginata |
| 8. | Butter Fly | Danaus Genutia |
| 9. | Common Woodshrike | Tephrodornis Pondicerianus |
| 10. | Pied Myna | Gracupica Contra |
| 11. | Red-Vented Bulbul | Pycnonotus Cafer |
| 12. | Skylark | Aluda Gulgula |
| 13. | Garden Tiger Moth | Arctia Caja |
| 14. | Little Owl | Athene Brama |
| 15. | Oleander Moth | Syntomeida Epilais |
| 16. | Slender Skimmer | Orthetrum Sabina |



Photo 8: Common Myna (*Acridotheres Tristis*)



Photo 9: House Sparrow (*Passer Domesticus*)



Photo 11: House Crow (*Corvus Splendens*)



Photo 12: Cuckoo (*Cuculidae*)



Photo 13: Snake (Naja Naja)



Photo 14: Yellow Wasp (Ropalidia Marginata)



Photo 15: Butter Fly (Danaus Genutia)



Photo 16: Beetle insect on a hibiscus flower



Common Woodshrike(Tephrodornis Pondicerianus)



Pied Myna (Gracupica Contra)



Photo 19: Red-Vented Bulbul (Pycnonotus Cafer)



Photo 20: Skylark (Aluda Gulgula)



Photo 21: Garden Tiger Moth (*Arctia Caja*)



Photo 22: Little Owl (*Athene Brama*)



Photo 23: Oleander Moth (*Syntomeida Epilais*)



Photo 24: Slender Skimmer (*Orthetrum Sabina*)

6. Plantation of Wild type Medicinal plants:

Two medicinal gardens were developed at our institute premises. Many wild medicinal plant varieties were lost daily due to anthropogenic activities and pollution.

After identifying these plants, we conserve these through propagation in our medicinal gardens. Any interested people or agencies can access it through the proper channel. Medicinal garden



is a specific area inside the grounds of a institute that is dedicated to the cultivation and upkeep of a wide range of different sorts of medicinal plants. As a n educational and research resource, it makes it possible for students, faculty members, and researchers to investigate and gain knowledge on medicinal plants' varied qualities and applications. Culturing a medicinal garden on a institute campus can confer major value and benefits to the surrounding academic community and society.

Table: List of tree species of BBSBEC, FATEGHGARH SAHIB, PUNJAB

| S.No. | Botanical Name | Family | Common Name | Total |
|-------|----------------------------|---------------|------------------|-------|
| 1 | Mangifera indica | Anacardiaceae | Mango | 195 |
| 2 | Alstonia Scholaris | Apocynaceae | Alstonia | 167 |
| 3 | Tabernaemontana divaricata | Apocynaceae | Crape jasmine | 4 |
| 4 | Araucaria heterophylla | Araucariaceae | Christmas Tree | 19 |
| 5 | Arecaceae | Arecaceae | Palm | 93 |
| 6 | Hyophorbe lagenicaulis | Arecaceae | Bottle Palm | 23 |
| 7 | Roystonea regia | Arecaceae | Cuban royal palm | 3 |
| 8 | Phoenix sylvestris | Arecaceae | Badela Palm | 2 |

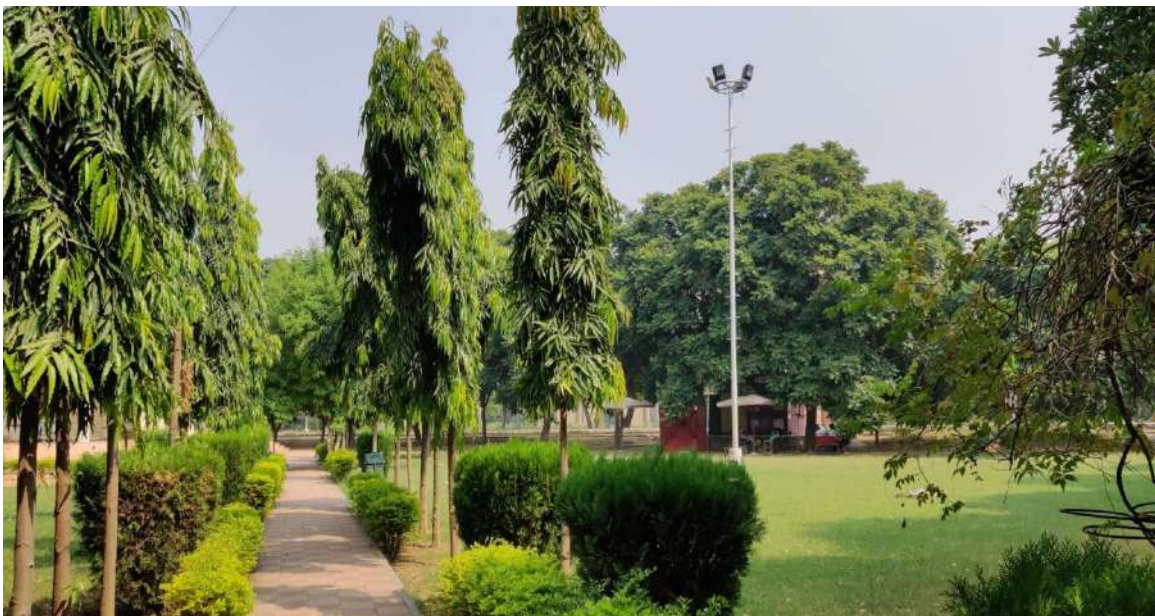
| | | | | |
|----|------------------------|---------------|---------------------|-----|
| 9 | Terminalia bellirica | Combretaceae | Bahera | 49 |
| 10 | Platyclusus orientalis | Cupressaceae | Oriental thuja | 67 |
| 11 | Saraca asoca | Fabaceae | Ashoka | 154 |
| 12 | Dalbergia sissoo | Fabaceae | Sissu / Tali | 56 |
| 13 | Vachellia nilotica | Fabaceae | Kikar | 19 |
| 14 | Cassia fistula | Fabaceae | Golden shower tree | 13 |
| 15 | Delonix regia | Fabaceae | Royal Poinciana | 3 |
| 16 | Tamarindus indica | Fabaceae | Tamarind | 1 |
| 17 | Tectona grandis | Lamiaceae | Sagwan | 25 |
| 18 | Punica granatum | Lythraceae | Pomegranate | 1 |
| 19 | Chukrasia velutina | Meliaceae | Chukrasia tabularis | 123 |
| 20 | Azadirachta indica | Meliaceae | Neem | 27 |
| 21 | Melia azedarach | Meliaceae | umbrella tree | 21 |
| 22 | Toona ciliata | Meliaceae | Tun | 1 |
| 23 | Morus alba | Moraceae | White mulberry | 27 |
| 24 | Ficus religiosa | Moraceae | Peepal | 17 |
| 25 | Ficus virens | Moraceae | White Fig | 16 |
| 26 | Ficus elastica | Moraceae | Rubber Plant | 7 |
| 27 | Moringa oleifera | Moringaceae | saujana | 2 |
| 28 | Syzygium cumini | Myrtaceae | Jamun | 68 |
| 29 | Psidium | Myrtaceae | Gauva | 54 |
| 30 | eucalypts | Myrtaceae | Safeda | 26 |
| 31 | Syzygium aromaticum | Myrtaceae | Clove | 3 |
| 32 | Pongamia Pinata | Papilionaceae | Indian Beech tree | 11 |

| | | | | |
|----|---------------------|-----------------|---------------------------|-----|
| 33 | Phyllanthus emblica | Phyllanthaceae | Gooseberry | 19 |
| 34 | Bambusoideae | Poaceae | Bamboo | 2 |
| 35 | Grevillea robusta | Proteaceae | Silver Oak | 58 |
| 36 | Ziziphus mauritiana | Rhamnaceae | Ber | 10 |
| 37 | Prunus persica | Rosaceae | Pears | 20 |
| 38 | Pyrus pyrifolia | Rosaceae | Nakh | 20 |
| 39 | Prunus bokharensis | Rosaceae | Aloo Bukhara | 8 |
| 40 | Rosa | <i>Rosaceae</i> | Rose | 90 |
| 41 | Citrus limon | Rutaceae | Lemon | 23 |
| 42 | Citrus limetta | Rutaceae | Mausambi | 8 |
| 43 | Murraya koenigii | Rutaceae | Curry Leaf | 2 |
| 44 | Aegle marmelos | Rutaceae | wood apple | 1 |
| 45 | Gmelina arborea | Rutaceae | Beechwood | 1 |
| 46 | Populus | salicaceae | Poplar | 35 |
| 47 | Litchi chinensis | Sapindaceae | Litchi | 11 |
| 48 | Mimusops elengi | Sapotaceae | Maulsari | 30 |
| 49 | Madhuca longifolia | Sapotaceae | Mahua/ Indian Butter Tree | 14 |
| 50 | Manilkara zapota | Sapotaceae | Chiku/Sapodilla | 11 |
| 51 | Vitis Vinifera | Vitaceae | Kismish/Raisins | 29 |
| 52 | Ficus benjamina | Fig family | Faux | 427 |
| 53 | Bugal Bael | ..... | Bugal Bael | 49 |
| 54 | Dakein | ..... | Dakein | 44 |
| 55 | Citrus Reticulata | Rutaceae | Kinnow | 39 |
| 56 | Sukhmani | ..... | Sukhmani | 29 |
| 57 | Faux Black Kina | ..... | Faux Black Kina | 22 |

| | | | | |
|-------|-----------------------|------------|-----------------------|------|
| 58 | Ficus Benghalensis | Moraceae | Barota | 16 |
| 59 | Badelia Kandia Flower | ..... | Badelia Kandia Flower | 10 |
| 60 | Momesia | ..... | Momesia | 10 |
| 61 | Rakh Manjan | ..... | Rakh Manjan | 9 |
| 62 | Red Faux | ..... | Red Faux | 8 |
| 63 | Mimusops | Sapotaceae | sari | 7 |
| 64 | Flower Faux | ..... | Flower Faux | 6 |
| 65 | Needi | ..... | Needi | 6 |
| 66 | Ajmohar | ..... | Ajmohar | 5 |
| 67 | Green Fax | ..... | Green Fax | 3 |
| 68 | Faux (White) | ..... | Faux (White) | 2 |
| 69 | Gul Lakkar | ..... | Gul Lakkar | 1 |
| 70 | Tarbeni | ..... | Tarbeni | 1 |
| Total | | | | 2383 |



Main Entry Road of College Campus



Asoka Trees near College Cafeteria



Entry point at Central Workshop



Tree Plantation drive



CARBON FOOT PRINT ASSESSMENT

ABOUT: Carbon Footprint is a measure of total quantity of green house gases being emitted by an individual or an Institution as a result of its daily activities. Carbon



Footprint tells the impact on the environment due to various activities inside the campus and quantifies the same in the form of total greenhouse gases being emitted. The most common greenhouse gases are carbon dioxide, water vapor, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon

dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. There lease of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions. The question is what should be done to reduce carbon emissions. Many colleges want to reduce their carbon dioxide (CO₂) emissions but it is a difficult task, given a range of factors determine carbon emissions, including mobility, waste, and energy consumption. So, gaining insight into CO₂ emissions is extremely important. An important aspect of doing a carbon foot print audit is to account the carbon foot print of the campus by determining the net amount of greenhouse gas emitted from various activities in the campus so that the can adopt better ways to reduce its carbon foot print. One aspect is to consider the d travelled and mode of travel used to commute between home and students and staffs. So the carbon foot print auditing determine the total carbon foot print of the campus and analyzes whether the campus is eco- friendly and follows environmentally sustainable practices. It is therefore essential that any environmentally responsive Institution shall examine its carbon footprint.

Key Methodologies adopted for Carbon Footprint Audit

1. A walk through survey was conducted in the entire campus to observe various greenhouse gas emission points.

2. Base Line data was collected by face to face/distributing online question through Google form. To the students and staff also by conducting interviews among staff.
3. Walk through survey and base line data collection was done between was done between 2022-23 session.
4. Based on the data collected, the Green House Gas Emission as CO₂ Eq from the various sources was calculated.
5. Observation was done to see whether if the authorities have implemented any Carbon Footprint Reduction Strategy.

Carbon Footprint Auditing–Key Findings

Feasible emission inventories were selected to analyze the carbon footprint of the campus. The inventory survey was done for one academic year. The selected inventories are Human Factor, Transportation, Electricity, Solid Waste, Production and Consumption of Food, LPG & Natural Gas.

Data keepers are identified and the primary details were collected. Parameter wise and zone wise details were also collected. The received data were assembled and the missing gaps were recognized.

Human factor



Carbon dioxide emitted by a person per day is not negligible. It is equivalent to the mission of a car in a 5 km stretch. Humans emit 26 giga tons of carbon dioxide per year while CO₂ in the atmosphere is rising by only 15 gigatonnes per year. Just for breathing, humans emit per person each day 1140 grams of CO₂, assuming that they eat normally and follow a mean diet of 2800

cal. The population details of each zone include the total number of teaching faculty; non-teaching staff and students were collected. The carbon dioxide emissions will be larger in the Zone having highest population. As the College Campus is concerned its limit is upto mark.

Transportation

Fossil fuels are used for transportation. The carbon dioxide emitted by different fuels is indifferent amounts. The engine of the vehicle burns fuel and creates a certain amount of CO₂, depending upon its fuel type, fuel consumption and the driving distances. One liter of petrol and diesel emits 2.3 kg and 2.7 kg of carbon dioxide, respectively. Travelling by car for 1000 km can produce about 200-230 kg of carbon dioxide into the atmosphere. If a person travels by a bus for 1000 km, it can add 1075 kg of CO₂ to his/her Carbon footprint. Worldwide, the fossil fuels used for transportation contribute over 13% of GHG emissions.



The approximate transportation details for the Institution campus like the type of vehicle, No. of vehicles and the fuel used were collected. The carbon dioxide emitted from petrol is less compared to that of diesel. The Carbon footprint by the emission inventory transportation will be quite high.

It was noted that there was no direct transportation under the control of institution but institution encourage Staffs and others to use Electronic Vehicle.

Electricity

Electricity is one emission inventory which contributes much to the Carbon footprint of



the Institution. On an average, electricity sources emit 1.297 lbs CO₂ per kwh i.e. 0.0005883 metric tons of CO₂ per kwh. The emission factor given by GRID 2010 version 1.1 for hydro electricity is 6.8956x 10⁻⁴ metric tons CO₂/k Wh. 50 grams of

CO₂ is emitted from 1 unit of solar power.

The details of the consumption of electricity and the use of generators in different zones were surveyed. If the number of classrooms and labs are more in a zone, consumption of electricity in that zone is more.



It was noted that the Institution uses a lot of Renewable power especially Solar Model as

a supplement to conventional power there by reducing emission of GHG to the atmosphere also contributing to the INDC `commitment pledged by Government of India.

Solid waste



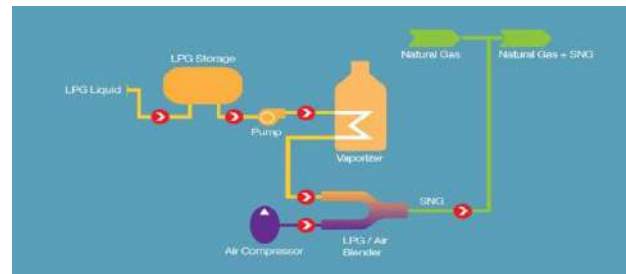
Generally, 1kg of solid waste is generated per capita per day. For high income countries, the solid waste generation is 1.1 – 5 kg per capita per day. For middle

income countries, it is 0.52-1 kg and for low income countries the value is 0.450.89 kg/ capita/ day. One kilogram of solid waste can emit about 0.125 kg of carbon. The details regarding the solid waste generated in each zone is collected including the waste produced in canteen and hostels.

The solid waste generated in the canteen and hostel which is taken out of the campus comes under other indirect emissions. Solid Waste emits less amount of carbon dioxide compared to other emission inventories considered. Their Solid waste disposal process found ok, so exposure is less.

LPG And Natural Gas

The consumption of 1L of LPG can release 1.5kg of CO₂ to the atmosphere. Also, burning of wood (250kg) can add 33kg of CO₂ to the Carbon footprint. The consumption details of LPG and Natural



Gas in canteen and hostels were surveyed. It was noted that the Institution uses normal limit of LPG as required.

Carbon Footprint Analysis

Carbon footprint analysis can be done by suitably combining data collected with respective emission factor of the selected emission inventories. Table represents emission factors of the selected inventories.

Best Practices Observed in the Institution–Carbon Footprint Reduction

- Restriction of personal vehicle inside the campus enhancing reduction of carbon footprints.
- Use of battery operated Vehicles to commute inside the campus.
- Blending of Conventional fuel with biodiesel generated from Waste Cooking Oil thereby reducing the carbon footprint.
- Use of Solar system power the Institution thereby reducing dependence on Conventional power.
- Use of Solar Lamps to light the Walk ways
- Use of limited LPG to Run the Kitchen
- Use of Walk ways to commute short distances
- All over the Campus the Green Area much more then the Working area.

SUGGESTIONS AND RECOMMENDATIONS

- The use of plastic products should be banned in the College campuses..
- There is urgent need to form a Green Monitoring Team. The priority of this body is to maintain the greenary of the College campuses
- The Green Monitoring Team sould consist of members from teaching staffs, non-teaching staffs, students and if possible, try to include some local interested people.
- Vermicompost facility may be practiced, the product of which can be used as manure or fertilizer for plantation purpose.
- Sustainable use of resources and ecological balance of the College campuses must be maintained throuout the year.
- Increase the use of Electrical vehicle to reduce the pollution.
- Encourage to reduce dairy and meat in take - No Meat Mondays! Animal products makeup 18% of greenhouse gas emissions. By replacing one or two of weekly meat and dairy meals to a vegetarian option, can help reduce emissions
- Encourage use of Bicycles.
- Improve garden: To grow healthy plants, you also need healthy soil. Improving soil quality is an ongoing process for a gardener. Good, rich in nutrients, and friable soil will offer the plants everything all on its own. Thus, you would need lesser fertilizers and pesticides.
- Promote awareness buildup programme on Environmental Issues time to time

Conclusion:

Focus on Environmental is applicable. The BABA BANDA SINGH BAHADUR ENGINEERING COLLEGE have proper plan for Future Development on Environmental expect.

We have also suggest them how to improve the Environmental expect in a better way.

Audit conducted by “Management System Consultancy”

Auditor

Amalesh kr. Mandal



Amalesh Kumar Mandal

(IRCA Accredited Lead Auditor on Quality, Environment, Energy Management System, Empanelled Auditor from IAF accredited Certification Body, Energy Management System Auditor from National Productivity Council, Environment Management System personnel from National Safety Council, ISO 17020:2012 Competence Certified for Quality Council of India and Carbon Footprint Calculator Certified from BSI)