

ENERGY AUDIT

2019-20 & 2020-21

AUDIT REPORT

Studied for

Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's
**B. L. Amlani College of Commerce & Economics
and M. R. Nathwani College of Arts**

N. S. Road No. 6, J.V.P.D. Scheme, Vile Parle (West), Mumbai – 400056

Analysed by



Valid till March 2023

Disclaimer

The Audit Team has prepared this report for the **Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts** located at N. S. Road No. 6, J.V.P.D. Scheme, Vile Parle (West), Mumbai – 400056 based on input data submitted by the College analysed by the team to the best of their abilities.

The details have been consolidated and thoroughly studied as per the various guidelines for Green Buildings available in National and International Standards; the report has been generated based on comparative analysis of the existing facilities and the prerequisites formulated by various standards. The inputs derived are a result of the inspection and research. These will further enhance and develop a Healthy and Sustainable Institution.

These can be implemented phase wise or as a whole depending on the decision taken by the Hon'ble Management and College. The warranty or undertaking, expressed or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

The audit is a thorough study based on the inspection and investigation of data collected over a period of time and should not be used for any legal action. This is the property of Greenvio Solutions and should not be copied or regenerated in any form.

The Report is prepared by the Team of Greenvio Solutions under their brand and department – Sustainable Academe as Consultancy firm with the Project Head - Ar. Nahida Shaikh is as an Accredited and Certified Green Building Professional-Architect.

Greenvio Solutions

Developing Healthy and Sustainable Environments

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

Palghar District, Maharashtra- 401208

sustainableacademe@gmail.com

Acknowledgement

The Audit Assessment Team thanks the **Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts, Mumbai** for assigning this important work of Energy Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to **Shri. Mahendrabhai K. Ghelani**, Chairman; **Smt. Shilpa Amlani**, Secretary and everyone from the Management.

Our heartfelt thanks to Chairperson of the entire process **Dr. Jitendra Aherkar**, Principal for the valuable inputs.

We are also thankful to **College's Task force the faculty members** who have collected data required **Prof. Suryaprakash Singh**, Senior Professor (**Special mention for the excellent coordination**).

We highly appreciate the assistance of the **entire Teaching, Non-teaching and Admin staff** for their support while collecting the data.

Sustainable Academe

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

Contents

Disclaimer	1
Acknowledgement	2
Contents.....	3
1. Introduction.....	4
2. Institution overview	6
3. Green Building Study Audit.....	9
4. Energy Audit	10
5. Towards a Healthy & Sustainable Institution.....	24
6. References	25

DETAILED REPORT

1. Introduction

1.1 About the management

B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts, was established in the year 2009 under the banner of Matushri Kanbai, Lalbai & Motibai Lohana Kanyashala & Balikagruh (MKLM) formed in 1906 in the Juhu area of suburban Vile-Parle. **The College is one of the only girl's college offering quality Professional Degree Education in Mumbai.** The MOTTO of the College is **"ENLIGHTEN & EMPOWER"**

1.2 Statements of the Institution

Mission - Our mission is to empower women by providing them with a conducive environment for acquiring professional skills, through an education that is life and career oriented value- based and creative in the pursuit of excellence.

Goals - The College has

Holistic Development of women by providing learning opportunities to empower her with knowledge

Double the capacity of the college

To equip today's women with sound education which will be an asset for them throughout their lives

1.3 About the Institution

The aim of the College is at equipping students with a human ethics and moral values and intellectual outlook and inculcating in them the highest principles of unity and national integration. **The College is affiliated to the University of Mumbai.**

1.4 The surrounding premises around the Institution

The Premises is situated amidst the landscape serene of **Mumbai city of Maharashtra** with immense peace and calmness in the surroundings. There is a frontal approach which provides quite a beautiful appreciation space while approaching the premises; this area is

surrounded by huge trees which positively complement the background-foreground aspect in terms of Natural space and built-form Architecture. It also provides ample shade which enhances the micro climate of the region. The location of College is feasible to the nearby essential amenities such as Public Health Center, Fire Station, Civic body-Public administrative buildings, Recreational gardens and Police Station which are not too close but nearby.

1.5 Assessment of the College

1.5.1 Affiliations

The College has all its courses approved and affiliated to **the University of Mumbai University**, a collegiate, public & state-owned university located at Mumbai in Maharashtra. It is one of the oldest educational institutes in the city, dating back to the British Bombay era.

1.5.2 Accreditation

The College had received a B level in its first cycle of NAAC in 2017 with a CGPA of 2.21. It shall enter its second cycle of NAAC soon.

2. Institution overview

2.1 Populace analysis for Academic year 2019-20

2.1.1 Students data

The student data (shared by the College) shows there were a total of **848 Girl students** in the premises.

2.1.2 Staff data

Type	Male	Female	Total
Admin Staff	00	02	02
Teaching Staff	09	07	16
Non-Teaching Staff	03	01	04
Total Staff Members	12	10	22

Table 1: Staff data of the Institution for 2019-20

The staff data shows the premises had a total of **22** Staff Members.

2.2 Populace analysis for Academic year 2020-21

2.2.1 Students data

The student data (shared by the College) shows there were a total of **796 Girl students** in the premises.

2.2.2 Staff data

Type	Male	Female	Total
Admin Staff	00	02	02
Teaching Staff	09	07	16
Non-Teaching Staff	03	01	04
Total Staff Members	12	10	22

Table 2: Staff data of the Institution for 2020-21

The staff data shows the premises had a total of **22** Staff Members.

2.3 Total College Area & College Building Spread Area

The **total site area is 0.5 acres** and the **total Built-up area of College is 37,002 sq. ft.** for a **total of 818 footfalls.**

2.4 College Infrastructure

2.4.1 Establishment

The College was established in 2009. The college is located pretty close to nature and hence has very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building. **Overall the Infrastructure of the Building is excellent in terms of the Architecture Design and Green Building Design. The Premises covers quite a few of the requirements for a Green Habitat.**

2.4.2 Spatial Organisation

The overall ambience of the College is warm and inviting. The classrooms and other spaces have ample natural ventilation in the form of clear glass windows with fresh air ventilation. The architecture of the building is quite well designed. The colour palette not just helps the building to stand out but also provides an Institutional arena. It balances with the local architecture with the natural landscapes of huge trees all around. The design emphasis on providing calmness to the built form and gradually merges with the serene landscape.

The floor to floor height is more than 10 feet. There is no provision for lifts in the premises, whereas there are amenities such as CCTV, Fire extinguishers, Library and first aid box.

2.4.4 Operation and Maintenance of the premises

The interview session with the staff regarding the operation and working hours is summarized in the table. The Institution is open from Monday to Saturday. The detail wise timing for each is mentioned below.

S. No.	Section	Spaces	Time	Hours/ day	Days in a year
1	Main Institutional College	Student areas and Teaching faculty	Monday to Friday (07:00 a.m. to 12:00 p.m.)	5	280
2	General areas	Admin areas and library, Passage, staircase, toilet	Monday to Friday (07:00 a.m. to 12:30 p.m.)	5.5	300

Table 3: Schedule of the timings of the premises

DETAILED REPORT

3. Green Building Study Audit

3.1 About the Green Building Study Audit

It is a systematic study of the aspects which make the Institution a sustainable and healthy premises for its inhabitants.

3.2 Analysis for the Green Building Study Audit

The procedure included detailed verification for the following:

Energy Audit

- Analysis of the Lights, Fans, AC, Equipment
- Renewable energy
- Scope for reducing the current energy bills if any
- Improvement in the thermal comfort of the campus

Green Audit

- Green initiatives
- Hygiene audit
- Water Audit - Analysis of the current water consumption of campus; Scope to include Rain water harvesting and Waste water treatment in campus
- Waste Audit - Current waste produced, its segregation and usage; Strategies to be adopted for waste management and awareness

Environmental Audit

- Analysis of the current landscape + hardscape of campus
- Analysis of the flora and fauna of campus
- Strategies adopted at present to enhance vegetation
- Measures that can be adopted for ecological improvement of the premises.

3.3 Strategy adopted for Green Building Study Audit

The strategies included data collection from admin department, actual inventory, investigation to check the operation and maintenance, analysis of the data collected and preparation of the Report.

3.4 Timeline of the activities for Green Building Study Audit

- 03 January 2022 – Allotment and Initiation by the College
- 05 February 2022 – Site visit
- 01 March 2022 – Survey of the Student and staff submitted
- 15 March 2022 – Data submitted by College
- 04 May 2022 – Submission of the Report

4. Energy Audit

4.1 Sources of Energy consumption

The premise uses following sources of energy consumption.

4.1.1 Primary sources

1. **Electrical (Metered)** – Light, Fans, AC, Equipments, Pumps are the major consumers.
2. **Renewable Energy** – There are Solar panels, solar hot water heaters installed in the premises at present.

4.1.2 Secondary sources

1. **Inverter** – There is 1 Inverter in the premises.
2. **UPS** – There are 2 UPS used in the premises.
3. **Batteries** – There is 1 Battery in the premises.
4. **Gas cylinders** – There is 1 gas cylinder in the premises.

4.2 Site investigation analysis

The Site investigation observations and interviews with the Maintenance staff, Electrical department in charge are summarised below:

- The **switch-off drills are practised at present**, the maintenance staff and Lab Attendants put off switches of all equipments regularly.
- All the **computers are shut-off after use** and also put on power saving mode.
- There are **display boards encouraging staff and students to save energy are put up in the classrooms and laboratories**.
- There are **Ultra-violet lights used only in the scientific labs for experiment purpose, apart from these any other harmful lights used** in the premise.

4.3 Actual Electrical Consumption as per Bills

The admin department had shared the bills for Meter which is connected to all Buildings and is main source of energy supply. The supplier is Adani Power Limited. The analysis of actual electrical energy consumption is summarised below. The solar panels were installed in recently post which the cost of electricity has been reduced. The details of unit consumption meter wise is as follows.

Sr. No.	Month	Year	Units Consumed	Amount
1	September	2021	1,613	4,020
2	October	2021	1,668	17,510
3	November	2021	2,008	21,230
4	December	2021	2,198	27,100
5	January	2022	1,382	14,170
6	February	2022	2,613	27,670
Total			11,482	1,11,700

Table 4: Study of the electricity consumption of the meters in premise

The summary of the above study shows the average consumption varies for each month.

4.4 Survey Results

An online survey was conducted to analyse the student and staff views about the Energy management practices adopted in College, following is the result received.

4.4.1 Participation

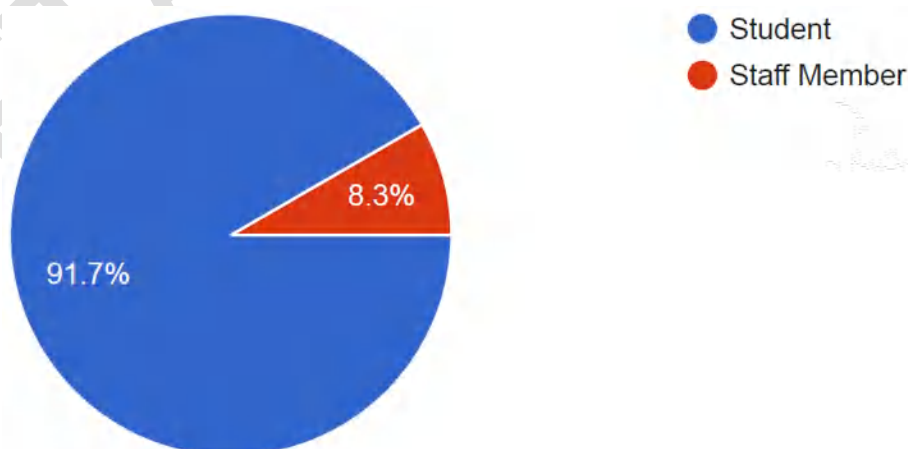


Figure 1: Participation analysis in the survey

A total of **180 responses** were received out of which 92% were students.

4.4.2 Review of the Energy management practices in the premises

Note: The Participants were asked to review the practice on a scale of 1-5 with scale components as follows:

- Scale 1 – Poor
- Scale 2 – Satisfactory
- Scale 3 – Good
- Scale 4 – Very good
- Scale 5 – Excellent

The figures in each of the columns of graph depict the Number of participants responses in numerical (Percentage of the participant response) – For example 101 responses (44.5%)

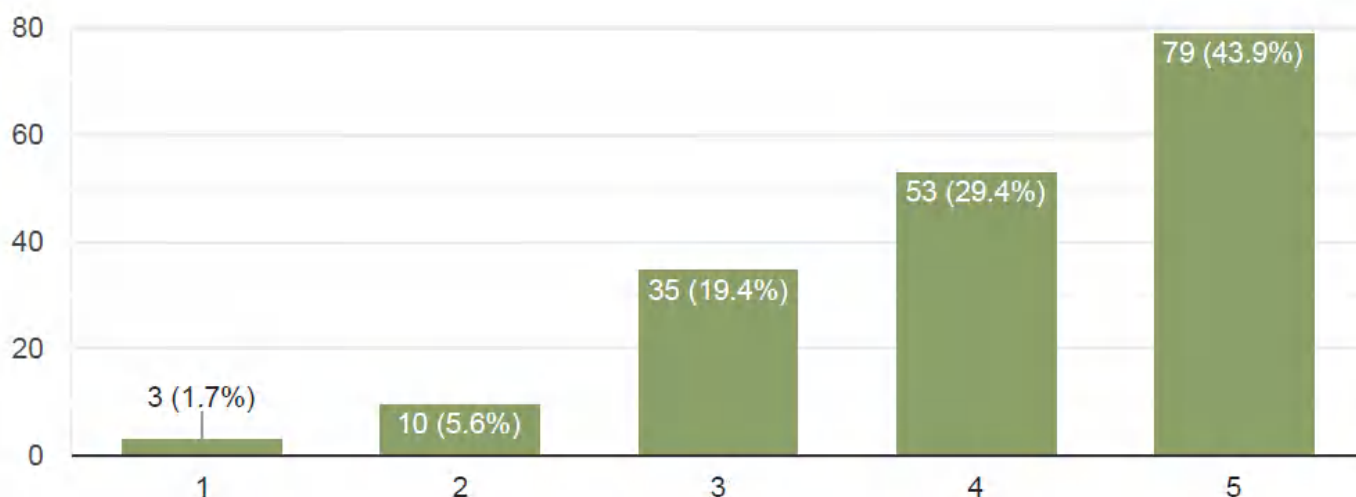


Figure 2: Energy management practices in college

The students, staff (**almost 44%**) of the responses found the practices to be **excellent** and **29%** of the responses found practices to be **good**.

4.5 Calculated Electrical Consumption as per inventory

The electricity bills provide actual consumption data. The following is the calculated consumption. It is done to understand the percentage of energy usage in the premises by various applications. It is based on the inventory collected and interviews with the staff. The additional data such as wattage is taken from market research. In terms of electrical consumption, the main sources are lights, fans, ac, equipment. The inventory and data collection for sources of energy consumed in the premise is summarised in the following sections. Note: The following analysis is combined for entire premise taking into considerations the duration before pandemic to understand the consumption pattern as post pandemic the premise is used only for a few hours.

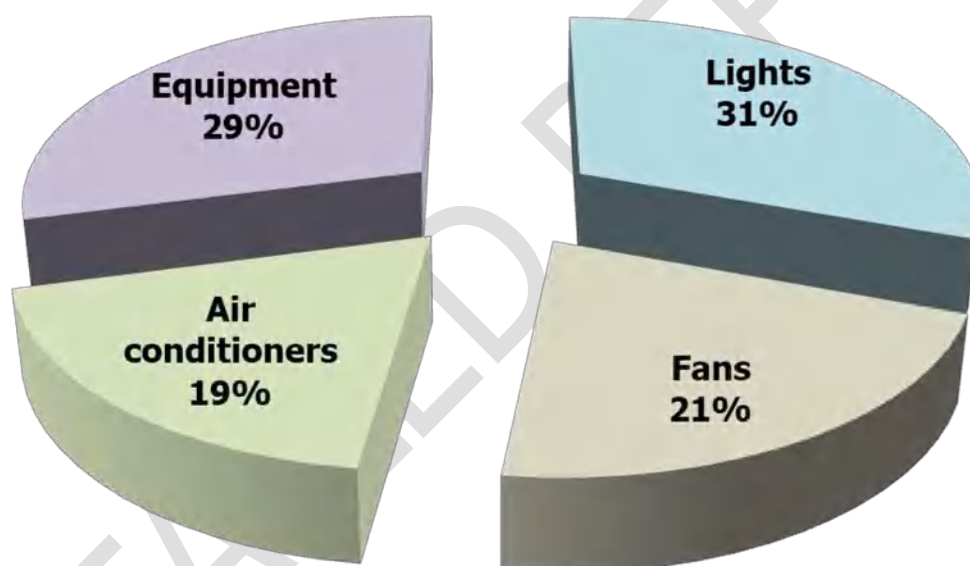


Figure 3: Summary of the calculated electrical consumption as per inventory

The above graph shows that light consumes 31% followed by equipment at 29% the fans at 21% and the air conditioners consume 19% of the total calculated electrical energy.

4.6 Lights

4.6.1 Types of lights based on the numbers

There are a total of **159 lights in the premises**; all of these lights are Non-LED based on the data shared by the College.

4.6.2 Types of lights based on the power consumption

As all the lights are Non-LED the entire 100% consumption contributed by lights is through Non-LED lights only.

4.6.3 Floor-wise consumption analysis

The energy consumption of Lights is **29,465 kWh** of energy; the following graph shows the block wise consumption.

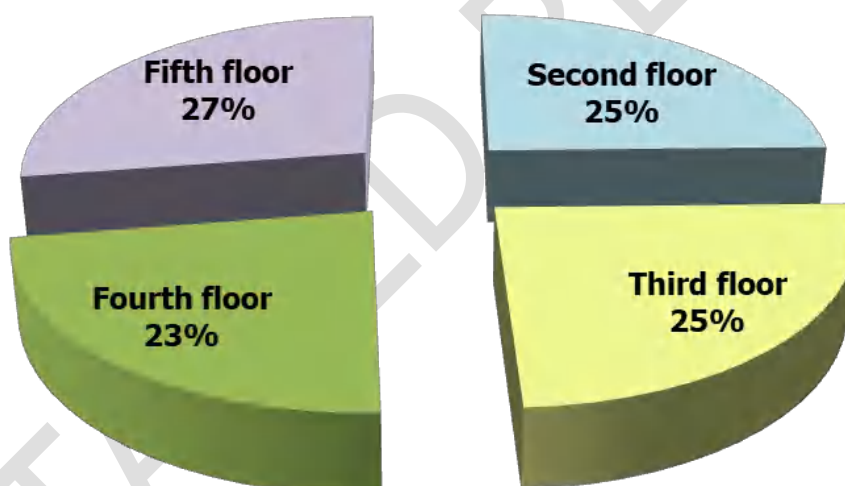


Figure 4: Energy consumed by lights floor wise

The above analysis shows the lights in the **Fifth floor consume 27%**; the ones in **Second and Third floor consume 25%** and the ones in **Fourth floor consume 23%** of the total power consumed by lights.

4.6.4 Requirement of NAAC

4.6.4.1 Alternative Energy Initiative

Percentage of power requirement met by renewable energy sources – here are 56 grid of solar panels resulting in 5 kW of energy. 75% energy is utilised in the premises and 80% of the power requirement is met by the solar energy.

4.6.4.2 Percentage of lighting power requirement met through LED bulbs

As there are no LED lights in the premises the contribution is 0% in terms of number and **0% of the power requirement** is met through the same. As per our study we could conclude the lights should be replaced with LED lights.

4.6.5 Site investigation observations

Some of the points noticed are as follows:

1. All lights are in working conditions
2. Daily monitoring and check is done by the maintenance staff.
3. There was no fuse defect observed.

DETAILED REPORT

4.7 Fans

4.7.1 Types of fans based on the numbers

There are a total of **141 fans** in the premises. The following table shows the various types of fans in the premises.

S. No.	Type	Nos.
1	Ceiling fan	140
2	Wall mounted fan	1
Total		141

Table 5: Summary of the types of fans in premise

4.7.2 Types of fans based on the power consumption

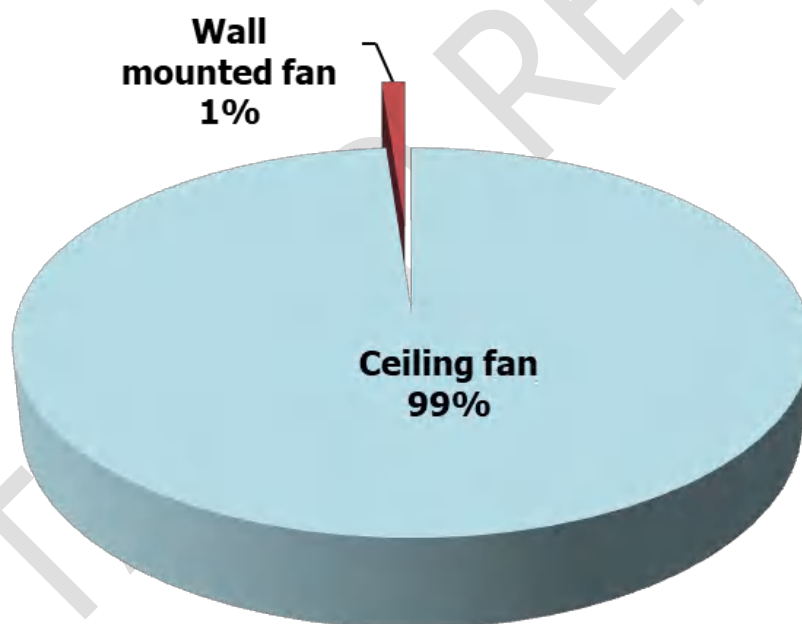


Figure 5: Energy consumed by types of fans in the premise based on the usage study

The analysis of the types of fans in premises shows **Ceiling fans consume 99%** the **Wall mounted fans consume 1%**

4.7.3 Floor-wise consumption analysis

The energy consumption of fans is **9,563 kWh** of energy; the following graph shows the floor wise consumption.

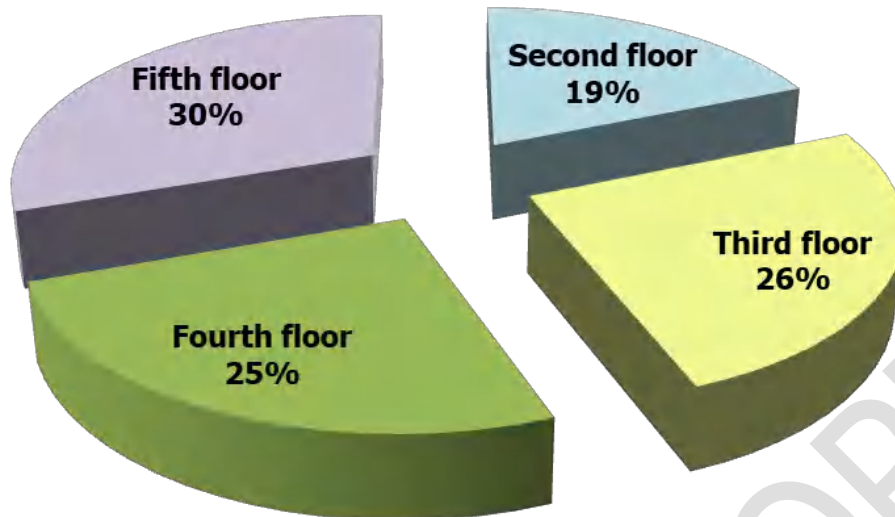


Figure 6: Energy consumed by fans floor wise

The above analysis shows the fans in the **Fifth floor consume 30%**; the ones in **Third floor consume 26%** the ones in **Fourth floor consume 25%** and the ones in **Second floor consume 19%** of the total power consumed by fans.

4.7.4 Site investigation observations

Some of the points noticed are as follows:

1. All fans are in working conditions
2. Daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.

4.8 Air conditioners

4.8.1 Types of air conditioners based on the numbers

There are **4 air conditioners** in the entire premises.

Sr. No	Room Name	Floor	Nos.
1	201-Principle room	Second floor	1
2	204-Computer lab	Second floor	2
3	Room no. 503	Fifth floor	1
Total			4

Table 6: Details of the air conditioners in the premises

4.8.2 Floor-wise consumption analysis

The energy consumption of air conditioners is **8,438 kWh** of energy; the following graph shows the floor wise consumption.

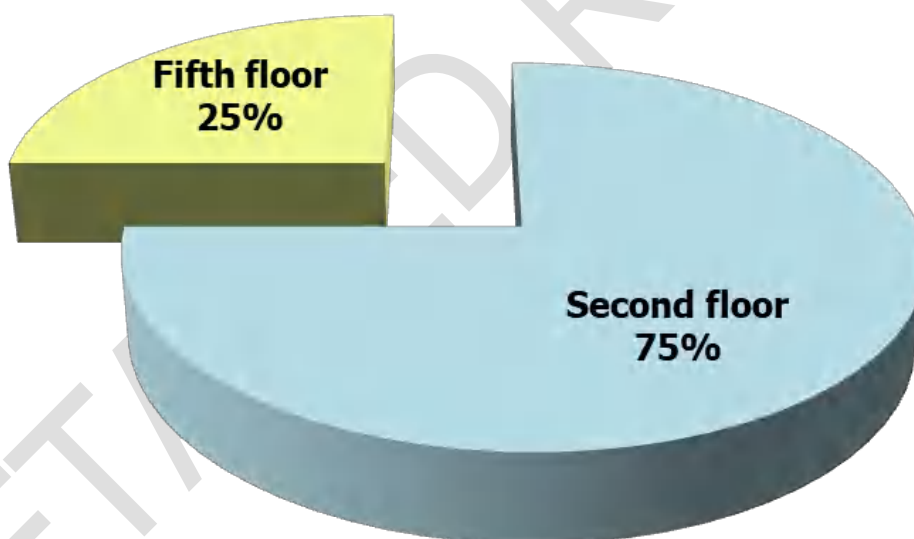


Figure 7: Energy consumed by air conditioners floor wise

The above analysis shows the air conditioners in the **Second floor consume 75%**; and the ones in **Fifth floor consume 25%** of the total power consumed by air conditioners.

4.8.3 Site investigation observations

Some of the points noticed are as follows:

1. Daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.

2. The Outdoor Unit is properly cleaned and maintained well and do not have any dust collection problem.

4.8.4 About the replacement of Current AC

The current air conditioners are well maintained, through there is not an immediate requirement for replacement however, whenever the college undergoes redevelopment or a new floor is constructed there can be provisions for replacement with energy efficient appliances or new air conditioners that require less power consumption.

DETAILED REPORT

4.9 Equipment

4.9.1 Types of Equipment as per numbers

There are a total of **9 types of equipment totalling to 22 in number** in the premise. The various types are mentioned in the table below.

S. No.	Name	Nos.
1	ID Printing Machine	1
2	Landline Phone	5
3	Refrigerator	1
4	Pump	1
5	Xerox Machine	2
6	Desktop Computer	8
7	Printer	2
8	Projector	1
9	CCTV	1
Total		22

Table 7: Types of equipment in the premise as per the quantity

4.9.1 Types of Equipment as per consumption

The energy consumption of equipment is **13,015 kWh** of energy.

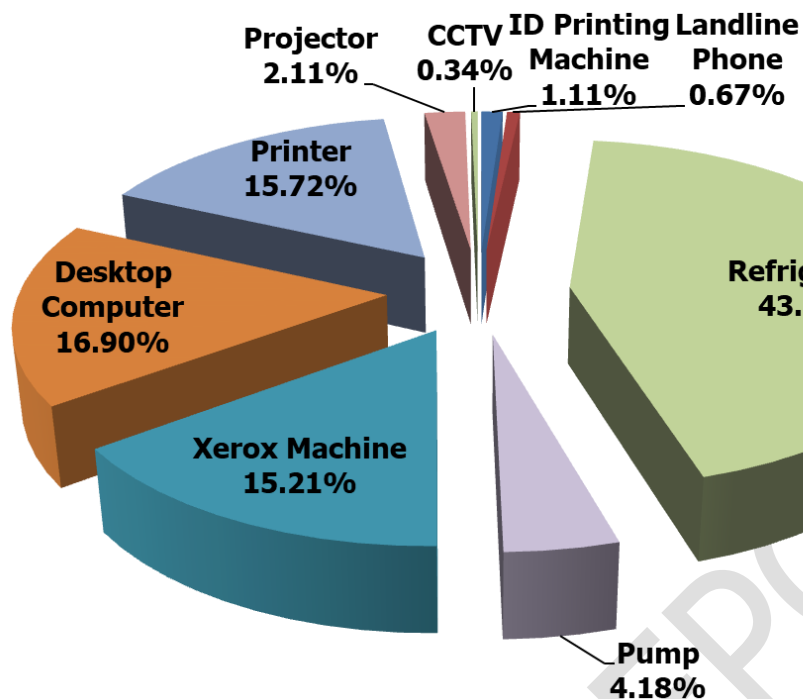


Figure 8: Summary of Energy consumed by equipment in the premises

The above summary shows that **refrigerator consumes more energy at 43.75%** while **desktop computer consumes 16.90%** the **printer consumes 15.72%** and the **Xerox machine consumes 15.21%** these are maximum consumers as compared to other equipment.

4.9.3 Site investigation observations

Some of the points noticed are as follows:

1. All equipments are in working conditions and daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.
2. No defect was found in any equipment of electrical consumption.

4.10 Recommendations for a Sustainable Habitat

Over the time energy efficient appliances have been a boon not only to the energy saving parameters they adhere to but also the eco-friendly habits it helps to inculcate. The Institution such as Schools and Colleges are the best way to implement these initiatives. It creates awareness among the students at a young age. The Institutions also act as a symbol and representative of being an energy efficient premise.

Following the analysis we found are some of the suggestions which can be implemented for an energy efficient Institution. This would help in reduction of the current electrical consumption by a major percentage.

4.10.1 Electromechanical systems - Electrical and Lighting

Section 1 - Lights

Non-LED lights

The current light analysis shows that Non-LED tube lights consume anywhere between 24W, 36W and 40W when in use; similarly the CFL lights consume more than 25 to 28W when in use; these should be replaced with LED lights which consume on an average 16-20W when in use.

Our technical analysis shows that there would be a reduction of an average of **100% reduction** in energy consumption through lights specifically as a part of the electro-mechanical system if all **Non-LED on all floors** are replaced with an energy efficient appliance whenever the college undergoes renovation.

Section 2 - Fans

Ceiling fans

The current Fans are in proper working conditions and maintained well. The ceiling fans are in more quantity and consume at least 60W when in use. These should be replaced with energy efficient fans consuming 32W when in use. Our detailed study states that is all the **ceiling fans on all floors** if replaced with star rated appliance results in a reduction of average of **47% reduction** in energy consumption if replaced with energy efficient appliance. It will be suggested to either replace these now if college can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

Section 3 - Equipment

Desktop computers to laptops

Among all equipment it suggested to replace the desktop computers with laptops as this would be energy efficient. A normal desktop computer consumes on an average 250W and it is to be connected all time when it has to be used. On the contrary a laptop consumes 40W and has a battery backup which lasts up to 4 hours.

There is **an average 84% reduction** in energy consumption if replaced with energy efficient appliance which is a laptop in all the areas of Educational and Residential areas.

This replacement is however is dependent on a variety of factors as follows.

- Some of the senior staff members may be more convenient with computers, replacement with laptop might result in a change of the working patterns and hours which may affect the productivity.
- Laptops – in case are not handled with care such as if dropped unintentionally might result in data imbalance.
- Students who are not day scholars can use laptop as per their own convenience, whereas in common areas there can a monitoring about the usage hours hence computers may be a preferable option then laptop in certain spaces.
- Similarly depending on the pandemic situation in case it might be possible due to irregular usage the device might have issues while functioning.

Thus the University should analyse the above points and then devise a strategy about the replacement, essentially when the devices get damaged or are not in working condition they can surely be replaced.

As well as once they are not in working condition the proposed strategy should be linked towards e-waste management as well.

On-site investigation and physical verification
Audit Team during the visit on 05 February 2022



On-site review with the Team

5. Towards a Healthy & Sustainable Institution

5.1 Inputs by Greenvio Solutions

Based on the analysis of the study of premises in addition to the recommendations provided in each section of Ecological, Water, Waste and Energy Audit the College can adopt the following strategies towards a Healthy and Sustainable Institution practices.

- a) **Cutlery in the Canteen** – The regular plastic and steel plates, spoons used in Canteen can be replaced with eco-friendly and organic leaves, paper straw, disposable plates, edible spoons and tables made out of sugarcane waste or bamboo. This will be first of its kind initiative to be adopted and practiced thus also inculcating the healthy practices in students.
- b) **Signages** – In addition to the signages being in regular language there can be additional signages in braille language for the especially abled students.

5.2 Survey Results

An online survey was conducted to analyse the student and staff views about what changes according to you can be undertaken for Green audit improvement in College premise and activity.

Some of the suggestions by the Students and staff are listed below:

- More plantation programmes can be conducted. Should organize more environmental awareness webinars.
- Creating eco-friendly rules in a campus, Good old recycling, having a place for refilling a water bottle, transportation.
- Less wastage of papers during examination. Use of white board and marker rather than blackboard and chalk. Installing taps in the toilets instead of flush.

However, it should be noted that the College has taken up multiple initiatives and because of Pandemic the students have not practically visited the campus so many of these points are not mandatory at the moment.

6. References

1. Uniform Plumbing Code – India, 2008
2. IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
3. IGBC Green Landscape Rating system, March 2013
4. BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
5. Used only for understanding Universal design - Universal accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National centre for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.

DETAILED REPORT



ENVIRONMENT AUDIT

2019-20 & 2020-21

AUDIT REPORT

Studied for

Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's

**B. L. Amlani College of Commerce &
Economics and M. R. Nathwani College of Arts**

N. S. Road No. 6, J.V.P.D. Scheme, Vile Parle (West), Mumbai – 400056

Analysed by



Valid till March 2023

Disclaimer

The Audit Team has prepared this report for the **Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts** located at N. S. Road No. 6, J.V.P.D. Scheme, Vile Parle (West), Mumbai – 400056 based on input data submitted by the College analysed by the team to the best of their abilities.

The details have been consolidated and thoroughly studied as per the various guidelines for Green Buildings available in National and International Standards; the report has been generated based on comparative analysis of the existing facilities and the prerequisites formulated by various standards. The inputs derived are a result of the inspection and research. These will further enhance and develop a Healthy and Sustainable Institution.

These can be implemented phase wise or as a whole depending on the decision taken by the Hon'ble Management and College. The warranty or undertaking, expressed or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

The audit is a thorough study based on the inspection and investigation of data collected over a period of time and should not be used for any legal action. This is the property of Greenvio Solutions and should not be copied or regenerated in any form.

The Report is prepared by the Team of Greenvio Solutions under their brand and department – Sustainable Academe as Consultancy firm with the Project Head - Ar. Nahida Shaikh is as an Accredited and Certified Green Building Professional-Architect.

Greenvio Solutions

Developing Healthy and Sustainable Environments

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

Palghar District, Maharashtra- 401208

sustainableacademe@gmail.com

Acknowledgement

The Audit Assessment Team thanks the **Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts, Mumbai** for assigning this important work of Environment Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to **Shri. Mahendrabhai K. Ghelani**, Chairman; **Smt. Shilpa Amlani**, Secretary and everyone from the Management.

Our heartfelt thanks to Chairperson of the entire process **Dr. Jitendra Aherkar**, Principal for the valuable inputs.

We are also thankful to **College's Task force the faculty members** who have collected data required **Prof. Suryaprakash Singh**, Senior Professor (**Special mention for the excellent coordination**).

We highly appreciate the assistance of the **entire Teaching, Non-teaching and Admin staff** for their support while collecting the data.

Sustainable Academe

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

Contents

Disclaimer	1
Acknowledgement	2
Contents.....	3
1. Introduction.....	4
2. Institution overview	6
3. Green Building Study Audit.....	9
4. Site Study.....	10
5. Ecological (Environmental) Audit	11
6. Towards a Healthy & Sustainable Institution.....	17
7. References	18

DETAILED REPORT

1. Introduction

1.1 About the management

B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts, was established in the year 2009 under the banner of Matushri Kanbai, Lalbai & Motibai Lohana Kanyashala & Balikagruh (MKLM) formed in 1906 in the Juhu area of suburban Vile-Parle. **The College is one of the only girl's college offering quality Professional Degree Education in Mumbai.** The MOTTO of the College is **"ENLIGHTEN & EMPOWER"**

1.2 Statements of the Institution

Mission - Our mission is to empower women by providing them with a conducive environment for acquiring professional skills, through an education that is life and career oriented value- based and creative in the pursuit of excellence.

Goals - The College has the following goals and objectives.

- Holistic Development of women by providing learning opportunities to empower her with knowledge
- Double the capacity of the college
- To equip today's women with sound education which will be an asset for them throughout their lives

1.3 About the Institution

The aim of the College is at equipping students with a human ethics and moral values and intellectual outlook and inculcating in them the highest principles of unity and national integration. **The College is affiliated to the University of Mumbai.**

1.4 The surrounding premises around the Institution

The Premises is situated amidst the landscape serene of **Mumbai city of Maharashtra** with immense peace and calmness in the surroundings. There is a frontal approach which provides quite a beautiful appreciation space while approaching the premises; this area is

surrounded by huge trees which positively complement the background-foreground aspect in terms of Natural space and built-form Architecture. It also provides ample shade which enhances the micro climate of the region. The location of College is feasible to the nearby essential amenities such as Public Health Center, Fire Station, Civic body-Public administrative buildings, Recreational gardens and Police Station which are not too close but nearby.

1.5 Assessment of the College

1.5.1 Affiliations

The College has all its courses approved and affiliated to **the University of Mumbai University**, a collegiate, public & state-owned university located at Mumbai in Maharashtra. It is one of the oldest educational institutes in the city, dating back to the British Bombay era.

1.5.2 Accreditation

The College had received a B level in its first cycle of NAAC in 2017 with a CGPA of 2.21. It shall enter its second cycle of NAAC soon.

2. Institution overview

2.1 Populace analysis for Academic year 2019-20

2.1.1 Students data

The student data (shared by the College) shows there were a total of **848 Girl students** in the premises.

2.1.2 Staff data

Type	Male	Female	Total
Admin Staff	00	02	02
Teaching Staff	09	07	16
Non-Teaching Staff	03	01	04
Total Staff Members	12	10	22

Table 1: Staff data of the Institution for 2019-20

The staff data shows the premises had a total of **22** Staff Members.

2.2 Populace analysis for Academic year 2020-21

2.2.1 Students data

The student data (shared by the College) shows there were a total of **796 Girl students** in the premises.

2.2.2 Staff data

Type	Male	Female	Total
Admin Staff	00	02	02
Teaching Staff	09	07	16
Non-Teaching Staff	03	01	04
Total Staff Members	12	10	22

Table 2: Staff data of the Institution for 2020-21

The staff data shows the premises had a total of **22** Staff Members.

2.3 Total College Area & College Building Spread Area

The **total site area is 0.5 acres** and the **total Built-up area of College is 37,002 sq. ft.** for a **total of 818 footfalls.**

2.4 College Infrastructure

2.4.1 Establishment

The College was established in 2009. The college is located pretty close to nature and hence has very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building. **Overall the Infrastructure of the Building is excellent in terms of the Architecture Design and Green Building Design. The Premises covers quite a few of the requirements for a Green Habitat.**

2.4.2 Spatial Organisation

The overall ambience of the College is warm and inviting. The classrooms and other spaces have ample natural ventilation in the form of clear glass windows with fresh air ventilation. The architecture of the building is quite well designed. The colour palette not just helps the building to stand out but also provides an Institutional arena. It balances with the local architecture with the natural landscapes of huge trees all around. The design emphasis on providing calmness to the built form and gradually merges with the serene landscape.

The floor to floor height is more than 10 feet. There is no provision for lifts in the premises, whereas there are amenities such as CCTV, Fire extinguishers, Library and first aid box.

2.4.4 Operation and Maintenance of the premises

The interview session with the staff regarding the operation and working hours is summarized in the table. The Institution is open from Monday to Saturday. The detail wise timing for each is mentioned below.

S. No.	Section	Spaces	Time	Hours/ day	Days in a year
1	Main Institutional College	Student areas and Teaching faculty	Monday to Friday (07:00 a.m. to 12:00 p.m.)	5	280
2	General areas	Admin areas and library, Passage, staircase, toilet	Monday to Friday (07:00 a.m. to 12:30 p.m.)	5.5	300

Table 3: Schedule of the timings of the premises

DETAILED REPORT

3. Green Building Study Audit

3.1 About the Green Building Study Audit

It is a systematic study of the aspects which make the Institution a sustainable and healthy premises for its inhabitants.

3.2 Analysis for the Green Building Study Audit

The procedure included detailed verification for the following:

Energy Audit

- Analysis of the Lights, Fans, AC, Equipment
- Renewable energy
- Scope for reducing the current energy bills if any
- Improvement in the thermal comfort of the campus

Green Audit

- Green initiatives
- Hygiene audit
- Water Audit - Analysis of the current water consumption of campus; Scope to include Rain water harvesting and Waste water treatment in campus
- Waste Audit - Current waste produced, its segregation and usage; Strategies to be adopted for waste management and awareness

Environmental Audit

- Analysis of the current landscape + hardscape of campus
- Analysis of the flora and fauna of campus
- Strategies adopted at present to enhance vegetation
- Measures that can be adopted for ecological improvement of the premises.

3.3 Strategy adopted for Green Building Study Audit

The strategies included data collection from admin department, actual inventory, investigation to check the operation and maintenance, analysis of the data collected and preparation of the Report.

3.4 Timeline of the activities for Green Building Study Audit

- 03 January 2022 – Allotment and Initiation by the College
- 05 February 2022 – Site visit
- 01 March 2022 – Survey of the Student and staff submitted
- 15 March 2022 – Data submitted by College
- 04 May 2022 – Submission of the Report

4. Site Study

The following listed are some of the positive site elements which are beneficial to the college in terms of tangible and intangible benefits.

- **Location** - The Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts located at N. S. Road No. 6, J.V.P.D. Scheme, Vile Parle (West), Mumbai – 400056 and falls K/West ward of Brihanmumbai Municipal Corporation.
- **Neighbourhood context** - The premise is surrounding by mix of Residential and Commercial (Small shops) on the immediate surroundings of the site. The premise is situated in Narhe, Pune.
- **Natural physical features** – Though situated amidst the urban centre, the college has made efforts to include plantation as part of its immediate site access.
- **Manmade features** – The premise is situated in an urban area with close proximity to all necessary amenities. The materials used for construction are RCC and the landscaping includes natural trees as well as potted plants.
- **Circulation** – There is a smooth transition of pedestrian traffic inside the premises due to the large entrance gate and the huge open space where vehicles of students and staff is parked.
- **Climate** – Mumbai has a tropical climate. When compared with winter, the summers have much more rainfall. According to Köppen and Geiger, this climate is classified as Aw. The average annual temperature is 26.4 °C | 79.6 °F in Mumbai. In a year, the rainfall is 2012 mm | 79.2 inch.

(Source: <https://en.climate-data.org/asia/india/maharashtra/mumbai-29/>)

Ecological (Environment) Audit



Background reference image Yugal Shrivastava on pexels

5. Ecological (Environmental) Audit

Environment is an essential part for human survival. We co-exist with the environment and it cannot be termed as a separate entity. The Ecological audit helps to understand the flora, fauna that exists and steps that can be taken to improve the same. To denote if there are problems related to sound in and around the surrounding. In terms of the carbon footprint it helps in keeping a tab on the eco-friendly habits incorporated by the inhabitants of the premises. Health today is the topmost priority, a general understanding of the initiatives undertaken along with sufficient hygiene practices adopted. Universal design is applicable to all built and unbuilt spaces.

As part of our study we could state that the Institution has developed eco-friendly practices and sustainable solutions which are well reflected in the rich biodiversity of the Premises. Being situated near the city the appreciation space towards the main entrance provides a welcoming approach to the College.

5.1 Open Spaces

There is an open space used by students at present for sports and outdoor activities. Located amidst the urban area it is a large space and **the efforts to maintain the existing space are commendable.**

5.2 Flora and fauna audit

5.2.1 Flora Audit

A flora survey was carried out to identify the total numbers of plants and trees. The landscape area has a variety of plantations constituting hundreds of surveyed trees in premises in the last few years as follows with detail description of each.

S. No.	Plant name	Type	Nos.	Planted by
1	Coconut Tree	Tree	12	Planted by Staff
2	Mango Tree	Tree	6	Planted by Staff
3	Ashoka Tree	Tree	19	Planted by Staff
4	Neem Tree	Tree	2	Planted by Staff

5	Seesam Tree	Tree	1	Planted by Staff
6	Jungle Tree	Tree	2	Planted by Staff
7	Jamun Tree	Tree	2	Planted by Staff
8	Peepal Tree	Tree	1	Planted by Staff
9	Badam Tree	Tree	2	Planted by Staff

Table 4: Details of the Flora in the premises

At present there are 47 plantations comprising of trees. On the periphery of the site there are hue trees providing ample shade and fresh ventilation.

5.3 Noise Audit

5.3.1 Macro level

On a macro level there are settlements close to the site. The approach road too has balanced traffic. As the college is oriented amidst the residential areas including close by Industrial areas thus there is some amount of noise from the surrounding areas. **Overall the noise level is moderate as per our analysis on macro level.**

5.3.2 Micro level

The college has a minimal open space covered but it has hardscape paving which is not useful in keeping noise levels low. There is provision for staff parking which causes some noise. The college does not have generator and there is no sound problem caused due to the same. There are no particular equipments which cause any effect. **Overall the noise levels inside the premises are between moderate and low which is a good approach.**

5.4 Carbon Footprint Audit

5.4.1 Eco-friendly Commuting Practices

Based on data collection and discussion with staff the following points were noted:

- **Ease of commuting** – Owing to close proximity to public transport the access is very feasible and walk able.
- **Parent's commute** - There are 2 Parent-teacher meetings held in a year and the turn-out is around 40-60%

- **Vehicles details** – The provision provided by College includes vehicle parking is allowed at present as follows.

S. No.	Type	Nos.	For (student/ Staff)
1.	Cars	1-2	Staff
2	Bikes	20-25	Staff and Students
3	Cycles	8-10	Students
4	Electric vehicles	1-2	Staff and Students

Table 5: Details of the Parking in the premises

- **Commute details** – The students and staff commute from multiple places. The details are summarised below.

S. No.	Name of all the place where student of staff comes from	Distance
1	Goregaon, Bandra, Kandivali, Vile Parle (Around 65% of the population)	Within or less than 5 km radius from College
2	Panvel, Virar, Mira road, Dadar (Around 35% of the population)	More than 5 km and up to 10 km radius from College

Table 6: Details of the places students and staff commute from

5.4.2 Heat Island Reduction

The Institution has adopted the following practices which are yielding positive results in terms of Urban Heat Island Effect which refers to increase in temperature of the surrounding because of ineffective strategies.

- Exposed roof areas – The terrace is flat roof some of the part is covered with solar panels.
- Exposed non-roof hardscape areas - There is a pathway on all sides of the premises. These include some natural and potted plantations.

There are adequate measures adopted in the premises to reduce heat island effect of Building roofs.

5.4.3 Outdoor Light Pollution Study

The college compound lights are not upward looking thus, these do not cause light pollution.

5.5 Universal Campus

As per World Report on Disability, 2011 there are 180 million approx. Persons with Disabilities that makes it 15% of total population of India.

There are ramps, lifts, and access with long - wide passage and handrails along staircase and low height risers in the Staircases as part of universal campus initiatives.

5.6 Fire Safety

The Institution has undertaken adequate fire safety measures. Each floor has an open staircase without any barriers for fire safety measures. These staircases are free of any kind of storage or combustible material. The windows in each classroom are at a low height with fresh air and natural light thereby adding to ample ventilation throughout the day. The current facilities are however quite well maintained. **Our observation was that there are adequate Fire extinguishers in the premises.** Though, there can also be provision for additional fire safety signages.

5.7 Survey Results

An online survey was conducted to analyse the views about the premises, following are some of the reviews.

5.7.1 Participation

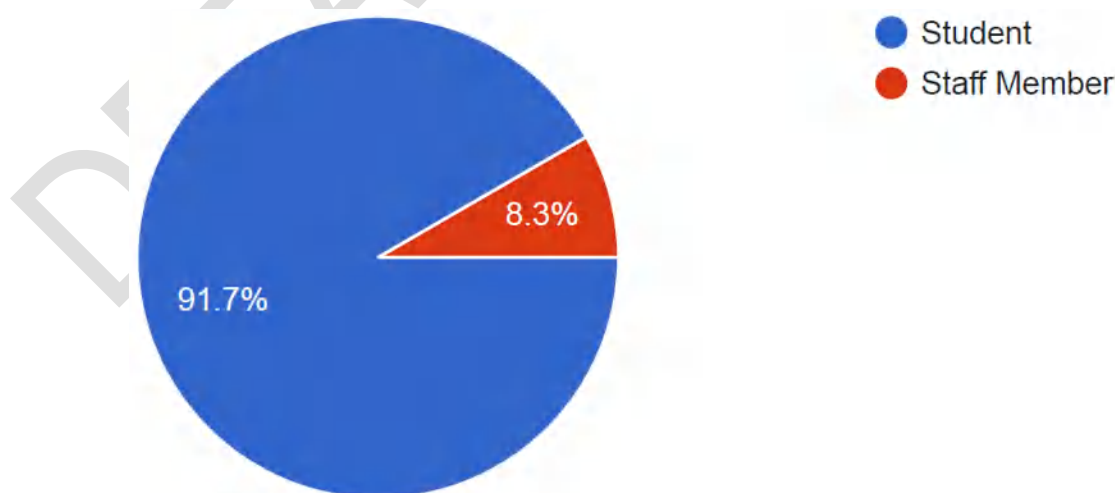


Figure 1: Participation analysis in the survey

A total of **180 responses** were received out of which 92% were students.

5.7.2 What according to you are the positive steps taken by the College towards Green Building/ Good maintenance?

We have listed some of the key responses below.

- Use of electronic vehicles
- They keep the surrounding very clean
- Taking online lectures and exams and reducing the paper waste and deforestation because of that
- Planted trees in the college premises
- Around our college we have clean roads and the college campus is very clean and have so many trees and plants.

5.8 Positive site features as per our study

a) Avoid using plastic in premises

There are provisions for ban on the use of plastic bags or products in the Premises.

b) OPAC system

The system in the library is beneficial for the students.

c) Paperless technologies

The college has gone technology friendly and paperless in the functioning of the Premises.

d) Resting places

There are provisions for resting places in premises in outdoor and indoor.

e) Avoid using plastic in premise

There are provisions for ban on the use of plastic bags or products in the Premise.

f) Ample greenery

There are provisions for garden with traditional trees in the premises.

a) User friendly movability in premises

There are provisions for Kerb Ramp near the main entrance of the Building premises, also low height hand rail for ease of access.

5.9 Recommendations for a Sustainable Habitat by Greenvio Solutions

Site beautification

Additional facilities for birds - There can be provision for drinking water and food facility for birds visiting in the College premise.

Universal Campus

Universal Toilet - There should be minimum 1 toilet for the specially abled people as per guidelines prescribed by National Building Code 2016 with size being minimum or more than 1.5m x 1.5m

Pollution Control

Avoid paper wastage through books - The College can collect all old semester notebooks; these can either be converted to reusable paper in the premises through a workshop or using shredder machine or handed over to vendor for making fresh paper. Additionally the Students can be motivated to undertake similar practice on an individual note.

Smart and responsible environment systems

Smart Gardening System - The College can undertake Smart Gardening system using IoT Technology such as an automated watering system. This will result in saving time by scheduling time for watering; Saving money and water as smart irrigation systems have automated water schedules in addition to tracking dampness of soil which helps the irrigation system know when and how much the garden needs. It also helps in healthier plants as with the help of apps, smart irrigation systems, or even smart growing containers, these tasks can be provided evenly and allow the plants to be healthier and more productive. More information on this system can be checked here <https://www.happysprout.com/inspiration/what-is-smart-gardening/>

On-site investigation and physical verification
Audit Team during the visit on 05 February 2022



On-site review with the Team

6. Towards a Healthy & Sustainable Institution

6.1 Inputs by Greenvio Solutions

Based on the analysis of the study of premises in addition to the recommendations provided in each section of Ecological, Water, Waste and Energy Audit the College can adopt the following strategies towards a Healthy and Sustainable Institution practices.

- a) **Cutlery in the Canteen** – The regular plastic and steel plates, spoons used in Canteen can be replaced with eco-friendly and organic leaves, paper straw, disposable plates, edible spoons and tables made out of sugarcane waste or bamboo. This will be first of its kind initiative to be adopted and practiced thus also inculcating the healthy practices in students.
- b) **Signages** – In addition to the signages being in regular language there can be additional signages in braille language for the especially abled students.

6.2 Survey Results

An online survey was conducted to analyse the student and staff views about what changes according to you can be undertaken for Green audit improvement in College premise and activity.

Some of the suggestions by the Students and staff are listed below:

- More plantation programmes can be conducted. Should organize more environmental awareness webinars.
- Creating eco-friendly rules in a campus, Good old recycling, having a place for refilling a water bottle, transportation.
- Less wastage of papers during examination. Use of white board and marker rather than blackboard and chalk. Installing taps in the toilets instead of flush.

However, it should be noted that the College has taken up multiple initiatives and because of Pandemic the students have not practically visited the campus so many of these points are not mandatory at the moment.

7. References

1. Uniform Plumbing Code – India, 2008
2. IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
3. IGBC Green Landscape Rating system, March 2013
4. BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
5. Used only for understanding Universal design - Universal accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National centre for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.
6. Climate <https://en.climate-data.org/asia/india/maharashtra/mumbai-29/>

DETAILED REPORT



GREEN AUDIT

2018-19; 2019-20 & 2020-21

AUDIT REPORT

Studied for

Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's

**B. L. Amlani College of Commerce &
Economics and M. R. Nathwani College of Arts**

N. S. Road No. 6, J.V.P.D. Scheme, Vile Parle (West), Mumbai – 400056

Analysed by



Valid till March 2023

Disclaimer

The Audit Team has prepared this report for the **Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts** located at N. S. Road No. 6, J.V.P.D. Scheme, Vile Parle (West), Mumbai – 400056 based on input data submitted by the College analysed by the team to the best of their abilities.

The details have been consolidated and thoroughly studied as per the various guidelines for Green Buildings available in National and International Standards; the report has been generated based on comparative analysis of the existing facilities and the prerequisites formulated by various standards. The inputs derived are a result of the inspection and research. These will further enhance and develop a Healthy and Sustainable Institution.

These can be implemented phase wise or as a whole depending on the decision taken by the Hon'ble Management and College. The warranty or undertaking, expressed or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

The audit is a thorough study based on the inspection and investigation of data collected over a period of time and should not be used for any legal action. This is the property of Greenvio Solutions and should not be copied or regenerated in any form.

The Report is prepared by the Team of Greenvio Solutions under their brand and department – Sustainable Academe as Consultancy firm with the Project Head - Ar. Nahida Shaikh is as an Accredited and Certified Green Building Professional-Architect.

Greenvio Solutions

Developing Healthy and Sustainable Environments

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

Palghar District, Maharashtra- 401208

sustainableacademe@gmail.com

Acknowledgement

The Audit Assessment Team thanks the **Matushri Kanbai Lalbai & Motibai Lohana Kanyashala & Balikagruh's B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts, Mumbai** for assigning this important work of Green Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to **Shri. Mahendrabhai K. Ghelani**, Chairman; **Smt. Shilpa Amlani**, Secretary and everyone from the Management.

Our heartfelt thanks to Chairperson of the entire process **Dr. Jitendra Aherkar**, Principal for the valuable inputs.

We are also thankful to **College's Task force the faculty members** who have collected data required **Prof. Suryaprakash Singh**, Senior Professor (**Special mention for the excellent coordination**).

We highly appreciate the assistance of the **entire Teaching, Non-teaching and Admin staff** for their support while collecting the data.

Sustainable Academe

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

Contents

Disclaimer	1
Acknowledgement	2
Contents.....	3
1. Introduction.....	4
2. Institution overview	6
3. Green Building Study Audit.....	9
4. Green Practices Audit	10
5. Waste Audit	17
6. Water Audit.....	21
7. Health and Hygiene Audit.....	25
8. Towards a Healthy & Sustainable Institution.....	27
9. References	28

1. Introduction

1.1 About the management

B. L. Amlani College of Commerce & Economics and M. R. Nathwani College of Arts, was established in the year 2009 under the banner of Matushri Kanbai, Lalbai & Motibai Lohana Kanyashala & Balikagrah (MKLM) formed in 1906 in the Juhu area of suburban Vile-Parle. **The College is one of the only girl's college offering quality Professional Degree Education in Mumbai.** The MOTTO of the College is **"ENLIGHTEN & EMPOWER"**

1.2 Statements of the Institution

Mission - Our mission is to empower women by providing them with a conducive environment for acquiring professional skills, through an education that is life and career oriented value- based and creative in the pursuit of excellence.

Goals - The College has the following goals and objectives.

- Holistic Development of women by providing learning opportunities to empower her with knowledge
- Double the capacity of the college
- To equip today's women with sound education which will be an asset for them throughout their lives

1.3 About the Institution

The aim of the College is at equipping students with a human ethics and moral values and intellectual outlook and inculcating in them the highest principles of unity and national integration. **The College is affiliated to the University of Mumbai.**

1.4 The surrounding premises around the Institution

The Premises is situated amidst the landscape serene of **Mumbai city of Maharashtra** with immense peace and calmness in the surroundings. There is a frontal approach which provides quite a beautiful appreciation space while approaching the premises; this area is

surrounded by huge trees which positively complement the background-foreground aspect in terms of Natural space and built-form Architecture. It also provides ample shade which enhances the micro climate of the region. The location of College is feasible to the nearby essential amenities such as Public Health Center, Fire Station, Civic body-Public administrative buildings, Recreational gardens and Police Station which are not too close but nearby.

1.5 Assessment of the College

1.5.1 Affiliations

The College has all its courses approved and affiliated to **the University of Mumbai University**, a collegiate, public & state-owned university located at Mumbai in Maharashtra. It is one of the oldest educational institutes in the city, dating back to the British Bombay era.

1.5.2 Accreditation

The College had received a B level in its first cycle of NAAC in 2017 with a CGPA of 2.21. It shall enter its second cycle of NAAC soon.

2. Institution overview

2.1 Populace analysis for Academic year 2019-20

2.1.1 Students data

The student data (shared by the College) shows there were a total of **848 Girl students** in the premises.

2.1.2 Staff data

Type	Male	Female	Total
Admin Staff	00	02	02
Teaching Staff	09	07	16
Non-Teaching Staff	03	01	04
Total Staff Members	12	10	22

Table 1: Staff data of the Institution for 2019-20

The staff data shows the premises had a total of **22** Staff Members.

2.2 Populace analysis for Academic year 2020-21

2.2.1 Students data

The student data (shared by the College) shows there were a total of **796 Girl students** in the premises.

2.2.2 Staff data

Type	Male	Female	Total
Admin Staff	00	02	02
Teaching Staff	09	07	16
Non-Teaching Staff	03	01	04
Total Staff Members	12	10	22

Table 2: Staff data of the Institution for 2020-21

The staff data shows the premises had a total of **22** Staff Members.

2.3 Total College Area & College Building Spread Area

The **total site area is 0.5 acres** and the **total Built-up area of College is 37,002 sq. ft.** for a **total of 818 footfalls.**

2.4 College Infrastructure

2.4.1 Establishment

The College was established in 2009. The college is located pretty close to nature and hence has very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building. **Overall the Infrastructure of the Building is excellent in terms of the Architecture Design and Green Building Design. The Premises covers quite a few of the requirements for a Green Habitat.**

2.4.2 Spatial Organisation

The overall ambience of the College is warm and inviting. The classrooms and other spaces have ample natural ventilation in the form of clear glass windows with fresh air ventilation. The architecture of the building is quite well designed. The colour palette not just helps the building to stand out but also provides an Institutional arena. It balances with the local architecture with the natural landscapes of huge trees all around. The design emphasis on providing calmness to the built form and gradually merges with the serene landscape.

The floor to floor height is more than 10 feet. There is no provision for lifts in the premises, whereas there are amenities such as CCTV, Fire extinguishers, Library and first aid box.

2.4.4 Operation and Maintenance of the premises

The interview session with the staff regarding the operation and working hours is summarized in the table. The Institution is open from Monday to Saturday. The detail wise timing for each is mentioned below.

S. No.	Section	Spaces	Time	Hours/ day	Days in a year
1	Main Institutional College	Student areas and Teaching faculty	Monday to Friday (07:00 a.m. to 12:00 p.m.)	5	280
2	General areas	Admin areas and library, Passage, staircase, toilet	Monday to Friday (07:00 a.m. to 12:30 p.m.)	5.5	300

Table 3: Schedule of the timings of the premises

DETAILED REPORT

3. Green Building Study Audit

3.1 About the Green Building Study Audit

It is a systematic study of the aspects which make the Institution a sustainable and healthy premises for its inhabitants.

3.2 Analysis for the Green Building Study Audit

The procedure included detailed verification for the following:

Energy Audit

- Analysis of the Lights, Fans, AC, Equipment
- Renewable energy
- Scope for reducing the current energy bills if any
- Improvement in the thermal comfort of the campus

Green Audit

- Green initiatives
- Hygiene audit
- Water Audit - Analysis of the current water consumption of campus; Scope to include Rain water harvesting and Waste water treatment in campus
- Waste Audit - Current waste produced, its segregation and usage; Strategies to be adopted for waste management and awareness

Environmental Audit

- Analysis of the current landscape + hardscape of campus
- Analysis of the flora and fauna of campus
- Strategies adopted at present to enhance vegetation
- Measures that can be adopted for ecological improvement of the premises.

3.3 Strategy adopted for Green Building Study Audit

The strategies included data collection from admin department, actual inventory, investigation to check the operation and maintenance, analysis of the data collected and preparation of the Report.

3.4 Timeline of the activities for Green Building Study Audit

- 03 January 2022 – Allotment and Initiation by the College
- 05 February 2022 – Site visit
- 01 March 2022 – Survey of the Student and staff submitted
- 15 March 2022 – Data submitted by College
- 04 May 2022 – Submission of the Report

Green practices

Background reference image Free photos on pixabay

4. Green Practices Audit

The increasing global warming and climate change have made us realise that apart from the enormous strategies the individual small efforts need to be taken by individuals and Educational Institutes as the younger generations are the future of the world and once they are taught about these practices only then can we assume a better future.

4.1 Green practices

We observed the following points during the Site investigation and data verification of the premises; these are common for all the Buildings in the premises.

- **Architecturally planned and designed landscaped garden spaces; Waste management; Wide walkways.**
- There is **availability of open space in the premise in addition to the provision of the multiple varieties of flora.**
- The NSS, College authorities **jointly conduct initiatives for upgrading of the premises from environmental view.**
- Fresh environment is maintained and upgraded by the presence plants. **These vegetation benefit the users by providing shade.**
- **Lectures/workshops conducted on green practices and green infrastructure.**

4.2 Community Development

The various community development programs conducted include Tree Plantation, Life Learning, Employability Skill program introduced for the youth, Blood Donation Camp, Food Kit Distribution Program to the neighbourhood community, Relief fund programs.

A lot of efforts are involved right from planning to execution. The main motive behind these is social welfare. This kind of a tough process is highly admirable. We respect and congratulate the Institute for the same.

4.3 Eco-friendly initiatives undertaken

The Institution has undertaken the following initiatives through **excellent efforts** towards save environment measures follows:

Sr. No	Organized by	Name of Activity	Date
1	NSS	Tree Plantation	09-07-2019
2	Dept. of Commerce	Inter –Collegiate Competitions	18-07-2019
3	Placement Cell	Seminar on Career Guidance	16-07-2019
4	NSS	Sahajyoga Meditation	26-07-2019
5	Placement Cell	Interpersonal Skill Effective Grooming	31-07-2019
6	Cultural Committee	Food Day	03-08-2019
7	NSS	Aadhar Card Camp	06-08-2019
8	Nature Club	Visit to National Park	10-08-2019
9	NSS	Flood Relief	10-08-2019
10	Cultural Committee	Independence Day	15-08-2019
11	NSS	Leadership Training Camp (LTC)	16-08-2019
12	NSS	Bottle for Change	21-08-2019
13	NSS	FIT India Camping	29-08-2019
14	NSS	Nirmalya Collection	03-09-2019
15	NSS	Beach Cleaning Drive	04-09-2019
16	NSS	Beach Cleaning Drive	07-09-2019
17	NSS	Beach Cleaning Drive	08-09-2019
18	Placement Cell	Session on 'Groom Your Feature'	10-09-2019
19	NSS	Traffic Control Activity	11-09-2019
20	NSS	Traffic Management Activity	12-09-2019
21	NSS	Cleanliness Drive at University, Kalina Campus	20-09-2019
22	NSS	Helping in Election Duty	20-09-2019
23	NSS	Rally on 'Nasha Bandi'	01-10-2019
24	NSS	Cleanliness Drive at University, Kalina Campus	02-10-2019
25	NSS	Swatchh Bharat Abhiyan	02-10-2019
26	NSS	Flood Donation	07-10-2019
27	NSS	Voting Awareness Drive at Bandra	19-10-2019
28	NSS	Voting Awareness Drive at University	20-10-2019
29	NSS	Traffic Management for Voting	21-10-2019

30	WDC	Seminar on Self Defence	23-11-2019
31	NSS	Mega Medical Camp	24-11-2019
32	NSS & WDC	Anti-Dowry Rally	26-11-2019
33	IQAC and Placement Cell	Seminar on 'Lead me Right Way'	03-12-2019
34	NSS	Paper Bag Distribution	09-12-2019
35	NSS	Cloth Bag Distribution	11-12-2019
36	NSS	Water Literacy	18-12-2019
37	NSS	Rally on Save Environment	20-01-2020
38	NSS	Health Check Up Camp	21-01-2020
39	NSS	Voting Awareness Drive	23-01-2020
40	NSS	National Voter's Day	25-01-2020
41	NSS	Seminar on HIV/ AIDS Awareness	27-01-2020
42	NSS and Nature Club	Seminar on 'Rethink Plastic'	01-02-2020
43	NSS	Seminar on Organ Donation	03-02-2020
44	NSS	Blood Donation Camp	05-02-2020
45	NSS	NSS Residential Camp	07/02/2020 to 13/02/2020
46	Dept. of F.C.	PPT Presentation on Social Issues	25-02-2020
47	NSS and Nature Club	Rally on Save Tree	25-02-2020
48	WDC	Seminar on Legal Provision for the protection of Women	05-03-2020

Table 4: Details of the events conducted by NSS and NCC Teams

The College conducts various activities like tree plantation, nature cleanliness, and visits to nearby flora and fauna, rural development initiatives.

4.4 Survey Results

An online survey was conducted to analyse the student and staff views about the Energy management practices adopted in College, following is the result received.

4.4.1 Participation

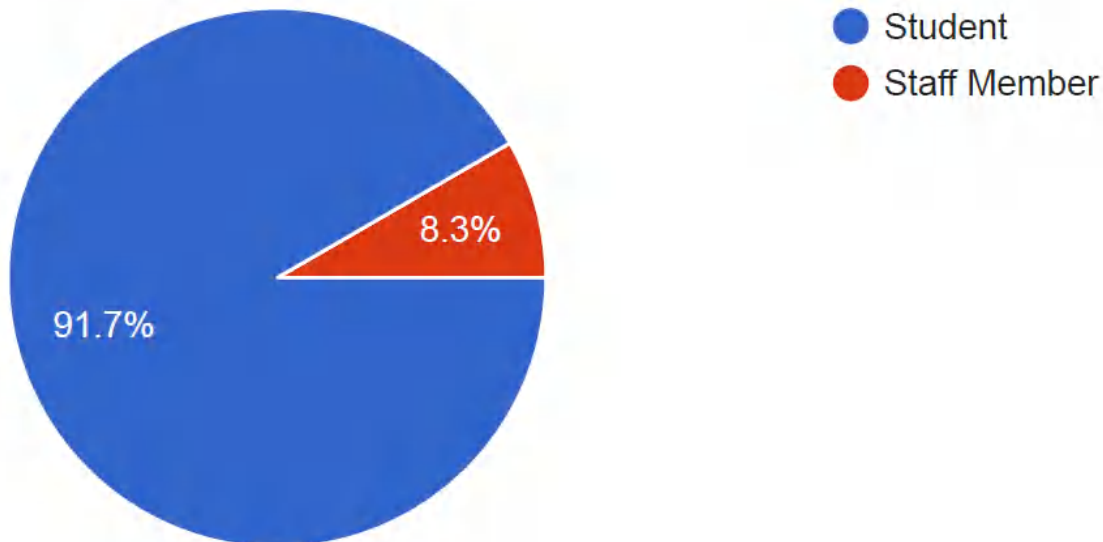


Figure 1: Participation analysis in the survey

A total of **180 responses** were received out of which 92% were students.

Note about the review-rating survey

The Participants were asked to review (Though an online mode) the practice on a scale of 1-5 with scale components as follows:

- Scale 1 – Poor
- Scale 2 – Satisfactory
- Scale 3 – Good
- Scale 4 – Very good
- Scale 5 – Excellent

The figures in each of the columns of graph depict the Number of participants responses in numerical (Percentage of the participant response) – For example 101 responses (44.5%)

4.4.2 Rate the Green awareness practices in College

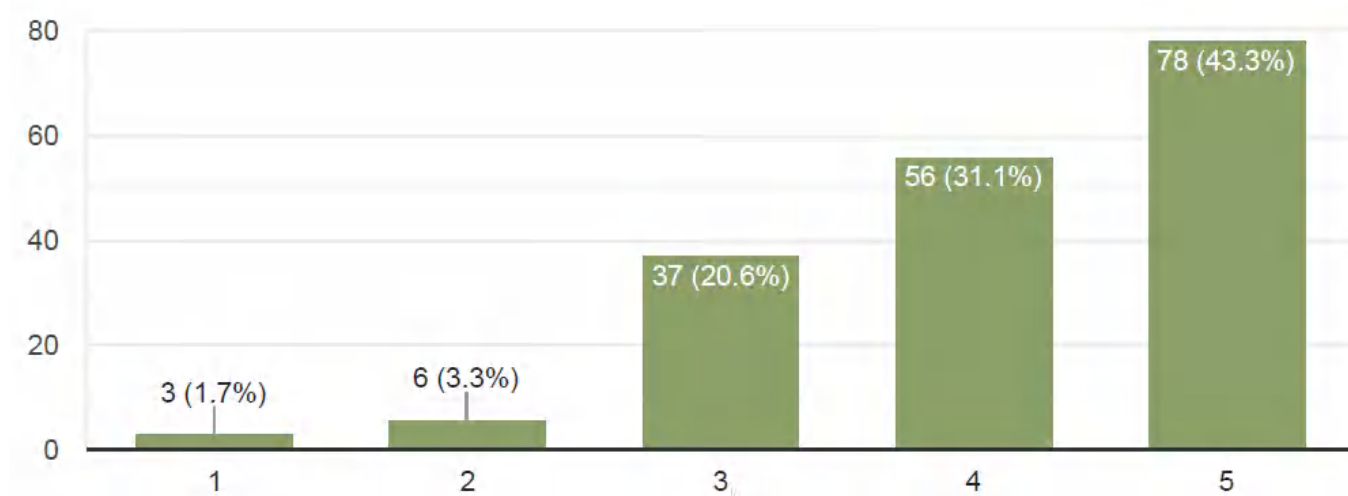


Figure 2: Green awareness practices in College

There were mixed responses received the highest was for **rating 5 (Excellent) at 43%** followed by **31% for rating 4 (Very good)**.

4.4.3 Does your College conduct environment awareness programs/ webinars/ plantations/ cleanliness or similar programs?



Figure 3: Confirmation of the environment awareness programs/ webinars/ plantations/ cleanliness or similar programs conducted by the College

The students, staff **97%** of responses confirmed activities are conducted which is very excellent.

4.4.4 Do you participate in such events?

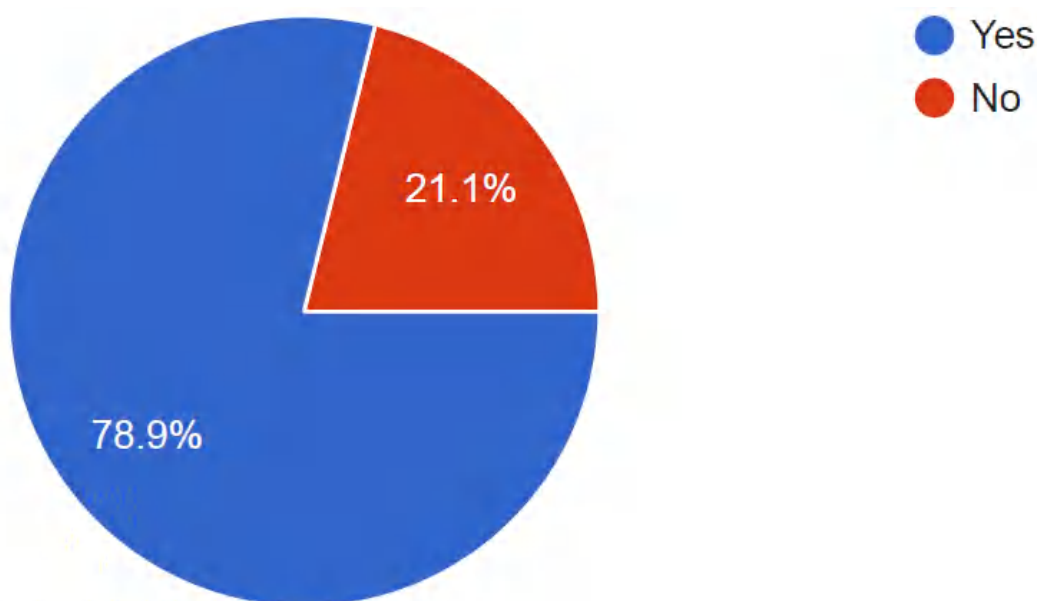


Figure 4: Participation in the environment awareness programs/ webinars/ plantations/ cleanliness or similar programs conducted by the College

The students, staff **almost 79%** of the responses confirmed their participation, **this is good and the college should continue its efforts.**

4.4.5 If yes, what has been your experience about the program?

We have listed some of the key responses below.

- College has always been in field of motivating students and staff members about the environment which has been proven helpful in many ways.
- It has been very informative and a sense of responsibility to take care of our environment.
- It's such a great experience loved to do plantations cleaning
- They explained very in detail everything about plantation, cleanliness, and etc.

4.5 Recommendations for a Sustainable Habitat by Greenvio Solutions

a) Plant as a gift

As a kind gesture the guests visiting the premise can be asked to plant a small plant in the premise itself and they can be even given plants/ bouquet from the flowers of the plants in the premise as a gift.

b) Tree adoption scheme

The college can adopt One Faculty – One tree adoption scheme which is one of its kind practice, this can be very beneficial especially during the summer season.

c) Signages on the plants mentioning scientific names

The practice of having the names of each plant and tree will provide awareness among the staff and students.

Waste Audit

Background reference image Polina Tankilevitch on pexels

5. Waste Audit

Waste is an inevitable part of our lives. Over the years as the awareness about waste management techniques has given a rise to rethink how the waste can be avoided from being sent to the landfills. The audit provides an approximation of the types of waste generated, location of waste collections, disposal techniques used, waste segregation methodologies adopted, waste management strategies that are and implemented in addition to the newer ways the can be adopted aiming to make the premise clean and sustainable. Here sustainable refers to a broader aspect to analyse whether the current techniques are having positive or negative effect on the stakeholders of the premises.

5.1 Waste produced

5.1.1 Types and disposal of waste in Premises

The types of waste collected in the premises are as follows, these are separated before processing.

S. No.	Type of waste	Source and quantity	Current Disposal method	Can be treated/ recycled?	Methodology
1	Solid waste	Toilets–Biodegradable waste of 15-20 kg per week	Led in the storm water drains	Yes	TREATED - Small biogas plant can be proposed in open space
2	Paper waste	Newspaper and other paper	Sold to vendor	Yes	CONTINUE - with the current practice
3	E-waste	Computers - Non-biodegradable waste as per the annual year usage	Given to vendor	Yes	CONTINUE - with the current practice
4	Dry waste in form of leaves	Open space & plantations, papers - Non biodegradable waste of 8-10 kg per week	Municipality	Yes	TREATED – Organic composting can be undertaken
5	Liquid waste	Toilets, washbasins – Around 100 – 120 litres per week during general times and 50 litres at present	Led to the storm water drain and garden	Yes	TREATED - Waste water treatment plant a well as continue with current practice of reuse in garden
6	Organic regular waste	Dust, dirt usually dry waste from Canteen and all sources – approx. 3 to 5 kg	Municipality	Yes	TREATED – Organic composting can be undertaken

Table 5: Summary of the types of waste produced in the premises

5.1.2 Bins summary

There are 18 Dustbins in the premises with volume of 7 litres (small) and made up of plastic material. The analysis of dustbins is presented below.

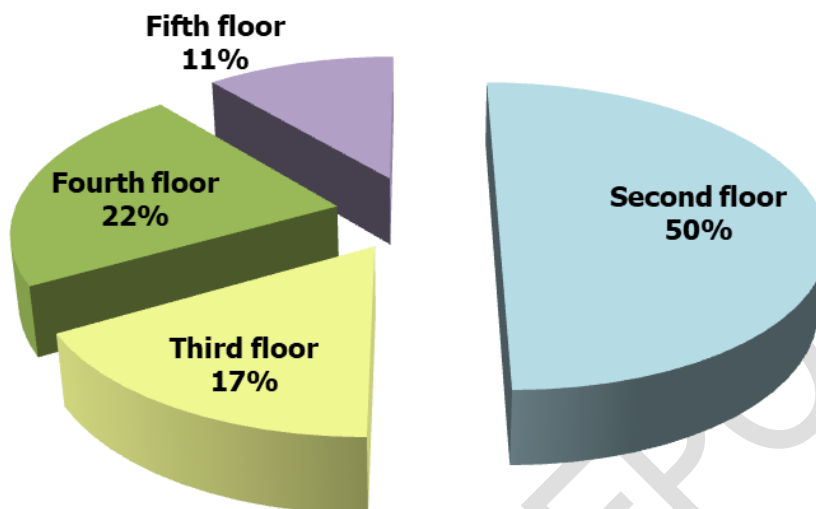


Figure 5: Analysis of dustbins floor wise in the premises

The above analysis shows **50% are present on the Second floor; 22% on the Fourth floor; 17% on the Third floor and 11% on the Fifth floor.**

5.2 Waste handling

Quantification wise as per Interview and survey it was found the following type of waste is Solid, Liquid, Hazardous Waste, Dry leaves, E-Waste, Canteen waste, Unused Equipment waste is collected. The waste produced on premises is segregated. It is collected on a weekly basis. The waste is not handed over to the local municipality van. There is a dumping pit in the garden which should not be there.

5.3 Waste management

The College reuses the papers. Ample measures are taken to maintain hygiene. No smell problem or health related issues due to the waste are there. There are adequate numbers of bins present in all parts of building. The waste does not pollute the ground or surface water. There is no problem of air pollution from waste as informed. The wastes from toilets are discharged to main drains through underground covered channels (Safety Tanks) thus avoiding any incident.

5.4 Survey Results

Note about the review-rating survey

The Participants were asked to review (Through an online mode) the practice on a scale of 1-5 with scale components as follows:

- Scale 1 – Poor
- Scale 2 – Satisfactory
- Scale 3 – Good
- Scale 4 – Very good
- Scale 5 – Excellent

The figures in each of the columns of graph depict the Number of participants responses in numerical (Percentage of the participant response) – For example 101 responses (44.5%)

Rating for the views regarding the Waste management practices adopted in College, following is the result received.

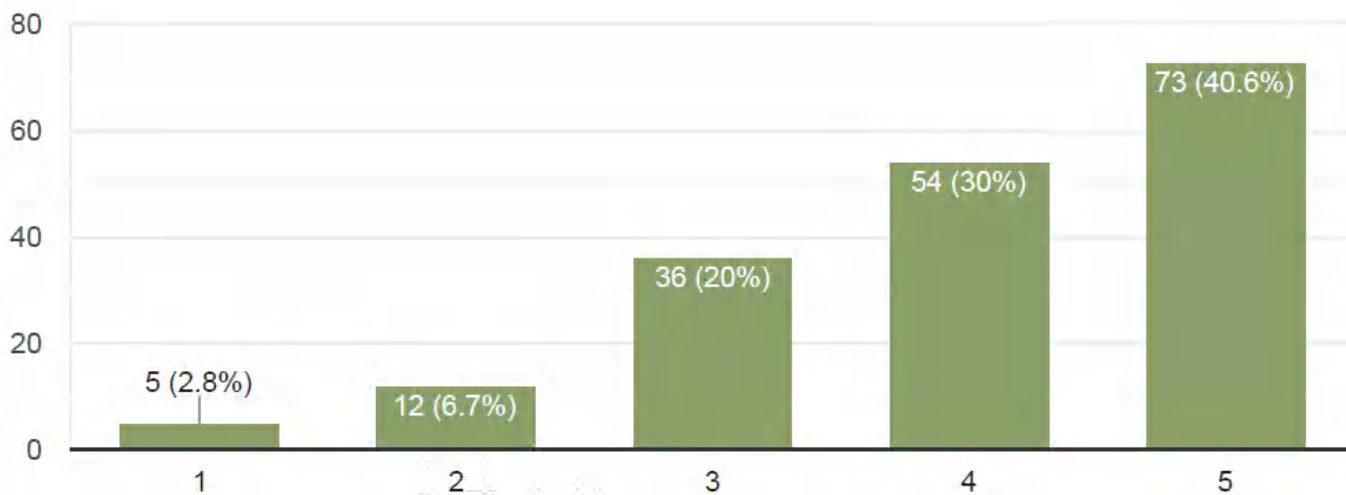


Figure 6: Waste management practices in College

There were mixed responses received the highest was for **rating 5 (Excellent) at 41%** followed by **30% for rating 4 (Very Good)**.

5.5 Recommendations for a Sustainable Habitat

The following practice can be adopted for further up gradation.

a) Zero Waste practice adoption

The College can undertake a zero organic waste protocol. The following practices can be adopted as part of the same.

- The food waste generated by the students and staffs are taken by them to their own home, so that, minimum waste is generated inside the premises.
- The organic waste generated in the canteen is used as feed for a biogas plant and the biogas is used as fuel in College canteen.
- Vegetable waste and other leaf litters can be used to fed in the vermi-compost pit and the resulting vermin-cast is used as manure in the garden.
- The chemicals from the laboratories be disposed in a sealed tank along with water, so that the chemicals undergo neutralization with the water.

As part of the above there will be a requirement for a Biogas plant, vermin-compost pit, awareness signages, sealed tank for waste water from chemical laboratory.

b) Incinerators

The Incinerators should be installed in Girls toilets for disposal of sanitary napkins

c) Twin Dual Litter Dustbin Bins

There should be more number of dual litter dustbins at various locations in areas such as Canteen, open spaces. This would inculcate the awareness of waste segregation among students.

d) Signages

Message about avoiding wastage should be placed at appropriate locations.

e) Material of the dustbin

The current plastic dustbins should be replaced with an eco-friendly material.

Water Audit



Background reference image Vlad Chetan on pexels

6. Water Audit

Water is one of the basic needs. Pure drinking water is a resource which needs to be preserved efficiently. Water audit helps to identify the sources of water consumption, the water requirement by the campus met by these sources. The points and effective usage of without any wastage. Understanding the techniques which are best suited to the site to increase water conservation in terms of awareness and practice.

6.1 Water availability and consumption

6.1.1 Sources of Primary water supply

The main source of water is through Municipality. The College requires water from the Local Municipality for drinking purpose. The total water consumption through a tanks of 10,000 litre capacity located on the terrace.

6.1.2 Sources of Secondary water supply

Bore well and wells – There is 1 Bore well available on the site which are used as underground water facility with daily water being pumped for using submersible pumps. On a daily basis water is pumped from per well for usage depending on the need.

Rain water harvesting – The colleges have rain water harvesting facility at all corners of building. The total rain water percolates to the ground and not in any tanks. In the College premise normal water storage tanks and pump set are available.

6.2 Water requirement

The main areas of water requirement and type of usage is as follows

- **Drinking water** – Consumption of around 2,000 litres of water through Aquaguard like system available in the premise, the taps and water cooler.
- **Toilet blocks**– General usage by occupants in toilets, urinals, bathrooms, wash basins using approx. 1,500 litres of water daily
- **Cleaning of the premises** – The entire College is very well maintained with respect to hygiene and cleaning is one of the major uses of water requirement. The toilet areas are cleaned twice on a daily basis.

6.3 Areas of water usage

Based on the inventory done and data shared by the staff it was found that the premise has the following facilities:

- Urinals – 15 Nos.
- Toilets – 22 Nos.
- Wash basins – 10 Nos.
- Taps (Indoors) – 22 Nos.

As per the data shared by the College and on site observation, it was noted that there is no water wastage of water in the form of Cleanliness of toilets.

6.4 Site investigation about water management.

The College has an excellent management system which is very appreciable. We have observed the following points.

- There is **no water leakage in the entire premise**; the pipes are well maintained with adequate hygiene.
- **The premise has an efficient water management in terms of operations and maintenance.**
- The toilets are kept very tidy and are cleaned every day.
- There are provisions for covered storm water drains for waste water.
- **The College has natural rainwater harvesting system which is very useful.**
- There are sufficient number of taps in the premise.

6.5 Survey Results

Note about the review-rating survey

The Participants were asked to review (Though an online mode) the practice on a scale of 1-5 with scale components as follows:

- Scale 1 – Poor

- Scale 2 – Satisfactory
- Scale 3 – Good
- Scale 4 – Very good
- Scale 5 – Excellent

The figures in each of the columns of graph depict the Number of participants responses in numerical (Percentage of the participant response) – For example 101 responses (44.5%)

Rating for the views regarding the Water management practices adopted in College, following is the result received.

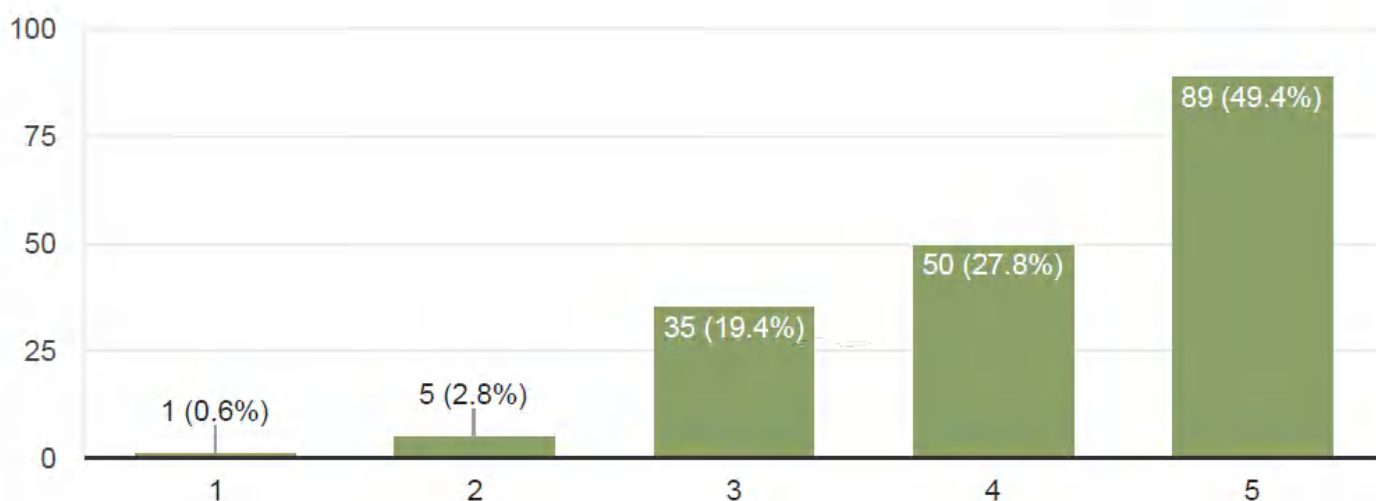


Figure 7: Water management practices in College

There were mixed responses received the highest was for **rating 5 (Excellent) at 49%** followed by **28% for rating 4 (Very Good)**.

6.6 Recommendations for a Sustainable Habitat

Below mentioned are few suggestions for better water management practices in the premise.

a) Waste water from toilets

This should be collected and a waste water treatment plant can be installed in the open space wherein this water can be treated and reused for gardening and toilet flushing.

b) Signages

Message about avoiding water wastage should be placed at appropriate locations.

c) Waterless urinals

There can be provision of waterless urinals as a Green Building initiative in the premise, either the existing ones can be replace with such a facility of new toilets can be constructed in this manner.

DETAILED REPORT

Health & Hygiene Audit



Background reference image Curology on unsplash

7. Health and Hygiene Audit

The hygiene is a part and parcel of our daily life. It is extremely essential to keep the surroundings clean in the same manner as we would want our houses to be. Educational Institutes have a bigger role to play in order to affect the young minds in the positive manner through better hygienic practices.

7.1 Facilities available

The Institution has the following facilities as part of the premise.

- Washroom facility in each of the Building.
- Hand wash facility
- Drinking water facility in the form of Water coolers and taps
- Ample number of dustbins in the premise

7.2 Smoke Exposure

As per the Site visit the following analysis **has a positive impact on premises.**

- The College has No Smoking on its compound wall as part of the awareness.
- Canteen uses Gas cylinders for cooking, there is no utilisation of fire wood. Thus **there is no smoke from burning of fire wood and any health issues related to the same.**
- The **garbage in premise is not burnt** and there is not air pollution because of it.
- The Institution is a tobacco and smoke free campus which helps in adapting to a Healthy Institution
- There is parking provision inside the campus there is slight issue of dust owing to the same but it is **balanced with the good vegetation in the premise.**

7.3 Hygiene

As per the Site visit the following analysis **has a positive impact on premises.**

- For overall hygiene of the students and staff there are facilities such as Washroom facility on ground floor, hand wash. The hygiene of toilet areas is well maintained. **The entire premises is cleaned twice on a daily basis. It is very appreciating that there are only few Maintenance staff who strive their best to take care of the entire premise in the most excellent way possible.**
- The staffs keep a regular check about the operation and maintenance of the equipments each floor.
- Water management initiative with appropriate hygiene is undertaken. The areas of water tanks in site on ground floor are clean and no mosquito breeding spots are there.
- There are pest controls program practiced with appropriate sanitation facilities and Annual Maintenance Contract for pest control is done once a year by professional Pest control units
- As part of Tree Plantation programme the initiative of **Swachh Bharat Abhiyan of Govt. of India** is undertaken during various occasions.

7.4 On-site investigation

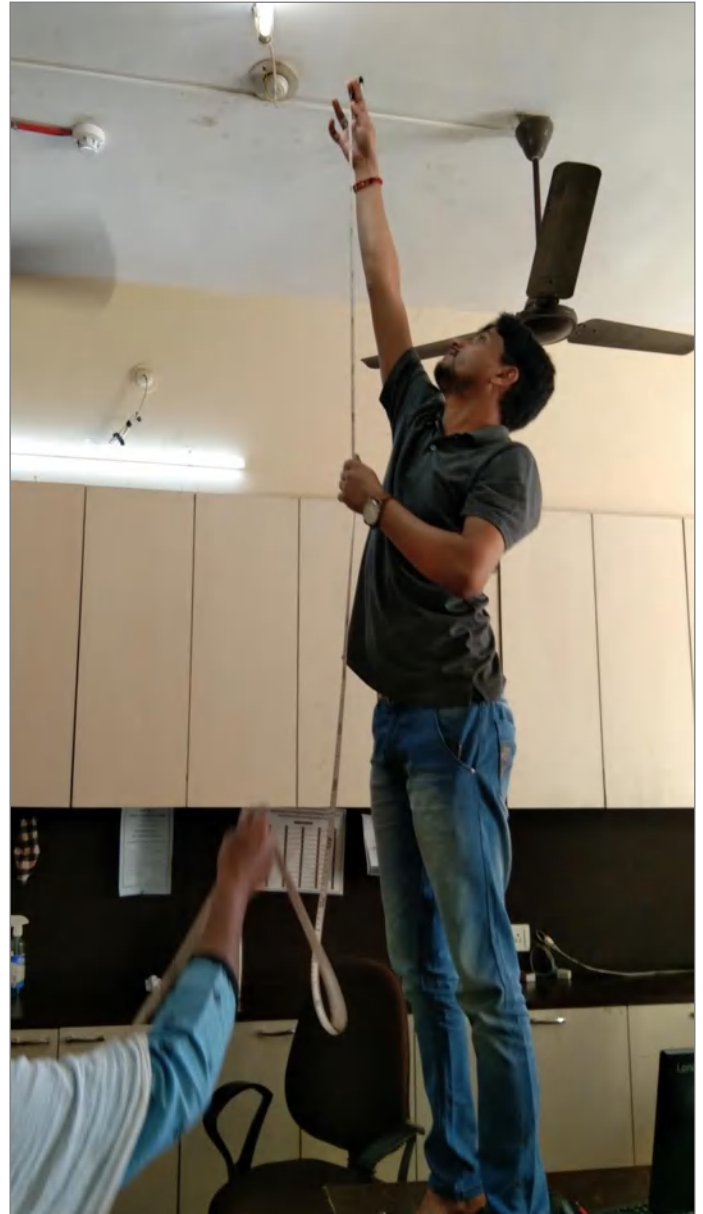
During the physical verification of the site, the following points were noted.

- All the facilities are cleaned on a daily basis.
- The Maintenance staffs are allotted the responsibility of the washroom hygiene and they do a very commendable and excellent job to maintain hygiene of the premise.

7.5 Recommendations for a sustainable habitat

As per site verification for this audit the efforts of the College are highly appreciable as they are very well maintained. However, the College should install sanitary vending and incinerator machines and incinerators at appropriate locations.

On-site investigation and physical verification
Audit Team during the visit on 05 February 2022



On-site review with the Team

8. Towards a Healthy & Sustainable Institution

8.1 Inputs by Greenvio Solutions

Based on the analysis of the study of premises in addition to the recommendations provided in each section of Ecological, Water, Waste and Energy Audit the College can adopt the following strategies towards a Healthy and Sustainable Institution practices.

- a) **Cutlery in the Canteen** – The regular plastic and steel plates, spoons used in Canteen can be replaced with eco-friendly and organic leaves, paper straw, disposable plates, edible spoons and tables made out of sugarcane waste or bamboo. This will be first of its kind initiative to be adopted and practiced thus also inculcating the healthy practices in students.
- b) **Signages** – In addition to the signages being in regular language there can be additional signages in braille language for the especially abled students.

8.2 Survey Results

An online survey was conducted to analyse the student and staff views about what changes according to you can be undertaken for Green audit improvement in College premise and activity.

Some of the suggestions by the Students and staff are listed below:

- More plantation programmes can be conducted. Should organize more environmental awareness webinars.
- Creating eco-friendly rules in a campus, Good old recycling, having a place for refilling a water bottle, transportation.
- Less wastage of papers during examination. Use of white board and marker rather than blackboard and chalk. Installing taps in the toilets instead of flush.

However, it should be noted that the College has taken up multiple initiatives and because of Pandemic the students have not practically visited the campus so many of these points are not mandatory at the moment.

9. References

1. Uniform Plumbing Code – India, 2008
2. IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
3. IGBC Green Landscape Rating system, March 2013
4. BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
5. Used only for understanding Universal design - Universal accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National centre for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.

DETAILED REPORT

