

# SUSTAINABILITY REPORT

2019-20 & 2020-21

## AUDIT REPORT

**Includes Environment, Energy and Green Audit**

**Studied for**

**Bharatiya Vidya Bhavan's**

**M. M. College of Arts, N. M. Institute of Science**

**and H. R. J. College of Commerce**

**Bhavan's College (Autonomous)**

**Munshi Nagar, Andheri (West), Mumbai – 400 058**

**Analysed by**



**13 March 2022**

## Disclaimer

The Audit Team has prepared this report for **Bharatiya Vidya Bhavan's M. M. College of Arts, N. M. Institute of Science and H. R. J. College of Commerce, Bhavan's College (Autonomous)** located at Munshi Nagar, Andheri (West), Mumbai – 400 058 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 Standards, the report has thereby been generated based on comparative analysis of the existing facilities and the benchmarks. The suggestions derived as a result of the inspection and research as per inputs which would further enhance and develop a Healthy and Sustainable Institution.

These can be implemented phase wise or as a whole warranty or undertaking, express 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 inventory and on-site 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.

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

### Greenvio Solutions

*Developing Healthy and Sustainable Environments*

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

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## Acknowledgement

The Audit Assessment Team thanks the **Bharatiya Vidya Bhavan's M. M. College of Arts, N. M. Institute of Science and H. R. J. College of Commerce, Bhavan's College (Autonomous)** for assigning this important work of Green, Energy and Environment Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to **everyone from the Management.**

Our sincere thanks to **Principal (Prof.) Dr. Zarine Bhatena** for the valuable inputs during the whole process.

We are also thankful to College's Task force the faculty members who have collected data required for the audit **Dr. Ujjvala Phatak**, IQAC Co-ordinator and IQAC Member, **Prof. Ruby Roy**, Incharge, IQAC Member (**Special mention for the excellent co-operation by Madam in entire process**); **Mr. Ramesh Palloti**, Librarian; **Mr. Santosh Jadhav** and other Admin staffs for the inventory and data collection.

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

### **Sustainable Academe**

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

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# 1. Introduction

## 1.1 About Institute

Bhavan's College was established in 1946 By Kulapati Kanhaiyalal Maneklal Munshi , To preserve and propagate *Bharatiya Vidya*, has throughout the post-independence period, served the society's educational needs, by being deeply committed to Bhavan's culture, traditions and values.

The Bhavan's campus at Andheri has been enriched by bonding and networking between the sister institutions on the campus; such that opportunities abound for bhavanites to learn the ancient and the new, to explore international endeavours and yet remain strongly rooted in Indian culture.

Thus, Bhavan's campus at Andheri truly lives up to the vision of the founder Kulapati Dr. K.M.Munshiji for Bhavan's education means "Amrutam Tu Vidya" i.e. "knowledge is nectar" as it strives to bring together sound academic achievement with an extensive, vibrant co-curricular program that includes sports, culture and leadership training.

## 1.2 Vision and Mission Statement of College

**Our Vision** - *Integrated Development of Students to empower them as citizens of India along the lines of Bharatiya Vidya envisioned by our founder Kulapati, Dr K.M. Munshiji.*

*Ensuring professional competence, personal development through social equity thereby making core competencies socially and environmentally beneficial.*

**Our Mission** - *Grooming professionals by providing modern facilities for academic excellence, training in soft and vocational skills, so that they can meaningfully contribute to the building of the nation.*

*Achieving a holistic development of personality through education which is in the view of Bharatiya Vidya Bhavan, is both modern and tradition so as "to motivate the weak, address the average and challenge the gifted"*

### 1.3 Institutions in the premises

The Premises is situated at Andheri (West) in Mumbai district with close proximity recreational and amenities such Hospital, Fire Station and much more. A smooth management of transition of internal students' traffic is highly commendable. It was established in 1946 in small barracks where now over the time it has grown into multiple blocks prevailing in the premise and has undergone multiple expansion activities.

The institution is committed to offer quality education which fulfil the requirements of its students and help them in pursuing their future goals. The institution designs curricular and co-curricular programs to develop the qualities of hard work, honesty, integrity and socialism among the students. The competitive environment helps students to attain their full intellectual and personal potential through passion for excellence, making them globally competent. The institution is always ready to take care of the students by providing following opportunities. The objectives of college are as follows:

*Student development encouraged through Knowledge, Imagination and Innovation thereby creating responsible global citizens. Linking studies with contemporary industry developments and applications, encouraging creative and collaborative engagement in curricular and co/extra-curricular activities*

The aim of the college is to continuously enhance the teaching methods in order to provide students with an opportunity for their all-round development. It also strives for excellence in academics and makes an effort to induce passion for learning along with the inspiration for decisive thinking and assessment, thereby helping them to become the best professionals in their chosen careers. The institution offers the following courses affiliated to University of Mumbai.

- **Graduation**
- **Post-Graduation**
- **Doctorate**
- **Short term courses** - The College has introduced Industry linked courses.

The College aims at training young women and men to be competent, committed and compassionate, and lead in all walks of life.

## 1.4 Assessment of the College

**University** - The institution is affiliated to University of Mumbai.

**Certification** – The institute has received the following Certifications

- ISO - The college is ISO:9001:2015 Certified for providing Educational Services for the Students of Arts, Commerce and Science in Graduation, Post-graduation and Doctoral Courses.
- AISHE – The data was submitted on 15 March 2022.

**Recognitions** - University Grant Commission (UGC) by 2(f) 12(b)

**Accreditation** - The following are details of the reaccreditation of the College.

Cycle	First	Second
<b>CGPA</b>	82	3.02
<b>Grade</b>	B++	A
<b>Year</b>	2004	2015

*Table 1: NAAC Accreditation details of the College*

## 1.5 Achievements of the College

The College has a tremendous track record of excellence in Built form and educational services provided, below are some of the achievements of the prestigious Institute.

- The standing committee constituted by UGC, conferred Autonomous status to Bhavan's College, Andheri which is affiliated to University of Mumbai w.e.f. 2019-20 for the period of 10 years.
- The 70<sup>th</sup> Republic day ceremony conducted by Mumbai University at Phirozeshah Mehta Bhavans Kalina was indeed very special for Bhavans College Andheri, as our principal Dr. Zarine Bhathena received the "**Best Teacher Award**" (**Urban Area**). She was recognised for her valuable contribution to knowledge teaching and research undertaken with a sense of commitment, dedication and sincerity.
- **Rajani Foundation India, founded by Assistant Professor Aniket M.R. Salvi of Bhavans College received 'Certificate of Merit'** on the World CSR Day, presented by ET Now News and organised by World CSR Congress for

their work at the grass root level for the underprivileged section of society.

- The students of Microbiology had participated in **18<sup>th</sup> State Level MicroiOlympiad** competition organised by the Department of Microbiology & Biotechnology, R.C. Patel Arts, Commerce & Science College Shirpur on 27 January 2019 and three of our students won third prize in competition.
- Four students of Zoology department were awarded the **“DD Kosambi Young Scientist Award 2019”** organised by Homi Bhabha Center for Science Education Tata Institute of Fundamental Research Mumbai.
- SGT Arshia Rashid and CPL Khushi Jangid attended the Prestigious All India Republic Day Camp. They were a part of the Maharashtra contingent and marched on the Rajpath with pride.



सत्यमेव जयते

भारत सरकार  
रक्षा मंत्रालय  
(राष्ट्रीय कैडेट कोर)

रक्षा राज्य मंत्री प्रशंसा पत्र

नं० : एनसीसी/9310032 रैंक : कैप्टन  
नाम : मालिनी ताराचंद शर्मा  
यूनिट : 8 महाराष्ट्र गर्ल्स बटालियन एनसीसी, मुंबई  
वर्ष : 2020

आपकी कर्तव्यनिष्ठा, सेवा और अनुशासन की भावना के लिए आपको वर्ष 2020 का रक्षा राज्य मंत्री प्रशंसा पत्र प्रदान किया जाता है।

(Shripad Naik)  
Raksha Rajya Mantri  
Ministry of Defence, Govt. of India  
New Delhi

रक्षा राज्य मंत्री

नई दिल्ली  
30 दिसम्बर 2020



## Best Teacher Award

The 70th Republic day ceremony conducted by Mumbai University at Phirozeshah Mehta Bhavan Kalina was indeed very special for Bhavan's College Andheri, as our Principal Dr. Zarine Bhathena received the "Best Teacher Award"(urban area) at the hands of the Vice Chancellor Dr. Suhas Pednekar amongst an august gathering of dignitaries, students & teachers. She was recognised for her valuable contribution to knowledge, teaching & research undertaken with a sense of commitment, dedication & sincerity. Dr.Bhathena believes that being a teacher is by choice & not by chance and we have to give our best keeping the student welfare in mind.

## 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 **4,000+ boys and girls students.**

#### 2.1.2 Staff data

The staff data shows the premise had a total an approximate 250+ 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 **2,387 Girl and 2,040 Boys** students.

#### 2.2.2 Staff data

Type	Total
Admin staff	<b>35</b>
Teaching staff	<b>112</b>
Non-teaching staff	<b>134</b>
<b>Total</b>	<b>281</b>

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

The staff data shows the premise had a total of **281** staff members.

### 2.3 Total Institute Area & College Building Spread Area

The **total site area is 8 Acres** and the **total Built-up area of College is 1,57,703.45 sq. ft.** for a **total of 4,708 footfalls.**

## 2.4 Site analysis

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 Bharatiya Vidya Bhavan's M. M. College of Arts, N. M. Institute of Science and H. R. J. College of Commerce, Bhavan's College (Autonomous) is located at Munshi Nagar, Andheri(West), Mumbai – 400 058 and falls under the K/West Ward of Andheri a locality in the western part of the city of Suburban area of the Mumbai City in the state of Maharashtra.
- **Neighbourhood context** - The premise is surrounding by open areas on the immediate surroundings of the site. The premise is situated amidst the lush greens of village areas and is surrounded by huge jungles on all sides.
- **Natural physical features** – The premise includes a rich biodiversity and huge number of plants in the adjacent open space.
- **Manmade features** – The premise is situated in an urban area amidst huge open land areas 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/>)

## 2.5 Institute Infrastructure

### 2.5.1 Establishment

The building was established in 1946. 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 Premise covers almost all the requirements for a Green Habitat and is one of its kind set up pretty close to nature.**

### 2.5.2 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 coconut trees all around. The design emphasis on providing calmness to the built form and gradually merges with the serene landscape.

There are no false ceilings in the premise. The floor to floor height is 20 feet and of 3m or 10 feet. There are no lifts in the premise. There are provisions for CCTV in addition to amenities such as library, open gardens, pond, seating areas, special blocks for NCC, state of the art infrastructure and playgrounds.

### 2.5.3 Fire Safety

When the building was constructed Fire fighting norms and permission from Chief Fire Officer was not in practice. However, the Institution has taken care for adequate fire safety measures to be adopted. 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 college should adopt additional fire safety practices such as fire hydrant and others. **The current facilities are quite well maintained.**

### 2.5.4 Operation and Maintenance of the premises

The interview session with the staff regarding the operation and working hours is summarised in the table. The Institution is open Monday to Saturday for full day. Sunday is an off for all. The operating hours and days are as follows.

S. No.	Section	Spaces	Time	Hours / day	Days in a year
1	Main Institutional College	Student areas and Teaching faculty	7:00 a.m. to 5:00 p.m.	10	280
2	General areas	Admin areas and library, Passage, staircase, toilet	8:00 a.m. to 6:00 p.m.	10	300

*Table 3: Schedule of the timings of the premises*

# On-site investigation and physical verification

## The Beautiful and Eminent Institution Building and premises



## 3. Green Audit

### 3.1 About the Green Audit

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

### 3.2 Analysis for the Green 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

#### 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 campus

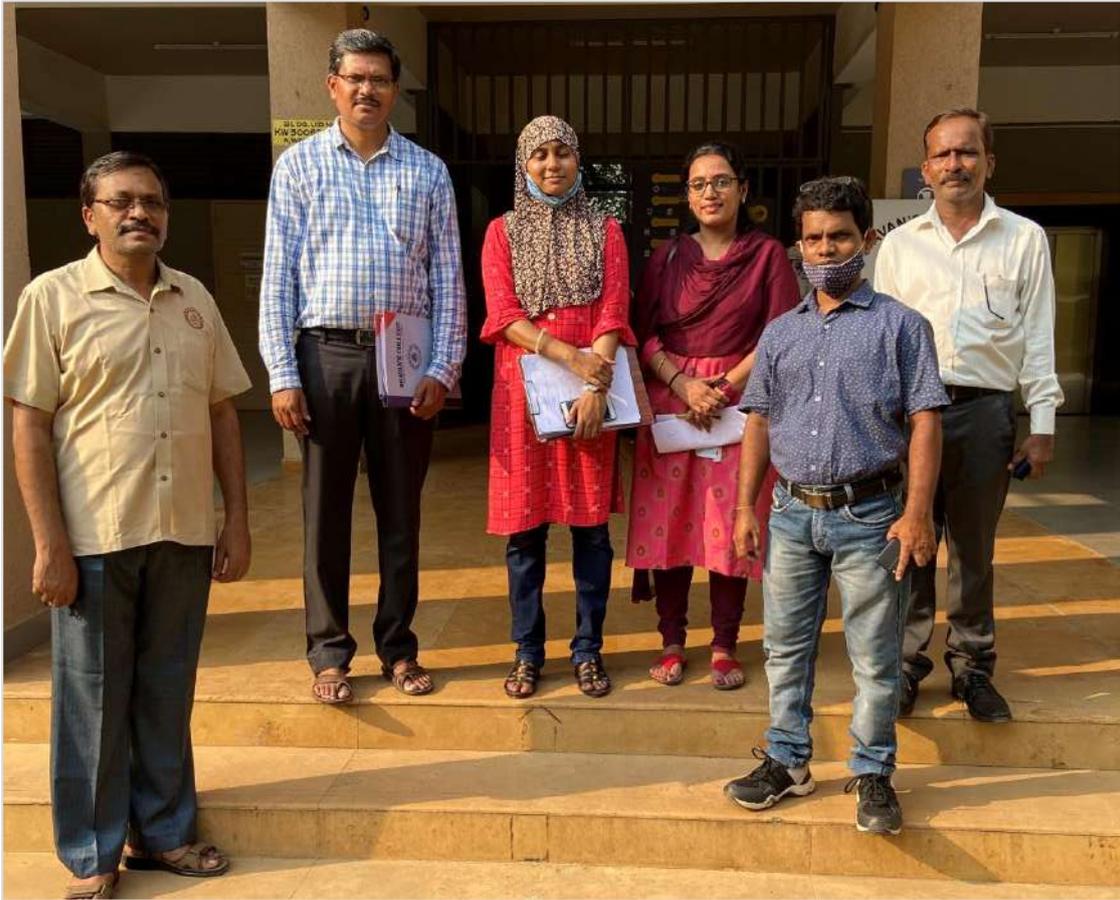
### 3.3 Strategy adopted for conducting Green Audit

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 Audit

- 03 June 2021 – Discussion with the College
- 29 July 2021 – Initiation by the College
- 06 October 2021 – Site visit of the College
- 19 November 2021 – Survey of the students and staff submitted
- 15 December 2021 – Data collection submitted by College
- 13 March 2022 – Submission of the Report

**On-site investigation and physical verification**  
Audit team with College team during the visit



# Ecological (Environment) Audit



*Background reference image Yugal Shrivastava on pexels*

## 4. 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 premise. 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. The premise needs to have facilities for students who are specially abled alike.

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 and in the beautiful western suburb of Andheri the appreciation space towards the main entrance provide a welcoming approach to the College. It has an equal balance of landscape and built space thus providing an enriching arena to the students.

The college has huge open space used by all. The students use it for as a leisure place for study and college ground is used for sports activities. The open auditorium is used for co-curricular and extra-curricular spaces, it also given for marriage functions. There are ample resting spaces as part of building design which provide a resting and warm welcoming approach in the premises.

### 4.1 Open Spaces

General playground used for sport activity and private function like cricket matches and Marriage functions. Around 400 sq. m of area is allocated for tree plantation in the premise. The college has a Botanical Garden facility with a coordinating team.

There is an appropriate coordinating team in charge for open spaces, its activities and maintenance. The college follows an appropriate irrigation system wherein water is supplied through pipe line to botanical garden, playground and landscaping.

## 4.1.1 Ecological analysis

### A) Plants and Trees (Flora)

There are a **total of 500+ varieties of plantations** and the trees constitute the maximum percentage out of all the varieties of plantations in the premises. The list is as follows:

S.No	Botanical Name	Type	Nos	Species planted during an event	Location
1	Rain Tree	Tree	1	No	Near entrance
2	Asoka	Tree	25	Yes	Along roads
3	Coconut	Tree	69	Yes	All over campus
4	Bottle Palms	Tree	20	Yes	Around garden
5	Banyan	Tree	1	No	Near garden
6	Gulmohor	Tree	4	No	Near garden
7	Neem	Tree	5	Yes	Around garden, along road
8	Mango	Tree	11	No	Premises, playground,
9	Almond	Tree	3	No	Near playground
10	Peepal	Tree	1	No	Near sfc building
11	Jamun	Tree	1	No	Near kulapati sadan
12	X Mas Tree	Tree	1	Yes	Front of nss office
13	Bettlenut Palm	Tree	5	Yes	Front of main office
14	Unidentified Trees	Tree	8	No	All over premises
15	Champa	Tree	23	Yes	Garden in front of main gate
16	Hibiscus	Bush	50	Yes	Front of main office
17	Unidentified Boundary Bushes	Bush	300	Yes	Garden boundary

*Table 4: List of Trees available in premise*

## B) Fauna

The premises has a rich variety of fauna which enhance the ecological footprint, the same are listed as follows:

S. No.	Name	Bird/ animal	Location
1	Crows	Bird	Premises, Playground
2	Sparrows	Bird	Premises, ,Playground, Garden
3	Parrots	Bird	Garden, Playground
4	Kingfisher	Bird	Garden, Playground
5	Peacocks	Bird	Adventure park
6	Kites	Bird	Playground, Premises
7	Owl	Bird	Banyan Tree
8	Bats	Animal	Banyan Tree
9	Turtles	Animal	Near Pond
10	Snakes	Reptiles	Premises , Near Pond
11	Squirrels	Animal	Premises, Near Pond

*Table 5: List of Medicinal plants available in premise*

### 4.1.2 Green practices

We observed the following points during the Site investigation:

- There is availability of open space in the premise in addition to the provision of the Botanical garden.
- There is vermin-composting process carried out for decomposition of organic matter of plants and it is used as an organic fertilizer.
- The Institution uses fertilisers thereby making efforts to maintain and increase ecology. The ample vegetation provides shade thereby benefiting the users. The College has compost pits available in premises which are used to make manure and organic slurry which are used for the plantation. The quantity generated is sufficient and the use of chemical fertilizers is avoided.
- There are adequate Maintenance staff who manage the entire premises. There is availability of pond which enhances the biodiversity of the space.

### 4.1.3 Eco-friendly initiatives undertaken

The Institution has undertaken the initiatives through **excellent efforts** towards save environment measures.

## 4.2 Noise Audit

### 4.2.1 Macro level

On a macro level there are zero settlements or any other type of built form close to the site. The approach road too has balanced traffic. As the college is oriented between the jungle there is bare minimum noise from the surrounding areas. **Overall the noise level is low and less noise Pollution as College falls under silent zone as per our analysis.**

### 4.2.2 Micro level

The college has huge open space covered with greens which absorb the sound and help in keeping noise levels low and students, staff do not have any disturbance in academics majorly. However 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 low which is a good approach.**

## 4.3 Carbon Footprint Audit

### 4.3.1 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 65%
- **Student vehicles** – The provision provided by College includes 80-100 cycle, 50 bikes, 40-50 four-wheeler.
- **Visitors vehicles** – Approximately 60 visitors with vehicles visit the premises

daily, but visitors vehicles are not parked in the premises.

Sr. No.	Name of the locality	Mode of transport
1	Nearby Andheri (<5km)	Walking/ Metro/ Auto/ Private vehicle
2	Away from Andheri (>5km)	Train/ Bus/ Metro/ Auto

*Table 6: Details of location from premise*

### 4.3.2 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 Buildings have solar panels.

Exposed non-roof hardscape areas - There is a pathway on all sides of the premises. There are huge open spaces with lush greens these help in maintaining the micro climate of the surrounding to a major extent in addition the courtyards are provided with grass pavers.

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

### 4.3.3 No Outdoor Light Pollution

The college compound lights are not upward looking there not causing light pollution.

## 4.4 Health & Hygiene Audit

### 4.4.1 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 premises is not burnt and there is not air pollution because of it. The Institution is a tobacco and smoke free premises which helps in adapting

to a Healthy Institution

- There is a huge open space in premises which is allowed for social gathering among students. It is also used for sports, outdoor games, annual days, cultural functions and also used for physical activities by the students.
- There is parking provision inside the premises there is slight issue of dust owing to the same but it is balanced with the thick vegetation in the premise.

#### 4.4.2 Hygiene

- For overall hygiene of the students and staff there are facilities such as Washroom facility on ground floor, napkin disposal, waterless urinals, hand wash, Sanitary vending machines, drinking water facility as Aquaguard.
- The hygiene of toilet areas is well maintained.
- **The entire premises is cleaned on 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.**
- There are designated Hygiene specialist and Maintenance staff who keep a regular check about the operation and maintenance of the toilet areas and the equipments, lights and all facilities on 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 signed.
- The food premises and equipments are cleaned as per schedule with special care taken to avoid any water stagnation.
- The food waste and other refuse is removed periodically from food handling areas to avoid accumulation.
- As part of Tree Plantation programme the initiative of **Swachh Bharat Abhiyan of Govt. of India** is undertaken during Environment Day Celebrations.



Bharatiya Vidya Bhavan's

Megji Mathradas College of Arts • Narrondass Manordass Institute of Science  
Haji Rashid Jaffar College of Commerce

## BHAVAN'S COLLEGE

Estd : 1946, Affiliated To University of Mumbai • Reaccredited Grade 'A' (2015-2020) by NAAC Bengaluru • Awarded Grade 'A' by KCG (Gujarat) under AAA-G.  
Munshi Nagar, Andheri (West), Mumbai - 400 058.

Ref. No. \_\_\_\_\_

Date : \_\_\_\_\_

14/01/2021

To,

Pest Control (India) Pvt. Ltd.  
Veera Desai Road Branch  
A/47, Gr. Floor, Ghanshyam Industrial Estate  
Off. Veera Desai Road, Andheri (West),  
Mumbai – 400053, Maharashtra, India  
Tel: 26740891, 40858787  
E-mail: veeradesairoad\_branch@pcil.in

### Sub: Renewal of Contract for Pest Management Services

With reference to your Quotation/Contract No. P2672/KMG/2021 dated 14/01/2021 we are pleased to Renew the **Contract for Pest Management Services** with you. Kindly provide the services as per the following terms and conditions.

1. The work order and contract covers the following premises as per the price agreed upon and mentioned below

No.	Service	Premises	Total Amt.
1)	TermiSeal Services	For Following Premises: I) Office Building + Chemistry Building (Ground+2Floors). II) Library Building (Ground +2Floors). III) Kulpati Sadan & Biotech Bungalow. IV) Gymkhana & Gymnasium <b>(Contract Period: 5 Year).</b>	Rs. 290500.00
		(Including 18% GST)	Rs. 52290.00
		<b>Grand Total</b>	<b>Rs.342790.00</b>

2. The payment will be made in two installments.  
**50% will be paid as an Advance Payment**  
**50% will be paid After Completion of 100% of the Treatment (Covering Total Premises Mentioned above)**
3. Mode of Treatment should be as per the guidelines given by Indian Standard Code of Practice.
4. The Contract will be for the period of ~~one~~ <sup>five</sup> year i.e. **01 Feb 2021 to 31<sup>st</sup> Jan 2026.**
5. Your company (PCI) has to take proper Safety Measures during and after treatment.
6. The contract includes initial drilling treatment +1<sup>st</sup> inspection in 4<sup>th</sup> month & thereafter once in a year. However, in case of pest resurgent during the contract, your company has to provide additional services without any extra cost.
7. You will have to produce a certificate of authenticity of materials/chemicals or assure the quality of the materials provided according to our requirements.
8. Bhavan's College, Andheri (W), reserves the right to cancel the order or withhold the payment for improper service or non-compliance of operational conditions and the decision of Bhavan's College will be the final.



**Principal**

**Dr. (Mrs.) Zarine Bhathena**

## 4.5 Universal Premises

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

The college has provisions of ramps for main access to all the Institutional Buildings.

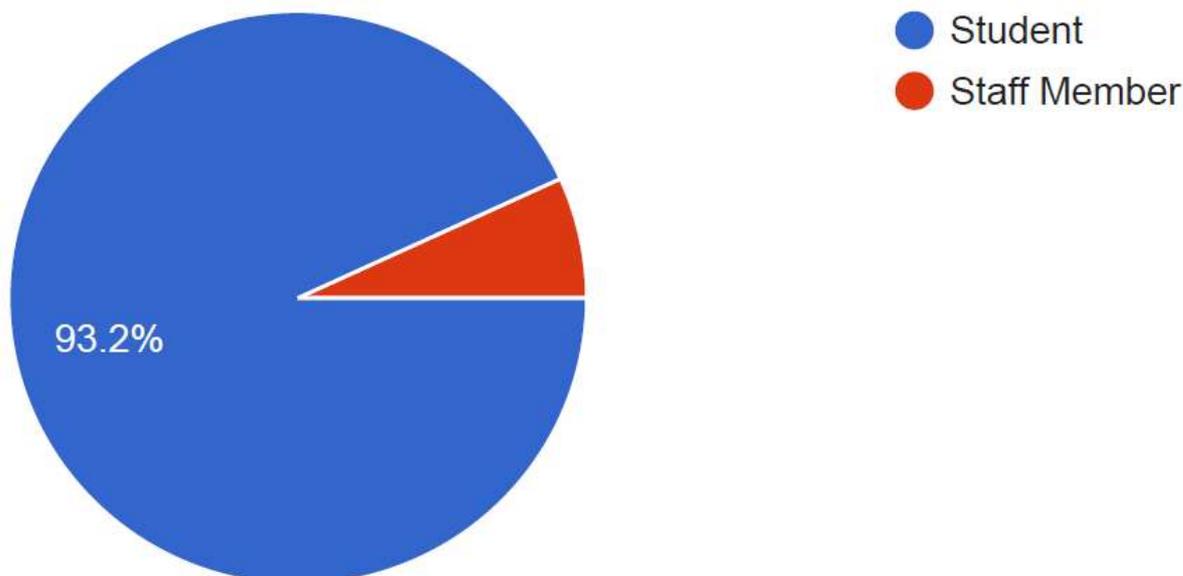
There are Handrails along corridors or near staircase main building, library, indoor stadium, outdoor stadium and provision of wheelchair as part of universal premises initiatives.

The college has resting places (seating areas) in the premises outdoors, thereby making it user friendly for the specially abled students. The design of the premises is appropriate for access with passages and corridors being wide. The single loaded corridors are safe from fire safety as there are staircases and fire extinguishers provided. There is a provision of ramp in premise.

## 4.6 Survey Results

An online survey was conducted to analyse the student and staff views about the premise, following are some of the reviews.

### 4.6.1 Participation



*Figure 1: Participation analysis in the survey*

A total of **117 responses** were received out of which 93% were students.

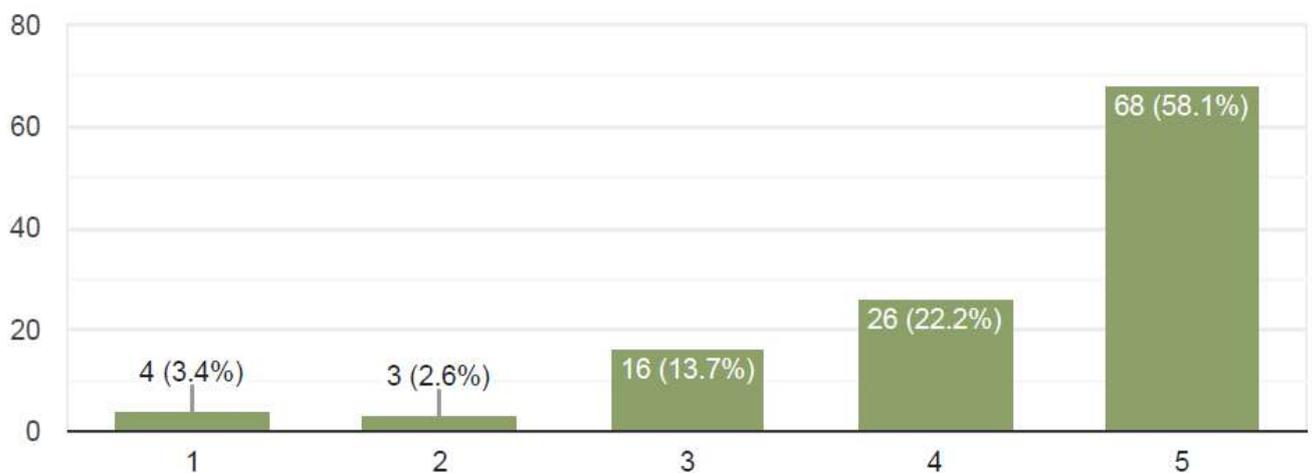
### About the survey ratings

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%)

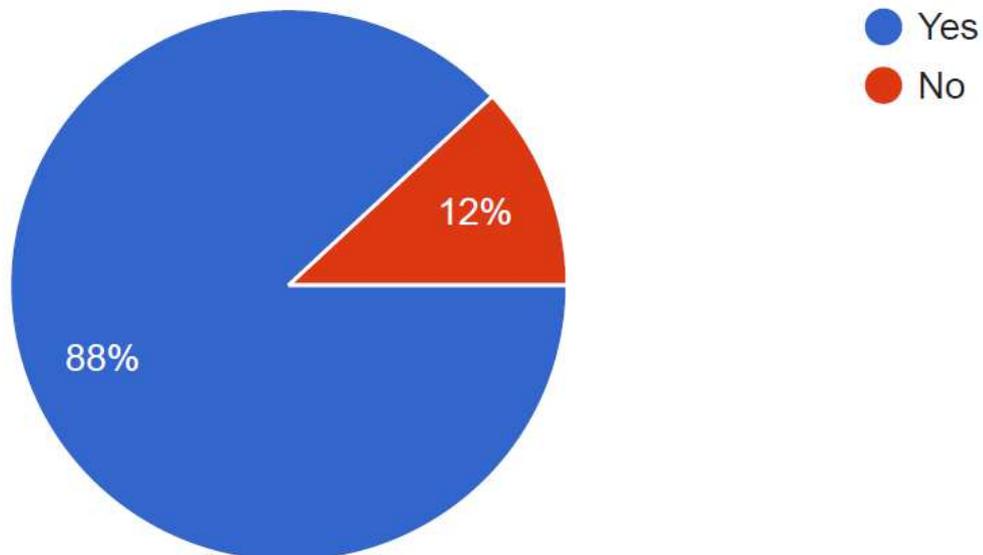
#### 4.6.2 Rate the Green awareness practices in College



*Figure 2: Green awareness practices in College*

The students, staff (**almost 58%**) of responses found the practices to be excellent.

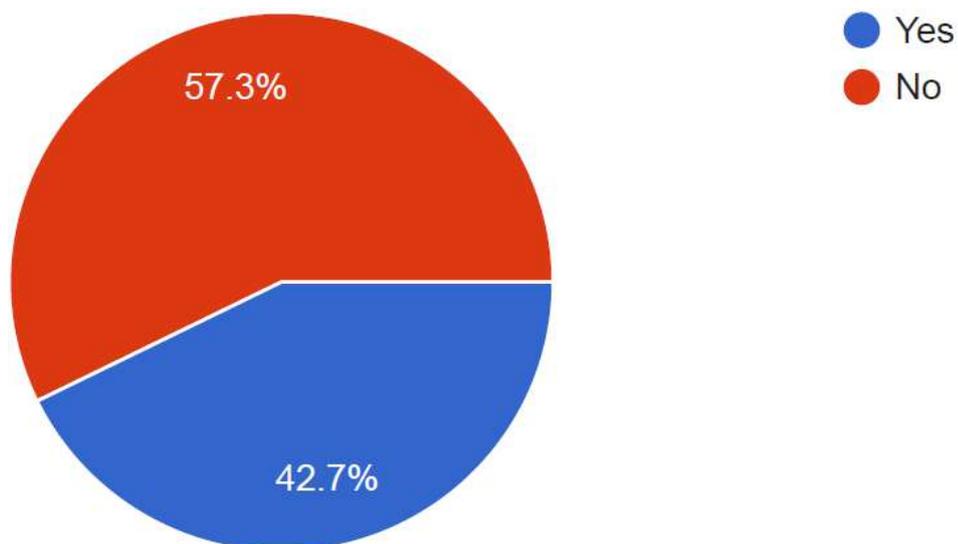
#### 4.6.3 Does your College conduct environment awareness programs/ webinars/ plantations/ cleanliness or similar programs?



*Figure 3: Green awareness practices in College*

The students, staff (**almost 88%**) of responses confirmed activities are conducted.

#### 4.6.4 Do you participate in such events?



*Figure 4: Students participation in the environment programmes conducted by college*

The students, staff (**only 43%**) of the responses confirmed their participation, this is not even half the population, this number should be improved. The college can adopt better strategies to get students involved in the programmes.

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

We have listed some of the key responses below.

- **The greenery of Bhavans college is top at the apex every morning going to the college feels very good with fresh air and green environment it feels great to be student of Bhavans college**
- It's amazing and very open and knowledgeable.
- It's really amazing.
- It was very good and we learnt something new and had a great experience.
- Being a part of the NSS group, the experience has been incredible and it feels amazing to be able to contribute to the environment and spreading awareness among all.
- **I have attended many such programs through NSS and all the webinars were informative.**
- It good and gave a chance to learn.

#### 4.6.6 What according to you are the positive steps taken by the Institute towards Green Building/ Good maintenance?

We have listed some of the key responses below.

- Plantation of trees, maintaining cleanliness, good water facilities, spacious campus
- **Being a bhavanite I have personally experienced greenery everywhere in my college and how perfectly the college is maintaining it is commendable.**
- Maintenance of ground, lakes and garden, saving light energy also.
- **Plantation of saplings and having a separate botanical garden that includes large and various number of plants it's very inspiring, healthy and soothing.**
- The college is very precise and particular. There are schedules which are followed regarding regular sweeping of the campus and cleaning of the washrooms which is very imp during these times

- **The Bhavans campus is the 'greenest' campus that I've across Mumbai.**
- Plantation everywhere and proper maintenance of those plants is some positive steps taken by my college
- **Institutions use natural gas which cause less pollution . They have planted ample amount of trees .**
- This college has a big green ground which is filled with so many plants and trees which creates a green and healthy environment for the students and college staffs.
- **Planting maximum number of trees in the college campus as well as taking care of them, Dustbins placed over for maintaining cleanliness; Motivating student about the significant of green environment by performing various activities and projects.**

#### **4.7 Recommendations for a Sustainable Habitat**

##### **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) Environmental awareness**

There can be various artworks on compound wall giving message of saving environment through the joint efforts of the students and staff thereby making the student socially and environmentally responsible citizen.

##### **c) 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.

##### **d) No vehicle day**

Once in a while a No vehicle day can be adopted by students and staff to promote the use of eco-friendly vehicles in the premise.

**On-site investigation and physical verification**  
The ecologically friendly premises with facilities for user benefit



# 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 Premise

S. No.	Type of waste	Source and quantity	Current Disposal method	Can be treated/ recycled?	Methodology
1	Solid waste	Toilets–Biodegradable waste of 15 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	Handed over to Municipality	Yes	TREATED – A small compost pit can be prepared
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	Handed over to Municipality	Yes	TREATED – A small compost pit can be prepared
7	Medicinal waste	Sanitary pads and labs	Vendor	Not required	CONTINUE - with the current practice

*Table 7: Summary of the types of waste produced in the premises*

### 5.1.2 Bins summary

There are 142 of 2 kg size per class rooms and 10 of 20 kg in size for Bhavan's premises; these are located as 33 dustbins per building with a capacity of 2 kg each. There are 20 kg bins located in the Main building, Library building, SFC and the Chemistry Building.

## 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 and Others (Sanitary Napkins) waste is collected. The waste produced on premises is segregated. It is collected on daily basis. The waste is handed over to the local municipality van.

## 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. There is provision for Sanitary Napkin Disposal Machine in the premise for proper & hygienic disposal of sanitary napkins. There are signages in College mentioning awareness about cleanliness.

## 5.4 Survey Results

### About the survey ratings

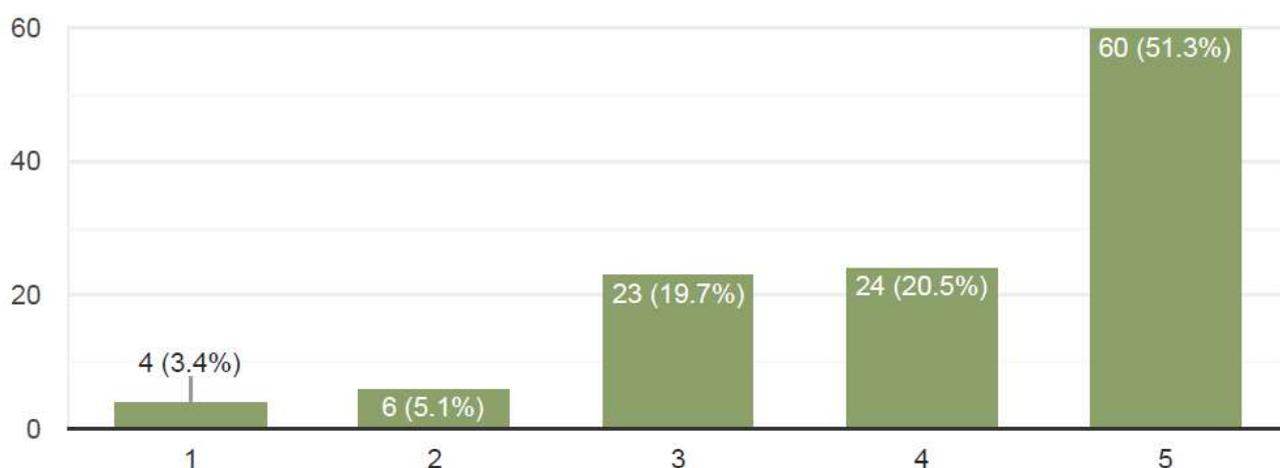
Note: The Participants were asked to review the practice on a scale of 1-5 with scale components as follows:

- 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%)

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



*Figure 5: Waste management practices in College*

The students, staff (**almost 51%**) of responses found the practices to be excellent.

## **5.5 Recommendations for a Sustainable Habitat**

**The current practices adopted by the Institutes in the premises are excellent, there are no further recommendations suggested for this section.**

# On-site investigation and physical verification

## Waste management practices in the premises



# 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 premises 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

The main source of water is through water from the Local Municipality. The total water consumption through the tanks on site is as follows:

S. No.	Area/ Dept.	Type of tank		Quantity (Each)	Total quantity
		RCC	Sintex		
1	Chemistry bldg. – Terrace area		2	3,000 litres	6,000 litres
2	Main bldg. – Biology dept.	2		3,000 litres	6,000 litres
3	Main bldg. – Botany dept.		1	3,000 litres	3,000 litres
4	Main bldg. – Microbiology dept.	2	1	3,000 litres	9,000 litres
5	Main bldg. – Outside area	2		3,000 litres	6,000 litres
6	Library bldg. – Terrace area		2	3,000 litres	6,000 litres
7	Biotech dept. old		1	3,000 litres	3,000 litres
8	SFC bldg. – Terrace area		6	5,000 litres	30,000 litres
9	SFC bldg. – Outside area	3		3,000 litres	9,000 litres
10	Gymkhana		1	3,000 litres	3,000 litres
11	Gymnasium		1	3,000 litres	3,000 litres
<b>Total</b>		<b>9</b>	<b>15</b>		<b>84,000 litres</b>

*Table 8: Tanks in the premise*

### 6.2 Water requirement

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

- **Drinking water** – General water required for drinking purpose using around 245-260 litres of water through the RO and Aquaguard available in the premise.
- **Toilet blocks and practical laboratories** – General usage by occupants in

toilets, urinals, bathrooms, wash basins using approx. 300 litres of water daily and

- **Cleaning of the premises** – The entire Institution is very well maintained with respect to hygiene and cleaning is one of the major uses of water requirement.
- **Garden and surrounding open space** – Cleaning, watering the plants requires approximately more than 1,000 litres of water on alternate days in winter season and about 2-3 times a day in summer season on a regular climate day it is watered 3 days a week and in rainy season it is dependent on the monsoon showers.
- **Preparation of solutions in labs** – For experiment purpose in the Practical Laboratories water is utilised, however there is water wastage of about to a certain extent and currently this water is not treated and care is taken that it does not get mixed with the drain.
- **Canteen** –. The main source of water supply for canteen is the water tank. It requires on an average 500 litres of daily water consumption. The waste water is drained to the plants through recycling.

### 6.3 Areas of water usage

The following is a summary of the general water usage spaces - toilets, urinals, shower, flush tanks and wash basins/ taps in the premises all of these are available on ground floor. Based on the inventory done and data shared by the staff it was found that the premise has a total of 51 lavatories (including urinals), 111 taps in Indoors, 65 washbasins and 5 taps in the outdoor areas. As per the data shared by the College, it was noted that there is wastage of water to a certain extent in the form of: 1) Toilet 2) Laboratory and 3) Canteen. Below mentioned is the quantification detail of the water wastage in the premises; **however the College is in process to set up a waste water treatment plant soon as informed by the Staff.** Water used for water wastage (excluding holidays)

- Laboratory wastage 1,000 lit. on Practical days
- Canteen wastage 500 lit. per day
- Toilet Wastage 1,000 lit. per day

## 6.4 Site investigation about water management.

- There was no water leakage in the entire premise, the pipes well maintained with adequate hygiene.
- The premise has an efficient water management in terms of operations and maintenance. The toilets were kept very tidy and are cleaned on alternate days.
- There are sufficient numbers of taps in the premise.
- Signages are included with information about avoiding water wastage near taps and wash basins.

## 6.5 Survey Results

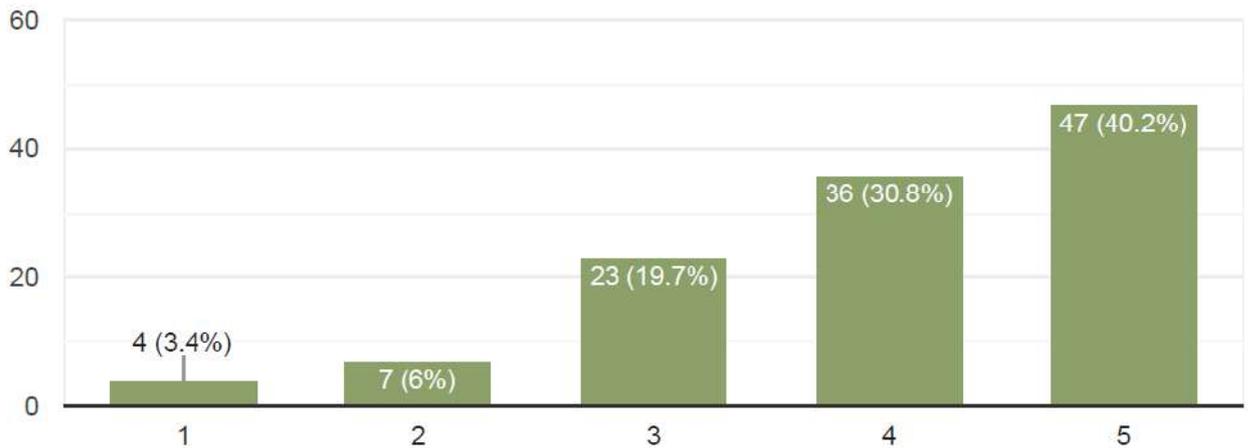
### About the survey ratings

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%)

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



*Figure 6: Water management practices in College*

The students, staff (**almost 40%**) of the responses found the practices to be excellent.

## 6.6 Recommendations for a Sustainable Habitat

The premise has provision for pond in the premises which is a unique feature this is one of the most prized possessions in terms of Green Building services for an Educational Institutes as the efforts to conserve water and its management are undertaken in an efficient manner by the joint efforts of the team. However, below mentioned are few suggestions for better water management practices in the premises.

### 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) Waterless urinals

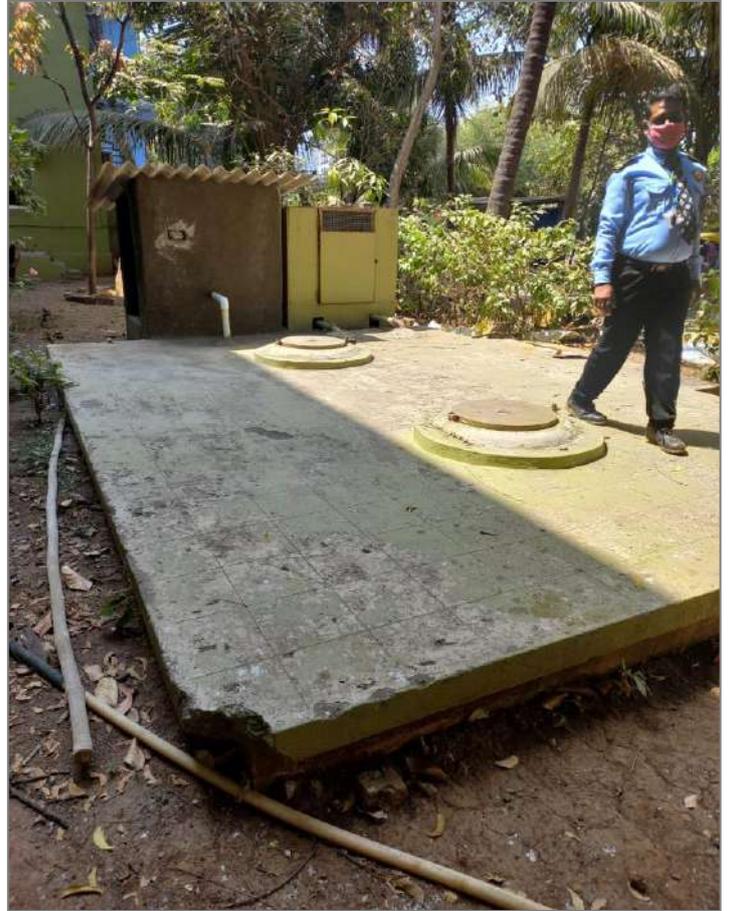
There can be provision of waterless urinals as a Green Building initiative in the premise, either the existing ones can be replace with such a facility of new toilets can be constructed in this manner.

### c) Water flow stopper

The water flow stopper should be installed to avoid overflow and smart use of system. Install water-saving shower heads or flow restrictors. No leakage anywhere in premises. Water lawn only when it needs it.

# On-site investigation and physical verification

## Facilities related to water consumption and usage in the premises



# Energy Audit

*Background reference image Janko Ferlic on pexels*

## 7. Energy Audit

### 7.1 Sources of Energy consumption

The premise uses following sources of energy consumption.

#### 7.1.1 Primary sources

**Electrical (Metered)** – Light, Fans, AC, Equipments, Pumps consume approximately 336 units per meter per month (average) from 17 meters in the premises connected to 3,500 kW units.

#### 7.1.2 Secondary sources

**LPG** – There are 5 Commercial Gas cylinders used in the premises.

### 7.2 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 **no Ultra-violet lights and any other harmful lights used** in the premise.

### 7.3 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 type of supply is **LT – Low Tension**. The analysis of actual electrical energy consumption is summarised below. The details of unit consumption meter wise is as follows.

S. No.	Meter no.	Month	Year	Units in kW
1	9042393	January	2021	0
2	7836111	January	2021	
3	9041821	January	2021	661
4	9041822	January	2021	33
5	9041823	January	2021	312
6	9041824	January	2021	8
7	9041825	January	2021	419
8	9042393	February	2021	0
9	7836111	February	2021	324
10	9041821	February	2021	733
11	9041822	February	2021	27
12	9041823	February	2021	324
13	9041824	February	2021	5
14	9041825	February	2021	433
15	9042393	March	2021	0
16	7836111	March	2021	
19	9041821	March	2021	916
20	9041822	March	2021	52
21	9041823	March	2021	442
22	9041824	March	2021	67
23	9041825	March	2021	514
24	9042393	April	2021	0
25	7836111	April	2021	244
26	9041821	April	2021	966
27	9041822	April	2021	34
28	9041823	April	2021	348
29	9041824	April	2021	9
30	9041825	April	2021	376
31	9042393	May	2021	0
32	7836111	May	2021	268
33	9041821	May	2021	1,017
34	9041822	May	2021	7
35	9041823	May	2021	272

<b>36</b>	9041824	May	2021	0
<b>37</b>	9041825	May	2021	382
<b>38</b>	9042393	June	2021	0
<b>39</b>	7836111	June	2021	270
<b>40</b>	9041821	June	2021	825
<b>41</b>	9041822	June	2021	20
<b>42</b>	9041823	June	2021	351
<b>43</b>	9041824	June	2021	16
<b>44</b>	9041825	June	2021	393
<b>45</b>	9042393	July	2021	0
<b>46</b>	7836111	July	2021	319
<b>51</b>	9041821	July	2021	825
<b>52</b>	9041822	July	2021	25
<b>53</b>	9041823	July	2021	356
<b>54</b>	9041824	July	2021	1
<b>55</b>	9041825	July	2021	405
<b>56</b>	9042393	August	2021	0
<b>57</b>	7836111	August	2021	313
<b>58</b>	9041821	August	2021	802
<b>59</b>	9041822	August	2021	79
<b>60</b>	9041823	August	2021	499
<b>61</b>	9041824	August	2021	0
<b>62</b>	9041825	August	2021	416
<b>63</b>	7926913/7960605	January	2021	1,117
<b>64</b>	7926913/7960605	February	2021	1,041
<b>65</b>	7926913/7960605	March	2021	1,374
<b>66</b>	7926913/7960605	April	2021	1,158
<b>67</b>	7926913/7960605	May	2021	510
<b>68</b>	7926913/7960605	June	2021	591
<b>69</b>	7926913/7960605	July	2021	1,275
<b>70</b>	7926913/7960605	August	2021	1,361
<b>71</b>	797673	January	2021	294
<b>72</b>	797673	February	2021	322

<b>73</b>	797673	March	2021	343
<b>74</b>	797673	April	2021	392
<b>75</b>	797673	May	2021	333
<b>76</b>	797673	June	2021	299
<b>77</b>	797673	July	2021	439
<b>78</b>	797673	August	2021	398
<b>79</b>	7976974	January	2021	525
<b>80</b>	7976974	February	2021	525
<b>81</b>	7976974	March	2021	508
<b>82</b>	7976974	April	2021	701
<b>83</b>	7976974	May	2021	701
<b>84</b>	7976974	June	2021	1,399
<b>85</b>	7976974	July	2021	2,665
<b>86</b>	7976974	August	2021	2,485
<b>87</b>	9016410	January	2021	0
<b>88</b>	9016410	February	2021	0
<b>89</b>	9016410	March	2021	0
<b>90</b>	9016410	April	2021	0
<b>91</b>	9016410	May	2021	0
<b>92</b>	9016410	June	2021	0
<b>93</b>	9016410	July	2021	0
<b>94</b>	9016410	August	2021	0
<b>95</b>	9022060	January	2021	28
<b>96</b>	9022060	February	2021	26
<b>97</b>	9022060	March	2021	26
<b>98</b>	9022060	April	2021	26
<b>99</b>	9022060	May	2021	64
<b>100</b>	9022060	June	2021	59
<b>101</b>	9022060	July	2021	0
<b>102</b>	9022060	August	2021	0
<b>103</b>	7976976	January	2021	219
<b>104</b>	7976976	February	2021	245
<b>105</b>	7976976	March	2021	267
<b>106</b>	7976976	April	2021	205

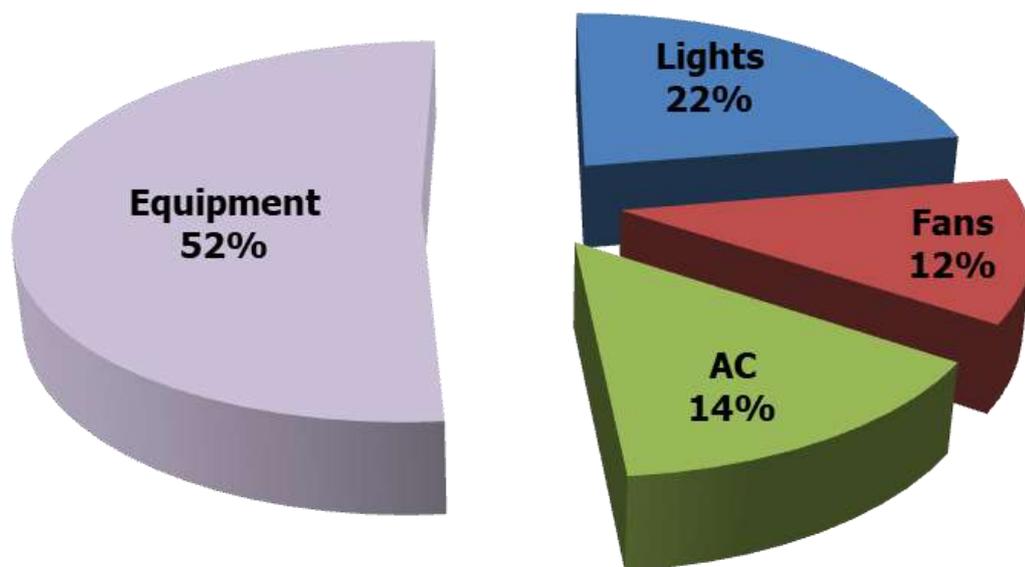
<b>107</b>	7976976	May	2021	247
<b>108</b>	7976976	June	2021	231
<b>109</b>	7976976	July	2021	163
<b>110</b>	7976976	August	2021	174
<b>111</b>	7977903	January	2021	386
<b>112</b>	7977903	February	2021	484
<b>113</b>	7977903	March	2021	459
<b>114</b>	7977903	April	2021	327
<b>115</b>	7977903	May	2021	141
<b>116</b>	7977903	June	2021	153
<b>117</b>	7977903	July	2021	392
<b>118</b>	7977903	August	2021	435
<b>119</b>	7977076	January	2021	90
<b>120</b>	7977076	February	2021	242
<b>121</b>	7977076	March	2021	103
<b>122</b>	7977076	April	2021	69
<b>123</b>	7977076	May	2021	35
<b>124</b>	7977076	June	2021	30
<b>125</b>	7977076	July	2021	106
<b>126</b>	7977076	August	2021	199
<b>127</b>	7976975	January	2021	129
<b>128</b>	7976975	February	2021	126
<b>129</b>	7976975	March	2021	90
<b>130</b>	7976975	April	2021	1,328
<b>131</b>	7976975	May	2021	1,329
<b>132</b>	7976975	June	2021	1,242

**Table 9: Study of the electricity consumption of the meters in premise**

The summary of the above study shows the average consumption varies depending on the consumption.

## 7.4 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. In this the key energy is consumed by Motors used for AC which are considered in equipment analysis. 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 7: Summary of the Calculated Electrical Consumption as per inventory*

The above graph shows that Equipment consumes 52% followed by Lights at 22% while AC consumes 14% and Fans consume 12% of the total calculated electrical energy.

## 7.5 Survey Results

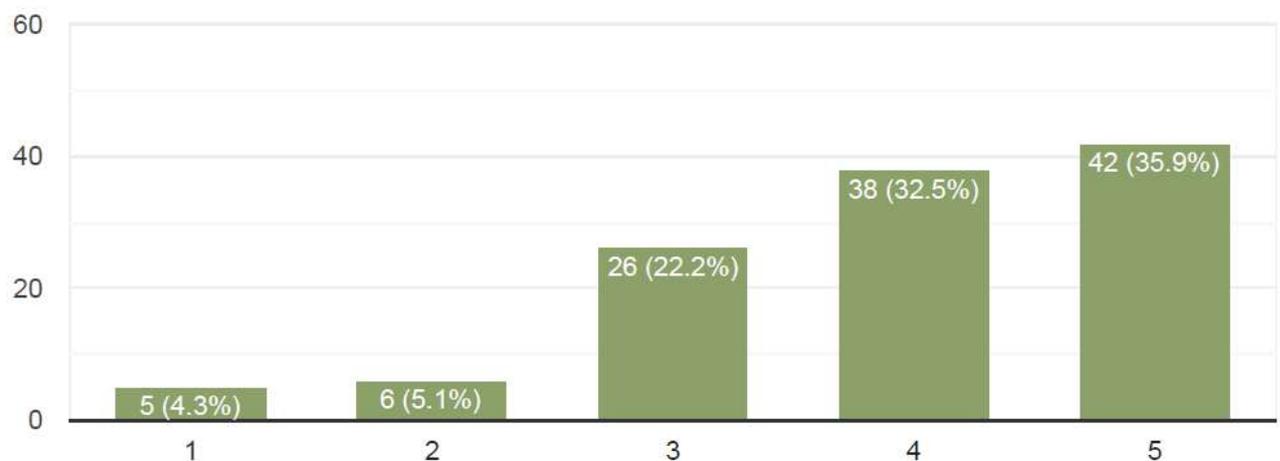
### About the survey ratings

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
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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%)

### Review of the Energy management practices in the premises



*Figure 8: Energy Management practices in College*

The students, staff (**almost 36%**) of the responses found the practices to be excellent.

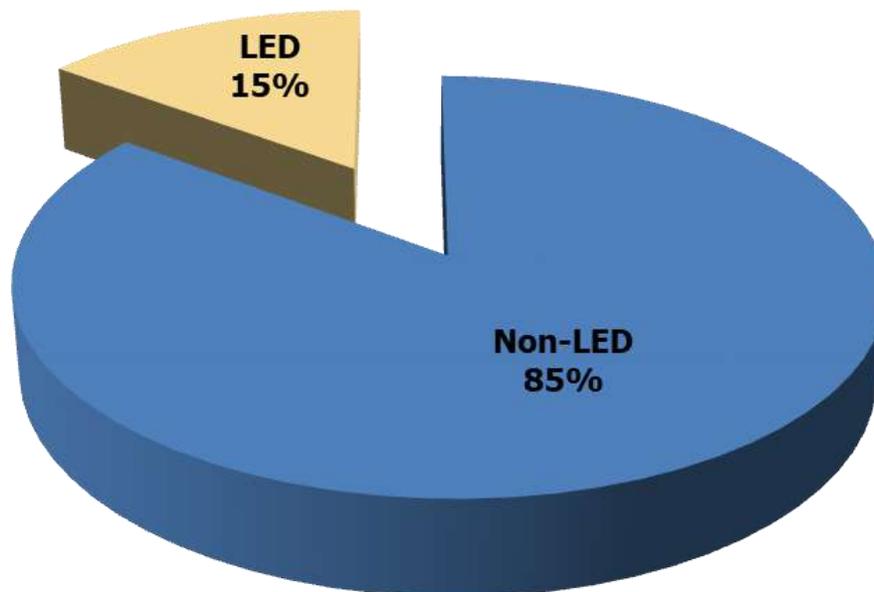
## 7.6 Lights

### 7.6.1 Types of lights

There are a total of **1,424 lights in the premises**; the following table shows the various types of lights in the premises.

S. No.	Type	Nos.
1	Non-LED lights	989
2	LED lights	435
<b>Total</b>		<b>1,424</b>

*Table 10: Summary of the types of Lights in premise*

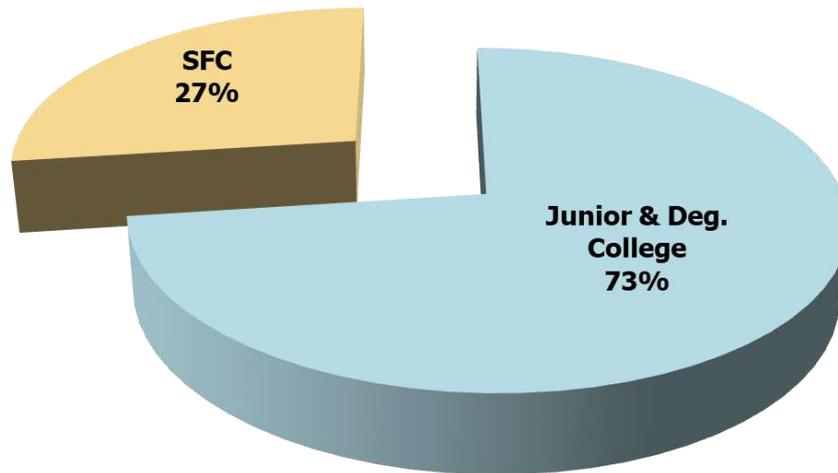


*Figure 9: Types of Lights in the premise*

The analysis of the types of fans in premises shows **Non-LED lights consume 1,63,138 kWh at 85%** followed by **LED lights consuming 28,264 kWh at 15%**

### 7.6.2 Section-wise consumption analysis

The energy consumption of Lights is **1,91,401 kWh** of energy; the following graph shows the section wise consumption. This section analysis constitutes all buildings as a single entity.



*Figure 10: Energy consumed by lights section wise*

The above analysis shows the lights in the **Junior and degree college consume 1,39,617 kWh at 73% which is the highest amount of energy** whereas the ones in **SFC consume 51,784 kWh at 27%**

### 7.6.3 Power analysis study of energy

(Based on the requirement of NAAC)

#### 7.6.3.1 Alternative Energy Initiative

**Percentage of power requirement met by renewable energy sources** – There are no solar panels available in premise at present. However, there are plans to install them in near future.

#### 7.6.3.2 Percentage of lighting power requirement met through LED bulbs

The premise has LED Lights (Combined study for SFC and Junior College) contribute to 31% in terms of number and **15% of the power requirement** is met through the same. As per our study we could conclude that both of these are second highest contributions among all the types of lights.

### 7.6.4 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.

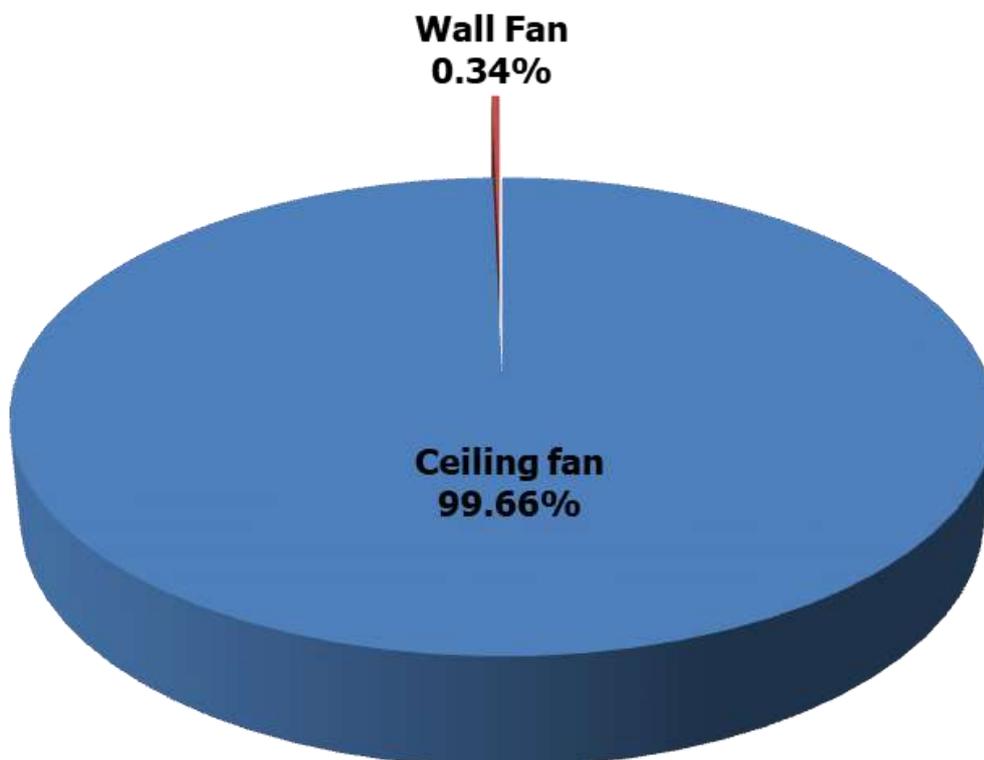
## 7.7 Fans

### 7.7.1 Types of fans

There are a total of **626 fans** in the premise. The following table shows the various types of fans in the premises.

S. No.	Type	Nos.
1	Ceiling fan	624
2	Wall mounted fan	2
<b>Total</b>		<b>626</b>

*Table 11: Summary of the types of fans in premise*

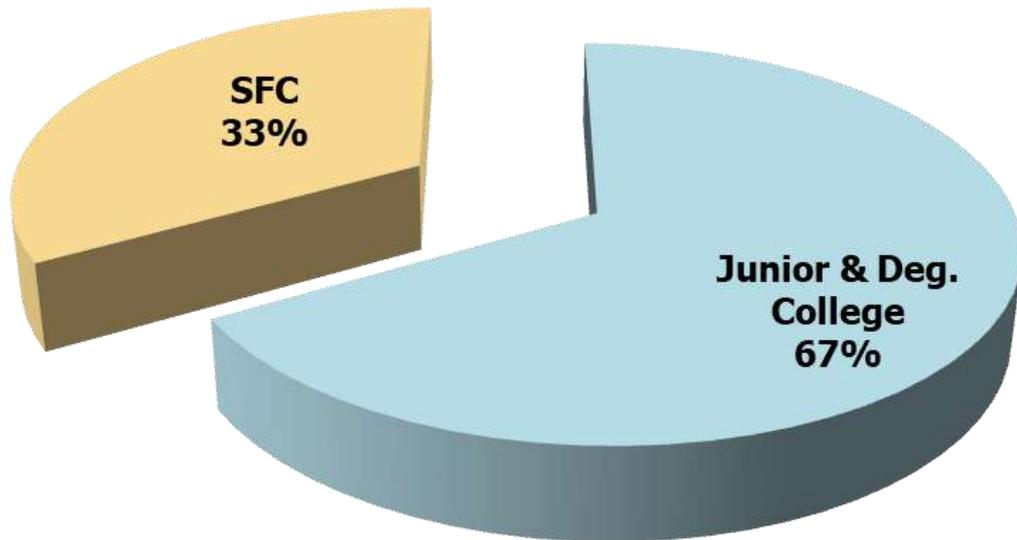


*Figure 11: Types of Fans in the premise*

The analysis of the types of fans in premises shows **Ceiling fans consume 1,03,826 kWh at 99.66%** while the **Wall mounted fans consume 349 kWh at 0.34%**

### 7.7.2 Section wise consumption analysis

The energy consumption of Fans is **33,464 kWh** of energy; the following graph shows the section wise consumption. This section analysis constitutes all buildings as a single entity.



*Figure 12: Energy consumed by fans section wise*

The above analysis shows the fans in the **Junior and degree college consume 69,505 kWh at 67% which is the highest amount of energy** whereas the ones in **SFC consume 34,670 kWh at 33%**

### 7.7.3 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.

## 7.8 AC

### 7.8.1 Types of AC

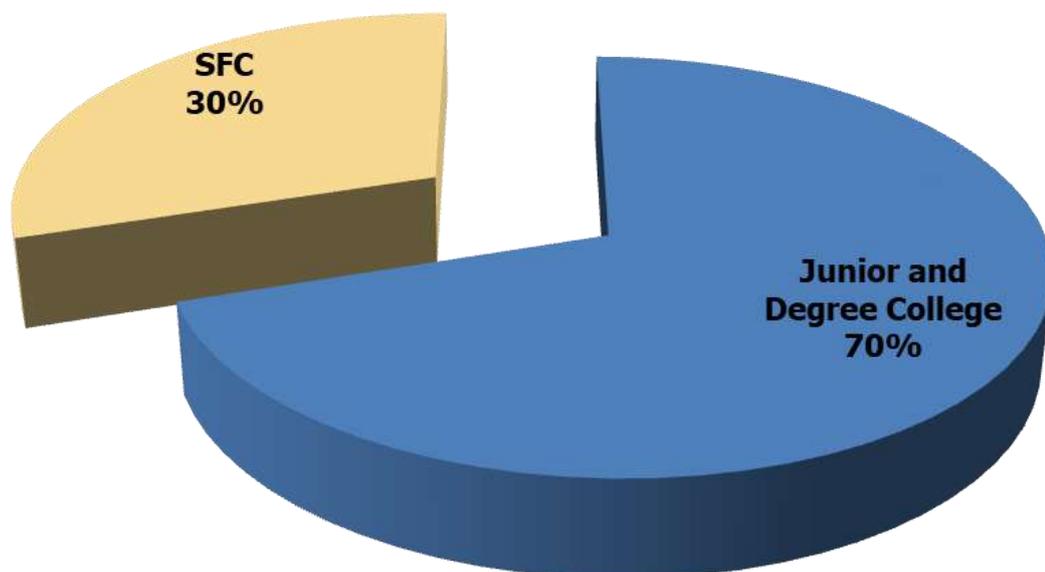
There are **60 Air conditioners** in the indoors of the premise. Below mentioned is a summary of the AC in the premise.

S. No.	Room Name	Dept.	Nos.
1	Office	Admin	9
2	Principal Office	Admin	11
3	Physics	Laboratories	12
4	Biology	Laboratories	4
5	Chemistry	Laboratories	4
6	Library	Library	2
7	SFC	SFC	18
<b>Total</b>			<b>60</b>

*Table 12: Details of the air-conditioners in premise*

### 7.8.2 Section wise consumption analysis

The energy consumption of AC is **1,22,400 kWh** of energy; the following graph shows the section wise consumption. This section analysis constitutes all buildings as a single entity.



*Figure 13: Energy consumed by AC section wise*

The above analysis shows the AC in the **Junior and degree college consume 85,680 kWh at 70% which is the highest amount of energy** whereas the ones in **SFC consume 36,720 kWh at 30%**

### 7.8.3 Site investigation observations

Some of the points noticed are as follows:

1. The AC's are old and should be replaced.
2. Daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.
3. The Outdoor Units are properly cleaned and maintained well.
4. The Outdoor Units do not have any dust collection problem.

## 7.9 Equipment

### 7.9.1 Types of Equipment

There are a total of **8 types of equipment totalling to 458 numbers** (*these are the most frequently used equipments, whereas the scientific laboratory equipment have been excluded as owing to pandemic they were not in use*) in the premises. The various types are mentioned in the table below.

S. No.	Name	Nos.
1	Analog Camera	55
2	Computers	290
3	Printers	52
4	Wi-Fi	21
5	Scanners	2
6	Photocopy Machine	4
7	Water Cooler	15
8	Aquaguard	19
<b>Total</b>		<b>458</b>

Table 13: Types of equipment in the premise

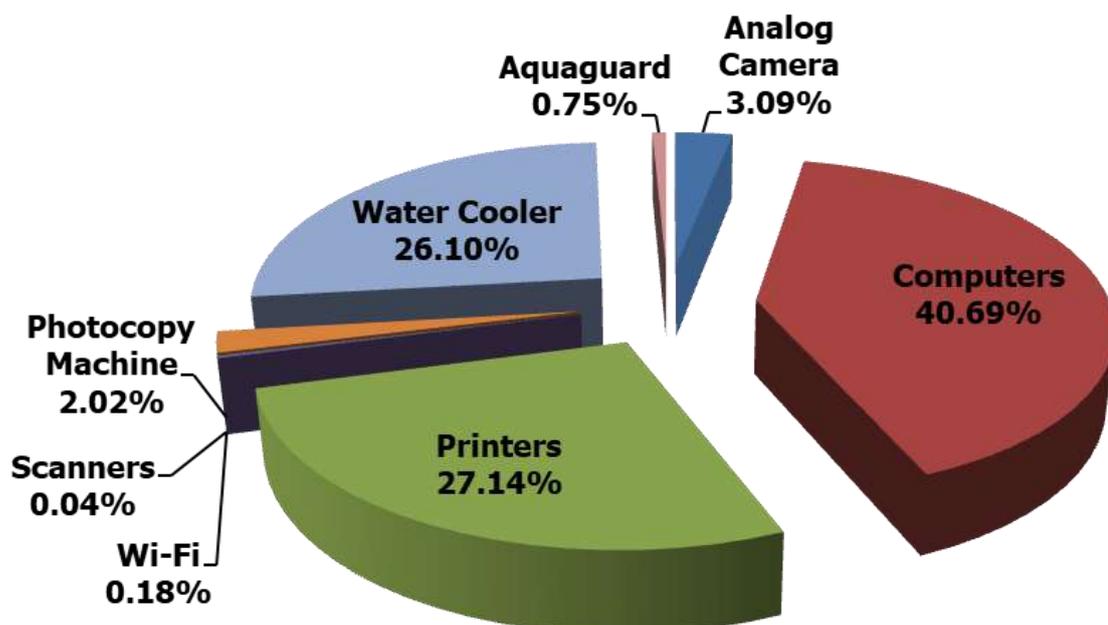


Figure 14: Summary of energy consumed by equipment

The above summary shows that **Computer consumes more energy at 40.69%** while **Printer at 27.14%** and the **Water cooler consumes 26.10%** these are maximum consumers as compared to other equipment. The UPS (when used for electrical consumption is a battery backup and does not require electricity as an equipment), similarly pumps are considered under common use as there are multiple institutes as part of the premises hence both of these have been excluded in this calculation.

### 7.9.2 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.

## 7.10 Recommendations for a Sustainable Habitat

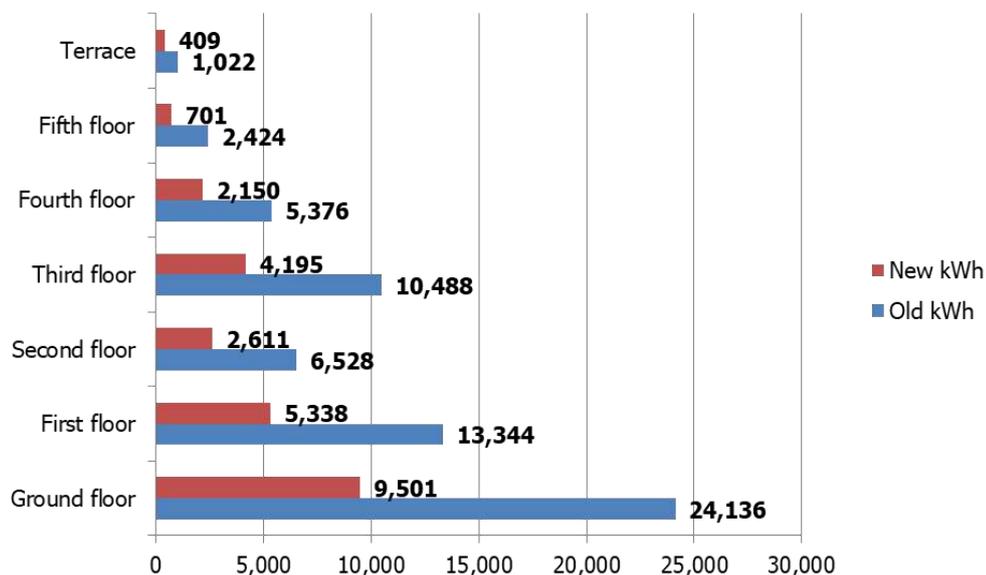
Over the time energy efficient appliances have been a boon not only to the energy saving parameters they adhere to but also the eco-friendly habits it helps to inculcate. The Institution such as Schools and Colleges are the best way to implement these initiatives. It creates awareness among the students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

### 7.10.1 Non-LED Tubelights

The current light analysis shows that Non-LED tube lights consume anywhere between 24W, 36W and 40W when in use and these should be replaced with LED lights which consume on an average 16-20W when in use.

The following graph shows a comparison of the current consumption and consumption of all **Non-LED Tubelights on all floors** if replaced with LED lights.



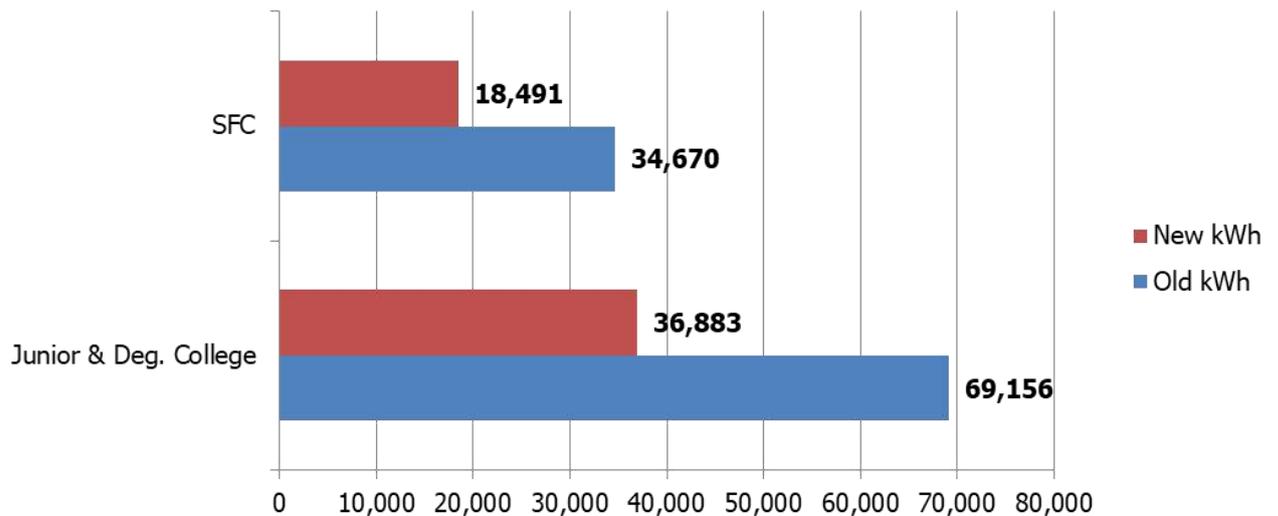
*Figure 15: Analysis of current Non-LED and new LED Lights*

The above analysis shows reduction of average of **62% reduction** in energy consumption if replaced with an energy efficient appliance whenever the college undergoes renovation.

### 7.10.2 Fans

The current Fans are in proper working conditions and maintained well. The ceiling fans are in more quantity and consume at least 45W when in use. These should be replaced with energy efficient fans consuming 32W when in use.

The following graph shows a comparison of the current consumption and consumption of all **479 ceiling fans on all floors** if replaced with star rated appliance.



*Figure 16: Analysis of current and new fans*

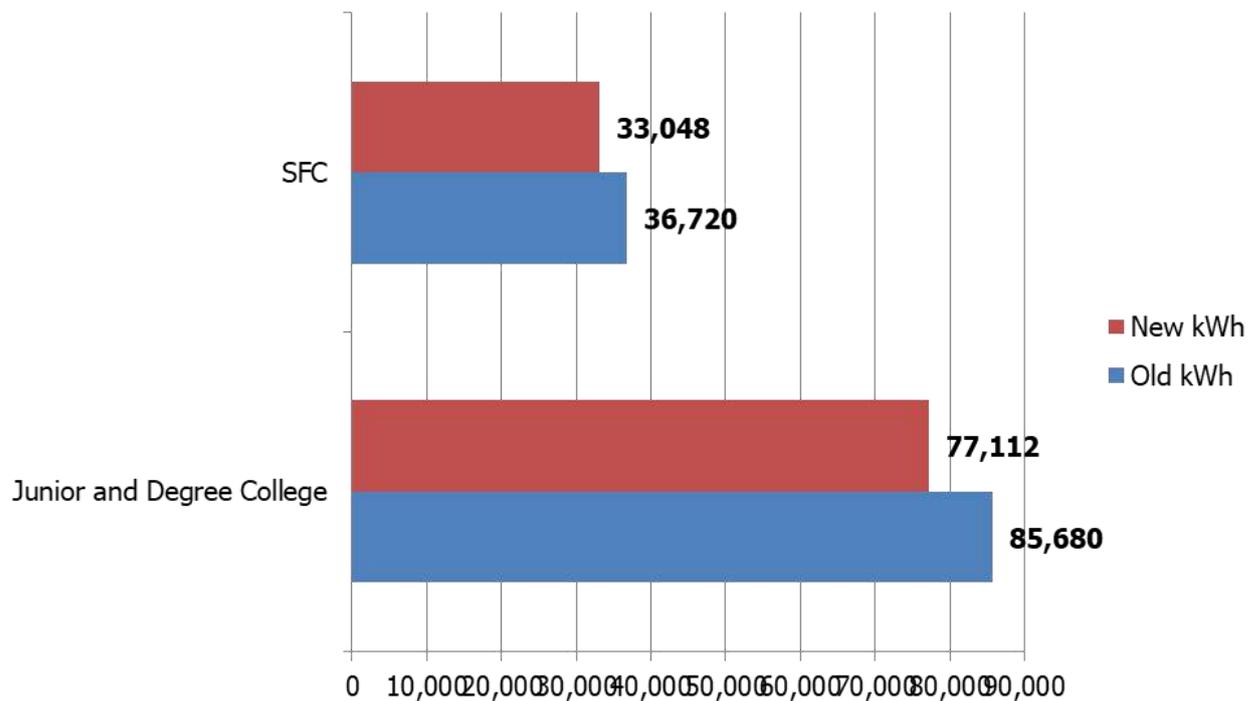
The above analysis shows reduction of average of **50% reduction** in energy consumption if replaced with energy efficient appliance.

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.

### 7.10.3 AC

The current Air conditioners have become old. Most of these are not star rated and are consuming more energy. These should be replaced with energy efficient and star rated air conditioners wherein 1 ton consumes only 900W, the 2 ton consumes 2000W and 1.5 ton consumes 1495W.

The following graph shows a comparison of the current consumption and consumption of all the **air conditioners** if replaced with star rated appliance.



*Figure 17: Analysis of current and new air conditioners*

The above analysis shows reduction of average of **10% 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 AC gets damaged or is not in working condition.

## 7.10.4 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 college 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

## Energy consuming appliances and spaces in the premises



## 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) Additional fire safety** - Measures such as Hose reel, signages, fire-fighting tank, fire alarm and sprinkler system should be included.
- c) Waste vio** – Stepping up a little further an initiative can be undertaken wherein College can tie up with an organisation and students can be encouraged to collect dry waste and electronic waste such as newspapers, old computers and others and hand over to organisation on a weekly or monthly basis thereby making a waste reduction approach in the community. This has benefits such as awareness, eco-friendly habits in becoming a responsible citizen.

## 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 key responses are listed below. Whereas many responses **stated there were no changes requires because the present practices are excellent.**

- College already has taken many measures for this.
- I don't think so any changes are required in our college premises .
- **I think there can be no other college as good as Bhavan's in matter of greenery and I think it needs no changes.**
- The practice that keep maintaining the environment is good, so nothing is needed improvement
- I don't think any change should be made
- **There's absolutely no change needed our college takes care of the plants as it takes care of us students and they always arrange seminars events to educate us about their importance.**

**Some of the changes suggested are as follows**

- Taking care the infrastructure. Keeping the campus green using potted plants even in corridors
- Solar energy can be used to supply power to classrooms since the classes are held in the day time.
- Pretty well maintained but they can start making fertilizer naturally at small level so it won't affect soil.
- Good green cover surround but Plant native only for biodiversity. Avoid introduced species of plant
- I think college should start terrace plantation also it might make the college the greenest college in India
- Every student must be awarded to grow plants only in college but the students' local areas to; making aware the people to prevent the nature.

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

## 9. References

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3. IGBC Green Landscape Rating system, March 2013
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5. Climate data <https://en.climate-data.org/asia/india/maharashtra/mumbai-29/>
6. 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.

