Green Audit 2019 - 21

AUDIT REPORT

Studied for

Children welfare center's

Clara's College of Commerce

Yari Road, Versova, Andheri (West), Mumbai-400 061

Analysed by

Greenvio Solutions

11 September 2021

Disclaimer

Green Audit Team has prepared this report for **Children Welfare Centre's Clara's College of Commerce, Andheri (West), Mumbai-400 061** 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 whatsoever.

The Report is prepared by the Team of Sustainable Academe, Sustainability Department of Greenvio Solutions as Green Building Consultant.

Acknowledgement

Green Audit Assessment Team thanks the **Children Welfare Centre's Clara's College of Commerce, Andheri (West), 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.Ajay Kaul Sir**, General Secretary, Children Welfare Centre; **Dr. Madhukar Gitte Sir**, Principal, Clara's College of Commerce; **Ms. Alka Correa Madam**, Principal, Children Welfare Centre's High School and Junior College; **Dr. Swati Shetty Madam**, Principal, Children Welfare Centre's Primary School; **Mrs. Anjum Iqbal Madam,** Head Mistress, Children Welfare Centre's School Pre-Primary Section.

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Sustainable Academe

Sustainability Department of Greenvio Solutions

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1. Introduction

1.1 About Children Welfare Centre

The Children Welfare Centre is registered under the Public Trust Act, 1950 it caters to the holistic development of every student and strives to ensure that the objectives of education percolate into every strata of society. It is currently in its 42nd year of existence, continues its sustained mission by making laudable inroads in the arena of education.

Children Welfare Centre is an ideal platform for the awe-inspiring force of more than 4000 registered students to spread their wings. With experience and better resources at hand, the institution has secured permission to start the M.Com course at Clara's College of Commerce, Versova, Andheri (West). The Management is also elated in stating that permission has been granted by the Govt. of Maharashtra to start Jr. College in Arts and Commerce streams at Malad (West) and also a school affiliated to CBSE Board has commenced in the same institution. The moment of pride for the Trust is the commencement of an IB School at off. Yari Road, Versova.

1.2 Vision and Mission Statement

Our Vision - To provide value based education with new innovations and ideas, so that our pupils grow into aesthetically rich, intellectually aware and integrated young people, capable of fulfilling their dreams and aspirations.

Our Mission - To instill qualities of leadership, ethics, values of good citizenship and above all of a good human being through both modern and traditional education.

1.3 Institutions in the premises

The Premises is situated in the prime location of Andheri (West) with close proximity recreational and amenities such as Versova beach, Hospital and much more. During the entire day schedule with smooth transition of internal student traffic management which is highly commendable.

The Building houses the following Institutes which are recognised by the prominent organizations such as Govt. of Maharashtra, Deputy Director of Education.

1. **Clara's College of Commerce (Permanently Affiliated to University of Mumbai, NAAC Accredited)**

It was established in the year 1999 in the memory of Late Smt. Clara Kaul- an eminent educationist, who had a missionary zeal to take learning to every strata of society. Strategically located in the heart of the western suburbs, the college is fully equipped with state-of-art facilities and well qualified teachers. The college is affiliated to University of Mumbai and has received Hindi Linguistic Minority status.

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:

- Bachelor of Commerce (B.Com)
- Bachelor of Mass Media (BMM)
- Bachelor of Management Studies (BMS)
- Bachelor of Commerce – Accounting & Finance (B.Com. – A/F)
- Master of Commerce M.Com (Advanced Accountancy)

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

2. **CWC Junior College of Commerce**

It was established in the year 1992 in the memory of Late Smt. Clara Kaul-an eminent educationist. The college is affiliated to the Mumbai Divisional Board of the Maharashtra State Board of Secondary and Higher Secondary Education, Pune. The Children Welfare Centre Trust has acquired Hindi Linguistic Minority Status.

The objective of the College is to provide students with the best teaching pedagogy to foster their overall development. It strives for excellence in both academic and extra-curricular activities and inspires in the students a passion for learning as well as acumen for decision making and critical thinking.

3. Children Welfare Centre's High School

This includes Pre-primary, Primary and Secondary Section respectively. The objectives of the School are nurturing young minds and preparing children physically, emotionally, psychologically, socially at the Pre-Primary stage.

Through Primary Education it helps children achieve basic literacy and numeracy, as well as establishing foundations in languages, mathematics, and social and environmental sciences. Through Secondary Education children are guided in making concrete and compounded decisions and deal with academic pressures.

1.4 Assessment of the Degree College

The following are details of the NAAC accreditation for Clara's College of Commerce.

- Cycle – First cycle
- Grade - B Grade
- CGPA - 2.67
- Year of application -2016

The college is included in the 2F and 12B of University Grants Commission (UGC).

2. Institution overview

2.1 Populace analysis for Academic year 2019-20

2.1.1 Students data

The CWC Trust houses School, Junior College and Degree College with PG, based on the data shared by College and School we have prepared the following analysis of the Populace data.

Student data section wise 2019-20				
S. No.	**Section**	**Student**		**Total**
		Boys	**Girls**	
1	Pre-primary	214	154	368
2	Primary	560	352	912
2	Secondary	954	565	1519
3	Junior College	347	235	582
4	Degree	602	384	986
Total				**4,367**

Table 1: Student data of the Institution

The student data shows there are total of **4,367** students occupying the premises out of which Secondary section has the maximum of students of **1,519.**

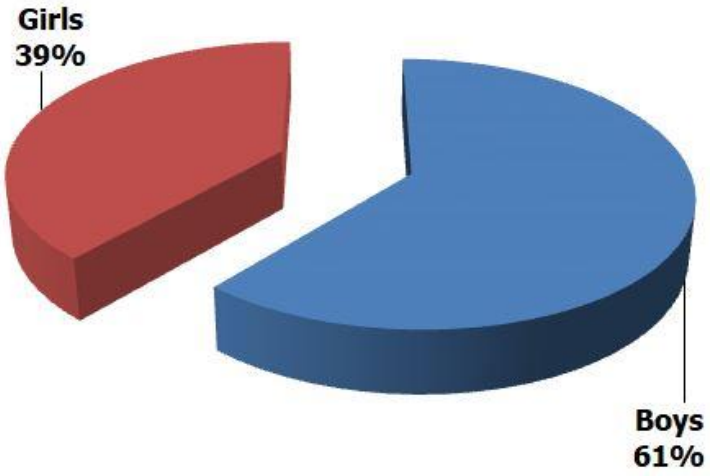

Figure 1: Summary of the students in Academic year 2019-20

The above graph shows that boys occupied **61%** as compared to girls **39%** in the year **2019-20.**

2.1.1.1 Degree College student's bifurcation

Sr. No.	Class	Total
1	FYBCom	167
2	SYBCom	131
3	TYBCom	138
Total		**436**
4	FYBMS	100
5	SYBMS	98
6	TYBMS	92
Total		**290**
7	FYBAF	40
8	SYBAF	60
9	TYBAF	60
Total		**160**
10	FYBMM	27
11	SYBMM	21
12	TYBMM	30
Total		**78**
13	MCOM – I	13
14	MCOM - II	9
Total		**22**
Grand total		**986**

Table 2: Degree College students analysis

The above analysis shows that F.Y.B.Com had maximum number of students in Academic year 2019-2020.

2.1.1.2 Degree College student summary

The following is the analysis of the data for students in academic year 2019-20.

Students of Degree College 2019-20				
S. No.	**Course**	**Boys**	**Girls**	**Total**
1	M. Com (Advanced Accountancy)	14	8	22
2	B. Com	258	178	436
3	BMS	204	86	290

4	B. Com (Accounting & Finance)	73	87	160
5	BMM	53	25	78
Total		**602**	**384**	**986**

Table 3: Summary of the degree college students in 2020-21

2.1.2 Staff data for 2019-20

S. No.	Section	Teaching staff and Admin		Non-teaching staff		Total
		Male	**Female**	**Male**	**Female**	
1	Pre-primary	0	7	1	2	10
2	Primary	3	24	6	4	37
3	Secondary	9	23	3	5	40
4	Junior College	5	7	4	1	17
5	Degree	11	11	6	5	33
Total		**28**	**72**	**20**	**17**	**137**

Table 4: Staff data of the Institution

The data shows the premise has **135** Teaching and Non-teaching Staff in all sections.

2.2 Populace analysis for Academic year 2020-21

2.2.1 Students data

The CWC Trust houses School, Junior College and Degree College with PG, based on the data shared by College and School we have prepared the following analysis of the Populace data.

Student data section wise 2020-21				
S. No.	**Section**	**Student**		**Total**
		Boys	**Girls**	
1	Pre-primary	156	99	255
2	Primary	517	346	863
2	Secondary	948	556	1,504
3	Junior College	293	198	491
4	Degree	497	308	805
Total				**3,918**

Table 5: Student data of the Institution

The student data shows there are total of **3,918** students occupying the premises out of which Secondary section has the maximum of students of **1,504.**

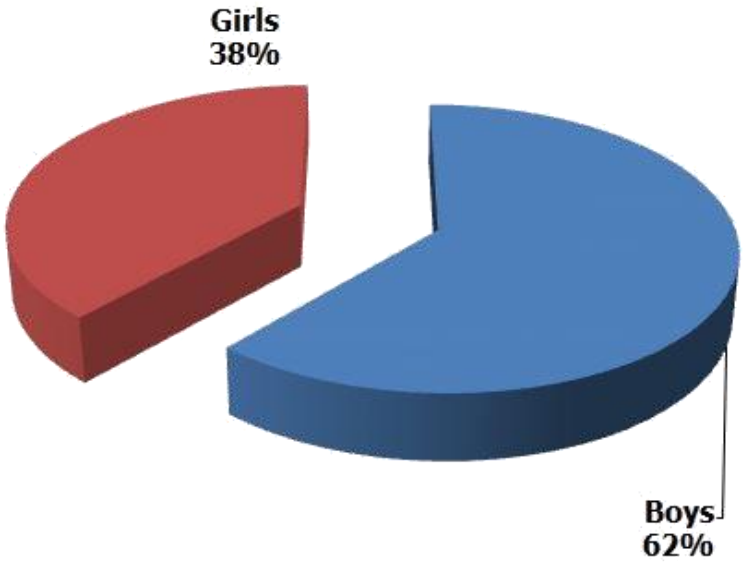

Figure 2: Summary of the students in Academic year 2020-21

The above graph shows that boys occupied **62%** as compared to girls **38%** in the year 2020-21

2.2.1.1 Degree College student's bifurcation

Sr. No.	Class	2020-21 Actual
1	FYBCom	95
2	SYBCom	130
3	TYBCom	126
Total		**351**
4	FYBMS	89
5	SYBMS	90
6	TYBMS	96
Total		**275**
7	FYBAF	28
8	SYBAF	36
9	TYBAF	57
Total		**121**
10	FYBMM	13
11	SYBMM	23

12	TYBMM	16
Total		**52**
13	MCOM – I	4
14	MCOM - II	2
Total		**6**
Grand Total		**805**

Table 6: Degree College students analysis

The above analysis shows there were more number of students in S.Y.B.Com in Academic year 2020-21.

2.2.1.2 Degree College student summary

The following is the analysis of the data for students in academic year 2020-21.

Students of Degree College 2020-21				
S. No.	**Course**	**Boys**	**Girls**	**Total**
1	M. Com (Advanced Accountancy)	4	2	6
2	B. Com	202	149	351
3	BMS	196	78	275
4	B. Com (Accounting & Finance)	61	60	121
5	BMM	34	19	52
Total		**497**	**308**	**805**

Table 7: Summary of the degree college students in 2020-21

2.2.2 Staff data for 2020-21

S. No.	**Section**	**Teaching staff and Admin**		**Non-teaching staff**		**Total**
		Male	**Female**	**Male**	**Female**	
1	Pre-primary	0	6	1	1	8
2	Primary	2	22	4	3	31
3	Secondary	9	18	3	1	31
4	Junior College	4	6	4	1	15
5	Degree	11	9	6	5	31
Total		**26**	**61**	**18**	**11**	**116**

Table 8: Staff data of the Institution

The data shows the premise has **116** Teaching and Non-teaching Staff in all sections.

2.3 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 Clara's College of Commerce is located in plot bearing CTS Number 1035 (PT). of village Versova, Andheri (West), Mumbai Suburban Region and falls under the K/ West Ward of Municipal Corporation of Greater Mumbai (MCGM).
- **Neighbourhood context -** The premise is surrounding by Residential areas on the North the immediate surroundings of the site including data on zoning and buildings and other impacts on our project.
- **Natural physical features –** The premise includes a rich biodiversity and huge number of plants in the adjacent open space. The site does not have any different in the land levels (contours).
- **Manmade features –** the premise is situated in an urban area amidst residential societies with close proximity to all necessary amenities. There is approximate 2m wide setback on all sides except rear. 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 school buses are parked. Outsider vehicles are prohibited thus there is not much hindrance caused due to vehicular traffic inside the compound.
- **Climate –** It falls under Mumbai (SCZ) station as per IMD, the temperature details as on 27 June 2021 state the facts as follows:
    - Temperature – Maximum being 32.5^{0}C and minimum 27.6^{0}C
    - Relative Humidity is 76%
    - Rainfall since 1 June 2021 is 941.1 mm

2.4 Total Institute Area & College Building Spread Area

The total Built-up area is 2,968.80 sq. m and open ground area for approx. 800 footfalls is 3,383.40 sq. m

2.5 Institute Infrastructure

2.5.1 Establishment

The building was established in 1999. There are some renovations going on ground floor. The Building is a Reinforced Cement Concrete (RCC) framework building. Overall the Infrastructure of the Building is fine.

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 of 1.5m in height with fresh air ventilation.

There are no false ceilings in the campus. The floors are mostly typical and floor to floor height is 3.55m of a classroom.

There are two meters in the Campus, one used only for commercial area, pumps, outdoor lights and lights in open ground. The other meter is shared by the School, Junior College and Degree College Infrastructure, the details are provided in the Energy Audit section.

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.

There is a fire extinguisher in the passage on Second, Third, Fourth, Fifth floors and in the Science laboratory on First floor in School section.

As per the interview with the staff it was found that the college is soon going to adopt additional fire safety practices such as fire hydrant and others.

2.5.4 Operation and Maintenance of the premises

2.5.4.1 Schedule

The interview session with the staff regarding the operation and working hours is summarised in the table. The Institutions are open Monday to Friday for full day and

Saturday is a half day. Sunday is an off for all.

S. No.	Section	Floor	Spaces	Time	Hours/ day	Days in a year
1	School	Ground floor	Pre-primary - Sr. Kg	9:30 a.m. to 12 p.m.	2.5	209
			Pre-primary - Jr. Kg	12:30 p.m. to 3:30 p.m.	3	209
		First and Second Floor	Primary section	1 p.m. to 6 p.m.	5	238
			Secondary section	7 a.m. to 1 p.m.	6	240
2	Junior College	Third, Fourth & Fifth floor	Student areas and Teaching faculty	1 p.m. to 5:30 p.m.	4.5	189
3	Degree College		Student areas and Teaching faculty	7 a.m. to 12 p.m.	5	260
4	General areas	Ground floor and Third floor	Admin areas	7 a.m. to 4 p.m.	9	280
		All floors	Passage, lift, staircase, toilet	7 a.m. to 6 p.m.	11	280
		Ground floor	Trust office	7 a.m. to 6 p.m.	11	365
		Ground floor	Outdoor Compound lights	5 p.m. to 6 p.m.	1	280
		Ground floor	Outdoor - Pumps	Any time in the day	1	280
		Fifth floor	Auditorium	3 to 4 hours average	5	250

Table 9: Schedule of the timings of the 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, on-site 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

- 19 May 2021 – Initiation by the College to conduct Audit
- 05 June 2021 – Process begins with the visit 1 for inventory and data collection,
- 14 June 2021 – Visit 2 for on-site investigation
- 28 June 2021 – Submission of Draft 1 Report
- 13 July 2021 – Submission of Draft 2 Report
- 11 September 2021 – Submission of Final Report

Ecological (Environment) Audit

Background reference image Yugal Shrivastava on pexels

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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 premises needs to have facilities for students who are specially abled alike.

As part of our visit 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.

4.1 Flora and Fauna Audit

4.1.1 Flora analysis

The landscape area in form of the open space adjacent to the ground is 3,383.40 sq. m. It has a variety of plantations as follows:

- The key trees identified based on the maximum coverage were Ashoka (25 in nos.), Bamboo (Placed in maximum number around the compound wall between open space and College Building), ***Subabul*** (1 in nos.), **Audumberg** (2 in nos.), ***Jamun*** (2 in nos.), **Custard** (1 in nos), **Coconut** (3 in nos), **Palm Trees** (more than 23 in nos.), ***Neem*** (1 in nos.), ***Peepal*** (1 in nos.), ***Badam* (Almond)(**2 in nos.), **Wild tree** (2 in nos.), ***Shevgad*** (2 in nos), **Mango** (1 in nos.), **Banana** (1 in nos.), **Bel Tree** (1 in nos.) and many others.
- Plantations including ***Mogra, Shoe Flower, Medicinal Bell, Jaijui*** and many others.
- Climbers included **Bougainvillea** occupying a good amount of area.
- In addition there are potted plants placed around the setback area including ***Parijatav.***

4.1.2 Fauna analysis

The campus has an equally rich diversity with respect to the flora. There are around 100 cats and a dedicated cat room with all facilities for the cats. There are also duck, birds which visit the campus.

4.1.3 Green practices

We observed the following points during the on-site investigation:

- The Institution does not use chemical fertilisers thereby minimising the impact of chemicals on ecology. The ample vegetation provides shade thereby benefiting the users.
- However the College can use organic fertiliser and also increase the use of locally adaptive plants in the premises.

4.1.4 Eco-friendly initiatives undertaken

The Institution has undertaken the following initiatives:

- NSS Students clean the Versova beach
- They have adopted locality and conduct free plastic campaign

4.2 Noise Audit

4.2.1 Macro level

On a macro level there are Residential spaces surrounding College, there is a Hospital and cemetery nearby thereby the College falls under Silent zone. The college is at a distance of approximately 350m from the Versova beach which is closed due to the lockdown most of the times. During non-covid days the footfalls increase in the after college hours thus not disturbing the noise levels of the surrounding. The main entrance is abutting the Yari Road which is an 18.28m wide road with two way traffic but the noise levels are less.

Overall, the noise levels of the surrounding being low have a positive impact on the premises.

4.2.2 Micro level

The college is surrounding by Residential areas on the all sides on micro level, the noise levels are thus low and students, staff do not have any disturbance in academics.

4.3 Carbon Footprint Audit

4.3.1 Eco-friendly Commuting Practices

The premise is close to Versova Metro Station by 15 mins by walking distance of 2.0km and nearest railway station Andheri by 15 mins and distance is 6.6km. This acts as a major benefit in reducing air pollution and land development impacts from personal automobile use as most of College Student and Staff use public transportation facility to commute.

In addition for School students there are 6 Buses provided which thereby help in reducing the carbon footprint to a major extent.

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 area is covered with China mosaic tiles which reflects the heat, thereby maintaining the Internal temperature in control.

Exposed non-roof hardscape areas - There is a pathway on all sides of the premises. On the South side there are restrooms for the staff, on the East side there is covered roofing near admin area along with resting and seating arrangement for the parents. In addition to these there is ample shading from existing tree canopies on all sides of campus. On the East side (Main Entrance) there is a projected roof with enclosed space for visitors.

4.3.3 No Outdoor Light Pollution

The college uses the compound lights occasionally for some functions and these are not upward looking there not causing light pollution.

4.4 Health & Hygiene Audit

4.4.1 Smoke Exposure

As per the on-site visit the following analysis has a positive impact on premises.

- 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 campus is not burnt and handed over to local municipality truck on a daily basis in morning
- The Institution is a tobacco and smoke free campus which helps in adapting to a Healthy Institution
- There are designated enclosed spaces and seating areas for relaxation for students and visitors
- There is a huge open space in campus which is allowed for social gathering among students. It is also used for sports, outdoor games, annual days, cultural functions, medical camps (held once a year with provision for 25 stalls)
- The open space is used for physical activities by the students

4.4.2 Hygiene

- There are 2 sanitary pad machines in the campus. The toilets areas were checked during the on-site investigation and it was found that the hygiene of toilet areas is well maintained.
- The entire campus is cleaned on a daily basis
- There is a designated team of 1 Faculty, 1 Admin staff and 2 Non-teaching staff for every floor who keep a regular check about the operation and maintenance of the toilet areas and the equipments, lights and all facilities on each floor
- The areas of water tanks in site on ground floor is clean and no mosquito breeding spots were found.

4.5 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.

The college has provisions of lift and resting places (seating areas) in the campus 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 3m wide. The single loaded corridors are safe from fire safety as there are staircases and fire extinguishers provided on every floor.

4.6 Recommendations for a Sustainable Habitat

a) Promote the use of Eco-friendly vehicles

There can be provision for cycle and battery operated vehicles/ low emission vehicles such as electrically driven vehicles parking in open space along with battery charge points, this would inspire students to change mode of transportation and adopt sustainable practices.

b) 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

c) User friendly movability in premises

There should be provision of Ramp near the main entrance of the Building premises, also low height hand rail for ease of access.

On-site investigation and data collection

Waste Audit

Background reference image Polina Tankilevitch on pexels

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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 they 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

The types of waste collected in the campus are as follows:

S. No.	Type of waste	Source	Current Disposal method	Can be treated?	Methodology
1	Solid waste	Toilets	Discharged to main drains through underground covered channels	Yes	Small biogas plant can be proposed in open space
2	Liquid waste	Toilets, wash basin, urinals, canteen taps		Yes	Waste water treatment plant so that treated water can be reused for gardening
3	Hazardous waste	Liquid from chemistry lab		Yes	Though the quantity is less but it will help in preventing mixing with groundwater
4	Dry waste	Open space & plantations, papers	Handed over to Local municipality	Yes	Vermicomposting
5	Organic waste	Canteen		Yes	Vermicomposting

Table 10: Summary of the types of waste produced in the premises

5.1.2 Bins summary

The types of bins and location found in premises are as follows:

S. No.	Type of Bin	Location	Capacity	Nos.
1.	Similar to Aristo Wheel Waste	Open Space	65 litres	8
2.	Portable Dustbin	Indoors	7 litres	18
3.	Round FRP Penguin Dustbin	Near Entrance	60 litres	1
4.	SS Rectangular Pole Mounted Twin Dual Litter Dustbin Bins	Near Entrance	60 litres	1
Total				**28**

Table 11: Types of bins in the premises

The above bifurcation shows there are 10 dustbins in outdoors and 18 indoors.

Floor wise	Numbers
Ground floor	18
First floor	10
Second floor	13
Third floor	10
Fourth floor	9
Fifth floor including Canteen	7
Total	**67**

Table 12: Bins summary floor wise

The above summary shows that Second floor has the maximum number of dustbins.

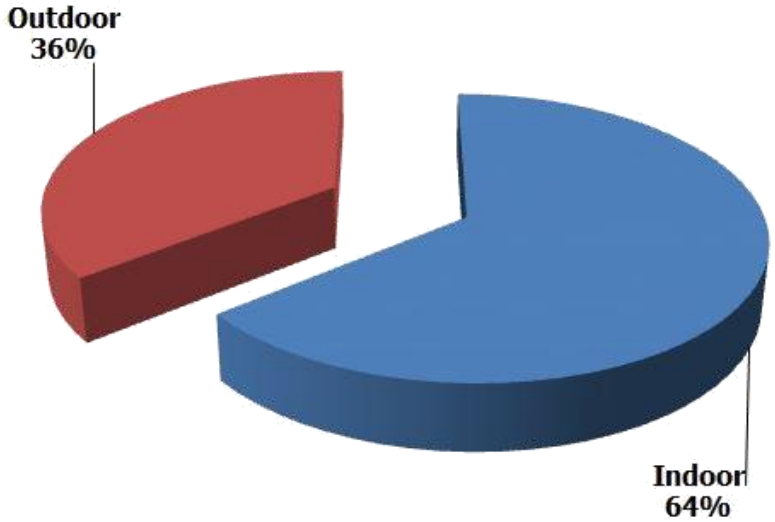


Figure 3: Analysis of dustbins in the premise

The above analysis shows the among the dustbins are **available 64% are in the Indoor spaces** (On all floors, classrooms) and **36% in the outdoor spaces** (setbacks, pathways, open space, along the plantations area).

5.2 Waste handling

Quantification wise as per Interview and survey it was found that dry waste collected is approx. 1kg and organic waste approximately 5 kg on a daily basis except weekends in the entire premise including Canteen.

The waste produced on campus is not segregated. It is collected on a regular basis as the campus and ground is cleaned daily. The waste is collated in large bins (at present in the open space) and then handed over to the local municipality van every morning.

5.3 Waste management

The Waste disposal takes place on a daily basis (For bio-degradable and non-biodegradable waste). There are no bifurcations and collection is done manually. Ample measures are taken to maintain hygiene. No smell problem or health related issues due to the waste were found. There is adequate number of bins present in all parts of building. The wastes from toilets are discharged to main drains through underground covered channels thus avoiding any incident.

5.4 Recommendations for a Sustainable Habitat

a) Zero Organic Waste compost

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

- 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.

On-site investigation and data collection

Water Audit

Background reference image Vlad Chetan on pexels

Greenvio Solutions

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

The Institution has the following provisions

- **Overhead tank for drinking water** of size 35' x 7' x 6' with a capacity of 41,600 litres
- **Overhead tank for general usage of size** 16' x 16' x 6' with a capacity of 43,460 litres
- **Well** for an underground water facility, the actual depth being approximate 12 feet and current depth with water being approx. 7 feet. The water is pumped using submersible pump from the pump room which is adjacent to the well. The hygiene of this area is well maintained and there are no leakages observed during the on-site investigation. There is an automatic ground water recharge and daily approximately 20,000 litres of water is pumped
- **Two sintex water tanks** in backyard of College near the admin counter with a capacity of 5,000 litres each. These act as a substitute for Underground water tank.

6.2 Water requirement

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

6.2.1 Drinking Water

- **Water Cooler** - Drinking water

There are water cooler of capacity 1550W and Blue Star make installed on first to fifth floor for student and staff use. They are in good working condition and no leakage or damage was found during the on-site investigation.

6.2.2 General usage

- **Toilet blocks** – General usage by occupants in toilets, urinals, bathrooms, wash basins, geyser
- **Garden and surrounding open space** – Cleaning, watering the plants
- **Canteen** – Washing utensils, vegetables, cooking, drinking
- **Laboratory** – As per the chemical laboratory lectures

There was no water leakage observed in the entire premise. The pipes and relevant systems are well maintained with adequate hygiene.

6.3 Water consumption

6.3.1 Municipal supply

The main source of water is through the Brihanmumbai Mahanagar Palika (Local Municipality) of Mumbai Suburban area. The total water consumption through the tanks on site is as follows:

Tank	Capacity in litres
Overhead tank (Drinking water)	41,600
Overhead tank (General use)	43,460
Sintex tank 1	5,000
Sintex tank 2	5,000
Total	**95,060**

Table 13: Tanks in the premise

In addition to the Municipal water supply daily an approximate amount of 20,000 litres is pumped twice in morning and evening for about two to two and half hours' time everyday from the well using submersible pump which is used for toilets and bathrooms.

6.4 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.

S. No.	Floor	Room Name	Toilet	Urinals	Shower	Flush tank	Wash basin / Taps
F1	Ground	Cloak Room	1			1	1
F2	Ground	Toilet block	2			2	2
F3	Ground	Trust office - Canteen					2
F4	Ground	Trust office - Toilet block	1		1	1	1
F5	Ground	Hall - Toilet block	1		1	1	1
F6	Ground	Hall - Kitchen area					1
F7	Ground	Outdoor passage as Staff area					4
F8	Ground	Open Ground for garden					1
F9	First	Science lab					1
F10	First	Girls Toilet	4			4	2
F11	First	Girls Toilet	3	3		6	2
F12	Second	Girls Toilet	3		1	3	3
F13	Second	Boys Toilet	3	3		6	3
F14	Third	Girls Toilet	2			2	2
F15	Third	Boys Toilet	2	3		5	2
F16	Fourth	Girls Toilet	2			2	2
F17	Fourth	Boys Toilet	2	4		6	2
F18	Fourth	Staff room	1			1	1
F19	Fifth	Girls Toilet	2			2	2
F20	Fifth	Boys Toilet	2	4		6	2
F21	Fifth	Common Room				1	1
F22	Terrace	Canteen eating area					2
F23	Terrace	Canteen Kitchen area					1
F24	Outdoor	Backyard Passage					4
Total			**31**	**17**	**3**	**49**	**45**

Table 14: Summary of the water consumption in the premises

Garden – It is watered daily once using a specific tap only for watering the open space and plants in premises in addition to the four taps (used commonly by the staff).

6.5 Water bill

As part of the Inventory verification and data collection, the water bill was collected. Following is the analysis of the water bill.

There is a direct use of 10,560 litres of water on a daily basis. The college is a private consumer. The bill is generated for duration of 3 months. The charges include sewerage charges as part of the water charges.

The analysis of water requirement is shown in the table below.

Duration	Usage in kilo litres (kl)
Nov 2020 to Feb 2021	956
Aug 2020 to Nov 2020	956
May 2020 to Aug 2020	2,763
Feb 2020 to May 2020	2,616
Nov 2019 to Feb 2020	2,734
Aug 2019 to Nov 2019	2,763
May 2019to Aug 2019	2,587
Feb 2019 to May 2019	2,675
Nov 2018 to Feb 2019	2,675
Aug 2018 to Nov 2018	2,793
May 2018 to Aug 2018	2,734
Feb 2018 to May 2018	2,616

Table 15: Water consumption details as per water bill

In the last annual year the water consumption through Municipal water supply was 7,291 kilo litres. The analysis of water consumption in last three years is as follows

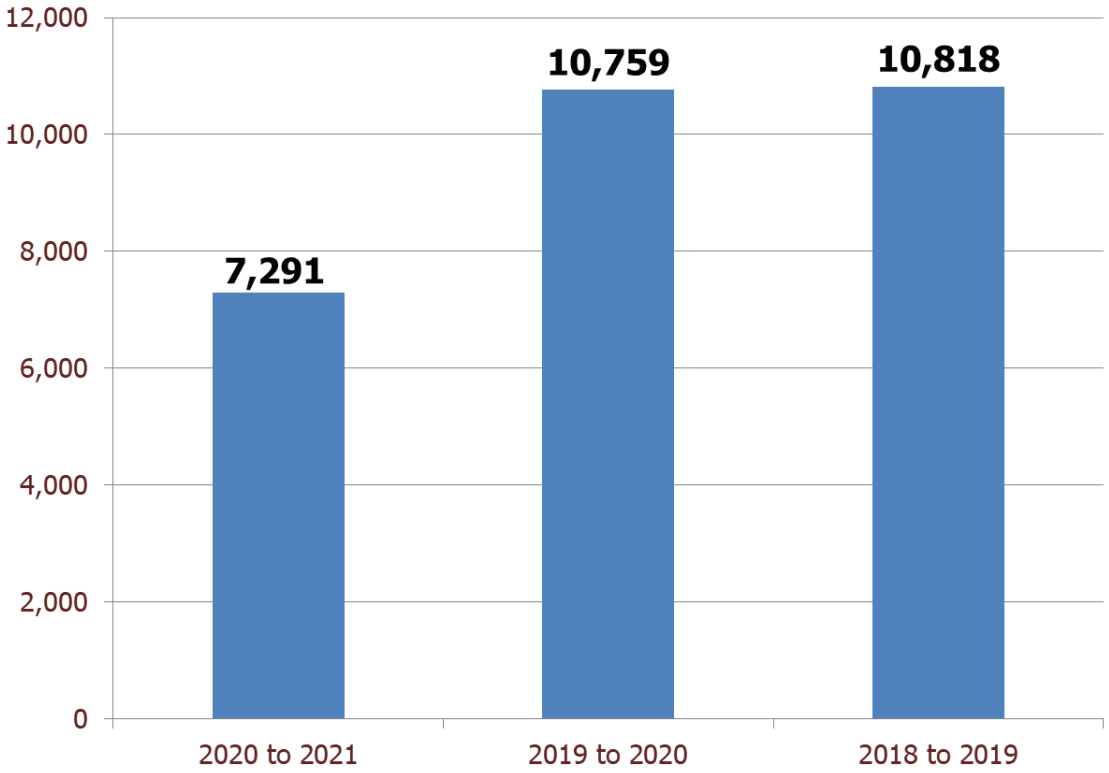


Figure 4: Analysis of water consumption from Municipal water supply

6.6 On-site investigation study about water management.

Based on the inventory done and data shared by the staff it was found that the premise has a total of 45 taps, 49 flush tanks, 3 showers, 17 urinals and 31 Toilets.

6.7 Water wastage

There was no water wastage found in the premises, the operation and maintenance is done by the admin and non-teaching staff in an excellent manner.

6.8 Water management

The premise has an efficient water management in terms of operations and maintenance. No leakage was found and even discussed with the staff. The toilets were kept very clean and there is use of aerators which helps in reducing the water wastage. There is provision of water coolers which is beneficial to occupants and visitors alike. Moreover there is sufficient number of taps in the premise.

6.9 Recommendations for a Sustainable Habitat

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

- Toilet – Replace the existing single flush cisterns with dual flush, if possible to include waterless urinals or e-toilets
- At least 1 toilet should be made for specially abled as per universal design norms.
- The college has a potential for rainwater harvesting given the huge terrace this should be put into practice and the water can be used for toilets, washing utensils, cleaning floors, gardening.
- Signages should be included proposed in toilet areas, canteen with information about avoiding water wastage.
- The waste water from toilets, canteen 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.

-

On-site investigation and data collection

Energy Audit

Background reference image Janko Ferlic on pexels

Greenvio Solutions

7. Energy Audit

7.1 Sources of Energy consumption

The premise uses two main sources of energy consumption.

1. **LPG - Gas cylinders**
2. **Electrical (Metered) –** Light, Fans, AC, Equipments, Pumps

7.2 On-site investigation analysis

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

- Generator is required as a backup for the annual or large functions held in open ground occasionally. In such a situation the generators are hired for temporary basis. There is no UPS/ Diesel Generator in the campus.
- There is no renewable energy/ solar plant at present. The College would like to install the same in future.
- The switch-off drills are not practised at present.
- The computers are shut-off after use and not put on power saving mode.
- Canteen uses Gas cylinders for cooking, there is no utilisation of fire wood.

The inventory and data collection for sources of energy consumed in the premise in summarised in the following sections.

7.3 Gas cylinders

There are two Canteens in the premises, one on the Ground floor

S. No.	Floor	Space	Nos. of cylinders required daily	Duration utilised	Quantity required in a month	Amount spent in a month (INR)	Amount spent in a year (INR)
1.	Ground	Trust office Canteen	1	Around a month	1	1,000/-	12,000
2.	Ground	School Canteen	1	For 2 months	0.5	500/-	6,000
3.	Ground	Hall – Sir's Personal	-	For 4 month	0.25	250/-	3,000

		room					
4.	First	Science lab	-	25 -30 days	1 in a year	-	1,000
5.	Terrace	Kitchen	1	For 7.5 days	4	4,000/-	48,000
Total			**3**		**5.75**	**5,750 /-**	**70,000/-**

Table 16: Cylinders used in Premises

There are a total of 3 cylinders used in Campus on a daily basis each of the quantity 15 kg. The cost of each cylinder is INR 1,000/- In the science laboratory there are 7 burners operated by a single cylinder. However these are used only during Science practical occasionally thus amounting to usage of 25-30 days in a year.

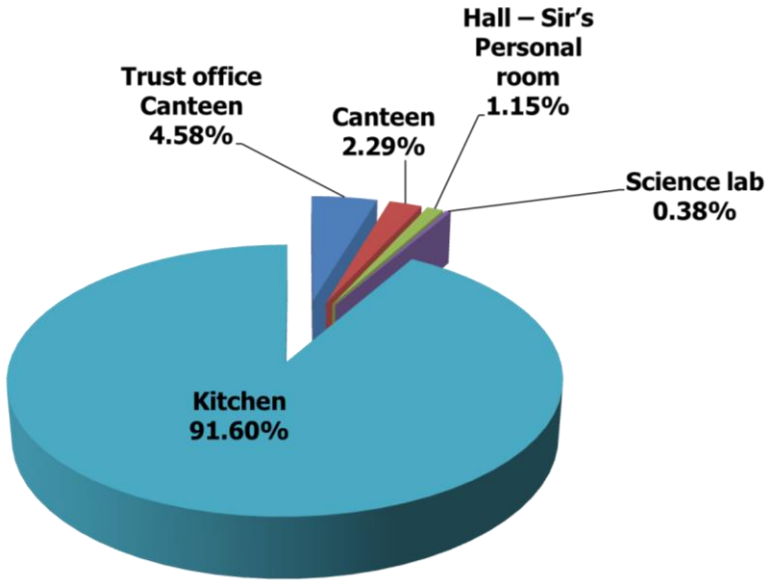


Figure 5: Consumption as per availability of gas cylinders in the premise

The above graph shows that canteen on Terrace has the consumption through the use of cylinder in various spaces in the premises. The annual amount spent of consumption by the use of cylinders is INR 70,000/-

7.4 Meters

7.4.1 Meter 1 – Only for outdoor activities

Pumps in the Premises

There are three submersible pumps in the premises, both are used for two hours daily twice a day (morning and in the evening) for pumping water from the Underground tank to Overhead tank and Well respectively. The detailed of the Pumps connected to Meter 1 are as follows:

S. No.	Location	Horse power (HP)	Kilo Watt (kW)	Quantity	Used for
1	Pump room	5	3.75	2	Pumping water to water tanks
2	Inside the well	5	3.75	1	Pumping water to the well
Total				**3**	

Table 17: Summary of the Pumps connected to Meter 1

Outdoor Lights

The Meter 2 is connected to the outdoor lights of 100W each present in the setback; there are also compound lights. For the ground occasionally for any outdoor functions in open space there are some lights used for temporary basis.

7.4.2 Meter 2 – Main and considered for the loads and audit

There are two meters in the premises. The meter 2 (connected to entire building and Institutions in the premises) is used as a base for overall calculation of load. The electricity bills shared were of this meter.

S. No.	Location	Horse power (HP)	Kilo Watt (kW)	Quantity	Used for
1	Lift room	9	6.75	1	Operating Lift
Total				**1**	

Table 18: Summary of the Pumps connected to Meter 2

7.4.3 Actual Electrical Consumption as per Bills

The admin department had shared the bills for Meter 2 which is connected to all floors and is main source of energy supply. The meter number is 102065626 and the supplier is **Adani Electricity**. The type of supply is **LT – Low Tension**. The analysis of actual electrical energy consumption for the Academic Year 2020-21 and 2019-20 is summarised in table and graph below.

Month	2021-2020	2020-2019
April	7,220	6,872
March	6,462	11,128
February	5,186	14,864
January	6,442	14,472
December	7,094	15,200
November	6,712	16,016

October	7,874	15,296
September	3,881	15,552
August	3,881	18,856
July	6,584	20,496
June	7,784	14,456
May	8,352	9,040
Total	**77,471**	**1,72,248**

Table 19: Summary of the monthly electrical consumption as per bill

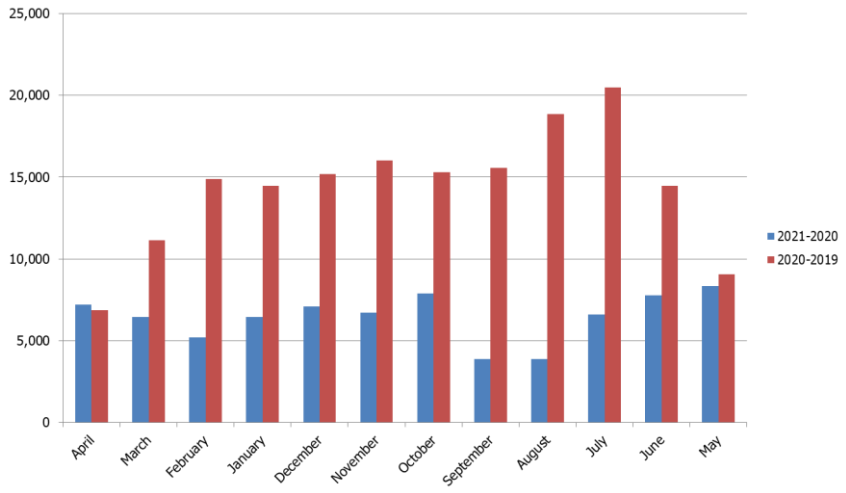


Figure 6: Annual electricity consumption for 2019- 21

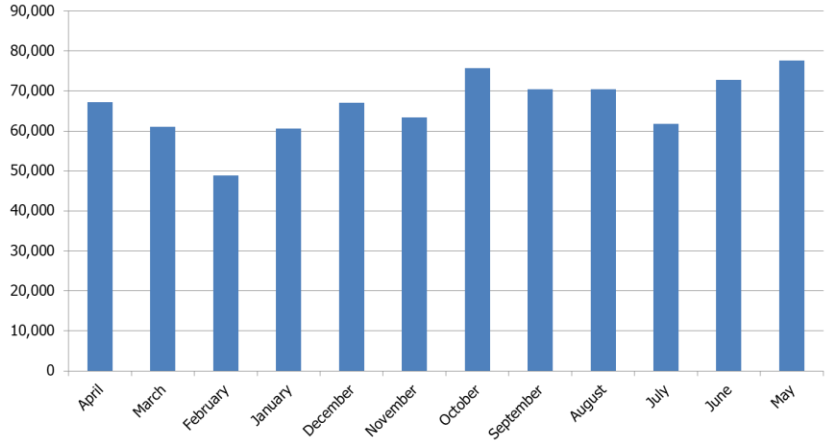


Figure 7: Summary of the amount spent on electrical bills in 2019-20

Below is a summary of the amount spent per month.

Month	Amount (INR)
April	67,180
March	60,970
February	48,900

January	60,540
December	67,000
November	63,380
October	75,680
September	70,365
August	70,365
July	61,760
June	72,780
May	77,620

Figure 8: Amount spent on bills

7.5 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. In this the key energy is consumed by Motors used for AC which are considered in equipment analysis.

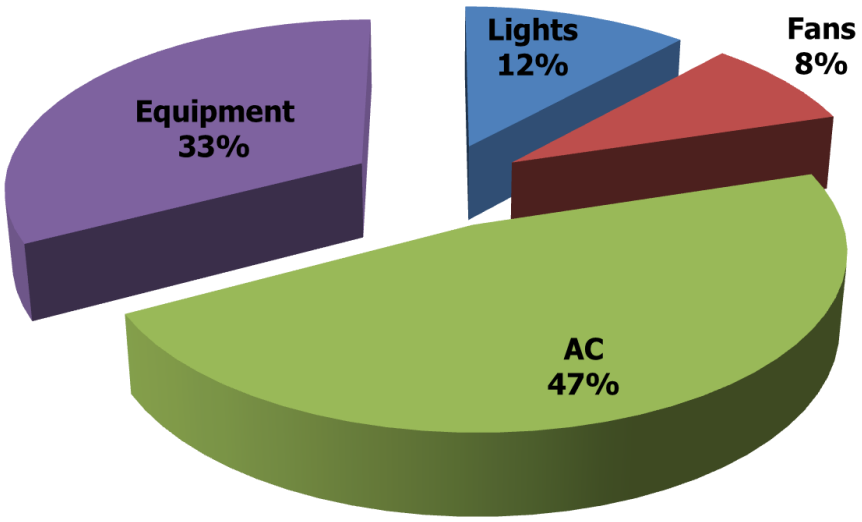


Figure 9: Summary of the Calculated Electrical Consumption as per inventory

The above graph shows that AC consumes 47% followed by Equipment at 33% while Lights consume 12% and Fans consume 8% of the total calculated electrical energy.

7.6 Lights

7.6.1 Types of lights

There are a total of **988 lights** in the campus.

S. No.	Type of Light	Wattage	Total
1	LED	3W, 15W, 22W, 9W, 12W, 28W, 16W, 35W, 20W	538
2	Fluorescent Tubelights with Ballast	36W+14W, 40W+14W, 20W + 14W	283
3	Fluorescent Tubelights	36W, 40W	165
4	CFL	40W	2
Total			**988**

Table 20: Brief summary of the types of lights in the premise

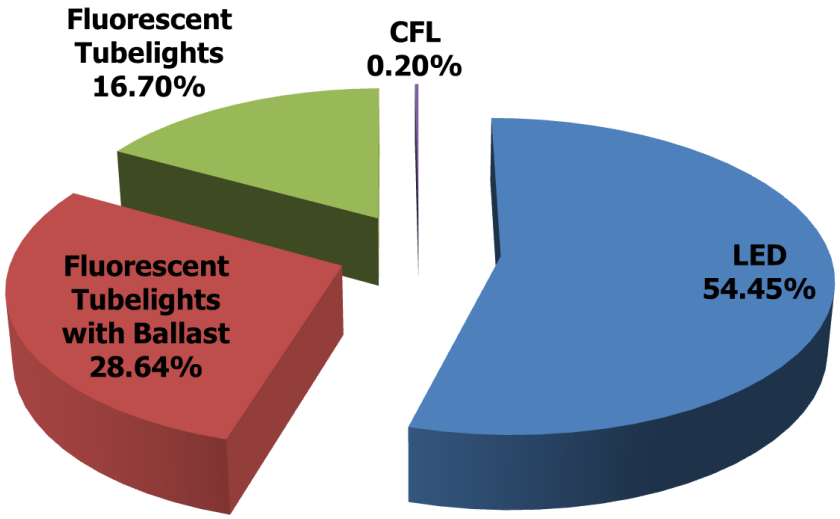


Figure 10: Types of Lights in the campus

The analysis of the types of lights in campus is as follows:

- **LED lights are the highest in number being 538 in total with 54.45%** consuming 3W, 15W, 22W, 9W, 12W, 28W, 16W, 35W and 20W respectively.
- **Fluorescent Tubelights with ballasts are the second highest being 283 in total with 28.64%** consuming 20W, 36W & 40W with ballast of 14W.
- **Fluorescent Tubelights are 165 in numbers with 16.70%** consuming 36W and 40W.
- **CFL are 2 in numbers at 0.20%** consuming 40W each.

7.6.2 Detail classification of each type of light

The following table shows the various types of lights per floor in the premises.

Room name	3W LED	15W LED	22 W LED TB	9W LED	12W LED	28W LED TB	16 W LED	35W LED	20 W LED	20W REGU	40W REGU TB	40W TB	36W REGU TB	36W RE TB	CFL 40W	Total Nos.
Ground Floor	12	133	136	19	21	0	36	0	1	0	1	29	0	0	0	**388**
First floor	0	0	0	0	0	5	20	4	0	0	57	11	0	0	0	**97**
Second floor	0	16	0	0	0	7	23	4	0	0	48	6	0	0	0	**104**
Third floor	0	0	0	0	0	9	21	4	0		55	2	0	0	0	**91**
Fourth floor	0	0	0	0	0	12	27	4	0		0	53	0	7	0	**103**
Fifth floor	0	0	0	0	0	3	17	4	0	2	0	53	120	0	1	**200**
Terrace	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	**5**
Total	**12**	**149**	**136**	**19**	**21**	**36**	**144**	**20**	**1**	**2**	**161**	**158**	**120**	**7**	**2**	**988**

Table 21: Detail classification of the types of lights in campus

7.6.3 Floor wise energy consumption

The total light consumption amounts to **75,049 kWh**, the floor wise consumption in kWh of all lights is as follows:

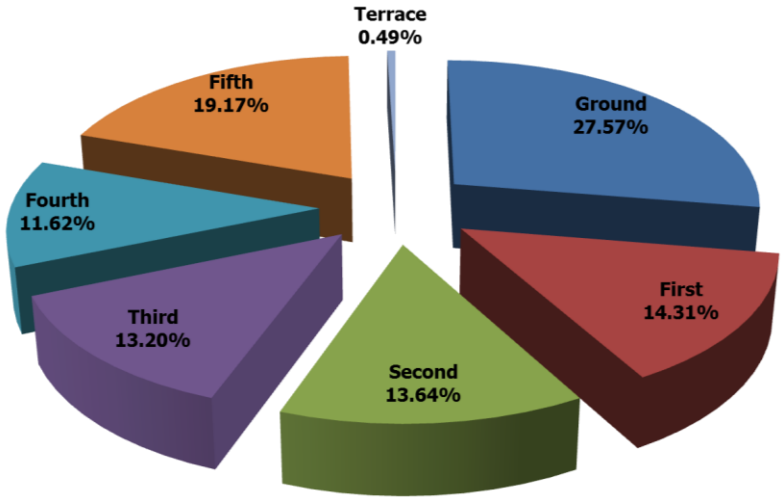


Figure 11: Floor wise energy consumption of lights

The **Ground floor consumes 20,691 kWh at 27.57%** which has *maximum types of lights* followed by the **Fifth floor consuming 14,390 kWh at 19.17%** owing to the *more number of lights* in the auditorium. The **first floor consumes 10,739 kWh at 14.31%** followed by **second floor consuming 10,234 kWh at 13.64% and**

third floor consuming 9,904 kWh at 13.20% while the **fourth floor consumes only 8,721 kWh at 11.62%** though these floors houses same number of classrooms as other floors and the **Terrace consumes the least energy of 370 kWh at 0.49%.**

7.6.4 Section wise energy consumption

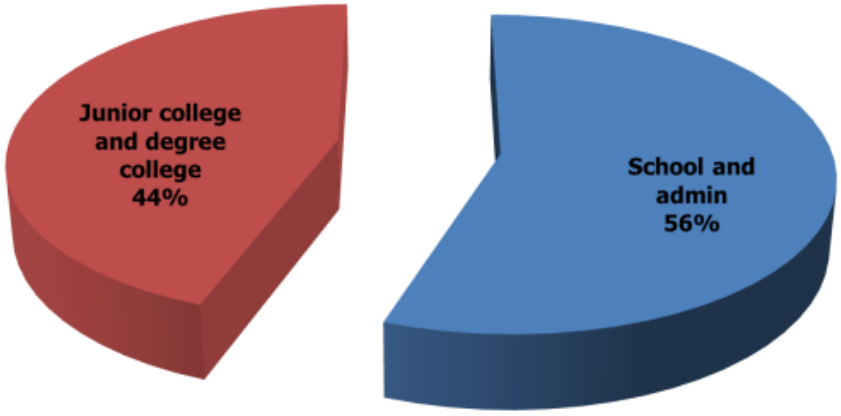


Figure 12: Section wise energy consumption of lights

The section wise consumption shows the Ground, First and Second floor occupied by **School (Pre-primary, Primary and Secondary) and Admin section consume 56% i.e. 41,664 kWh** of energy and the Third, Fourth and Fifth floor occupied by **Junior, Degree College consume 44% or i.e. 33,385 kWh.**

7.6.5 Requirement of NAAC

7.6.5.1 Alternative Energy Initiative

Percentage of power requirement met by renewable energy sources – There is no renewable energy available on campus at present.

7.6.5.2 Percentage of lighting power requirement met through LED bulbs

Percentage of lighting power requirement met through LED bulbs
= (Lighting power requirement met through LED bulbs / Total lighting power requirement) X 100
= (27,935 kWh/75,049 kWh) X 100
= 37.22%

7.6.6 On-site investigation observations

During the site visit and check some of the points were noticed as follows:

1. Most of the Tube lights are non-led
2. All lights are in working conditions
3. Daily monitoring and check is done by the maintenance staff.
4. There was no fuse defect observed.

7.7 Fans

7.7.1 Types of fans

There are a total of **393 fans** in the campus. The following table shows the various types of fans per floor in the premises.

Floor	Ceiling Fan	Wall Mounted	Table fans	Exhaust Fan	Exhaust fans with motors	Total Nos.
Ground Floor	86	0	2	8	4	100
First floor	54	1	0	0	0	55
Second floor	57	3	0	0	0	60
Third floor	61	1	0	0	0	62
Fourth floor	58	0	0	0	0	58
Fifth floor	56	1	0	0	0	57
Terrace	0	1	0	0	0	1
Total	**372**	**7**	**2**	**8**	**4**	**393**

Table 22: Summary of the types of fans in premise

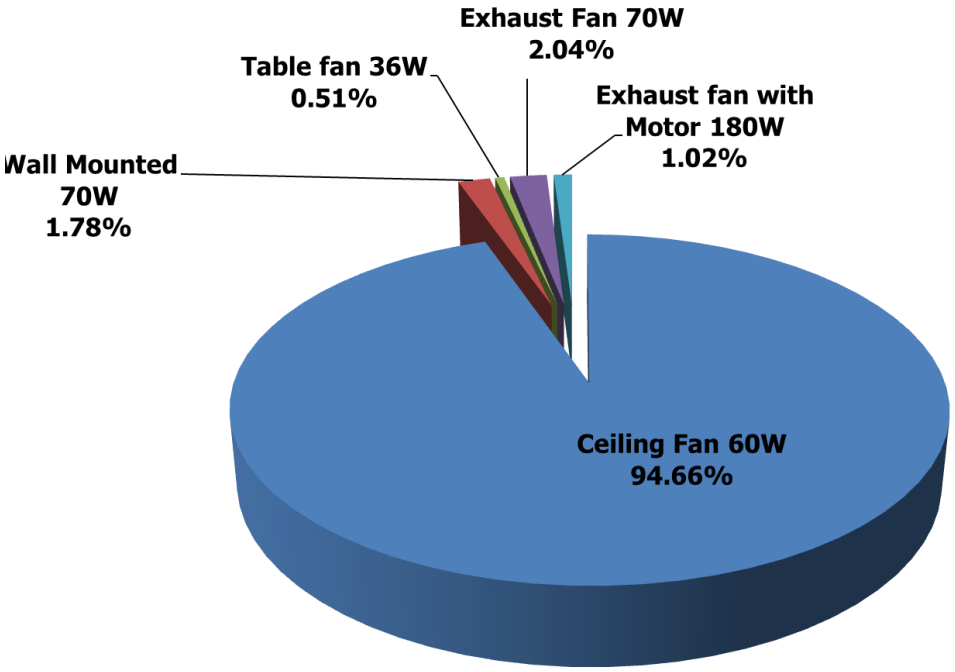


Figure 13: Types of Fans in the premise

The analysis of the types of fans in campus is as follows:

- **Ceiling fans are the highest in number being 372 in total with 94.66%** consuming 60W each almost equally distributed on all floors with the maximum number being on ground floor.

- **Exhaust fans are the second highest being 8 in total with 2.04%** consuming 70W each.
- **Wall mounted fans are 7 in numbers with 1.78%** consuming 70W each.
- **Exhaust fans with motors are present only on ground floor in the cat room near the staff area in backyard in the being 4 in numbers at 1.02%** consuming 180W each.
- **Table fans are the least in numbers present only on ground floor in KG, Nursery area being 2 in total at 0.51%** consuming 36W each.

7.7.2 Floor wise consumption analysis

The energy consumption of fans is **53,873** kWh of energy, the following graph shows the floor wise consumption.

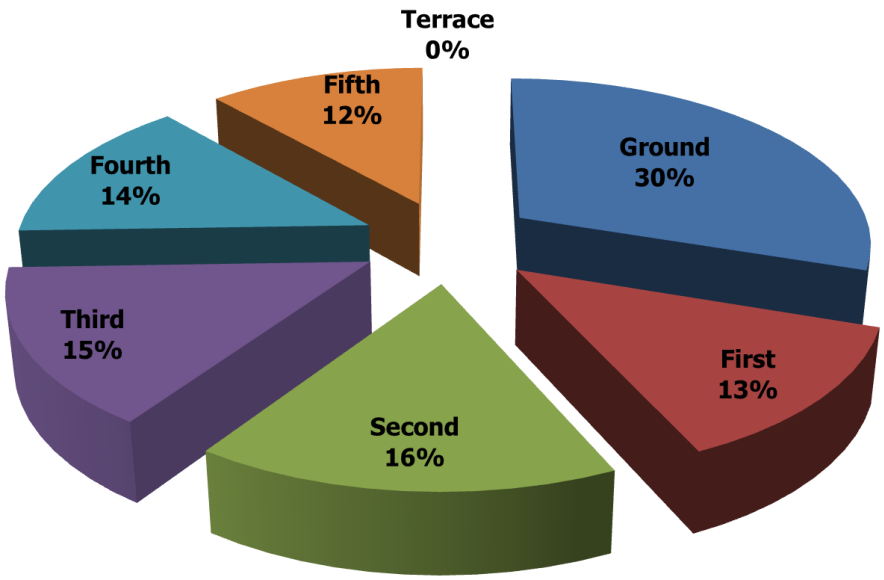


Figure 14: Energy consumed by fans

The above analysis shows the **Ground floor consumes the highest amount of energy of 16,239 kWh at 30%** followed by **Second floor consuming 8,775 kWh at 16%;** the **Third floor consumes 8,065 kWh of energy at 15%** while the **Fourth floor consumes 7,537 kWh at 14%;** the **First floor consumes 7,048 kWh at 13%,** the **Fifth floor consumes only 6,024 kWh of energy at 12% , the terrace does not consume any energy.**

7.7.3 Section wise energy consumption

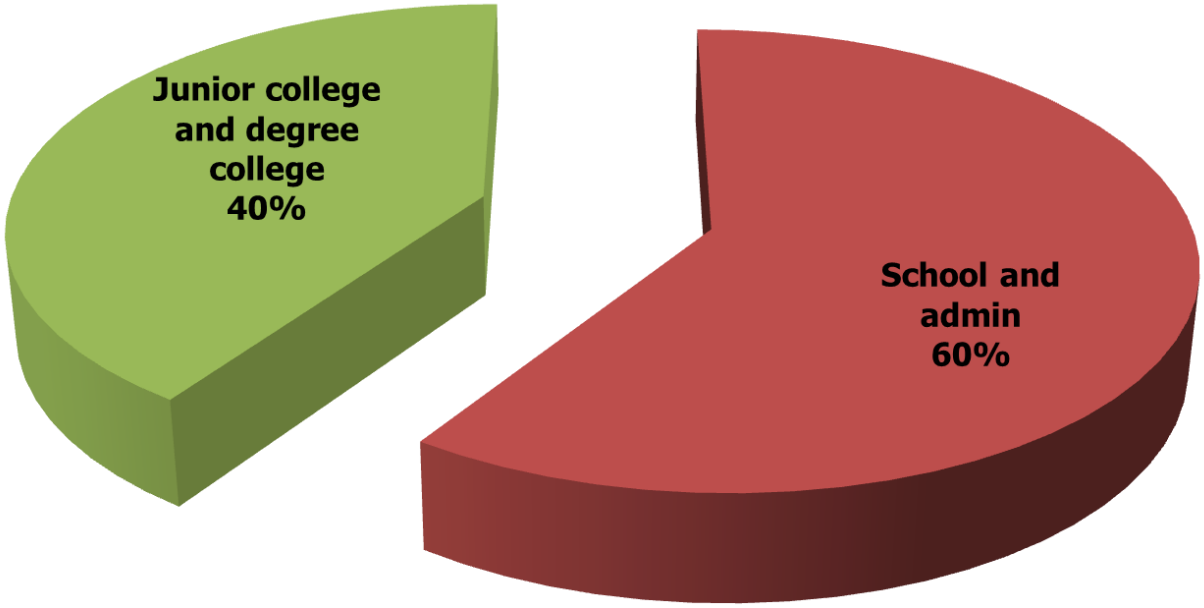


Figure 15: Section wise energy consumption of fans

The section wise consumption shows the Ground, First and Second floor occupied by **School (Pre-primary, Primary and Secondary) and Admin section consume 60% i.e. 32,062 kWh** of energy and the Third, Fourth and Fifth floor occupied by **Junior, Degree College consume 40% or i.e. 21,811 kWh.**

7.7.4 On-site investigation observations

During the site visit and check some of the points were noticed 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 total of **59 Air conditioners** in the premise. The summary of each is given in table below.

S. No.	Room Name	Make	Star	Ton	Wattage	Total Nos.	kWh
1	KG A/ Nursery	Carrier		2	2625	1	1330.88
		Hitachi		2	1405	1	712.335
2	Sr. Kg B	LG		2	1875	2	1584.38
3	JR,KG & SR.KG C Division	Voltas		2	1450	1	735.15
		LG		2	1450	1	735.15
		Voltas		2	1565	1	793.455
4	Play area	Voltas		2	1450	1	735.15
5	Trust office Sir cabin including canteen, Toilet, Bathroom, seating, Conference, lobby area	Blue star	3 Star	2	5030	1	15492.4
		Blue Star	-	2	3430	1	10564.4
		Hitachi	5 Star	2	1485	1	4573.8
		Carrier		2	2625	2	16170
6	Hall - Sir room	LG	-	2	1450	3	870
	Hall - Activity area	LG	-	2	1450	8	25520
	Hall - Gym	LG	-	2	2300	4	20,240
7	Activity room	Voltas		2	2250	1	7425
Total of Ground Floor						**29**	**1,07,482**
8	Exam room	Blue star	1 Star	2	2450	1	5733
9	Classroom	Voltas	3 Star	2	3150	2	15246
10	Classroom	LG		2	2090	2	10115.6
		Voltas	3 Star	2	3150	1	7623
11	IT LAB	Carrier	2 Star	2	2950	3	21417
Total of Second floor						**8**	**60,135**
12	Classroom	Hitachi	-	2	2000	1	4,180
13	Office	LG	2 Star	2	2190	1	5,782
14	Vice Principal Cabin	-	-	2	2190	1	5,782

15	Degree Principal Cabin	Voltas	3 Star	2	5,000	1	13,200
Total of Third floor						**4**	**28,943**
16	Examination room	Hitachi	5 Star	2	1275	1	3,366
17	Co-ordinator room	LG	3 star	2	1610	1	4,250
		General	-	2	1610	1	4,250
18	I.T Room	Blue star	2 Star	2	1750	1	3,658
		LG	3 star	2	1610	1	3,365
Total of Fourth floor						**5**	**18,889**
19	Hall	Blue Star	1 Star	2	6,025	10	63,263
20	Seminar AV	Voltas	3 Star	2	5,000	2	20,900
Total of Fifth floor						**12**	**84,163**
Grand total						**59**	**2,99,612**

Table 23: Types of AC in the premise

It was informed by the Electrical staff that all AC's are of 2 tonnages each. The **Ground floor has 29 AC**; the **Second floor has 9 AC**; the **Third floor has 4 AC**; the **Fourth floor has 5 AC** and the **Fifth floor has 12 AC**; the First floor does not have any air conditioner.

7.8.2 Floor wise consumption analysis

The energy consumption of AC is **2,99,612** kWh of energy, the following graph shows the floor wise consumption.

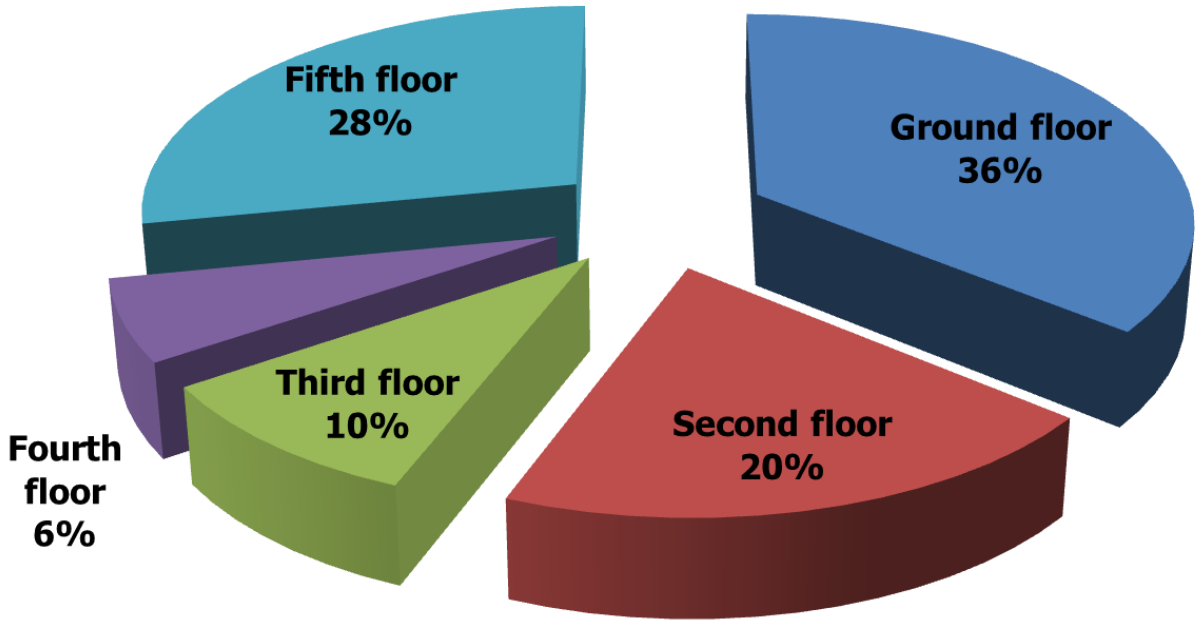


Figure 16: Energy consumed by AC

The above analysis shows the **Ground floor consumes the highest amount of energy of 1,07,482 kWh at 36%** followed by **Fifth floor consuming 84,163 kWh at 28%;** the **Second floor consumes 60,135 kWh of energy at 20%** while the **Third floor consumes 28,943 kWh at 10%;** the **Fourth floor consumes 18,889 kWh at 6%** which is the least.

7.8.3 Section wise energy consumption

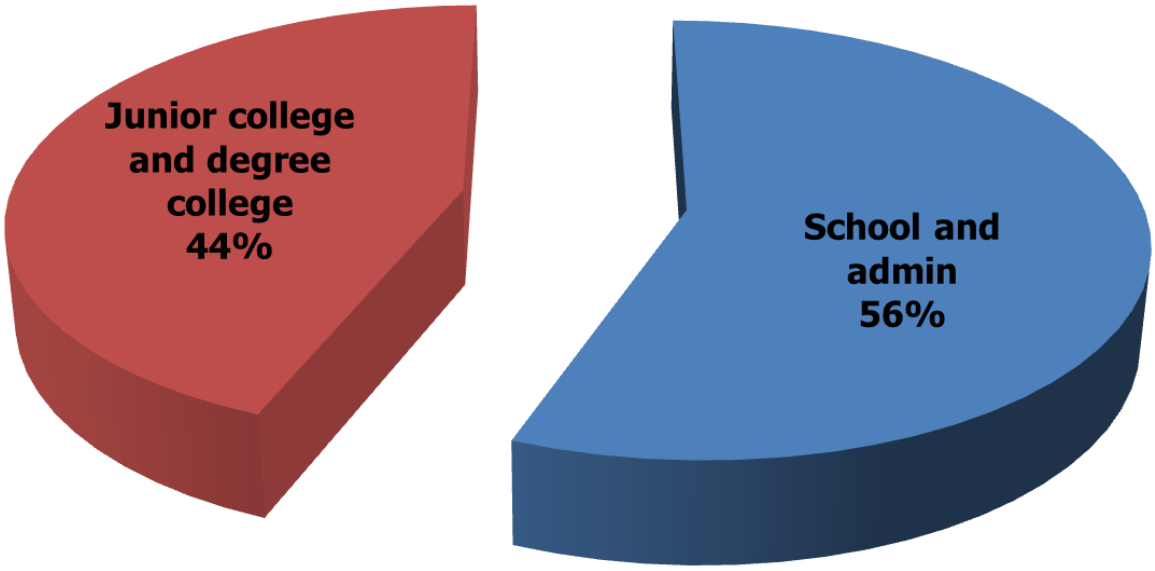


Figure 17: Section wise Energy consumed by AC

The section wise consumption shows the Ground and Second floor occupied by **School (Pre-primary, Primary and Secondary) and Admin section consume 56% i.e. 1,67,617 kWh** of energy and the Third, Fourth and Fifth floor occupied by **Junior, Degree College consume 44% or i.e. 1,31,995 kWh.**

7.8.4 On-site investigation observations

During the site visit and check some of the points were noticed as follows:

1. All AC are in working conditions.
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 **29 types of equipment totalling to 409 in number** in the premise. The various types are mentioned in the table below.

Room Name	Smart board and system	Speaker	Projector	Camera	TV	Amplifier	Bell	Computer	Washing machine
	250 W	30 W	250 W	15 W	150 W	350 W	11 W	250 W	2000 W
Ground Floor	2	4	2	9	2	2	0	11	1
First floor	9	9	9	14	0	0	1	0	0
Second floor	8	21	10	18	2	0	1	44	0
Third floor	3	15	4	18	0	1	2	6	0
Fourth floor	0	20	1	16	1	6	1	51	0
Fifth floor	0	12	1	12	1	3	1	1	0
Terrace	0	0	0	0	0	0	0	0	0
Total	**22**	**81**	**27**	**87**	**6**	**12**	**6**	**113**	**1**

Room Name	Reflactor	Scanner	Printer	Reflector machine	Landline phone	Wi fi router	Stabilizer	Music system	Controller unit
	60 W	10 W	450 W	60 W	2 W	20 W	50 W	50 W	500 W
Ground Floor	0	0	0	0	1	0	0	0	0
First floor	0	0	0	0	0	0	0	0	0
Second floor	1	1	0	0	0	0	0	0	0
Third floor	0	2	2	1	0	3	1	0	0
Fourth floor	0	1	5	0	0	2	7	0	1
Fifth floor	0	0	0	0	0	0	2	1	0
Terrace	0	0	0	0	0	0	0	0	0
Total	**1**	**4**	**7**	**1**	**1**	**5**	**10**	**1**	**1**

Room Name	Xerox machine	DVD player	Refrigerator	Microwave	Geyser	Fish tank	Water Cooler	Chimney	Lift
	930 W	13 W	250 W	1200 W	500 W	5 W	1550 W	120 W	5000 W
Ground Floor	0	2	3	1	3	2	0	1	0
First floor	0	0	0	0	0	0	1	0	0
Second floor	0	0	0	0	0	0	1	0	0
Third floor	0	0	0	0	0	0	1	0	0
Fourth floor	2	0	0	0	0	0	1	0	0

Fifth floor	0	0	0	0	0	0	1	0	1
Terrace	0	0	0	0	0	0	0	0	0
Total	**2**	**2**	**3**	**1**	**3**	**2**	**5**	**1**	**1**

Room Name	Pump	Sanitary Machine
	675 kW	10 W
Ground Floor	0	0
First floor	0	1
Second floor	0	0
Third floor	0	0
Fourth floor	0	1
Fifth floor	0	0
Terrace	1	0
Total	**1**	**2**

Table 24: List of the equipment in premise

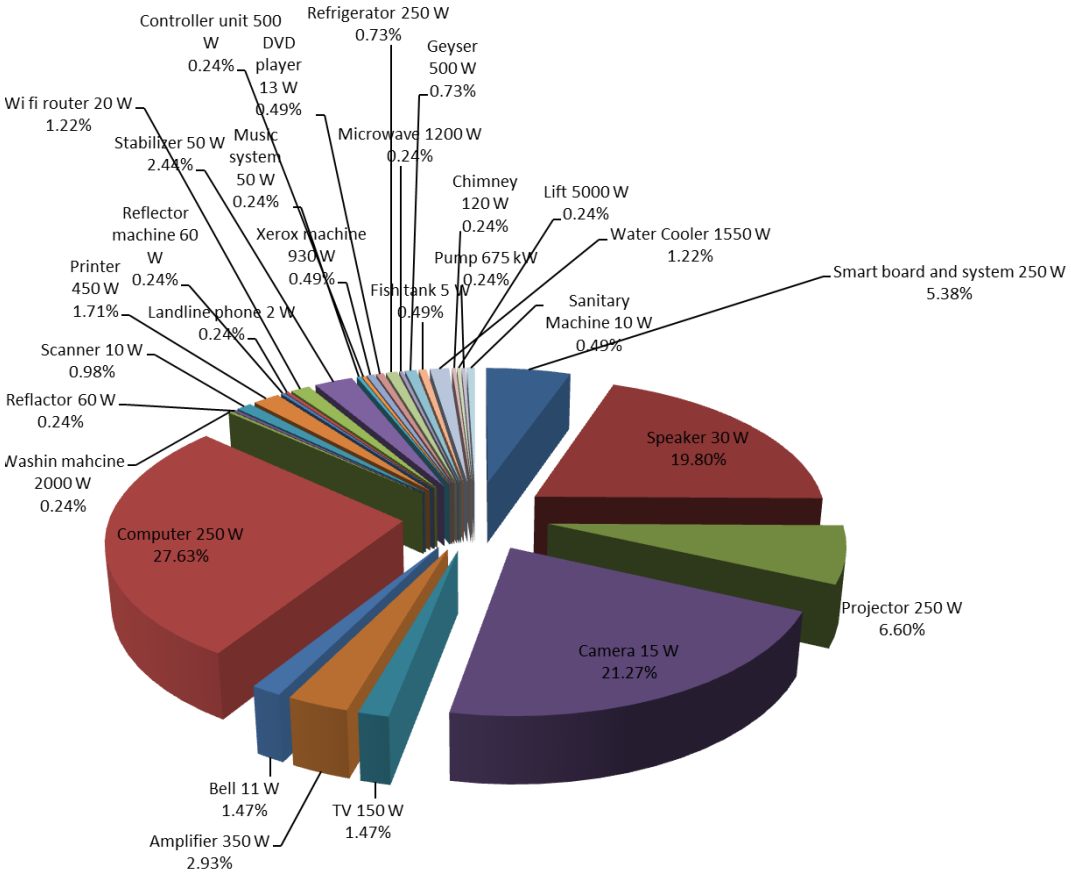


Figure 18: Summary Energy consumed by Equipment

The above summary shows that Computer consumes more energy at 27.63% while Camera at 21.27% the speakers consume 19.80% and Smart board and system consumes 5.38% these are maximum consumers as compared to other equipment.

7.9.2 Floor wise consumption analysis

The energy consumption of Equipment is **2,08,266** kWh of energy, the following graph shows the floor wise consumption.

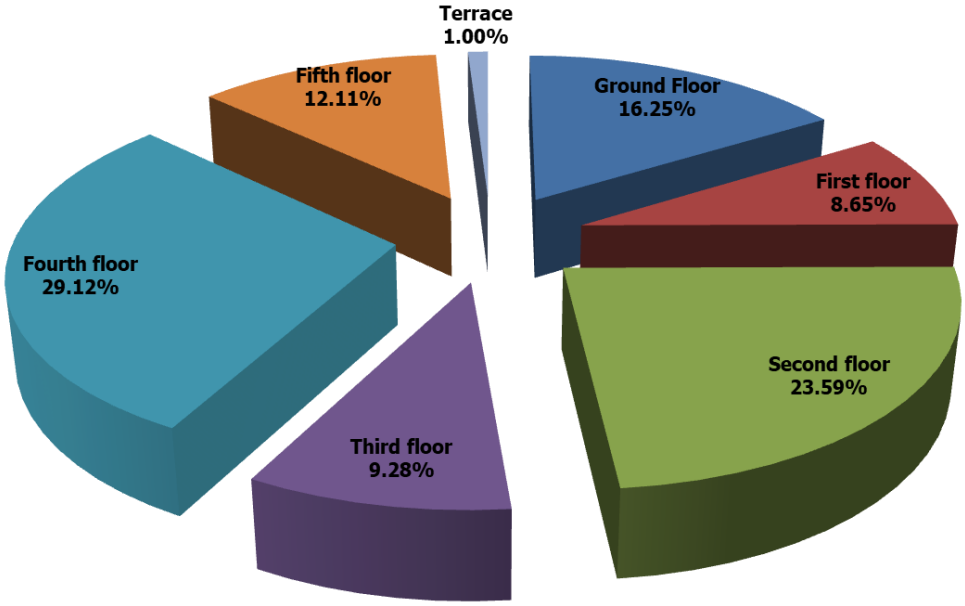


Figure 19: Energy consumed by Equipment floor wise

The above analysis shows the **Fourth floor consumes the highest amount of energy of 60,637 kWh at 29.12%** followed by **Second floor consuming 49,136 kWh at 23.59%;** the **Ground floor consumes 33,849 kWh of energy at 16.25%** while the **Fifth floor consumes 25,219 kWh at 12.11%;** the **Third floor consumes 19,327 kWh at 9.28%; the First floor consumes 18,019 kWh at 8.65% and the Terrace consumes only 1%**.

7.9.3 Section wise energy consumption

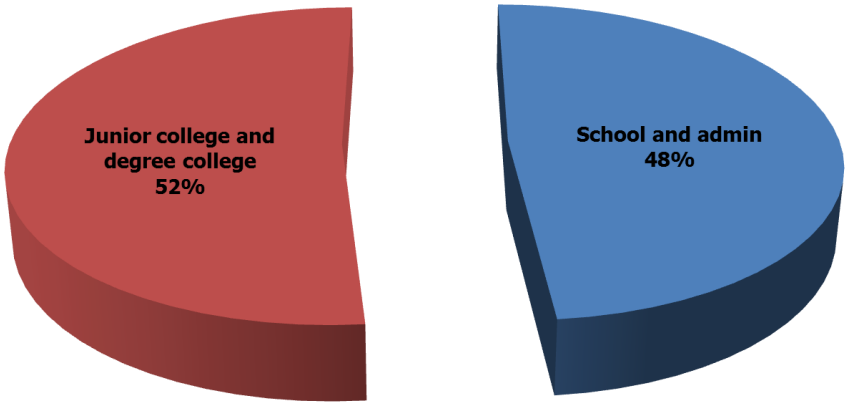


Figure 20: Section wise Energy consumed by Equipment section wise

The section wise consumption shows the Ground and Second floor occupied by

School (Pre-primary, Primary and Secondary) and Admin section consume 48% i.e. 1,01,004 kWh of energy and the Third, Fourth and Fifth floor occupied by **Junior, Degree College consume 52% or i.e. 1,07,262 kWh.**

7.9.4 On-site investigation observations

During the site visit and check some of the points were noticed as follows:

1. All Equipments are in working conditions.
2. Daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.
3. There is a designated team comprising of 1 Teaching staff, 1 Admin staff and 2 Non-teaching staff members for every floor to keep a check about the equipments and hygiene.
4. No defect was found in any equipment of electrical consumption.
5. Fire extinguishers (Do not fall as part of equipment for electrical consumption) shall be replaced within a week's time as informed by staff along with additional fire safety measures.

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 Lights

The current light analysis shows that LEDs occupy 538 nos. of the total 988 lights in the premises. The remaining lights are CFL, Fluorescent Tubelights and Fluorescent Tubelights with Ballast. The CFL being very minimal that is only 2 in number can be kept as it is or replaced.

The Fluorescent Tubelights (20W, 36W, 40W) and Fluorescent Tubelights with Ballast (36W+14W (ballast), 40W+14W (ballast)) occupying a major portion in the form of 448 nos. should be replaced with LED lights which consume on an average 16-20W when in use.

The following table shows a comparison of the current consumption and consumption of all 448 Fluorescent Tubelights (20W, 36W, 40W) and Fluorescent Tubelights with Ballast (36W+14W (ballast), 40W+14W (ballast)) if replaced with star rated appliance.

Floor	Current consumption kWh	New consumption kWh	kWh reduction	Percentage Reduction
Ground floor	3,404	1,676	1,728	51
First floor	8,968	3,471	5,497	61
Second floor	7,494	2,862	4,632	62
Third floor	7,747	2,901	4,846	63
Fourth floor	6,061	3,074	2,987	49
Fifth floor	12,970	5,754	7,216	56
Terrace	247	123	124	50
Total	**46,891**	**19,861**	**27,030**	

Table 25: Summary of current and new lights

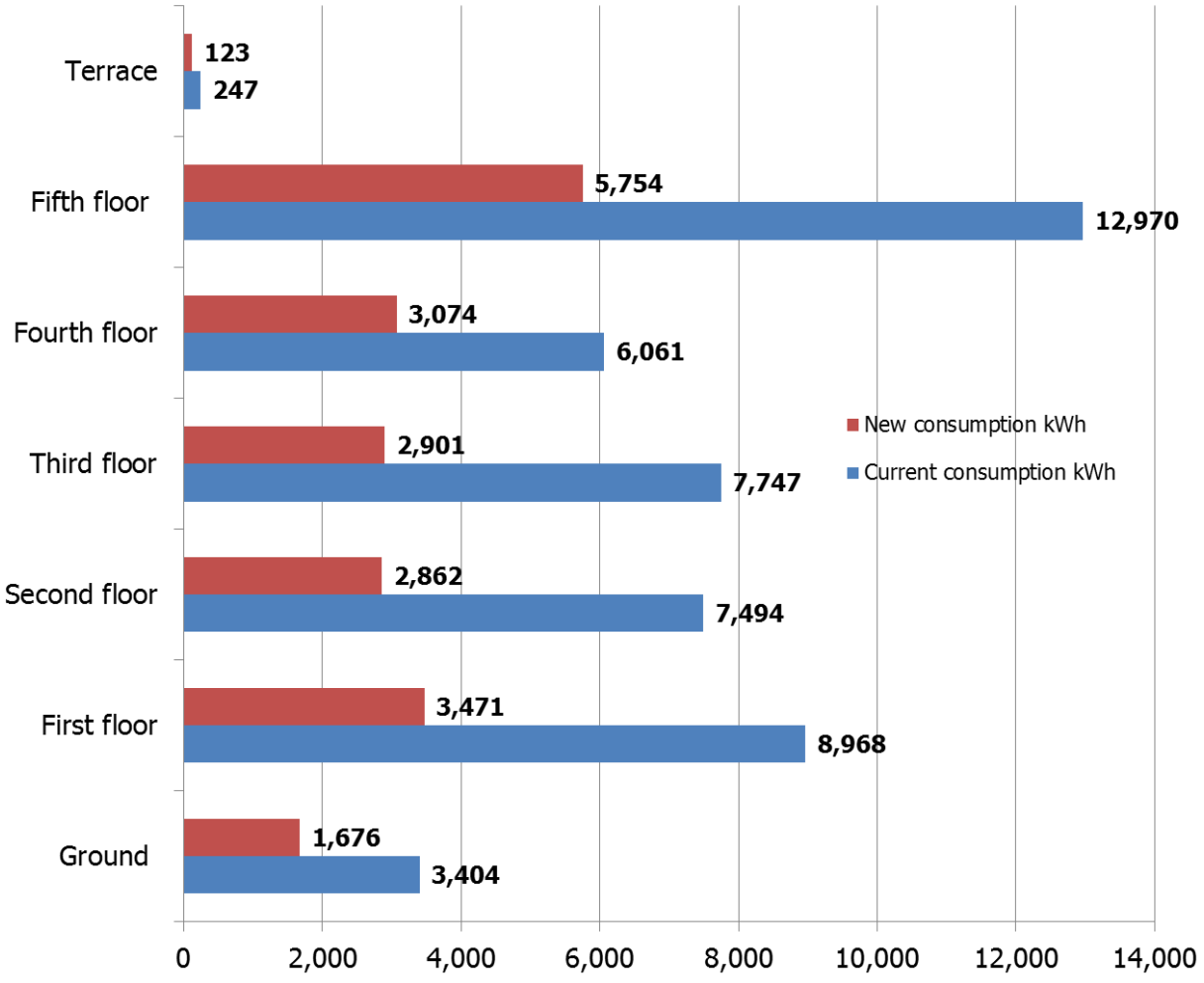


Figure 21: Analysis of current and new fans

The above analysis shows reduction of average of **49% reduction in energy consumption** if replaced with energy efficient appliance**.**

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 60W when in use. These should be replaced with energy efficient fans consuming 32W when in use.

The following table shows a comparison of the current consumption and consumption of all 372 ceiling fans if replaced with star rated appliance. The terrace does not have any ceiling fans hence it is excluded.

Floor	Current consumption kWh	New consumption kWh	kWh reduction	Percentage Reduction
Ground floor	16,239	10,493	5,746	35
Second floor	7,048	3,845	3,203	45
Third floor	8,775	4,917	3,858	44
Fourth floor	8,065	4,388	3,677	46
Fifth floor	7,537	4,020	3,517	47
Total	**6,024**	**3,213**	**2,811**	**44%**

Table 26: Summary of current and new fans

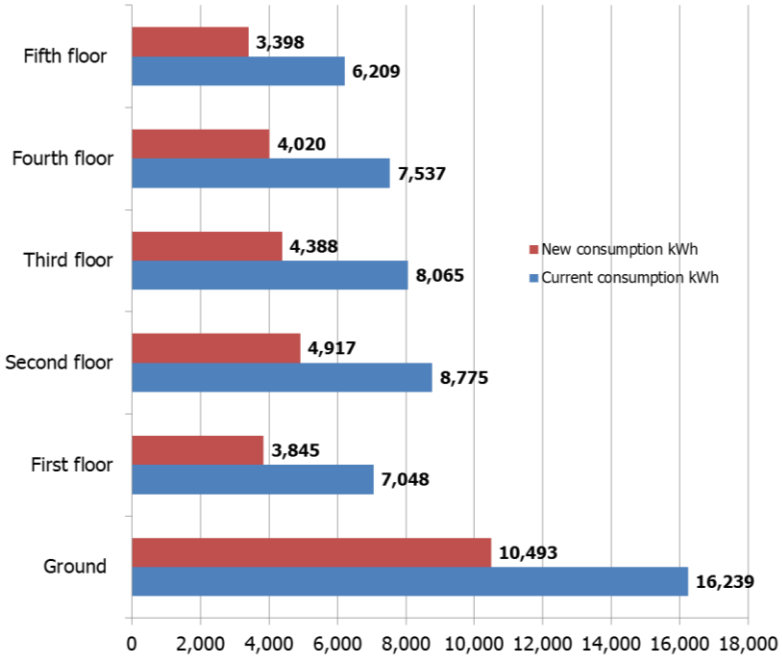


Figure 22: Analysis of current and new fans

The above analysis shows reduction of average of **44% reduction in energy consumption** if replaced with energy efficient appliance**.**

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 consuming approximately 1500W and being 1 ton.

The following table shows a comparison of the current consumption and consumption of the 59 air conditioners if replaced with star rated appliance. The first floor and terrace do not have any air conditioner hence they are excluded.

Floor	Current consumption kWh	New consumption kWh	kWh reduction	Percentage Reduction
Ground floor	1,07,482	74,381	33,101	31
Second floor	60,135	32,550	27,585	46
Third floor	28,943	15,015	13,928	48
Fourth floor	18,889	18,150	739	4
Fifth floor	84,163	22,020	62,143	74
Total	**2,99,612**	**1,62,116**	**1,37,496**	**41%**

Table 27: Summary of current and new air conditioners

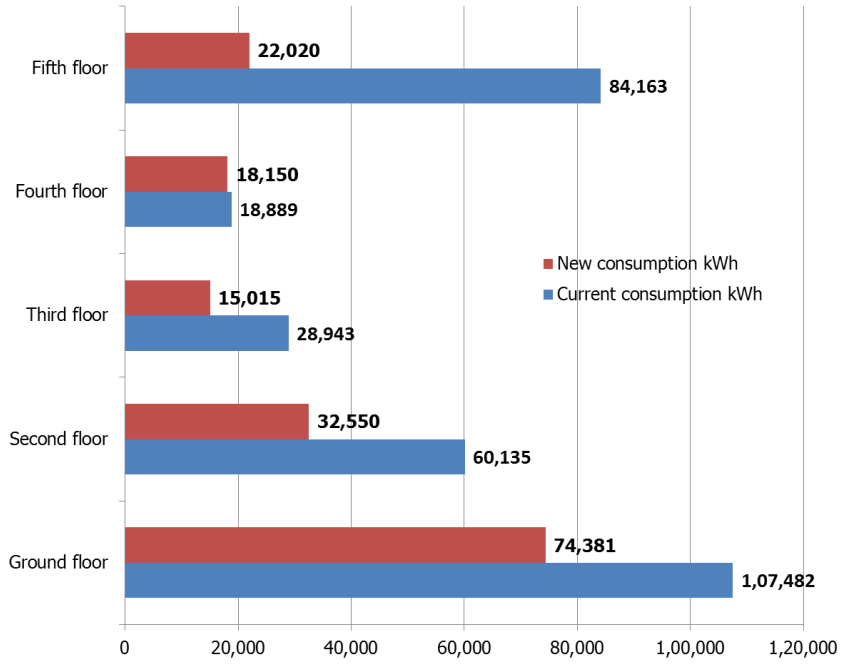
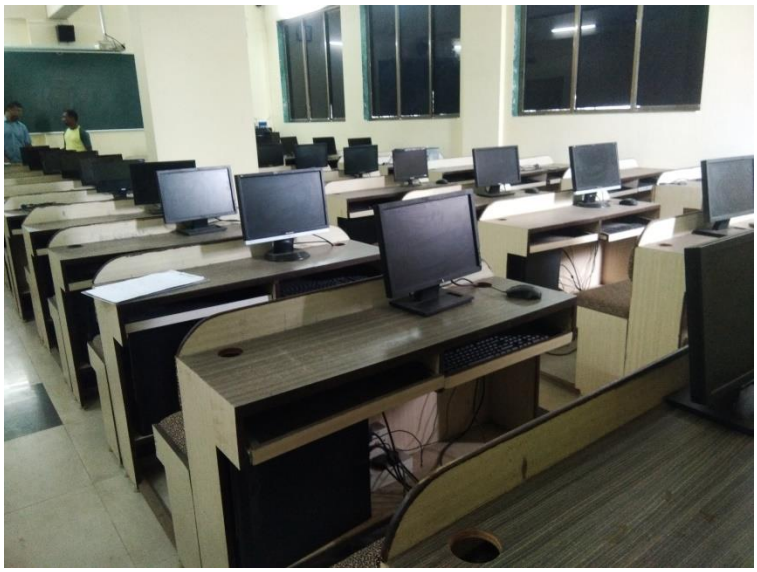
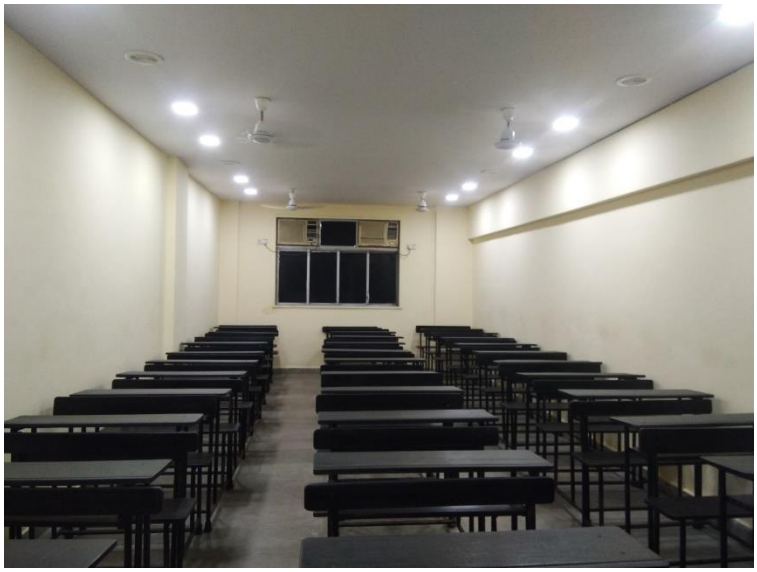


Figure 23: Analysis of current and new air conditioners

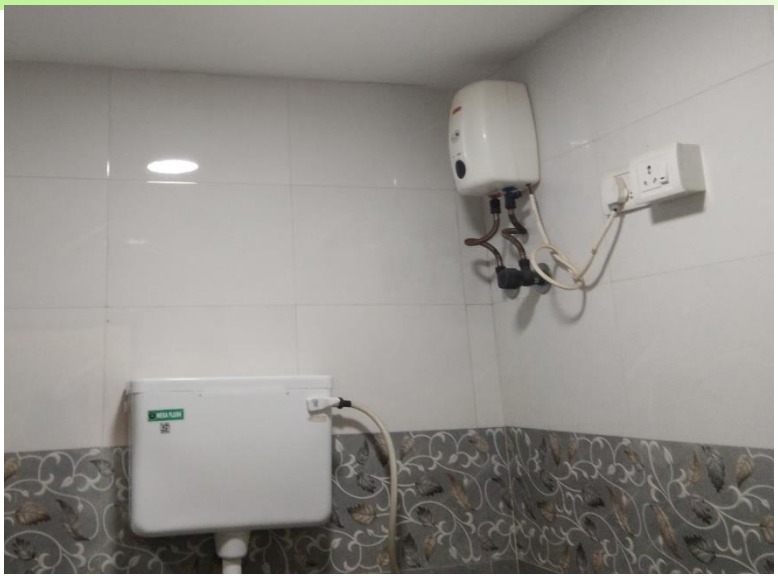
The above analysis shows reduction of average of **41%** reduction in energy consumption if replaced with energy efficient appliance.

On-site investigation and data collection





On-site investigation and data collection



8. Towards a Healthy & Sustainable Institution

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) **Eco clubs –** In addition to the NSS there can be an eco-club with school and college students operating together which will help the collaboration to yield results right from micro level. The role of students and staff will be to engage in environmental awareness and protection activities. The functioning would be through various events, workshops and similar outreach programs.

c) **Additional fire safety -** The premises at present has only Fire extinguisher as the safety practice but additional fire safety measures should be adopted such as Hose reel, signages, fire-fighting tank, fire alarm and sprinkler system. There should be fire extinguisher minimum two per floor, at present ground floor does not have any fire extinguisher. Canteen should have minimum one fire extinguisher each. The validity of each extinguisher has expired and needs to be replaced on an immediate basis.

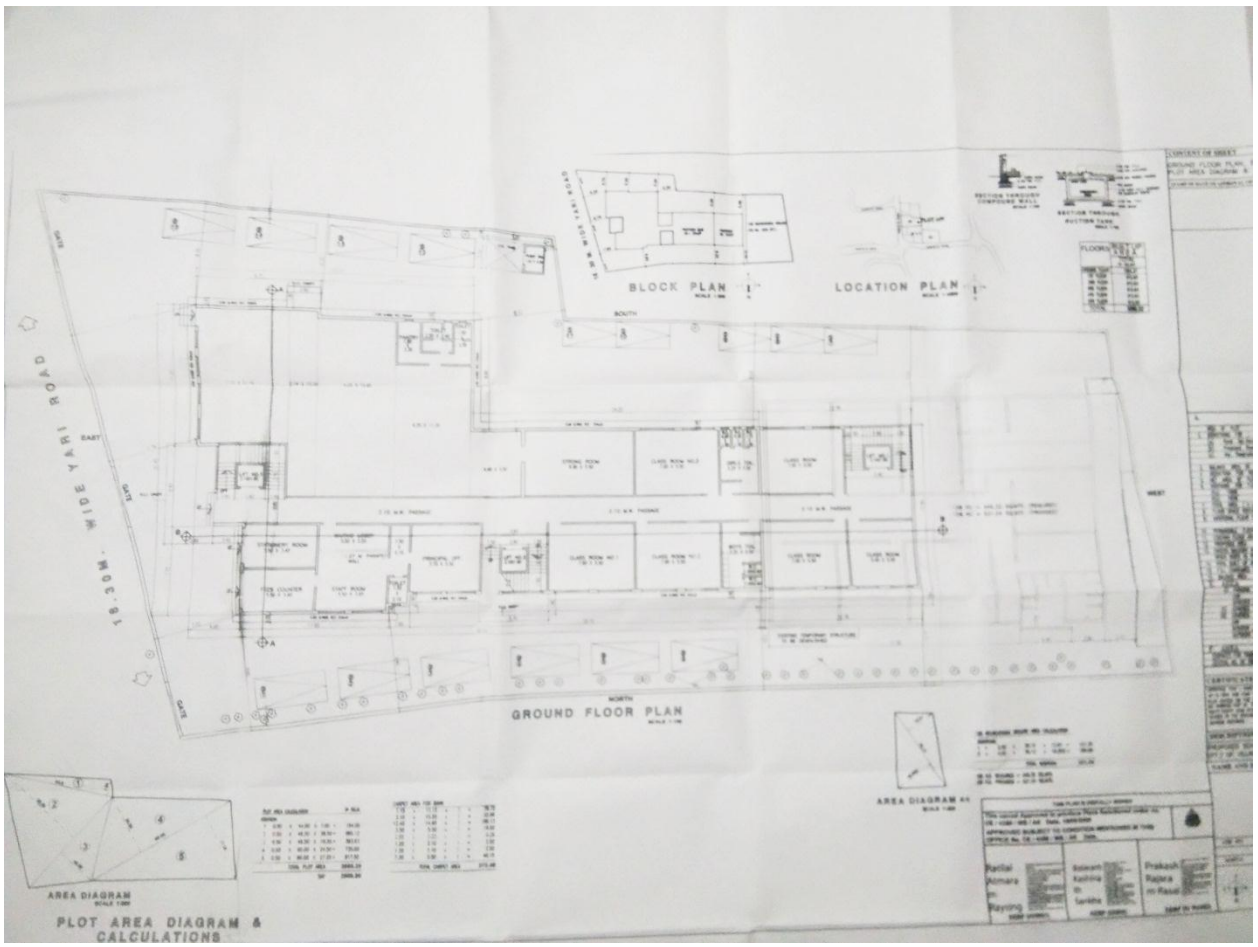
d) **Waste vio –** Stepping up a little further an initiative can be undertaken wherein College can tie up with an organisation and students can be encouraged to collect dry waste and electronic waste such as newspapers, old computers and others and hand over to organisation on a weekly or monthly basis thereby making a waste reduction approach in the community. This has benefits such as awareness, eco-friendly habits in becoming a responsible citizen.

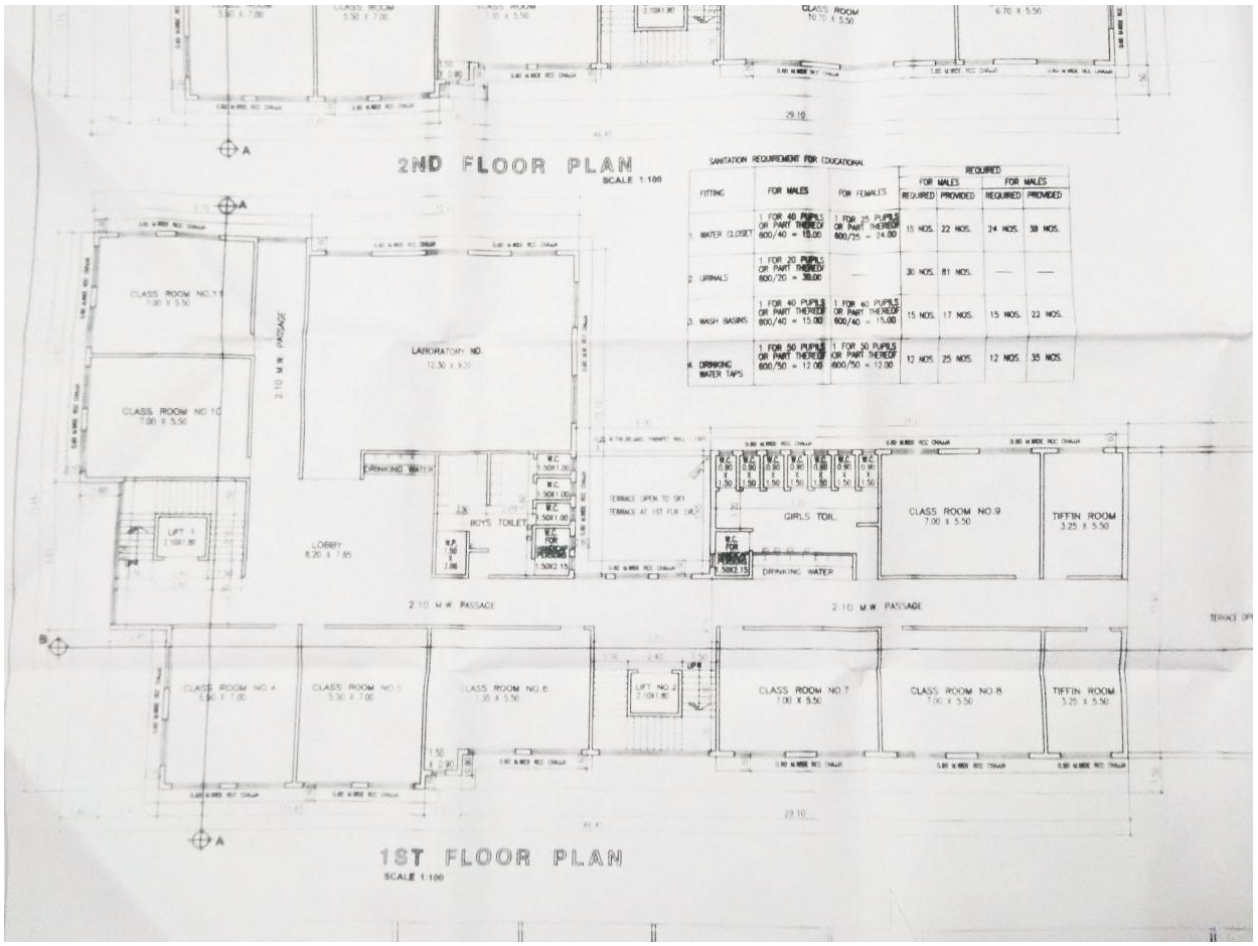
e) **Signages –** In addition to the signages being in regular language there can be additional signages in braille language for the specially abled students.

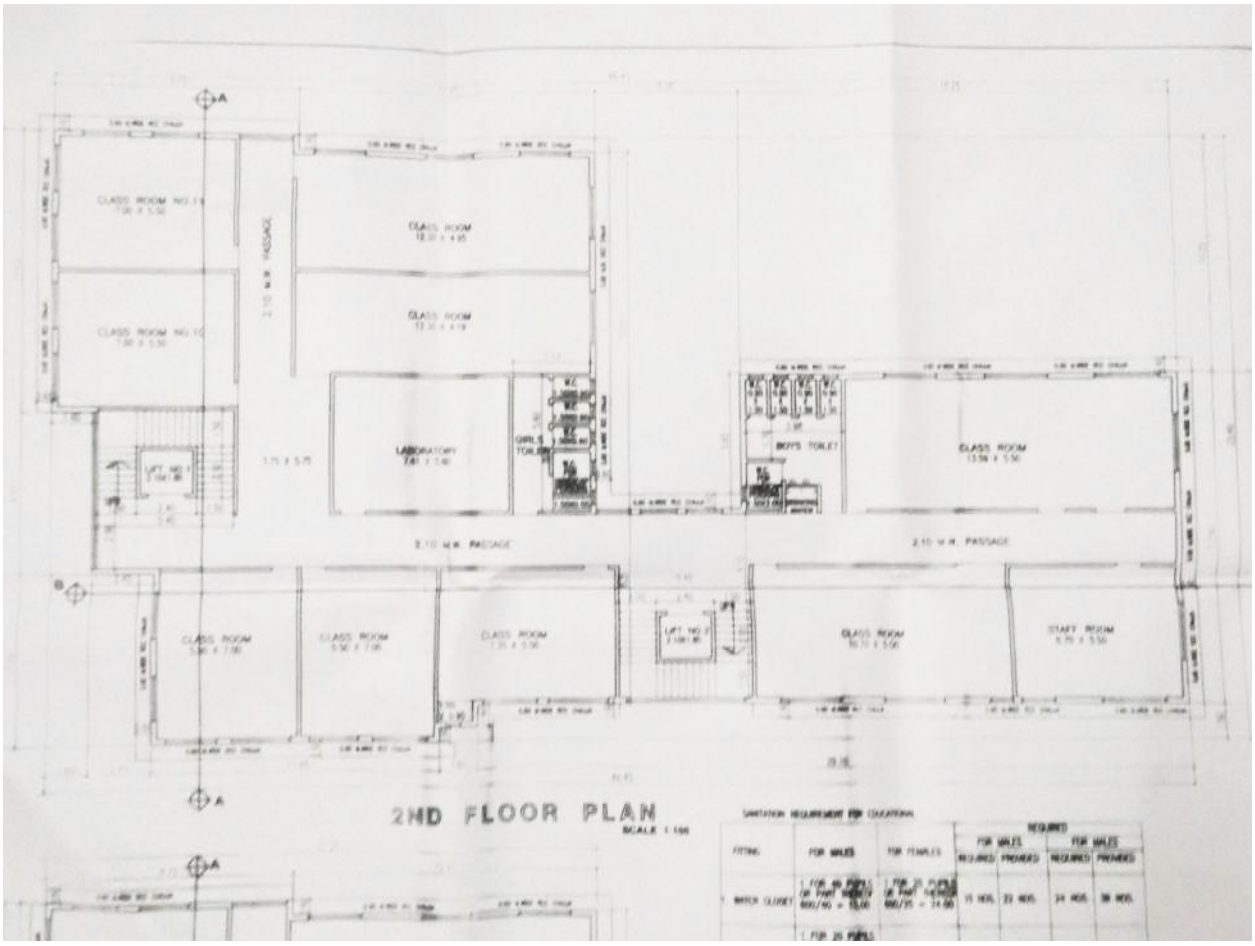
9. References

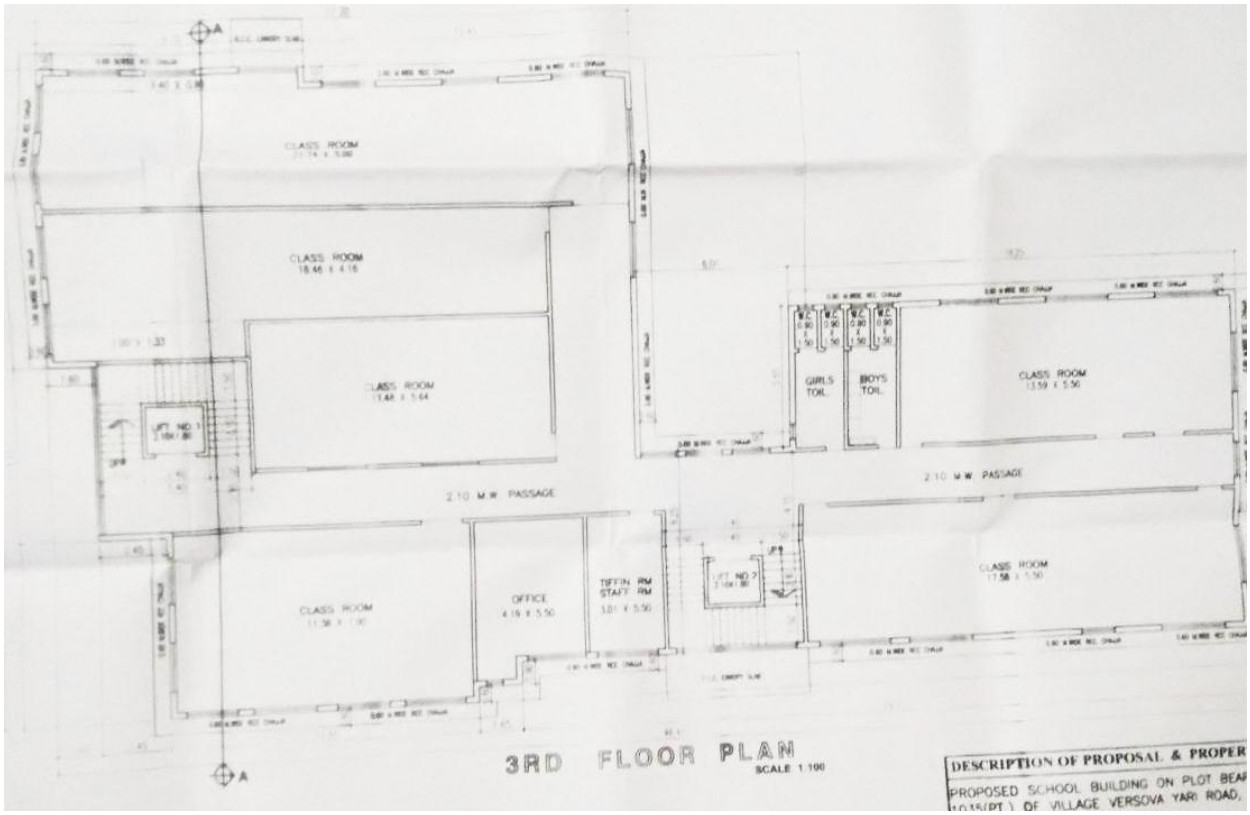
1. Uniform Plumbing Code – India, 2008
2. IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
3. IGBC Green Landscape Rating system, March 2013
4. BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST - Canada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

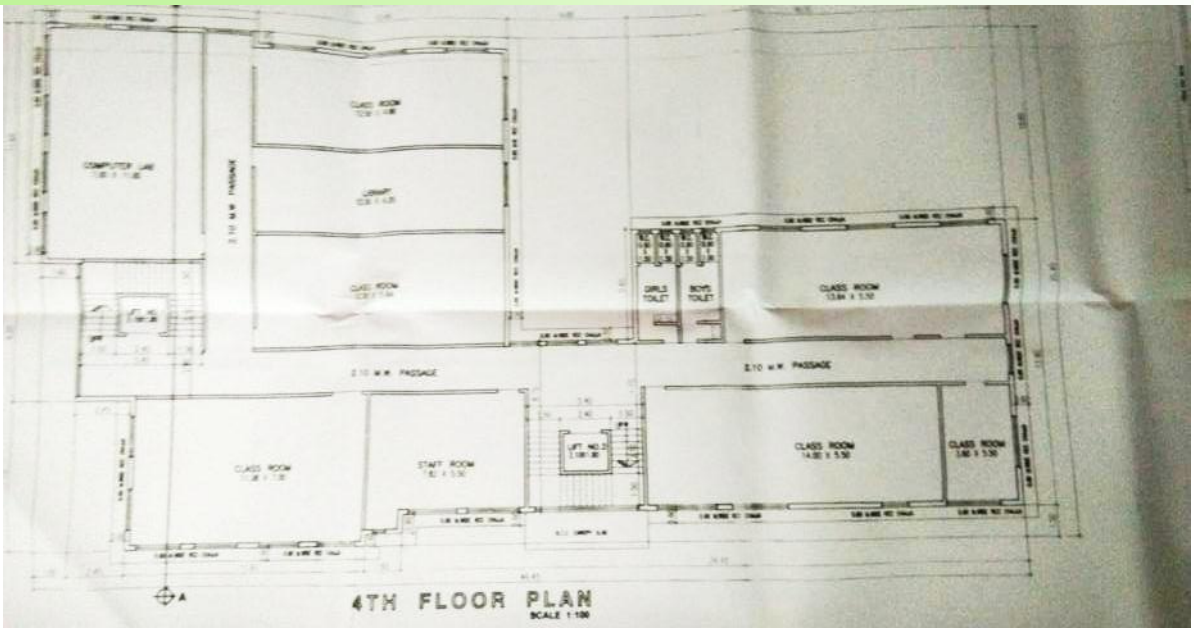
10. Annexure

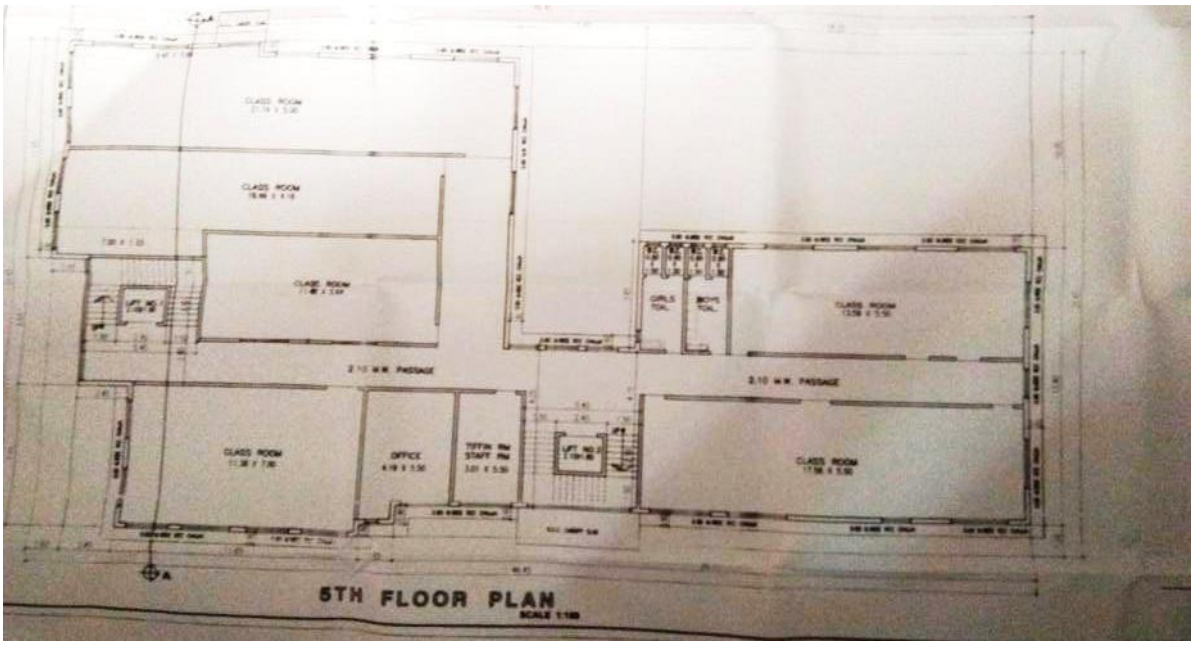

BLOCK PLAN
LOCATION PLAN
GROUND FLOOR PLAN
PLOT AREA DIAGRAM & CALCULATIONS
AREA DIAGRAM
18.30 M. WIDE VARI ROAD

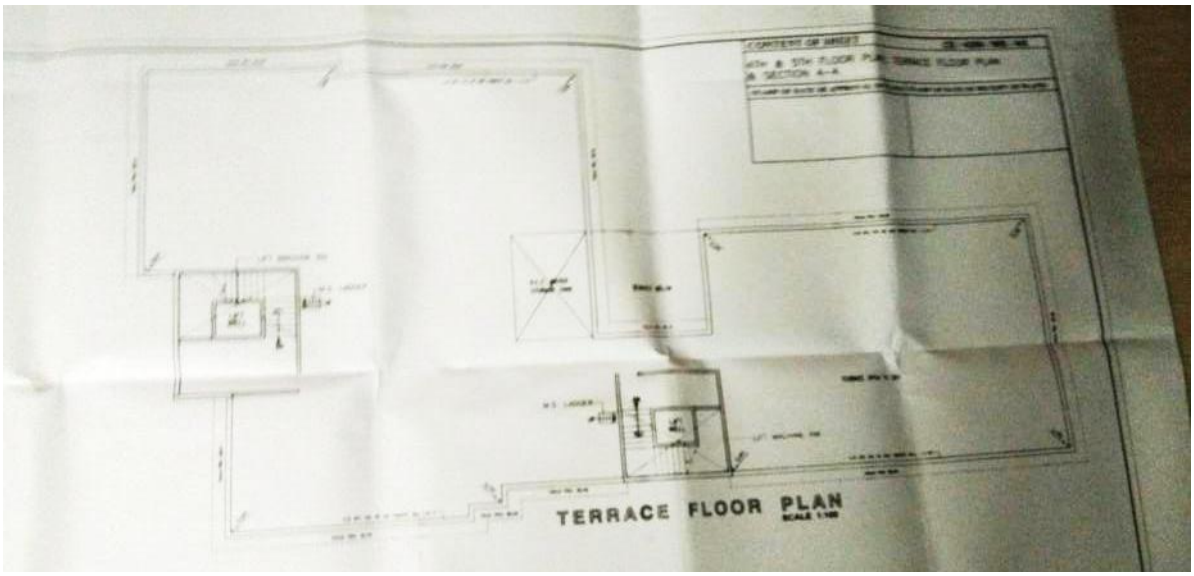

2ND FLOOR PLAN
SCALE 1:100
SANITATION REQUIREMENT FOR EDUCATIONAL
1ST FLOOR PLAN
SCALE 1:100
CLASS ROOM NO.9
TIFFIN ROOM
CLASS ROOM NO.7
CLASS ROOM NO.8
LABORATORY NO.
BOYS TOILET
GIRLS TOIL.
DRINKING WATER
LOBBY
2.10 M.W. PASSAGE

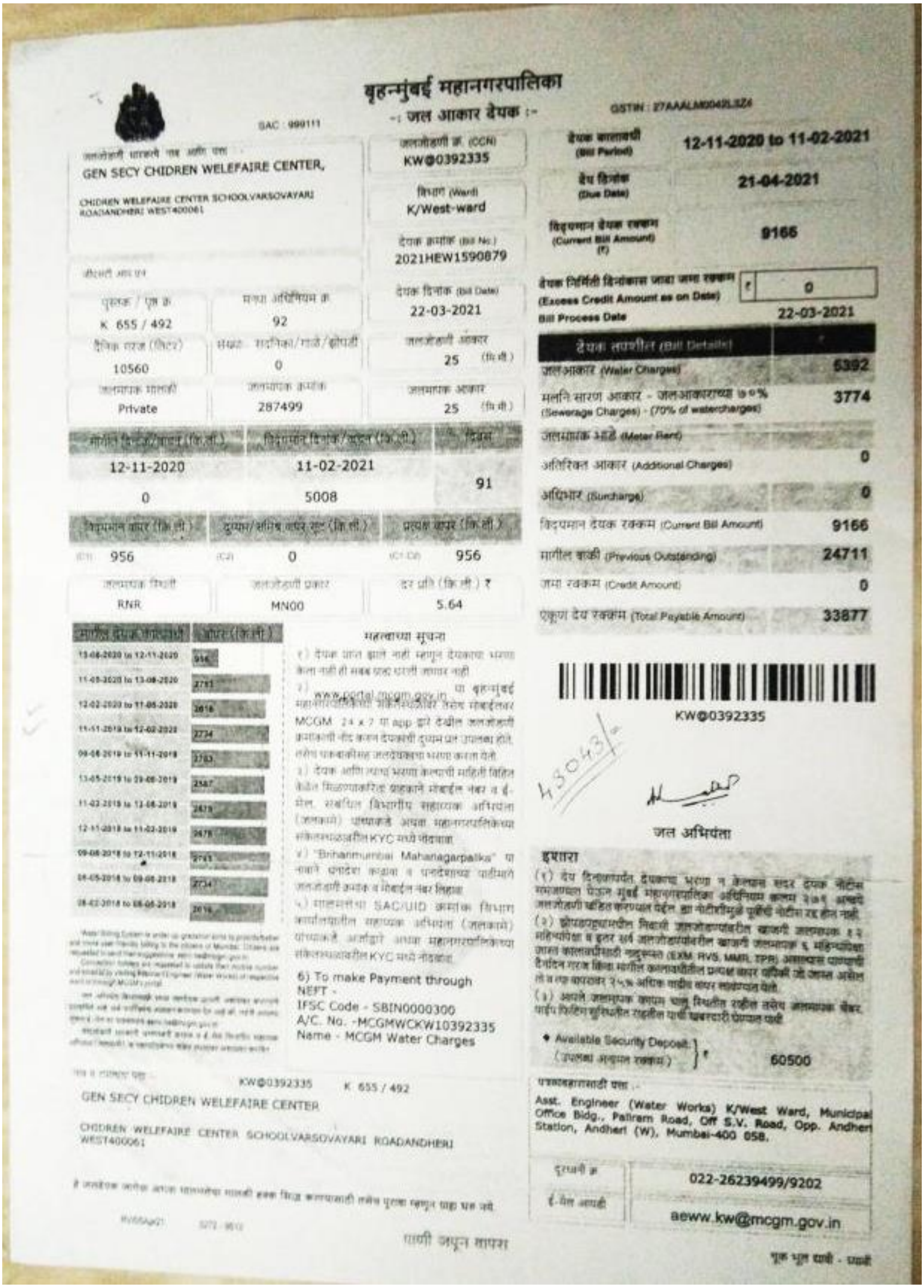

2ND FLOOR PLAN
SCALE 1:100
CLASS ROOM
LABORATORY
GIRLS TOILET
BOYS TOILET
2.10 M.W. PASSAGE
STAFF ROOM


3RD FLOOR PLAN
SCALE 1:100
CLASS ROOM
GIRLS TOIL.
BOYS TOIL.
2.10 M.W. PASSAGE
OFFICE
TIFFIN RM
STAFF RM
DESCRIPTION OF PROPOSAL & PROPER
PROPOSED SCHOOL BUILDING ON PLOT BEA


4TH FLOOR PLAN


5TH FLOOR PLAN


TERRACE FLOOR PLAN



बृहन्मुंबई महानगरपालिका

-: जल आकार देयक :-

SAC : 999111

GSTIN : 27AAALM0042L1Z4

GEN SECY CHIDREN WELEFAIRE CENTER,

CHIDREN WELEFAIRE CENTER SCHOOLVARSOVAYARI ROADANDHERI WEST400061

CCN	KW@0392335
Ward	K/West-ward
Bill No.	2021HEW1590879
Bill Date	22-03-2021
	K 655 / 492
	92
	10560
	0
	25
	Private
	287499
	25

12-11-2020	11-02-2021	91
0	5008	
(C1) 956	(C2) 0	(C1-C2) 956
RNR	MN00	5.64

Bill Period	12-11-2020 to 11-02-2021
Due Date	21-04-2021
Current Bill Amount (₹)	9166
Excess Credit Amount as on Date	₹ 0
Bill Process Date	22-03-2021

देयक तपशील (Bill Details)	₹
जलआकार (Water Charges)	5392
मलनि:सारण आकार - जलआकाराच्या ७०% (Sewerage Charges) - (70% of watercharges)	3774
जलमापक भाडे (Meter Rent)	
अतिरिक्त आकार (Additional Charges)	0
अधिभार (Surcharge)	0
विद्यमान देयक रक्कम (Current Bill Amount)	9166
मागील बाकी (Previous Outstanding)	24711
जमा रक्कम (Credit Amount)	0
एकूण देय रक्कम (Total Payable Amount)	33877

KW@0392335

13-08-2020 to 12-11-2020	956
11-05-2020 to 13-08-2020	2791
12-02-2020 to 11-05-2020	2616
11-11-2019 to 12-02-2020	2734
09-08-2019 to 11-11-2019	2783
13-05-2019 to 29-08-2019	2567
11-02-2019 to 13-05-2019	2679
12-11-2018 to 11-02-2019	2478
09-08-2018 to 12-11-2018	2741
08-05-2018 to 09-08-2018	2734
08-02-2018 to 08-05-2018	2616

महत्वाच्या सूचना

2) www.portal.mcgm.gov.in ... MCGM 24 x 7 ...

4) "Brihanmumbai Mahanagarpalika" ...

5) ... SAC/UID ... KYC ...

6) To make Payment through NEFT -
IFSC Code - SBIN0000300
A/C. No. -MCGMWCKW10392335
Name - MCGM Water Charges

KW@0392335 K 655 / 492

GEN SECY CHIDREN WELEFAIRE CENTER

CHIDREN WELEFAIRE CENTER SCHOOLVARSOVAYARI ROADANDHERI WEST400061

43043/-

जल अभियंता

इशारा

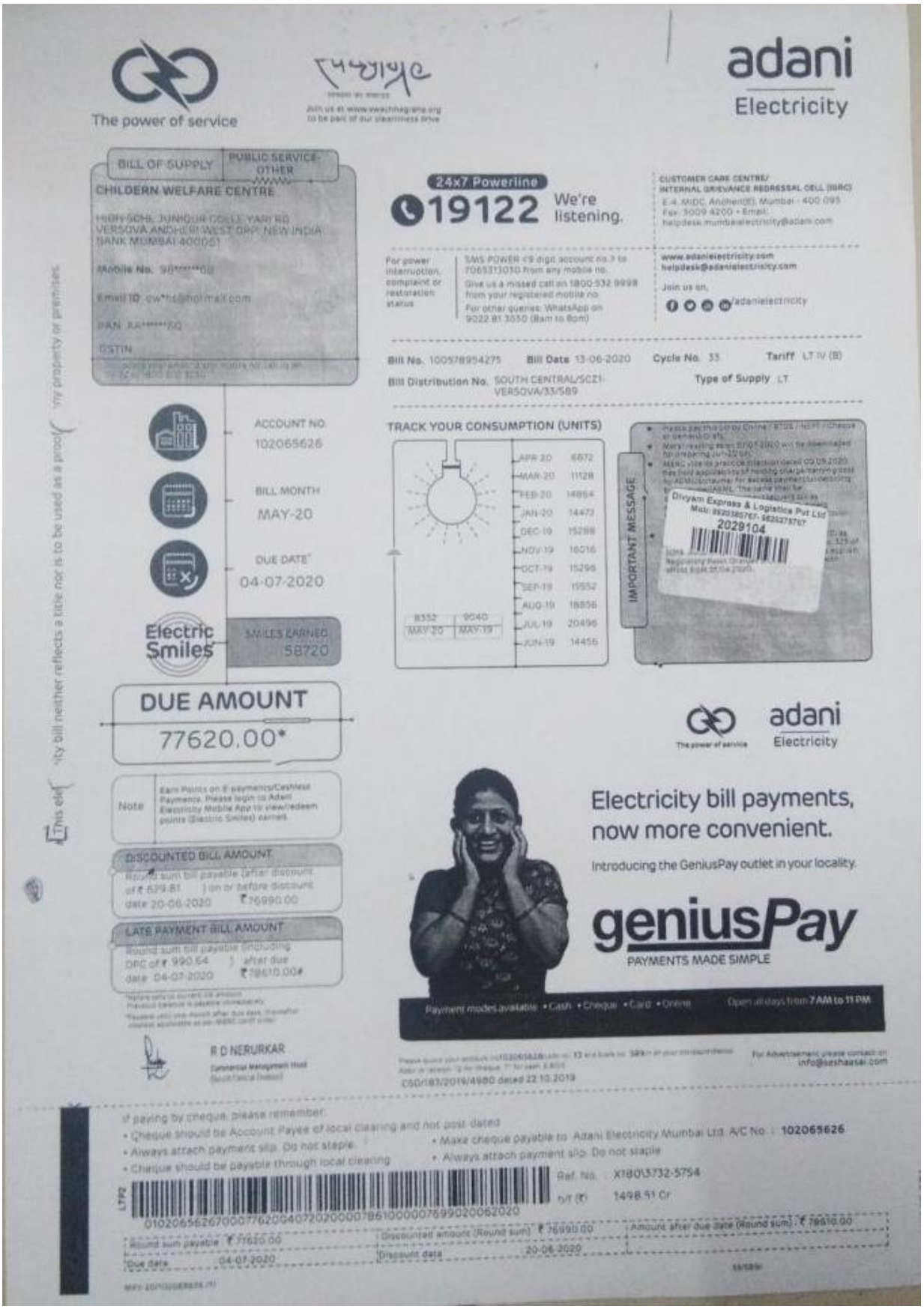
(EXM, RVS, MMR, TPR)

• Available Security Deposit ₹ 60500

Asst. Engineer (Water Works) K/West Ward, Municipal Office Bldg., Pallram Road, Off S.V. Road, Opp. Andheri Station, Andheri (W), Mumbai-400 058.

दूरध्वनी क्र	022-26239499/9202
ई-मेल आयडी	aeww.kw@mcgm.gov.in

पाणी जपून वापरा


The power of service
adani
Electricity
BILL OF SUPPLY
PUBLIC SERVICE-OTHER
CHILDERN WELFARE CENTRE
24x7 Powerline
19122
We're listening.
ACCOUNT NO.
102065626
BILL MONTH
MAY-20
DUE DATE*
04-07-2020
Electric Smiles
SMILES EARNED
58720
DUE AMOUNT
77620.00*
TRACK YOUR CONSUMPTION (UNITS)
IMPORTANT MESSAGE
Bill No. 100578954275
Bill Date 13-06-2020
Cycle No. 33
Tariff LT IV (B)
Type of Supply LT
Bill Distribution No. SOUTH CENTRAL/SCZ1-VERSOVA/33/589
Note
DISCOUNTED BILL AMOUNT
LATE PAYMENT BILL AMOUNT
R D NERURKAR
Electricity bill payments, now more convenient.
Introducing the GeniusPay outlet in your locality.
geniusPay
PAYMENTS MADE SIMPLE
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Open all days from 7 AM to 11 PM
If paying by cheque, please remember:
• Cheque should be Account Payee of local clearing and not post dated
• Always attach payment slip. Do not staple
• Cheque should be payable through local clearing
• Make cheque payable to Adani Electricity Mumbai Ltd. A/C No. : 102065626
• Always attach payment slip. Do not staple
Ref. No. X18053732-5754
Round sum payable ₹ 77620.00
Discounted amount (Round sum) ₹ 76990.00
Amount after due date (Round sum) ₹ 78610.00
Due date 04-07-2020
Discount date 20-06-2020