

# ENVIRONMENT AUDIT

2018-19; 2019-20 & 2020-21

## AUDIT REPORT

Studied for

Karnataka Rashtriya Education Society's

**Karnatak Arts, Science  
and Commerce College, Bidar**

Hyderabad Road, Bidar (Karnataka), India - 585 401

Analysed by



**29 April 2022**

## Disclaimer

The Audit Team has prepared this report for the **Karnataka Rashtriya Education Society's Karnatak Arts, Science and Commerce College, Bidar** located at Hyderabad Road, Bidar (Karnataka), India - 585 401 based on input data submitted by the College analysed by the team to the best of their abilities.

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

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

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The Report is prepared by the Team of Greenvio Solutions under their brand and department – Sustainable Academe as Consultancy firm with the Project Head - Ar. Nahida Shaikh who has completed audits of multiple Institutes including Technical, State University, Private University and Single Faculty Colleges for a total of more than 60 lakhs+ sq. ft. of Built-up area audited till date Pan India as an Accredited and Certified Green Building Professional-Architect; ISO Certified Internal Auditor for Integrated Management System (IMS) which includes ISO 9001 Quality Management, ISO 14001 Environment Management and Occupational Health and Safety Management OHSAS 18001. Green Building consultancy is her forte and she is one of the most sought after names when it comes to providing excellent quality services within the stipulated time frame.

The Study is conducted in capacity of Accredited & Certified Green Building Professional with extensive experience.

### Greenvio Solutions

*Developing Healthy and Sustainable Environments*

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

Palghar District, Maharashtra- 401208

[sustainableacademe@gmail.com](mailto:sustainableacademe@gmail.com)

# Acknowledgement

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## Sustainable Academe

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

# Contents

<b>1. Introduction.....</b>	<b>4</b>
<b>2. Institution overview .....</b>	<b>8</b>
<b>3. Green Building Study Audit.....</b>	<b>11</b>
<b>4. Site Study.....</b>	<b>12</b>
<b>5. Ecological (Environmental) Audit .....</b>	<b>14</b>
<b>6. Towards a Healthy &amp; Sustainable Institution.....</b>	<b>27</b>
<b>7. References .....</b>	<b>29</b>

# 1. Introduction

## 1.1 About the Karnataka Rashtriya Education Society

It was established in 1942. It is the master mind of Shri R.V. Bidar who founded the Society under the name of "Karnatak Rashtirya Education Society Bidar", its aim is to:

- To establish, run, maintain and expand various types of educational institutions and ancillary establishments including hostels libraries.
- To organize mobile libraries, clubs or academic interest and take steps to spread adult education especially in backward classes.
- To organize and conduct cultural activities
- To create K.R.E. Society's trust vesting all immobile assets of the society in it.

## 1.2 Statements of the Institution

**Vision** - To achieve the higher level of Excellence.

**Mission** - To liberate the young minds from the shackles of ignorance and motivate them to face the complexities of life efficiently with a sense of Self respect and National Pride.

## 1.3 About the Institution

**Karnatak Arts, Science and Commerce College, Bidar** is one among the 26 educational institutions being run by Karnataka Rashtriya Education Society Bidar. Established in 1970, the college is one of the prime Institutions of Bidar district. It is the biggest learning hub of Bidar district located at the Northern tip of Karnataka State. Although a number of colleges have come up lately in different parts of the district, yet this institution has been drawing the students from every corner of the state due to its ability to offer a spectrum of courses that are not available in newly established colleges. It attracts the students irrespective of gender, geographical location, social and economic strata. The enrolment of students in various disciplines is exponential and exhibits a typical example of a multi-disciplinary co-educational institute. **It is the first and only College with CPE status among the affiliated colleges of Gulbarga University, Kalaburagi.**

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 is affiliated to the Gulbarga University and it offers the following courses.**

- **Graduation** – It offers the following courses
  - Bachelor of Arts (Economics, Statistics, Political Science, History, Kannada, English and Hindi)
  - Bachelor of Science (Mathematics, Computer Science, Electronics, Biotechnology, Zoology, Botany, Physics, Chemistry, Statistics)
  - Bachelor of Commerce
  - Bachelor of Vocational courses (Food processing technology, Renewable energy)
  - Bachelor of Computer Application – Professional course approved by UGC, University
- **Post-Graduation** – It offers the following courses
  - Master of Arts (Kannada, English)
  - Master of Science (Zoology, Computer Science, Biotechnology, Mathematics)
  - Masters of Commerce
- **UGC Web development technology course**
- **2 Research centres are recognized by the University the programs offered are Ph. D. in Kannada and in Computer Science.**
- **Recognised by IIT Mumbai as an Academic centre to run the spoken tutorial project courses since 2014 till date.**
- **IIT Madras local chapter for running SWAYAM/ NPTL Programmes since 2015.**

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

## 1.4 The surrounding premises around the Institution

The Premises is situated amidst the landscape serene of **Bidar district of Karnataka** with immense peace and calmness in the surroundings. The college is locate very close to the National highway and has a huge open spaces adjacent to its location. There is a frontal approach which provides quite a beautiful appreciation space while approaching the premises; this area is surrounded by huge trees which positively complement the background-foreground aspect in terms of Natural space and built-form Architecture. It also provides ample shade which enhances the micro climate of the region. The location of College is feasible to the nearby essential amenities such as Public Health Center, Fire Station, Civic body-Public administrative buildings, Recreational gardens and Police Station which are not too close but nearby.

## 1.5 Assessment of the College

### 1.5.1 Affiliations and approvals

The College has all its courses approved and affiliated to **Gulbarga University, a public university located in Kalaburagi, Karnataka, India**

### 1.5.2 Certification

- NIRF – The College is ranked participating in every year.
- AISHE – The code is C-9146
- ISO – The last certification was done in ISO 9001 for Quality Management System in 2015-16

### 1.5.3 Accreditation

**NAAC** - The following are details of the accreditation of the College.

Cycle	First	Second	Third
<b>CGPA</b>	-	3.05	3.24
<b>Grade</b>	B+	A	A
<b>Year</b>	2004	2012	2017

*Table 1: NAAC Accreditation details of the Institute*

The College is due to enter its Fourth cycle of NAAC soon.

### 1.5.4 Recognitions

The college has achieved the following recognition from **University Grant Commission (UGC) under section 2 (f) and 12 (b) of the UGC Act by University Grants Commission, New Delhi.**

## 1.6 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.

- **College with Potential for excellence by UGC during 2006-2020 continuously awarded for 3 phases.**
- **Award for being the 'District Green Champion' by M.G.N.R.E Govt. of India 2020-21.**



## 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 **918 Boys and 1,068 Girls students**, thus there were **a total of 1,986 students** in the premises.

#### 2.1.2 Staff data

Type	Male	Female	Total
<b>Admin Staff</b>	3	0	<b>3</b>
<b>Teaching Staff</b>	26	66	<b>92</b>
<b>Non-Teaching Staff</b>	15	26	<b>41</b>
<b>Total Staff Members</b>	<b>44</b>	<b>92</b>	<b>136</b>

*Table 2: Staff data of the Institution for 2019-20*

The staff data shows the premises had a total of **136** 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 **933 Boys and 1,088 Girls students**, thus there were **a total of 2,021 students** in the premises.

#### 2.2.2 Staff data

Type	Male	Female	Total
<b>Admin Staff</b>	3	0	<b>3</b>
<b>Teaching Staff</b>	26	66	<b>92</b>
<b>Non-Teaching Staff</b>	15	26	<b>41</b>
<b>Total Staff Members</b>	<b>44</b>	<b>92</b>	<b>136</b>

*Table 3: Staff data of the Institution for 2020-21*

The staff data shows the premises had a total of **136** Staff Members.

## 2.3 Total College Area & College Building Spread Area

The **total site area is 5.1 Acres** and the **total Built-up area of College is 81,085 sq. ft.** for a **total of 2,157 footfalls.**

## 2.4 College Infrastructure

### 2.4.1 Establishment

**The College was established in 1970.** The college is located pretty close to nature and hence has very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building. **Overall the Infrastructure of the Building is excellent in terms of the Architecture Design and Green Building Design. The Premises covers quite a few of the requirements for a Green Habitat.**

### 2.4.2 Spatial Organisation

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

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

### 2.4.4 Operation and Maintenance of the premises

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

S. No.	Section	Spaces	Time	Hours/ day	Days in a year
<b>1</b>	Main Institutional College	Student areas and Teaching faculty	Monday to Friday (07:30 a.m. to 05:30 p.m.) Saturday (07:30 a.m. to 01:30 p.m.)	Mon-Fri - 10  Sat - 6	280
<b>2</b>	General areas	Admin areas and library, Passage, staircase, toilet	Monday to Friday (07:00 a.m. to 05:30 p.m.) Saturday (07:00 a.m. to 01:30 p.m.)	Mon-Fri – 10.5  Sat – 6.5	300

*Table 4: Schedule of the timings of the premises*

## 3. Green Building Study Audit

### 3.1 About the Green Building Study Audit

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

### 3.2 Analysis for the Green Building Study Audit

The procedure included detailed verification for the following:

#### Energy Audit

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

#### Green Audit

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

#### Environmental Audit

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

### 3.3 Strategy adopted for Green Building Study Audit

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

### 3.4 Timeline of the activities for Green Building Study Audit

- 10 March 2022 – Allotment and Initiation by the College
- 12 March 2022 – Induction Meeting
- 15 March 2022 – Survey of the Student and staff submitted
- 24 April 2022 – Data submitted by College
- 29 April 2022 – Submission of the Report

## 4. Site Study

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

- **Location** - The Karnataka Rashtriya Education Society's Karnatak Arts, Science and Commerce College, Bidar located at Hyderabad Road, Bidar (Karnatak), India - 585 401 and falls under the Bidar City Municipal Council of Karnataka State.
- **Neighbourhood context** - The premises is surrounding by open spaces and Residential, Commercial and Educational areas on the immediate surroundings of the site.
- **Natural physical features** – The premises includes a rich biodiversity and huge number of plants in the adjacent open space. The site does not have major difference in the land levels (contours).
- **Manmade features** – The premises is situated in a rural area amidst residential areas and open spaces with appropriate proximity to necessary amenities. There is sufficient appreciation space for entrance. The materials used for construction are RCC and the landscaping includes innumerable 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 are parked.
- **Climate** – January, the same as December, is another warm winter month in Bidar, India, with average temperature ranging between min 17.5°C (63.5°F) and max 28.9°C (84°F). In January, the average high-temperature is almost the same as in December - a still warm 28.9°C (84°F). The last month of the winter, February, is a hot month in Bidar, India, with average temperature fluctuating between 32.1°C (89.8°F) and 20.5°C (68.9°F). In Bidar, the average high-temperature marginally rises, from a moderately hot 28.9°C (84°F) in January, to a tropical 32.1°C (89.8°F). March, the first month of the pre-monsoon summer, in Bidar, is a sweltering month, with temperature in the range of an average low of 24.7°C (76.5°F) and an average high of 35.8°C (96.4°F). In March, the average high-temperature slightly increases, from a tropical 32.1°C (89.8°F) in February, to a sweltering 35.8°C (96.4°F). April, like March, in Bidar, India, is a very hot pre-monsoon summer month, with temperature in the range of an average high of 38.5°C

(101.3°F) and an average low of 27.9°C (82.2°F). In April, the average high-temperature is relatively the same as in March - a still very hot 38.5°C (101.3°F). May, the last month of the pre-monsoon summer, in Bidar, is another very hot month, with temperature in the range of an average high of 39.3°C (102.7°F) and an average low of 30°C (86°F). The warmest month is May, with an average high-temperature of 39.3°C (102.7°F) and an average low-temperature of 30°C (86°F). The average relative humidity is 26%. June, the first month of the rainy (monsoon) season, in Bidar, is still a hot month, with temperature in the range of an average low of 25.6°C (78.1°F) and an average high of 33.3°C (91.9°F). In Bidar, the average high-temperature drops, from a sweltering 39.3°C (102.7°F) in May, to a hot 33.3°C (91.9°F). July, like June, in Bidar, India, is another warm rainy (monsoon) season month, with temperature in the range of an average high of 29.3°C (84.7°F) and an average low of 23.2°C (73.8°F). In July, the average high-temperature marginally drops, from a hot 33.3°C (91.9°F) in June, to a warm 29.3°C (84.7°F). August, like July, in Bidar, India, is a moderately hot rainy (monsoon) season month, with temperature in the range of an average high of 28.3°C (82.9°F) and an average low of 22.3°C (72.1°F). In August, the average high-temperature is essentially the same as in July - a still moderately hot 28.3°C (82.9°F). The last month of the rainy (monsoon) season, September, is another warm month in Bidar, India, with average temperature ranging between max 28.9°C (84°F) and min 22°C (71.6°F). In September, the average high-temperature is almost the same as in August - a still warm 28.9°C (84°F). October, the first month of the post monsoon autumn, in Bidar, is also a moderately hot month, with average temperature varying between 20.5°C (68.9°F) and 29.5°C (85.1°F). In Bidar, the average high-temperature is essentially the same as in September - a still moderately hot 29.5°C (85.1°F). The last month of the post monsoon autumn, November, is still a warm month in Bidar, India, with average temperature fluctuating between 28.7°C (83.7°F) and 18.1°C (64.6°F). In Bidar, the average high-temperature is almost the same as in October - a still moderately hot 28.7°C (83.7°F). December, the first month of the winter, in Bidar, is still a warm month, with temperature in the range of an average low of 16.5°C (61.7°F) and an average high of 27.7°C (81.9°F). December is the coldest month, with an average high-temperature of 27.7°C (81.9°F) and an average low-temperature of 16.5°C (61.7°F). In December, the average heat index is computed to be 28.1°C (82.6°F).

(Source: <https://www.weather-atlas.com/en/india/bidar-climate>)

## 5. Ecological (Environmental) Audit

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

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

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

### 5.1 Open Spaces

There is a beautiful balance of natural and open spaces in the premises and the open/vegetation spaces are balanced overall. The ground is used by students at present for sports and cultural gatherings. The design on the entire is such that the landscape and softscape spaces are very well oriented and located thus being extremely useful to Institutions in the site. **There are provisions for natural plantations which have enhanced the beauty of the space.**

There are adequate numbers of Maintenance staff allotted for the upgrading the open spaces and they have done an excellence job in terms of the duty allotted. The infrastructure committee too is involved in this process. The traditional tap and pipe facility is adopted for watering and the college has taken special provisions for the same. The spaces are watered daily in summer. **The efforts to maintain the existing space are commendable.**

## 5.2 Flora and fauna audit

### 5.2.1 Flora Audit

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

S. No.	Plant Name	Botanical name
1	<i>Azadirachta indica</i>	<i>Meliaceae</i>
2	<i>Pongamia pinnta</i>	<i>Fabaceae</i>
3	<i>Simarouba glauca</i>	<i>Simaroubaceae</i>
4	<i>Terminalia catappa</i>	<i>Combretaceae</i>
5	<i>Basella alba</i>	<i>Basellaceae</i>
6	<i>Passiflora edulis</i>	<i>Passifloraceae</i>
7	<i>Tinospora cardifolia</i>	<i>Minispermiaceae</i>
8	<i>Muntangia calabura</i>	<i>Muntiginaceae</i>
9	<i>Casuarinas equisetifolia</i>	<i>Casuarinaceae</i>
10	<i>Citrus medica</i>	<i>Rutaceae</i>
11	<i>Syzygium samarangense</i>	<i>Myrtaceae</i>
12	<i>Phyllanthus embalica</i>	<i>Phyllanthaceae</i>
13	<i>Averrhoa carambola</i>	<i>Oxyladaceae</i>
14	<i>Datura metal</i>	<i>Solanaceae</i>
15	<i>Tribulus terrestris</i>	<i>zygophyllaceae</i>
16	<i>Aegle marmelos</i>	<i>Rutaceae</i>
17	<i>Bumbusa vulgaris</i>	<i>poaceae</i>
18	<i>Ficus krishne</i>	<i>Moraceae</i>
19	<i>Ficus bengalansis</i>	<i>Moraceae</i>
20	<i>Pterocarpus santalinus</i>	<i>Fabaceae</i>
21	<i>Ocimum santum</i>	<i>Lamiaceae</i>
22	<i>Roystonea regia</i>	<i>Arecaceae</i>
23	<i>Ficus benjamina</i>	<i>Moraceae</i>
24	<i>Cycas revoluta</i>	<i>Cycadaceae</i>
25	<i>Artocarpus heterophyllus</i>	<i>Moraceae</i>
26	<i>Annona reticuleta</i>	<i>Annonaceae</i>



27	<i>Glycyrrhiza glabra</i>	<i>Fabaceae</i>
28	<i>Syzygium cumini</i>	<i>Myrtaceae</i>
29	<i>Punica granatum</i>	<i>Lythraceae</i>
30	<i>Senegalia catechu</i>	<i>Fabaceae</i>
31	<i>Butea monosperma</i>	<i>Fabaceae</i>
32	<i>Calatropis gigantea</i>	<i>Apocynaceae</i>
33	<i>Calatropis procera</i>	<i>Apocynaceae</i>
34	<i>Madhuca longifolia</i>	<i>Sapotaceae</i>
35	<i>Morus alba</i>	<i>Moraceae</i>
36	<i>Eucalyptus lanceolata</i>	<i>Myrtaceae</i>
37	<i>Psidium guajava</i>	<i>Myrtaceae</i>
38	<i>Cocos nucifera</i>	<i>Arecaceae</i>
39	<i>Aloe vera</i>	<i>Asphodelaceae</i>
40	<i>Magnolia champaca</i>	<i>Magnoliaceae</i>
41	<i>Bauhinia racemosa</i>	<i>Fabaceae</i>
42	<i>Polyalthia longifolia</i>	<i>Annonaceae</i>
43	<i>Sauropus androgynus</i>	<i>Phyllanthaceae</i>
44	<i>Bryophyllum pinnatum</i>	<i>Crassulaceae</i>
45	<i>Gymnema sylvestre</i>	<i>Apocynaceae</i>
46	<i>Jasminum grandiflorum</i>	<i>Oleaceae</i>
47	<i>Ocimum tenuiflorum</i>	<i>Lamiaceae</i>
48	<i>Agave americana</i>	<i>Asparagaceae</i>
49	<i>Hibiscus rosa-sinensis</i>	<i>Malvaceae</i>
50	<i>Tradescantia spathacea</i>	<i>Commelinaceae</i>
51	<i>Araucaria columnaris</i>	<i>Araucariaceae</i>
52	<i>Adhatoda zeylanica</i>	<i>Acanthaceae</i>
53	<i>Canna indica</i>	<i>Cannaceae</i>
54	<i>Vitex negundo</i>	<i>Lamiaceae</i>
55	<i>Thuja occidentalis</i>	<i>Cupressaceae</i>
56	<i>Dracaena</i>	<i>Asparagaceae</i>
57	<i>Albizia lebbek</i>	<i>Fabaceae</i>
58	<i>Ficus racemosa</i>	<i>Moraceae</i>
59	<i>Achyranthes aspera</i>	<i>Amaranthaceae</i>

<b>60</b>	<i>Ficus religiosa</i>	<i>Moraceae</i>
<b>61</b>	<i>Senegalia ferruginea</i>	<i>Fabaceae</i>
<b>62</b>	<i>Cynodon dactylon</i>	<i>Poaceae</i>
<b>63</b>	<i>Eragrostis cynosuroides</i>	<i>Poaceae</i>
<b>64</b>	<i>Phyllanthus niruri</i>	<i>Euphorbiaceae</i>
<b>65</b>	<i>Gravelia robusta</i>	<i>Proteaceae</i>
<b>66</b>	<i>Pedilanthus tithymloides</i>	<i>Euphorbiaceae</i>
<b>67</b>	<i>Alangium salvifolium</i>	<i>Cornaceae</i>
<b>68</b>	<i>Sansevieria trifasciata</i>	<i>Asparagaceae</i>
<b>69</b>	<i>Nephrolepis</i>	<i>Nephrolepidaceae</i>
<b>70</b>	<i>Ixora coccinea</i>	<i>Rubiaceae</i>
<b>71</b>	<i>Lagerstroemia parviflora</i>	
<b>72</b>	<i>Swietenia mahagoni</i>	<i>Meliaceae</i>
<b>73</b>	<i>Machilus macrantha</i>	<i>Lauraceae</i>
<b>74</b>	<i>Pterocarpus marsupium</i>	<i>Fabaceae</i>
<b>75</b>	<i>Bombax ceiba</i>	<i>Bombacaceae</i>
<b>76</b>	<i>Calophyllum inophyllum</i>	<i>Calophyllaceae</i>
<b>77</b>	<i>Lagerstroemia lanceolata</i>	<i>Lythraceae</i>
<b>78</b>	<i>Sapindus emarginatus</i>	<i>Sapindaceae</i>
<b>79</b>	<i>Albizia procera</i>	<i>Mimosaceae</i>
<b>80</b>	<i>Garcinia indica</i>	<i>Garcinieae</i>
<b>81</b>	<i>Melia azedarach</i>	<i>Meliaceae</i>
<b>82</b>	<i>Cordia dichotoma</i>	<i>Boraginaceae</i>
<b>83</b>	<i>Nyctanthes arbor-tristis</i>	<i>Oleaceae</i>
<b>84</b>	<i>Alstonia scholaris</i>	<i>Apocynaceae</i>
<b>85</b>	<i>Vitex altissima</i>	<i>Lamiaceae</i>
<b>86</b>	<i>Mallotus philippensis</i>	<i>Euphorbiaceae</i>
<b>87</b>	<i>Cinnamomum zeylanicum</i>	<i>Lauraceae</i>
<b>88</b>	<i>Hardwickia binata</i>	<i>Cesalpiniaceae</i>
<b>89</b>	<i>Calymmanthium sp.</i>	<i>Cactaceae</i>
<b>90</b>	<i>Pilosocereus sp.</i>	<i>Cactaceae</i>
<b>91</b>	<i>Weingartia sp.</i>	<i>Cactaceae</i>

<b>92</b>	<i>Gymnocalycium sp.</i>	<i>Cactaceae</i>
<b>93</b>	<i>Euphorbia trapfolia</i>	<i>Euphorbiaceae</i>
<b>94</b>	<i>Echinocereus</i>	<i>Euphorbiaceae</i>
<b>95</b>	<i>Notocactus</i>	<i>Euphorbiaceae</i>
<b>96</b>	<i>Astrophytum asterias</i>	<i>Cactaceae</i>
<b>97</b>	<i>Euphorbia iharanae</i>	<i>Euphorbiaceae</i>
<b>98</b>	<i>Aricocarpus</i>	<i>Euphorbiaceae</i>
<b>99</b>	<i>Rebutia muscula</i>	<i>Euphorbiaceae</i>
<b>100</b>	<i>Haworthia limifolia</i>	<i>Euphorbiaceae</i>
<b>101</b>	<i>Glandulicactus uncinatus</i>	<i>Euphorbiaceae</i>
<b>102</b>	<i>Opuntia cochenillifera</i>	<i>Cactaceae</i>
<b>103</b>	<i>Opuntia elatior</i>	<i>Cactaceae</i>
<b>104</b>	<i>Opuntia ficus-indica</i>	<i>Cactaceae</i>
<b>105</b>	<i>Opuntia microdasys</i>	<i>Cactaceae</i>
<b>106</b>	<i>Opuntia robusta</i>	<i>Cactaceae</i>
<b>107</b>	<i>Opuntia stricta</i>	<i>Cactaceae</i>
<b>108</b>	<i>Euphorbia tirucalli]</i>	<i>Euphorbiaceae</i>
<b>109</b>	<i>Euphorbia</i>	<i>Euphorbiaceae</i>
<b>110</b>	<i>Euphorbia lacteal</i>	<i>Euphorbiaceae</i>
<b>111</b>	<i>Euphorbia abyssinic</i>	<i>Euphorbiaceae</i>
<b>112</b>	<i>Austrocylindropuntia</i>	<i>Cactaceae</i>
<b>113</b>	<i>Stenocereus</i>	<i>Cactaceae</i>
<b>114</b>	<i>Murraya koenigii</i>	<i>Rutaceae</i>
<b>115</b>	<i>Asparagus racemosa</i>	<i>Asperagaceae</i>
<b>116</b>	<i>Cassia fistula</i>	<i>Fabaceae</i>
<b>117</b>	<i>Acorus calamus</i>	<i>Acoraceae</i>
<b>118</b>	<i>Terminalia panniculeta</i>	<i>Commbritateae</i>
<b>119</b>	<i>Tribulus terrestris</i>	<i>Zygophyllaceae</i>
<b>120</b>	<i>Annona reticuleta</i>	<i>Annonaceae</i>
<b>121</b>	<i>Tectona grandis</i>	<i>Lamiaceae</i>
<b>122</b>	<i>Zizipus jujuba</i>	<i>Rhamnaceae</i>
<b>123</b>	<i>Aralia racemosa</i>	<i>Araliaceae</i>

**Table 5: Details of the Flora in the premises**

At present there are more than 120+ plantations comprising of plants, trees, shrubs. All of these are planted on various occasions by the department of Botany, NSS, NCC Students and Staff while some have grown naturally. Timely maintenance with sufficient care has resulted in positive benefits for the surroundings.

### 5.2.2 Fauna Audit

**It is a beautiful site to have the birds chirping around the College premises. It highlights the ecological co-existence concept in the most beautiful way.** The surveyed data of the fauna shows that there are Butterflies, Moths, *Culex* Mosquito, *Anopheline* Mosquito, Ants, Spiders, *Myna*, Sparrow, Squirrel, Lizard are available in the premises

## 5.3 Noise Audit

### 5.3.1 Macro level

On a macro level there are open grounds in the site. The approach road too has very minimal traffic. As the college is oriented amidst the residential areas with immense vegetation the noise levels do not affect the students and staff in their day to day functioning. The approach road too is pretty away. **Overall the noise level in terms of bad effect is extremely low and there are positive outcomes as per our analysis on macro level.**

### 5.3.2 Micro level

The college has an adequate open space covered with huge trees prevailing naturally in the premises which act as a noise barrier; in addition the Institution building is surrounded by Residential Buildings which further act as a benefit in reducing any noise pollution. There are bare minimum parking provisions provided in the premises which causes bare minimum noise as they are situated near the entrance which is a bit away from the College building. The college has a generator which is used as per need arises, but located far away from the mail building, thus there is no inconvenience or sound problem caused due to the same. There are no particular equipments which cause any noise effect. **Overall the noise levels inside the premises are low which is a good approach.**

## 5.4 Carbon Footprint Audit

### 5.4.1 Eco-friendly Commuting Practices

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

- **Ease of commuting** – Owing to close proximity to public transport the access is very feasible and walk able.
- **Parent's commute** - There are 2 Parent-teacher meetings held in a year and the turn-out is around 40-60%
- **Vehicles details** – The provision provided by College includes vehicle parking is allowed at present as follows.

S. No.	Type	Nos.	For (student/ Staff)
1.	Cars	5-8	Staff
2	Bikes	20-25	Staff and Students
3	Cycles	50-60	Students
4	Electric vehicles	0	Staff and Students

*Table 6: Details of the Parking in the premises*

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

S. No.	Name of all the place where student of staff comes from	Distance
1	Naubad, Shahapurgate, etc.	Within or less than 5 km radius from College
2	Kamathana, Kolar, Kadwad, Mannaikheli, Andur, etc.	More than 5 km and up to 10 km radius from College

*Table 7: Details of the places students and staff commute from*

### 5.4.2 Heat Island Reduction

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

- **Exposed roof areas** – The terrace is a flat roof which is absolutely clean and well maintained. The Buildings are covered with white paint and the Maintenance staff

along with Management have taken ample measures to maintain the same. **There was no weathering of roof observed.** The current practices are well maintained.

- **Exposed non-roof hardscape areas** - There are pathway on all sides of the premises. These include some natural and potted plantations along the pathways. However, the trees are huge and the canopy is wide spread thus providing ample shade to the outdoor areas of the premises. Hence, there are no direct sunrays or similar effect affecting the students and staff. The college has an open space in the form of lush green carpet which acts as a solution for the urban heat island effect. This huge green space is a very good solution for reducing any harmful health consequences which may arise due to harsh sunlight.

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

### 5.4.3 Outdoor Light Pollution Study

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

## 5.5 Universal Campus

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

**There are Ramps, Handrails along staircase and low height risers in the Staircases as part of universal campus initiatives.** The design of the premises is appropriate for access with passages and corridors being wide enough in size and naturally ventilated. The doubly and singly loaded corridors are safe from fire safety aspect. The college has resting places (seating areas) in the outdoor along the trees thereby making it user friendly for the especially abled students. **The college can have plans to install lift in future depending on the situation and facilities like addition of universal toilet.**

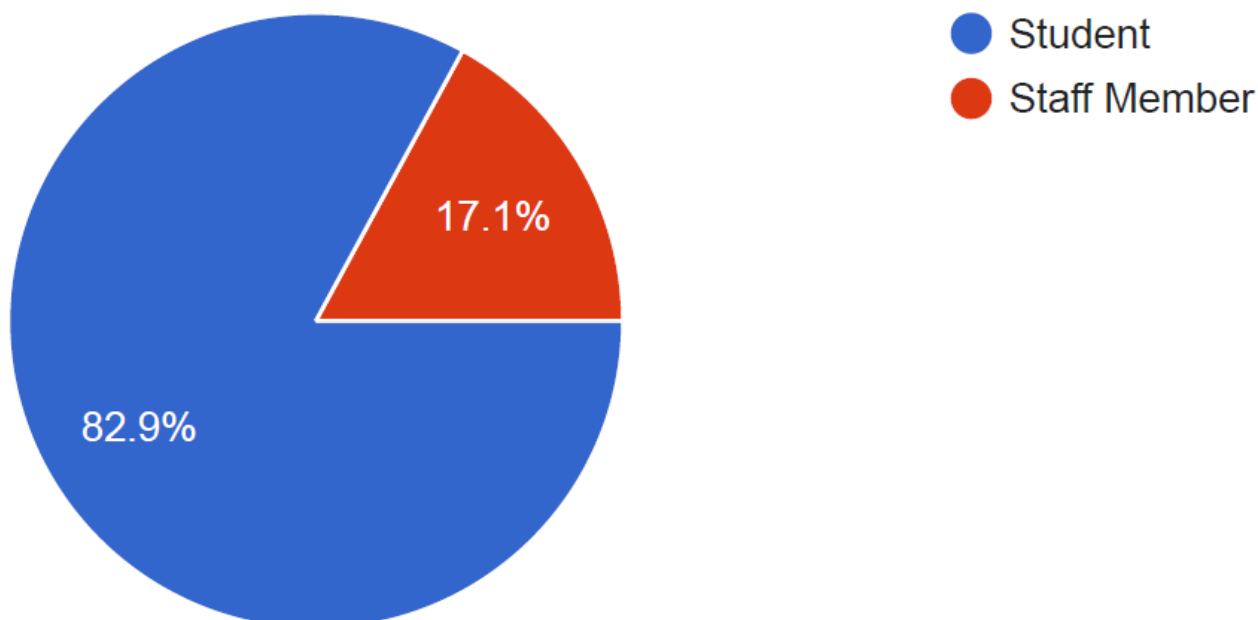
## 5.6 Fire Safety

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

## 5.7 Survey Results

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

### 5.7.1 Participation



*Figure 1: Participation analysis in the survey*

A total of **129 responses** were received out of which 83% were students.

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

We have listed some of the key responses below.

- Plantation of trees
- Watering the plants time to time
- We are maintaining green garden.
- Maintenance of good and healthy food in canteen and cleanliness surrounding us
- **After planting they gave a QR code for all planted plants which gives all the information about that plant.**
- To organize the meetings, group discussion on development, tree plantation, exhibition etc.



## **5.8 Positive site features as per our study**

### **a) Avoid using plastic in premises**

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

### **b) OPAC system**

The system in the library is beneficial for the students.

### **c) Paperless technologies**

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

### **d) Resting places**

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

### **e) Avoid using plastic in premise**

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

### **f) Ample greenery**

There are provisions for herbal garden, plenty of lawns with traditional trees and greenhouse in the premises.

### **a) User friendly movability in premises**

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

## 5.9 Recommendations for a Sustainable Habitat by Greenvio Solutions

### Site beautification

#### a) Additional facilities for birds

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

#### b) Nutrition pits

Certain pits can be demarcated as 'Nutrition pits' where the organic food from kitchen and Canteen fruit peels and fruits or vegetables can be degraded for making nutrition rich soil

### Universal Campus

#### Universal Toilet

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

### Pollution Control

#### a) Promote the use of Eco-friendly vehicles

There can be provision for 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) Bicycles as a gift

As an appreciation gesture may be the students toppers/ staff best performers can be awarded with a bicycle occasionally.

### Smart and responsible environment systems

#### a) Smart Gardening System

The College can undertake Smart Gardening system using IoT Technology such as an automated watering system. This will result in saving time by scheduling time for

watering; Saving money and water as smart irrigation systems have automated water schedules in addition to tracking dampness of soil which helps the irrigation system know when and how much the garden needs. It also helps in healthier plants as with the help of apps, smart irrigation systems, or even smart growing containers, these tasks can be provided evenly and allow the plants to be healthier and more productive.

More information on this system can be checked here <https://www.happysprout.com/inspiration/what-is-smart-gardening/>

## 6. Towards a Healthy & Sustainable Institution

### 6.1 Inputs by Greenvio Solutions

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

- a) Terrace farming** - There can be provision of kitchen garden practices in a designated area of the open space this would enhance the biodiversity and be useful in training students and staff about the healthy practices and vegetables grown which would be used in Canteen. It helps in capacity building as well as the smaller steps taken have huge impacts when each student would adopt these practices in their homes or societies and grow kitchen garden, terrace garden there will be a long term benefit for the environment as a whole.
- b) 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.
- c) Additional fire safety** - Measures such as Hose reel, signages, fire-fighting tank, fire alarm and sprinkler system should be adopted.
- 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 especially abled students.

## 6.2 Survey Results

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

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

- **Increase the trees**
- **Try to make herbal garden.**
- **Organising webinars and bring awareness among the students about green premises.**
- **Make a green garden at college for pure air and environment**
- **I think from all the departments of college should inform the students to plant one tree once in a month.**

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

## 7. References

1. Uniform Plumbing Code – India, 2008
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3. IGBC Green Landscape Rating system, March 2013
4. BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
5. Climate data <https://www.weather-atlas.com/en/india/bidar-climate>
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.

