Environment Audit

Study Period (Two Years) 2022 – 2023 & 2023 - 2024

Sustainability study

AUDIT REPORT

Studied for

A. J. Institute of Engineering & Technology

NH-66, Kottara Chowki,
Mangaluru-575006

Studied in the capacity of

Accredited and Certified GBP

Studied by

Website: https://thegreenviosolutions.co.in/
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Background reference image Nic Y C Gua on unsplash

Disclaimer

The Audit Team has prepared this report for the **A. J. Institute of Engineering & Technology** located *NH-66, Kottara Chowki, Mangaluru-575006* based on input data submitted by the Institute 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 internal team. The warranty or undertaking, expressed or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

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

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

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Acknowledgement

The Audit Assessment Team extends its appreciation to the **A. J. Institute of Engineering & Technology** for assigning this important work of Environment Audit. We appreciate the cooperation extended to our team during the entire process.

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

Our heartfelt thanks are extended to the Chairperson of the entire process **Dr. Shantharama Rai C,** (Principal) for the valuable inputs.

We are also thankful to Institute's Task force who have played a major role in data collection.

- Teaching staff member – ***Dr. John Prakash Veigas,*** *Assoc. Prof & HOD-AIDS*
- Non-teaching staff member – ***Mr. Abhishek Shetty,*** *Maintenance Engineer*
- Admin staff member - ***Mrs. Smitha Shetty,*** *Office Superintendent*

Sustainable Academe
Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

Contents

Disclaimer 1

Acknowledgement 2

Contents 3

1. Introduction 4

2. Overview 6

3. Research 7

4. Investigation 8

5. Documentation 12

6. Investigation 18

7. Suggestion 19

8. Compilation 24

1. Introduction

1.1 About statements of the Institute

1.1.1 Vision

The Institute proposes *"To produce top-quality engineers who are groomed for attaining excellence in their profession and competitive enough to help in the growth of nation and global society."*

1.1.2 Mission

The Institute adheres:

- *To offer affordable high-quality graduate program in engineering with value education and make the students socially responsible*
- *To support and enhance the institutional environment to attain research excellence in both faculty and students and to inspire them to push the boundaries of knowledge base*
- *To identify the common areas of interest amongst the individuals for the effective industry- institute partnership in a sustainable way by systematically working together*
- *To promote the entrepreneurial attitude and inculcate innovative ideas among the engineering professionals*

1.2 Assessment of the Institute

The Institute was established in 2016.

1.2.1 Affiliations

The courses provided by Institute have received affiliation through the **Visvesvaraya Technological University (VTU), Belagavi, Karnataka.**

1.2.2 Certification

AISHE – The All India Survey of Higher Education code is C-56446

1.2.3 Approval

The courses by the Institute have received approval through **All India Council for Technical Education (AICTE), New Delhi**.

2. Overview

2.1 Summarised Populace analysis for 2023-2024

2.1.1 Students data

The data (shared by the Institute) shows there were **1,251 students.**

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	14	20	**34**
2	Teaching staff	41	48	**89**
3	Non-Teaching staff	11	16	**27**
Total Staff Members		**66**	**84**	**150**

Table 1: Staff data of the Institution for 2023-2024

The staff data shows the Institute premises had **150 Staff Members.**

2.2 Summarised Populace analysis for 2022-2023

2.2.1 Students data

The data (shared by the Institute) shows there were **1,039 students.**

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	10	21	**31**
2	Teaching staff	46	34	**80**
3	Non-Teaching staff	12	23	**35**
Total Staff Members		**68**	**78**	**146**

Table 2: Staff data of the Institution for 2022-2023

The staff data shows the Institute premises had **146 Staff Members.**

3. Research

3.1 Campus area

The **site spread over 0.5 acres of land.**

3.2 About the Green Building Study Audit

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

3.3 Analysis of the Green Building Study Audit

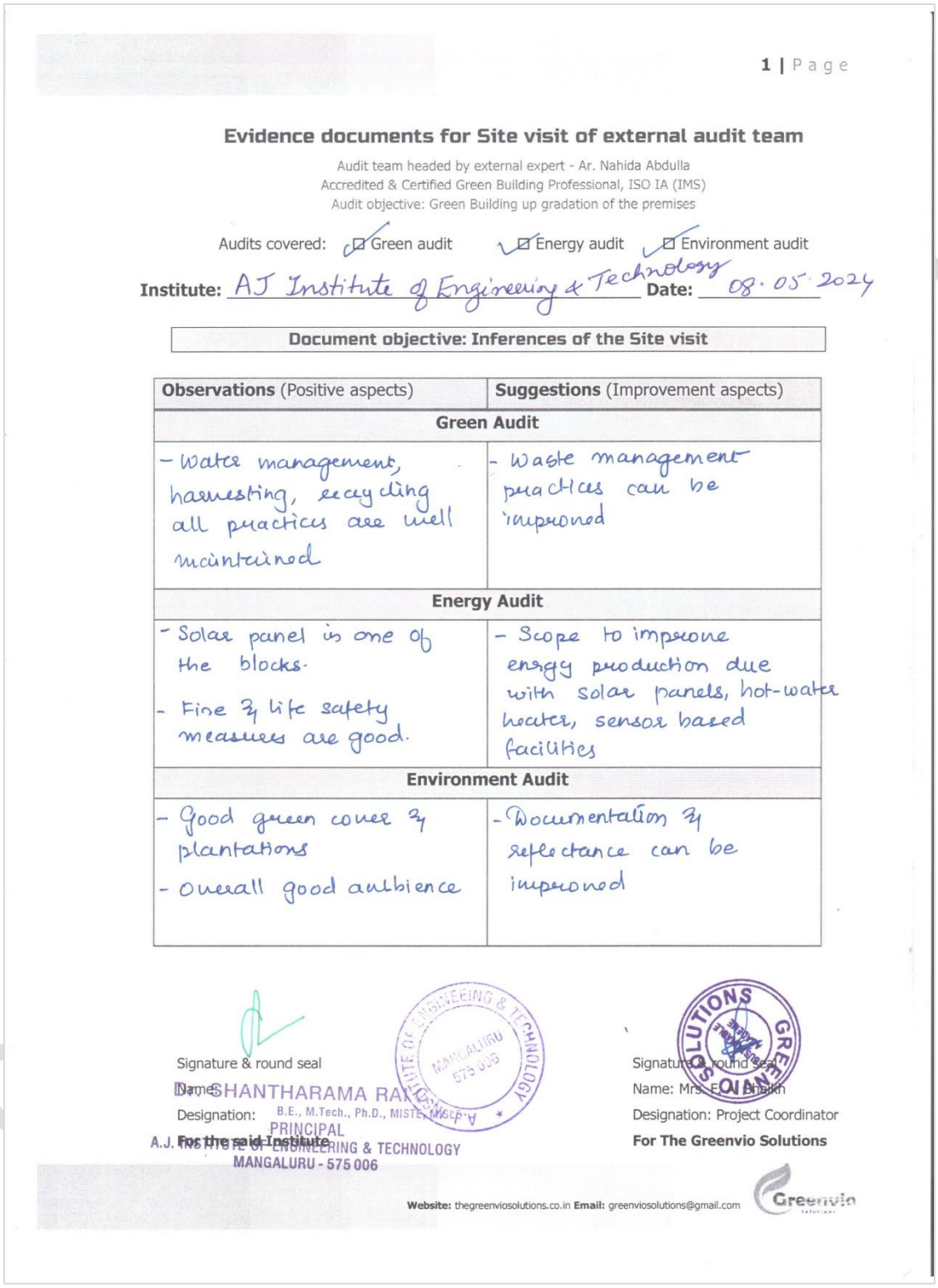
The procedure included detailed verification as follows:

- Investigation
- Technical
- Observations
- Inferences

3.4 Strategy adopted for Green Building Study Audit

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

4. Investigation



1 | Page

Evidence documents for Site visit of external audit team

Audit team headed by external expert - Ar. Nahida Abdulla
Accredited & Certified Green Building Professional, ISO IA (IMS)
Audit objective: Green Building up gradation of the premises

Audits covered: ☑ Green audit ☑ Energy audit ☑ Environment audit

Institute: AJ Institute of Engineering & Technology Date: 08.05.2024

Document objective: Inferences of the Site visit

Observations (Positive aspects)	**Suggestions** (Improvement aspects)
Green Audit	
- Water management, harvesting, recycling all practices are well maintained	- Waste management practices can be improved
Energy Audit	
- Solar panel is one of the blocks. - Fire & life safety measures are good.	- Scope to improve energy production due with solar panels, hot-water heater, sensor based facilities
Environment Audit	
- Good green cover & plantations - Overall good ambience	- Documentation & reflectance can be improved

Signature & round seal
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Plate 1: Evidence files related to inferences of the site visit

Evidence documents for Site visit of external audit team

Audit team headed by external expert - Ar. Nahida Abdulla
Accredited & Certified Green Building Professional, ISO IA (IMS)
Audit objective: Green Building up gradation of the premises

Audits covered: ☑ Green audit ☑ Energy audit ☑ Environment audit

Institute: AJ Institute of Engineering and Technology **Date:** 08.05.2024

Document objective: Proof of the Site visit

Meeting with the core team

Investigation of the systems

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Plate 2: Evidence files related to the site visit

Evidence documents for Site visit of external audit team

Audit team headed by external expert - Ar. Nahida Abdulla
Accredited & Certified Green Building Professional, ISO IA (IMS)
Audit objective: Green Building up gradation of the premises

Audits covered: ☑ Green audit ☑ Energy audit ☑ Environment audit

Institute: AJ Institute of Engineering & Technology **Date:** 08.05.2024

Document objective: Induction Meeting attendance sheet

S. No.	Name	Committee	Designation	Signature
1.	Mrs. F. A. Shaikh	External	Project Coordinator	
2.	Ar. Nahida Abdulla	External	Project Head	
3.	DR. Shrikanth Rao	External	Principal	
4.	Dr. P. Mahabaleswarappa	Internal	Dean Academics	
5.	Dr. Antony P J	Internal	Vice Principal	
6.	Dr. John P. Veigas	Internal	HOD - AI & DS	
7.	Dr. Amarnath	Internal	Prof. (civil)	
8.	N. ARUL	"	N. ARUL	
9.	Jithendra. N.K	"	Asst. Prof (ECE)	
10.	Nitesh	"	Assl Prof (CV)	
11.	Renuka M. Kotian	"	Asst. Prof (chemistry)	
12.	Rachanna Kunder	"	Asst. Prof (chemistry)	
13.	Dr. Laxmi Gulappagol	"	Associate Prof & HOD ICE	
14	Amogh Shetty	"	Asst. Prof (Physics)	
15.	Dr. Prabhakara B.K	"	Associate Professor (ISE)	
16.	Dr. Chanchal Antony	"	Associate Prof & Head (Mathematics)	

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Plate 3: Evidence file related to induction meeting attendance record

Evidence documents for Site visit of external audit team

Audit team headed by external expert - Ar. Nahida Abdulla
Accredited & Certified Green Building Professional, ISO IA (IMS)
Audit objective: Green Building up gradation of the premises

Audits covered: ☑ Green audit ☑ Energy audit ☑ Environment audit

Institute: AJ Institute of Engineering & Technology **Date:** 08.05.2024

Document objective: Exit Meeting attendance sheet

S. No.	Name	Committee	Designation	Signature
1.	Mrs. F. A. Shaikh	External	Project Coordinator	
2.	Ar. Nahida Abdulla	External	Project Head	
3	Dr. Shantharam Rai C	Internal	PRINCIPAL	
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5.	Dr. Antony P J	Internal	Vice Principal	
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8	Dr Sadananda K N	Internal	HOD - Physics	
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10	Nitesh	Internal	Assl Prof (CV)	
11	Mrs. Nydile. T. N	Internal	Asst. Professor (Physics)	8/5/24
12	Ms. Divika. M. Kotian	Internal	Asst. Prof (chemistry)	
13.	Ms. Rachana K	Internal	Asst. Prof (Chemistry)	
14.	Dr. Laxmi Gulappagol	Internal	Associate Prof & HOD ICE	
15.	Dr. Chanchal Antony	Internal	Assoc. Prof & HoD AIML	
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Plate 4: Evidence file related to exit meeting attendance record

5. Documentation

5.1 Open Spaces

There are facilities such as breakout zones, green pockets, open ground, well-maintained driveways and spaces with seating facilities in front yard and backyard of the premises.

Plate 5: Green cover and plantations in the premises

The study suggests that:

- ***The plantations should have numbering/ coding done***
- ***The site should be designed and boards identifying these spaces as 'BREAKOUT ZONE' and 'GREEN ZONE' can be displayed around the site***

5.2 Biodiversity audit

5.2.1 Flora audit

A flora survey to identify the total numbers of plants and trees by internal team as documented below displays the verities of the plantations.

S. No.	Plant name
1	*Cashew Plant*
2	*Mango Tree*
3	*Teak*
4	*Ashoka*

5	*Gaint Calotrope*
6	*Guava*
7	*China Berry*
8	*Ti Plant*
9	*Chinese Scholar*
10	*Rose Plant*
11	*Coconut Tree*
12	*Royal Poinciana*
13	*Kanaka Cheampa*
14	*Indian Almond*
15	*Chikku*
16	*Mexica Lilac*
17	*Aratiles*
18	*Sugar Apple*
19	*Neem Tree*
20	*Royal Palm Tree*
21	*Papper Flower*
22	*Jasmine*
23	*Black Ficus*
24	*Ealing Wax Palm*
25	*Aralia Plants*
26	*Bird Of Paradise*
27	*Himalayan Blinding Tree*
28	*Five Leaved Chaste Tree*
29	*Tree Of Heaven*
30	*Avacado*
31	*Eucalyptus Globulus Tree*
32	*Lemon Plant*
33	*Jungle Geranium*
34	*Coromandel Ebony*
35	*Hi-Res Stock*
36	*Kismet Echinacea*
37	*Gardenia*
38	*Gardenia Latifolia*
39	*Koffir Lime*

40	*Myrtle*
41	*Ixora*
42	*Polyscior Gerifoyleil Gerna*
43	*Western Soapberry*
44	*Golden Shower Tree*
45	*Poinsettia*
46	*Aracanut*
47	*Buy Mussacnda*
48	*Tusticia Brand Geeoma*
49	*Ivy Tree*
50	*Pinanga*
51	*Broad Leaf Ladypalm*
52	*Phyllanthus Myrtifolius*
53	*Ligustrem Texanum Agal*
54	*Dwarf Umbrella*
55	*Bottle Palm*
56	*Plumeria*
57	*Snake Plant*
58	*Arrow Head*
59	*Beach Spider Cring*
60	*Bismark Palm*
61	*Dwarf Umbrella Tree*
62	*Variegatal Shell Ginger*
63	*Arrow Head Plant*
64	*Common Guava*
65	*Polyscias Guilfoyler*
66	*Polyscias*
67	*Myrsine Africana*
68	*Jungle Geranium*
69	*King Of Bittery*
70	*Ponytial Palm*
71	*Vinca Minar*
72	*Muntingia Calabura*
73	*Shoe Blank Plant*
74	*Pinaaga*

75	*Phyllanthus Myrtifolius*
76	*Plumera Obtusa*
77	*Hyophobe Yophorbe Lagenilulis*
78	*Golden Legium*
79	*Dracena Reflex*
80	*Beach Spider Lily*
81	*Jungle Geranuim Grandifolius*
82	*Blue Heaven*
83	*Des Baishinia Lunararioid*
84	*Weeping Fig*
85	*Darcena Reflexa*
86	*Tebernocemotana*
87	*Almonda*
88	*Swietenia Macrophylla*
89	*Java Plum*
90	*Fountain Grass*
91	*Banaba*
92	*Royal Poinciana*
93	*Pleiblastus*
94	*Helrisus*
95	*Heptaplerum Arboricola*
96	*Alpinia Zerumblet*
97	*Psedium Guajava*
98	*Depris Pembana*
99	*Psidium Guajava*
100	*Dupsis Pembana*
101	*Plumeria Obtusa*
102	*Spathiphyllum Wallise*
103	*Banana*
104	*Ficus Variegata Blume*
105	*Birds Cherry*
106	*Beach Spder Lilly*
107	*False Ashoka*
108	*Jungle Geranium*
109	*Rhodocactus Grand Folius*

110	*Lime Prickly Ash*
111	*Blue Heaven*
112	*Bauhinia Lunarioids*
113	*Weeping Fig*
114	*Corn Palm*
115	*Shore Eugenia*
116	*Pinwheel Flower*
117	*Red Stem Fig*
118	*Snake Plant*
119	*False Ashoka*
120	*Golden Legium*
121	*Kathy Japanese Spindle Bush*
122	*Mahagony*
123	*Pygmy Bamboo*
124	*Java Palm*
125	*Fountain Grass*
126	*Queen Palm Larger*
127	*Shell Ginger*
128	*Pemba Palm*
129	*Bamboo*
130	*Alexandra Palm*
131	*Champa Plant*

Table 3: Details of the Flora in the premises

At present there are hundreds of plantations in the premises.

5.2.2 Fauna audit

The information was not shared.

5.4 Noise Audit

The noise levels within premises are relative yow because the site is surrounded by residential areas on all sides and is located at a good distance from the main road.

The study suggests that outside the campus a signboard could be displayed that highlights 'Silent zone' and 'No honking zone' being an Educational Institute.

5.5 Carbon Footprint Audit

5.5.1 Eco-friendly Commuting Practices

- The site is located in an urban locality.
- Buses are provided for stakeholder commuting.

5.5.2 Heat Island Reduction

The heat island effect refers to the study of micro climatic feature within a site. There are multiple factors that add on to the feature such as external temperature, internal temperatures, site context including available and site adjacent facilities. The shaded areas (Due to the built space and green cover) add to low heat island effects of campus:

The study suggests that light colored facades, green cover has been instrumental in keep heat island effects relatively low.

5.5.3 Outdoor Light Pollution Study

The campus is located in an urban area however this phenomena was not majorly experienced.

The study suggests that the Institute can undertake sensitization program related to the subject.

6. Investigation

The following results are based on the investigation carried out during the site visit.

Sampling testing as on

08 May 2024

Figure 1: Energy and environmental parameters investigation study

7. Suggestion

The suggestion (inference) would act as a 'PLAN OF ACTION' to implement all the suggestions in a detailed manner.

- **Phase 1**
  - *Duration: One year from the date of Report submission – Shared currently*
  - These are first hand suggestions
  - They are easy and quick to implement
  - They involve close very less or almost no expenses
  - They can serve as a foundation for the entire plan of action

Section 1 – Eco-restoration of outdoors (Landscape perspective)

- **Feeders**
  - At appropriate locations there can be provisions for drinking water and some grains for birds as they visit the site much frequently.
- **Numbering the plantations in the premises**
  - *Make a list of all the plantations in the premises*
  - *Secondly, start numbering the plantations in either of the ways:*
    i. Painting the nos. on iron plates and nailing the same
    ii. Printing the nos. on paper, laminating and pasting the same
    iii. Painting the nos. with letters and nos. directly
  - *Care should be taken that the display should be visible*
  - *Uniform color palette should be identified and used*
  - *Measures should be taken to avoid withering during monsoon*
  - *This could be undertaken as a student activity*

Reference suggestions 1: Numbering the plantations

- **Improve the ecological footprint of the premises**
  - Undertake the landscape ecological redesign to increase green cover
  - Opportunity can be explored to have a dedicated:
    i. Nursery
    ii. Greenhouse
    iii. Organic farm
    iv. Kitchen garden in backyard
  - The following plantations can be planted for Carbon neutralisation as an additional measure, even though they might be existing in premises
    i. Pine – Known for its ability to sequester carbon

(https://www.single.earth/blog/which-trees-absorb-the-most-carbon#:~:text=Pine%20trees%20as%20carbon%20sinks,their%20ability%20to%20sequester%20carbon.&text=These%20trees%20are%20found%20in,also%20make%20good%20landscape%20plants)

    ii. Neem – Helps reduce greenhouse gases through photosynthesis absorbing large quantities of CO_2 producing oxygen

(https://neemfoundation.org/greening-india-with-neem/#:~:text=The%20planting%20of%20Neem%20trees,of%20CO2%20and%20producing%20oxygen)

    iii. Peepal – Can uptake CO_2 during the night as well because of its ability to perform a type of photosynthesis called Crassulacean Acid Metabolism (CAM)

(https://nurserylive.com/blogs/sustainable-living/do-you-know-plants-that-give-oxygen-24-hours#:~:text=2.-,Peepal,Crassulacean%20Acid%20Metabolism%20(CAM))

iv. Bamboo - Can absorb as much as 12 tonnes of carbon dioxide per hectare per year, giving the plant a potentially crucial role in stabilising our planet's atmosphere.

(https://www.theguardian.com/environment/2003/mar/20/research.science#:~:text=Research%20in%20Japan%20and%20elsewhere,in%20stabilising%20our%20planet's%20atmosphere) and https://www.nelda.org.in/15-indian-trees-that-produce-the-most-oxygen

v. Teak – The highest capacity for carbon sequestration among trees in India. This is the finding of a study conducted by the Gujarat Ecological Education and Research (GEER).

(https://timesofindia.indiatimes.com/city/ahmedabad/teak-absorbs-max-co2-from-air-helps-check-global-warming/articleshow/51721842.cms)

- **Plant as an extension of 'Green motto'**
  - External resource persons visiting the premises can share the goal of green environment in the following ways:
    i. Plant a sapling within the premises
    ii. Handover a sapling as a gesture
- **Nutrition pits**
  - Certain pits (mound of earth covered in green grass/ shrubs) can be demarcated as 'Nutrition pits' where the organic food from the kitchen and Canteen fruit peels and fruits or vegetables can be degraded for making nutrition-rich soil.

Section 2 – Documentation

- **Messages on the beam area**
  - Include quotes and messages from eminent personalities all over the premises on beam for inspiration and beautification.
- **Awareness**
  - Introduce zone wise display boards at relevant locations

Section 3 – Amenities

- **Facilities**
  - Speed limit signage
  - Zebra crossing
  - First aid box near the administrative area
  - Suggestion box every floor of the premises

Section 4 – Environmental management systems

- **Heat island control measures**
  - *Cool rooftops*
    i. Keep terrace areas free of any kind of storage materials
    ii. Terrace rooftops can be painted with Cooltop (Reflective material) to reflect the harsh sun rays and reduce the heat absorption in the top most floor and surrounding areas of the building.
    iii. Introduce signboards about 'No students are allowed to enter'
    iv. Undertake feasibility study of before - after temperature reading.

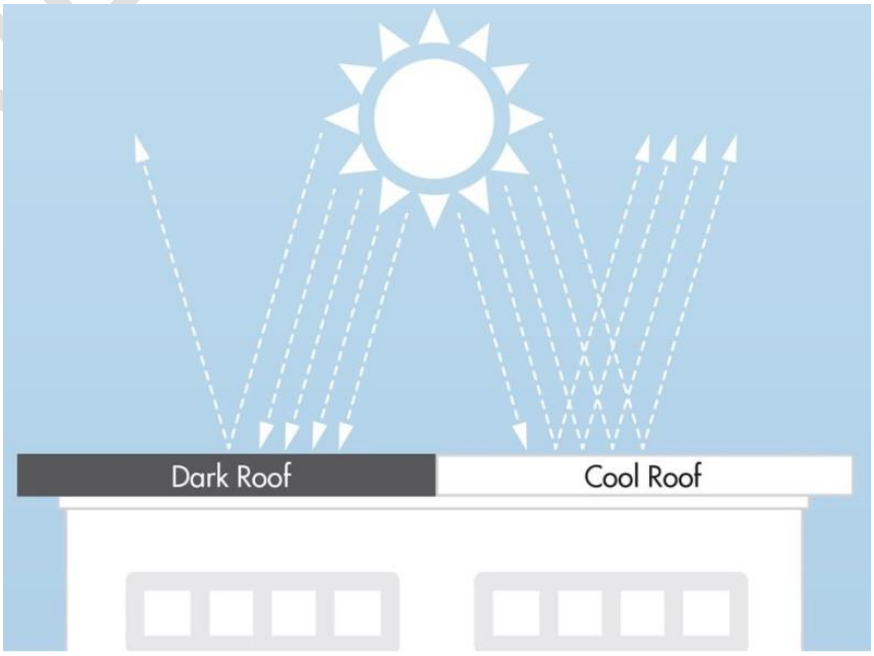

Plate 6: Cool roof comparative analysis (For reference purpose only)

Source: Image by https://www.gaf.com/en-us/blog/six-truths-about-cool-roofs-281474980105387

➲ Pollution control measures

- *Vehicle usage -* Restricting the speed limit of vehicles on the premises to 10 km per hour, not horning on the premises will help in maintaining the sound in control and emphasis on a silent zone.
- *Avoid burning waste -* The waste produced on the premises should not be burned as it is dangerous to the health of students and staff

8. Compilation

The study is based on the data collected, analyzed, rechecked, and confirmed through multiple modes. For the quality study, some standards/ notes have been referred to. These are listed and noted below. However, no direct references have been used anywhere. These are used as a base to analyze and study the data collected.

National references

- IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
- IGBC Green Landscape Rating system, March 2013

International references

- The city of Cheyenne, Streetscape/ Urban Design elements - Wyoming Planning Association, Gillette, Wyoming, United States
- Streetscape elements – Chapter 6 on San Francisco
- American lung association https://www.lung.org/
- Study related to air pollution https://www.airgle.com/
- Exploring the light pollution https://education.nationalgeographic.org/
- Urban heat island effect https://www.epa.gov/heatislands/what-you-can-do-reduce-heat-islands