

ENVIRONMENT AUDIT

STUDY PERIOD (TWO YEARS) 2021 – 2022 & 2022 - 2023

Sustainability study
AUDIT REPORT

Studied for

Maharashtra Shikshan Samiti's

Maharashtra Mahavidyalaya, Nilanga

Main Road, Nilanga,

District Latur, Pin – 413521

(Maharashtra), India

Studied in the capacity of

Accredited and Certified GBP



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Disclaimer

The Audit Team has prepared this report for the **Maharashtra Shikshan Samiti's Maharashtra Mahavidyalaya, Nilanga** located at Main Road, Nilanga, District Latur, Pin – 413521 (Maharashtra), India 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.


Ar. Nahida Abdulla

Greenvio Solutions

Developing Healthy and Sustainable Environments

We are an Environmental and Architectural Design Consultancy firm

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Acknowledgement

The Audit Assessment Team extends its appreciation to the **Maharashtra Shikshan Samiti's Maharashtra Mahavidyalaya, Maharashtra** 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 extended to the Chairperson of entire process **Dr. M.N Kolpuke**, (Principal) for the valuable inputs.

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

- ⇒ Teaching members – **Dr. G.G Shivshette and Dr. Dnyaneshwar Choudhari**,
- ⇒ Non-teaching staff members – **Shri N. K Gadiwan**
- ⇒ Admin staff members – **Shri. S.S Mane**

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

Sustainable Academe

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

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1. Introduction

1.1 About the Institute

1.1.1 About the Samiti

Maharashtra Shikshan Samiti was established in 1968 with a view to create national and social awareness among the people of the region. With a vision, he established 16 primary, secondary and higher secondary schools in nearby rural areas, along with Institutes to provide technical education to the students belonging to the rural areas of this region.

1.1.2 About the College

Maharashtra Mahavidyalaya was established by Maharashtra Shikshan Samiti at Nilanga District Latur of Maharashtra state, in June 1970 with Arts and Commerce faculties. Later Science faculty was introduced in June 1986. To fulfil the need of the students courses like B.C.A., B.Voc.(FPPS, WPT), M.Sc. (CS) and M. Com. have also been introduced in the college.

1.2 Assessment of the Institute

1.2.1 Affiliations

The courses provided by the College have received their affiliation through the **S. R. T. M. U. Nanded**, a state public university of Maharashtra state.

1.2.2 Certification

The **All India Survey of Higher Education (AISHE)** code is C-7279

1.2.3 Recognitions

The College has achieved '**Recognition of UGC**' under section [2 \(f\) and 12\(b\) of the UGC Act, 1956](#) by University Grants Commission, New Delhi.

1.2.4 Accreditation

The College received a **B+ Grade with a CGPA of 2.62 in First Cycle** awarded by the National Assessment & Accreditation Council (NAAC).



राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद
 विश्वविद्यालय अनुदान आयोग का स्वायत्त संस्थान
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL
 An Autonomous Institution of the University Grants Commission

Certificate of Accreditation

*The Executive Committee of the
 National Assessment and Accreditation Council
 on the recommendation of the duly appointed
 Peer Team is pleased to declare the
 Maharashtra Mahavidyalaya
 Tal. Nilanga, Dist. Batur,
 affiliated to Swami Ramanand Teerth Marathwada University, Maharashtra as
 Accredited
 with CGPA of 2.62 on seven point scale
 at B⁺ grade
 valid up to March 27, 2024*

Date : March 28, 2019



*S. C. Sharma
 Director*

EC/SC/37/RAR/MIICOGN1147

1.3 Statements of the Institute

1.3.1 Vision

The Institute proposes "To provide value based quality education and generate human resource equipped with contemporary skills."

1.3.2 Mission

The Institute adheres and focuses:

- To search the students in the area who are eligible but deprived of taking higher education.
- To inculcate the value of labour and education through self-help
- To contribute to the development of economically backward area by helping the rural students to get quality education and to facilitate them with global stream of courses
- To make the students aware about the career opportunities available through the programs offered to them
- To mould the character of students through value based education
- To refine the personality of the students with positive approach and purposeful skills
- To create environmental and social awareness by exposing students to various activities

1.3.3 Aim

The College channelizes its efforts towards:

- To provide quality education by offering the modern courses in rural area
- To make needy students self-sufficient through "Earn and Learn" scheme
- To mould and shape the rural students for their all round development according to demands of local, state and national level and to inbuilt self confidence in them
- To inculcate patriotism and the realization of their responsibility towards their environment and society

2. Overview

2.1 Summarised Populace analysis for 2022-2023

2.1.1 Students data

The data (shared by the Institute) shows there were **1,707 students**.

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	02	00	02
2	Teaching staff	53	13	66
3	Non-Teaching staff	20	01	21
Total Staff Members		75	14	89

Table 1: Staff data of the Institution for 2022-2023

The staff data shows the Institute premises **89 Staff Members**.

2.2 Summarised Populace analysis for 2021-2022

2.2.1 Students data

The data (shared by the Institute) shows there were **1,573 students**

2.2.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	02	00	02
2	Teaching staff	47	12	59
3	Non-Teaching staff	26	01	27
Total Staff Members		75	13	88

Table 2: Staff data of the Institution for 2021-2022

The staff data shows the Institute premises had **88 Staff Members**.

3. Research

3.1 Site & Institute Building Spread Area

The Institute spread over **22 acres** with a built-up area comprising of **2,679.17 sq. m.**

3.2 Institute Infrastructure - Spatial Organisation

2.3.1 Establishment

The Institute established and began its operations in **1970.**

2.3.2 Spatial Organisation

The Institute has the following spatial features:

- A modern infrastructure amidst a semi-urban set-up
- Cluster of blocks spread over the campus
- Open ground and open courtyards
- High floor to floor ceiling heights for spacious organization

3.3 Operation and Maintenance of the premises

The Institution is open from Monday to Saturday between 08:00 to 17:45 hours.

4. Evidence



Plate 1: Discussion with the team and investigation



Plate 2: Investigation of the system



Plate 3: Investigation and Seminar on subject related to Sustainability for the stakeholders

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: Maharashtra Mahavidyalaya, Nilanga Date: 23/12/2023

Document objective: Inferences of the Site visit

Observations (Positive aspects)	Suggestions (Improvement aspects)
Green Audit	
<ul style="list-style-type: none"> - Ground water recharge is practised - Chemical waste managed well. 	<ul style="list-style-type: none"> - Documentation & reflectance has to improve - Waste management general practices should improve
Energy Audit	
<ul style="list-style-type: none"> - Renewable energy sources are available - Certain spaces have smart & LED appliance. (class room) 	<ul style="list-style-type: none"> - Scope to replace non-efficient appliances - Ventilation aspects can be improved
Environment Audit	
<ul style="list-style-type: none"> - Hundreds of plantations all over - pollution-free atmosphere there 	<ul style="list-style-type: none"> - Documentation & reflectance has scope for improvement.

Signature & round seal
 Name: Dr. Nilanga N. Kulkarni
 Designation: Principal
 For the said Institute

Signature & round seal
 Name: Mrs. F. S. Ghosh
 Designation: Project Coordinator
 For The Greenvio Solutions



5. Documentation

5.1 Open Spaces

The first hand observations about the space documented below:



Plate 4: Courtyard in the premises

The internal courtyard is open to sky with varieties of plantations all over that provide shade.



Plate 5: The front yards of the premises

The front yard of the premises has open space with walkways, shade providing plantations.



Plate 6: The botanical garden in the premises

The study suggests that this space requires up gradation, there is scope to develop bamboo garden and breakout zone in this area.

5.2 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	Type	Nos.	Planted by
1	<i>Delonix Regia (Gulmohor)</i>	Tree	42	Planted by staff, students
2	<i>Dypsis Onilahensis (Palmtree)</i>	Tree	21	Planted by staff, students
3	<i>Mangifera Indica (Mango)</i>	Tree	10	Planted by staff, students
4	<i>Polyalthia Longifolia (Ashok)</i>	Tree	10	Planted by staff, students
5	<i>Eucalyptus Globulus (Nilagari)</i>	Tree	17	Planted by staff, students
6	<i>Azadirachta Indica (Kadulimb)</i>	Tree	90	Planted by staff, students
7	<i>Mirlosopa Elengi (Bakul)</i>	Tree	15	Planted by staff, students
8	<i>Ficus Beniamina</i>	Tree	3	Planted by staff, students
9	<i>Thuja Occidentalis</i>	Shrub	3	Planted by staff, students
10	<i>Hibiscus Rosa-Sinesis (Jasvand)</i>	Shrub	5	Planted by staff, students
11	<i>Pongamia Pinata (Karanj)</i>	Tree	170	Planted by staff, students

12	<i>Ficus Benghlensis (Wad)</i>	Tree	21	Planted by staff, students
13	<i>Ficus Religiosa (Religiosa) Pipal</i>	Tree	35	Planted by staff, students
14	<i>Dimocarpus Longan</i>	Tree	18	Planted by staff, students
15	<i>Muntingia Calabura</i>	Sbrub	1	Grown naturally
16	<i>Bogainvillea Glabra</i>	Vine	150	Planted by staff, students
17	<i>Plumeria Obtusa (Chafa)</i>	Tree	17	Planted by staff, students
18	<i>Spondias Mombin</i>	Tree	1	Planted by staff, students
19	<i>Pentalion Luteum</i>	Vine	1	Planted by staff, students
20	<i>Cocos Nucifera (Narial)</i>	Tree	7	Planted by staff, students
21	<i>Syzygium Jambolanatum (Jangali Jambul)</i>	Tree	25	Planted by staff, students
22	<i>Prunus Dulcis (Badam)</i>	Tree	11	Planted by staff, students
23	<i>Peltophorum Pterocarpum</i>	Tree	26	Planted by staff, students
24	<i>Santalum Album (Cahndan)</i>	Tree	8	Planted by staff, students
25	<i>Tamarindus Indica (Chinch)</i>	Tree	43	Planted by staff, students
26	<i>Annona Squamosa (Shitafal)</i>	Small tress	9	Planted by staff, students
27	<i>Clitoria Tinctoria (Gokarana)</i>	twiner	1	Planted by staff, students
28	<i>Cathranthus Roseus (Sadafuli)</i>	Herb	20	Planted by staff, students
29	<i>Oscimun Sanctum (Tulsi)</i>	Herb	50	Planted by staff, students
30	<i>Calotrpis Procera (Ruchaki)</i>	Shrub	2	Planted by staff, students
31	<i>Aloe Vera (Korpad)</i>	Herb	5	Planted by staff, students
32	<i>Trades Cantia Pallida</i>	Herb	10	Planted by staff, students
33	<i>Murrya Koengii (Kadipatta)</i>	Tree	2	Planted by staff, students
34	<i>Phoenix Dactifera (Khajurr)</i>	Tree	1	Planted by staff, students
35	<i>Syzygium Panicultum (Jambool)</i>	Tree	1	Planted by staff, students
36	<i>Canna Indica (Kardali)</i>	Herb	7	Planted by staff, students
37	<i>Phyllostachys Sulphurea</i>	Tree	2	Planted by staff, students
38	<i>Dulbergia Sissoo (Shishav)</i>	Tree	22	Planted by staff, students
39	<i>Cassia Fistula (Bhava)</i>	Tree	3	Planted by staff, students
40	<i>Terminalea Chebula (Hirda)</i>	Tree	1	Planted by staff, students

41	<i>Terminalia Bellerica (Behada)</i>	Tree	5	Planted by staff, students
42	<i>Terminalia Arjuna (Arjuna)</i>	Tree	22	Planted by staff, students
43	<i>Putranjiva Roxburghii (Putrajiva)</i>	Tree	1	Planted by staff, students
44	<i>Leucaena Leucocephala (Subabul)</i>	Tree	10	Planted by staff, students
45	<i>Bahunia Varigata (Kanchan)</i>	Tree	7	Planted by staff, students
46	<i>Albizia Lebbek (Shiras)</i>	Tree	2	Planted by staff, students
47	<i>Euphorbia Tithymaloidea</i>	Herb	1	Planted by staff, students
48	<i>Nephelium Lappacum</i>	Tree	1	Planted by staff, students
49	<i>Carica Papaya (Pappya)</i>	Tree	3	Planted by staff, students
50	<i>Pithecellobium Dulc (Villati Chinch)</i>	Tree	19	Planted by staff, students
51	<i>Cycas Circinalis (Cycas)</i>	Tree	3	Planted by staff, students
52	<i>Jasminum Sambuc (Mogra)</i>	Shrub	9	Planted by staff, students
53	<i>Trichodesma Zelanicum</i>	Herb	1	Planted by staff, students
54	<i>Tectona Grandis (Sagwan)</i>	Tree	7	Planted by staff, students
55	<i>Morus Alba (Cherry)</i>	Shrub	3	Planted by staff, students
56	<i>Millingtonia Hortensis (Ratmogara)</i>	Tree	36	Planted by staff, students
57	<i>Acacia Nilotica (Babul)</i>	Tree	4	Planted by staff, students
58	<i>Tecoma Stans (Tecoma)</i>	Tree	25	Planted by staff, students
59	<i>Solanum Mauritianum</i>	Herb	1	Planted by staff, students
60	<i>Bahunia Racemosa (Apata)</i>	Tree	1	Planted by staff, students
61	<i>Senna Siamea</i>	Tree	7	Planted by staff, students
62	<i>Cascabela Thevetia (Pivlikaner)</i>	Shrub	17	Planted by staff, students
63	<i>Emblica Officinalis (Awala)</i>	Tree	7	Planted by staff, students
64	<i>Mangolia Champaca (Hirwa Chapha)</i>	Tree	5	Planted by staff, students
65	<i>Neolamarckia Cadornba (Kadamb)</i>	Tree	4	Planted by staff, students
66	<i>Nyctantnes Arbortristis (Parijatak)</i>	Shrub	4	Planted by staff, students
67	<i>Ficus Elastica (Rubber Tree)</i>	Tree	1	Planted by staff, students
68	<i>Psidium Gujava (Peru)</i>	Tree	6	Planted by staff, students
69	<i>Spathodea Campanulata</i>	Tree	1	Planted by staff, students
70	<i>Artocarpus Hetrophyllus(Phans)</i>	Tree	3	Planted by staff, students
71	<i>Khaya Sengalensis</i>	Tree	2	Planted by staff, students

72	<i>Alostonia Scolaris(Saptparni)</i>	Tree	1	Planted by staff, students
73	<i>Pistachia Vera(Pista)</i>	Tree	1	Planted by staff, students
74	<i>Ficus Raqcimosa(Pimpri)</i>	Tree	2	Planted by staff, students
75	<i>Agave Vivipara</i>	Herb	1	Planted by staff, students
76	<i>Cupaniopsisan Cardioides</i>	Small tree	1	Planted by staff, students
77	<i>Morus Rubra</i>	Tree	1	Planted by staff, students
78	<i>Swietenia Macrophylla (Mahogoni)</i>	Tree	1	Planted by staff, students
79	<i>Jatropha Ccurcus(Muggle Erand)</i>	Shrub	1	Planted by staff, students
80	<i>Cupanispsis Ancardioides</i>	Tree	1	Planted by staff, students
81	<i>Zizphus Mauritana (Janglee Bor)</i>	Tree	1	Planted by staff, students
82	<i>Rostonea Regia</i>	Tree	4	Planted by staff, students
83	<i>Acalypha Wilkesiana</i>	Herb	25	Planted by staff, students
84	<i>Annona Reticulata (Ramphal)</i>	Tree	2	Planted by staff, students
85	<i>Jatropha Podarica</i>	Herb	1	Planted by staff, students
86	<i>Justicia Adahatoda(Adulsa)</i>	Shrub	1	Planted by staff, students
87	<i>Dypsis Lutescens</i>	Herb	1	Planted by staff, students
88	<i>Arqucaria Hetrophylla (Chrismus Tree)</i>	Tree	2	Planted by staff, students
89	<i>Dracaena Reflexa</i>	Tree	1	Planted by staff, students
90	<i>Cymbopogon Citralis (Lemon Grass)</i>	Herb	1	Planted by staff, students
91	<i>Russelia Equisetfolia</i>	Herb	1	Planted by staff, students
92	<i>Markhamia Lutea</i>	Tree	3	Planted by staff, students
93	<i>Asparagus Densiflorus</i>	Herb	1	Planted by staff, students
94	<i>Nerium Indicum(Kanheri)</i>	Shrub	4	Planted by staff, students
95	<i>Dracaena Trifasciata</i>	Herb	2	Planted by staff, students
96	<i>Kalanchoe Serrata</i>	Herb	2	Planted by staff, students
97	<i>Cyprus Alternifolium</i>	Herb	1	Planted by staff, students
98	<i>Asplenium Trichomanes</i>	Herb	1	Planted by staff, students
99	<i>Philodendron Martianum</i>	Herb	4	Planted by staff, students
100	<i>Duranta Erecta</i>	Shrub	100	Planted by staff, students
101	<i>Syzigium Cumini (Jambhul)</i>	Tree	23	Planted by staff, students

102	<i>Melia Dubia</i>	Tree	2200	Planted by staff, students
103	<i>Aegle Marmelos</i>	Tree	1	Planted by staff, students
104	<i>Chrysan Themum Indicum (Shevanti)</i>	Herb	10	Planted by staff, students

Table 3: Details of the Flora in the premises

At present there are **3,506 numbers of plantations** in the premises confined to the campus.

The study suggests that there is scope to document the plantations further through coding, numbering and book.

Additionally, a display board about 'GREEN ZONE' and 'FOREST ZONE' could be undertaken.

5.3 Fauna audit

The campus is located in a rural area with rich biodiversity.

Fauna available	Names
Birds	<i>Sparrow, House Crow, Parrot, Ceron Egret, Wood Picker (Golden Backed), Owl, Kite, Jangle Crow, Common Babbler, Large Gray Babbler, Spotted Dove, Common Hawk Cuckoo, Laughing Dove, Purple Sun-Bird, Spotted Owlet, Bay Backed Shrike, Coppersmith Borbd, Brahmini Starling, Ashy Prinia, Eurationt-Collard Dove, Large Cauca, Baya Weaver, Coommon Myna, Indian Rabin, Purple Rumped Sunbird, Common Tailor Bird, Asian Koel, Red Waltted Lapwing</i>
Insects	Butter Flies, (Bee) Honey Bee, Grass Hopper Spiders, Ticks, Mites, Termites, Ants, House Fly and Moths
Reptiles	Wall lizard, Garden lizard, Rat snake, Cobra, Viper and Varanus
Mammals	Squirrel, Rat, Cat, Mongoose and Bat

Table 4: Details of the fauna in the premises

The study suggests that there is scope to document the fauna in a publication format for stakeholder sensitization and awareness.

5.4 Noise Audit



Plate 7: Green cover near the premises

Being surrounded by huge amount of green cover within the premises, the exterior sounds are absorbed and no sound pollution is within campus.

The study suggests no suggestions for this section.

However, 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 campus is located in a rural area and majority of stakeholders used public mode or bicycles, car-pooling , buses to reach the campus. In this manner, eco-commuting practices are observed

The study suggests no suggestions for this section.

5.5.2 Heat Island Reduction

The following features add to low heat island effects of the campus:



Plate 8: Wide canopy plantations with green cover provide shade throughout



Plate 9: The interiors of the premises are with filtered light



Plate 10: Light colored interiors surrounded with shaded plantations all over

The study suggests no suggestions for this section.

5.5.3 Outdoor Light Pollution Study

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

5.6 Life Safety

Fire and life safety are an important consideration of the National Building Code 2016.

This aspect is touched upon as part of this study in the capacity of an Architect registered with the Council of Architecture. As part of the research, fire safety audit was considered from the 'Building systems' perspective. All provisions documented below:

- ➔ Sand buckets
- ➔ Fire extinguisher



Plate 11: Fire extinguisher in the premises

The study suggests that the current nos. of fire extinguishers can be increased, however they could be in the form of sand buckets or fire balls.

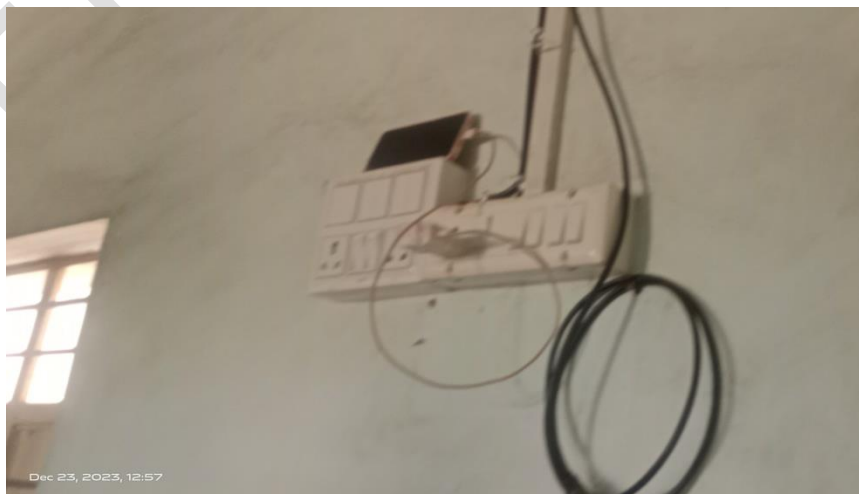


Plate 12: Exposed wiring in the interior spaces



Plate 13: Exposed wiring in the computer laboratory areas

The study suggests that:

- ➔ **The wiring should be concealed**
- ➔ **The students should not be allowed to decorate the spaces that have electrical connections**
- ➔ **There should be documentations of the switchboards and main boards such as SB1, MB1 further the switches should be documented appropriately**
- ➔ **Specifically, the area in the**

Overall, the study suggests the current practices are fine, however few up gradations are suggested as follows:

- ➔ **Fireballs/ sand buckets can be introduced these spaces would be the ones that have an air conditioner or any combustible equipment.**
- ➔ **PASS Board near fire extinguishers and RACE Board near entrance**
- ➔ **There should be additional provisions in the laboratories including:**
 - **Eye washers**
 - **Sand buckets**
 - **First aid box**
 - **Concealing of exposed wiring**
 - **Display chart about the 'dos and don'ts, a workshop for stakeholders about fire and life safety**
 - **Rubber flooring as an electrical safety measure**

6. Suggestion

6.1 Section-wise suggestions

The following suggestions are to be considered as a ***first priority*** for implementation. These **should be executed within the next 2.5 years from the date of Report submission.**

➔ Extra care for the rooftop areas

- Introduce the signboards about 'No students are allowed to enter this area'
- Increase the height of parapet walls
- Upgrade the space as cool roof by painting it with cooltop material.
- Undertake feasibility study of before and after temperature reading.
- Take precautions to keep terrace areas free of any kind of storage materials

➔ Inspirational timelines on the blank interior facades

Include quotes, messages, timelines, details about specific subject or career prospects in the interior areas for inspiration and beautification.

➔ General aspects

- Develop plantations areas and zones
- Develop walkways with appropriate lining of eco-friendly materials
- Introduce information boards everywhere
- Placards and manuals for awareness
- Upgrade the website w.r.t. green initiatives

6.2 General suggestions

The following are consolidated study related to 'entire Institute' should be considered as **second priority** once section wise recommendations are implemented.

6.2.1 Site beautification

- ➔ **Beautification of the entrance pathway** - The existing bricks (waste from the existing new construction going on) can be used or upgraded the pathway through an appropriate Landscape Architecture design.
- ➔ **Bird house/ Feeders** - At appropriate locations there can be provisions for drinking water and some grains for birds as they visit the site much frequently.
- ➔ **Child area** - There can be one provision where if student's or staff relative who are toddlers or senior citizens can rest and this area could have facilities accordingly.
- ➔ **Xeriscaping** – This practice involves designing the open spaces and planning to use xeriscaping plants which require less water and beautify the premises equally. This type of practice should be implemented in areas where there is water shortage.
- ➔ **Garden development** - The existing open space should be designed as an Architectural landscape.
- Nursery documentation, expansion and beautification – The premises should have a nursery, details can be decided as per the landscape beautification.
- Scientific name plates and QR codes – The team should undertake a project to have name plates with QR codes on every plant of the premises.

6.2.2 Heat island reduction

- ➔ **Cool rooftops** - The Terrace rooftops should be painted with Cooltop – reflective materials to reflect the harsh sun rays and reduce the heat absorption in the top most floor and surrounding areas of the building.

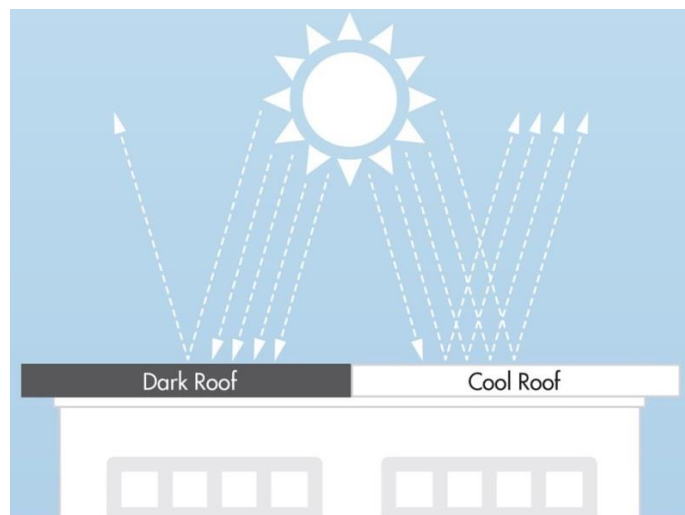


Plate 14: Cool roof comparative analysis (For reference purpose only)

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

- ➔ **Thermally cool roof interiors** - The heat reflective roof interior will help in reducing the heat absorption further once the Cooltop material is applied on the rooftop.



Plate 15: Thermally cool roof interiors analysis (For reference purpose only)

Source: Image by <https://www.srikrishnaoverseas.com/heat-reflective-roof-coating.html>

6.2.3 Life safety

- ➔ **Fire station** – A dedicated fire station could be established within the premises as part of the Fire and Life safety practices.
- ➔ **Mandate fire extinguisher in spaces** - One fire extinguisher should mandatorily be there in every space which has an air conditioner/ gas cylinder.
- ➔ **Combustible equipment** - Every space which has a gas cylinder or combustible equipment should have a provision for the barricade around the gas cylinders, appropriate safety board's mentioning 'danger sign' and 'Do not touch' with an additional small fire extinguisher close by.

6.2.4 Pollution Control

- ➔ **Promote the use of Eco-friendly vehicles** - There can be student and staff sensitization program on eco-friendly and battery-operated vehicles/ low emission vehicles for daily use.
- ➔ **Avoid burning waste** - The waste produced on the premises should not be burned as it is dangerous to the health of students and staff
- ➔ **Bicycles as a gift** - As an appreciation gesture maybe the student's toppers/ staff best performers can be awarded a bicycle occasionally.
- ➔ **Avoid using plastic in premise** - There should be a provision for a ban on the use of plastic bags or products on the Premise.
- ➔ **Plant more carbon dioxide absorbing plants** - The following plantations should be planted as they will help in Carbon neutralisation.
 - Pine – It is 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>)
 - Neem – It helps to reduce greenhouse gases through photosynthesis absorbing large quantities of CO₂ and producing oxygen.
 (<https://neemfoundation.org/greening-india-with->

[neem/#:~:text=The%20planting%20of%20Neem%20trees,of%20CO2%20and%20producing%20oxygen](#))

- Peepal – It can uptake CO₂ 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\(CAM\)](https://nurserylive.com/blogs/sustainable-living/do-you-know-plants-that-give-oxygen-24-hours#:~:text=2,-.Peepal,Crassulacean%20Acid%20Metabolism%20(CAM)))
- Bamboo - It 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>
- Teak – It has 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>).

DETAILED REPORT

7. 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

- ➔ Uniform Plumbing Code – India, 2008
- ➔ 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

- ➔ BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
- ➔ Used only for understanding Universal design - Universal Accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National center for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation and www.umassd.edu
- ➔ 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/>
- ➔ Accessibility study <https://www.washington.edu/>
- ➔ Urban heat island effect <https://www.epa.gov/heatislands/what-you-can-do-reduce-heat-islands>

