ENERGY AUDIT

SHOLAPUR SOCIAL ASSOCIATION'S ARTS AND COMMERCE COLLEGE SOLAPUR (MS) INDIA

Prepared By

DEPARTMENT OF ENVIRONMENTAL SCIENCE,
SCHOOL OF EARTH SCIENCES,
PUNYASHLOK AHILYADEVI HOLKAR,
SOLAPUR UNIVERSITY SOLAPUR
MAHARASHTRA, INDIA

AUGUST - 2023

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CERTIFICATE

ENERGY AUDIT CERTIFICATE

Academic Year 2018 to 2023

This is to certify that, Sholapur Social Association's Arts and Commerce, College Solapur (Maharashtra State) has taking and implementing respectable initiatives for Conservation, Management of Energy resources and protection of Campus Environment.

We, Department of Environmental Science, PAH Solapur University have satisfactory and successfully completed the Energy Audit Consultancy work based on the continuous site visits, observations, laboratory work and information provided by college from the Academic Year 2018 -19, 2019-20, 2020-2021, 2021-22 and 2022-23 with support of Principal, IQAC Coordinator, NSS Coordinator, Criteria Coordinator, Concerned Teachers, Heads of Department, staff of Sholapur Social Association's Arts and Commerce, College Solapur (Maharashtra State).

School of Earth Sciences

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ACKNOWLEDGEMENT

Environment, Green and Energy Audit Assessment Team thanks to the Sholapur Social Association's Arts and Commerce, College Solapur (Maharashtra State) *Prin. Dr. I. J. Tamboli for assigning this important work. We appreciate the cooperation extended to our audit team during the entire process.*

I would like to express my sincere gratitude to Hon'ble Vice Chancellor Prof. Rajnish Kamat, Hon'ble Prov Vice Chancellor Prof. Gautam Kamble, Registrar Smt. Yogini Ghare for giving official permission during environmental audit consultancy work.

Our special thanks to Prof. Dr. Jainoddin K. Mulla NAAC – IQAC Coordinator, Dr. D. S. Narayankar NSS Coordinator, Dr. M.D. Shaikh Criteria Coordinator.

Also, I am thankful to Heads of Department, various Centre Heads, Coordinators, and other official staff members of the college who were actively involved while collecting the data and supported us during field measurements and report writing.

I thanks to all participants of the auditing team especially to Dr. M. D. Shaikh College Environment, Green & Energy Audit Coordinator and our P.G Students, Research Students of Dept. of Environmental Science, P.A.H. Solapur University Solapur for giving necessary inputs to carry out this very vital exercise of Energy, Environment and Green Audit.

At the last, I sincerely thank to all the people who involved directly or indirectly and their significant contribution to execute this Environment, Green and Energy, Environment Audit Report.

Thank you!!

Dr. Vinayak P. Dhulap

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1. INTRODUCTION

1.1 Environment and Green Audit: The Environment and Green audit is a process of systematic identification, quantification, recording, reporting and analysis of various components of environmental diversity of college or institution. This 'Green and Environmental Audit' aims to analyze the environmental practices within and outside premises of the college / campus area, which will have to study status of environmental parameters and it's an impact. This audit is a valuable means for a college to determine how and where they areusing or consumes the most energy resources or water resources or other resources; then college can consider how to implement changes and make savings. This audit creates health consciousness, environmental awareness, sustainability, values and ethics of nature. The audit provides better understanding of green impact on all stakeholders.

Thus, college evaluates its own contributions towards a sustainable future with the help of audit. As environmental consciousness and sustainability is becoming an increasingly alarming issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent. So, this environment and green audit is assigned to the criteria 7 of NAAC under best practices. National Assessment and Accreditation Council which is a self-governing organization ofIndia which declare the institutions as Grade A, B or C according to the scores assigned during the accreditation.

The Environment, Green and Energy audits are based on the major environmental acts/policies of India which are applicable to educational institutions, international norms & environmental best practices. We follow following acts & related regulations / policies:

- *The Environment (Protection) Act, 1986*
- *Water (Prevention and Control of Pollution) Act, 1974*
- *Air (Prevention and Control of Pollution) Act, 1981*
- *Energy Conservation Act, 2001*
- *Hazardous Waste Management Rules-2016*
- *The Forest (Conservation) Act, 1980*
- *The Wildlife Protection Act, 1972*
- *The Indian Forest Act, 1927*
- *The biological Diversity Act 2002 etc.*

1.2 Environment, Green and Energy Audit Process:

A Green Campus is a place where eco-friendly practices and education combine to promote sustainability in the campus. This green audit offers opportunity to take the lead in the environmental conservation, culture and developing new paradigms by creating sustainablesolutions to needs of the mankind in the institution. Environmental audit focuses on the study and status of quality of air, water and wastewater, soil, noise level, solid waste, hazardous waste and its management, wildlife conservation (birds, insects, reptiles etc.) in the college premises as well as at the college outside area.

Green Audits focuses on the green cover or vegetation cover in the college campus area which comprises types of vegetation, scientific details of floral diversity, list of indigenous and exotic (non-native) floral species etc.

Energy Audit focuses on the energy requirement, generation, types of energy, energy losses and its sustainable usage has been implemented by the College Management.

The main goal of audit is to help college / institution up to date on the latest environmental issues and environmental consciousness, so that institution can understand whether performing environment or green audit is a good idea for their institution. The audit assesses various sides of institutional work and determine whether an institution's work and operations impact the ambient air quality, water quality, solid waste pollution and soil health. These audits shall also be help to avoid compliance issues and support to the overall institutional development through green policy document. The audit data can be used to improve workplace ecofriendly, safety and sustainable.

During an environment, green and energy audit, assessors / environment experts followed following steps:

- ✓ Review current processes
- ✓ Assess effects of process on air, water, soil etc.
- ✓ Review potential water, air and soil contamination
- ✓ Examine waste production data
- ✓ Determine ways to prevent contamination
- ✓ Scope of Environmental Awareness

1.3 About College:

Sholapur Social Association has established this college in 1978. It is one of the leading Muslim Institutions in the Western Maharashtra which has been recognized as a Minority Institution by the Govt. of Maharashtra. It is a symbol of National integration

Secularism where more than 40% students other than Muslim are imparted education. It maintains an atmosphere of harmony and discipline among the students of different castes and creeds. The college is the only center for teaching Urdu at post-graduation level in PAH Solapur University. It has provision for teaching all subjects both in English and Marathi Medium. Right from the beginning, the college results are meritorious which indicate a high standard of teaching. The college has constituted IQAC committee to plan and project academic courses and activities to meet the needs of the Global Community. The college has its own independent separate and huge building in the heart of the city furnished with all educational, cultural and civic amenities.

Sholapur Social Association's Arts and Commerce, College Solapur, has been a renowned institution of education from KG to PG. Our college provides several subjects such as Persian, Sociology, Geography, Political Science, History, Hindi, Marathi, Commerce etc. This college has created a niche in providing quality education to the underprivileged and vernacular medium students, in particular from the minority community and made sustained progress and raised the bar of success, over the years, with help from management, staff and students. 100% of college staff has doctorates in their respective subjects.

1.4 Location:

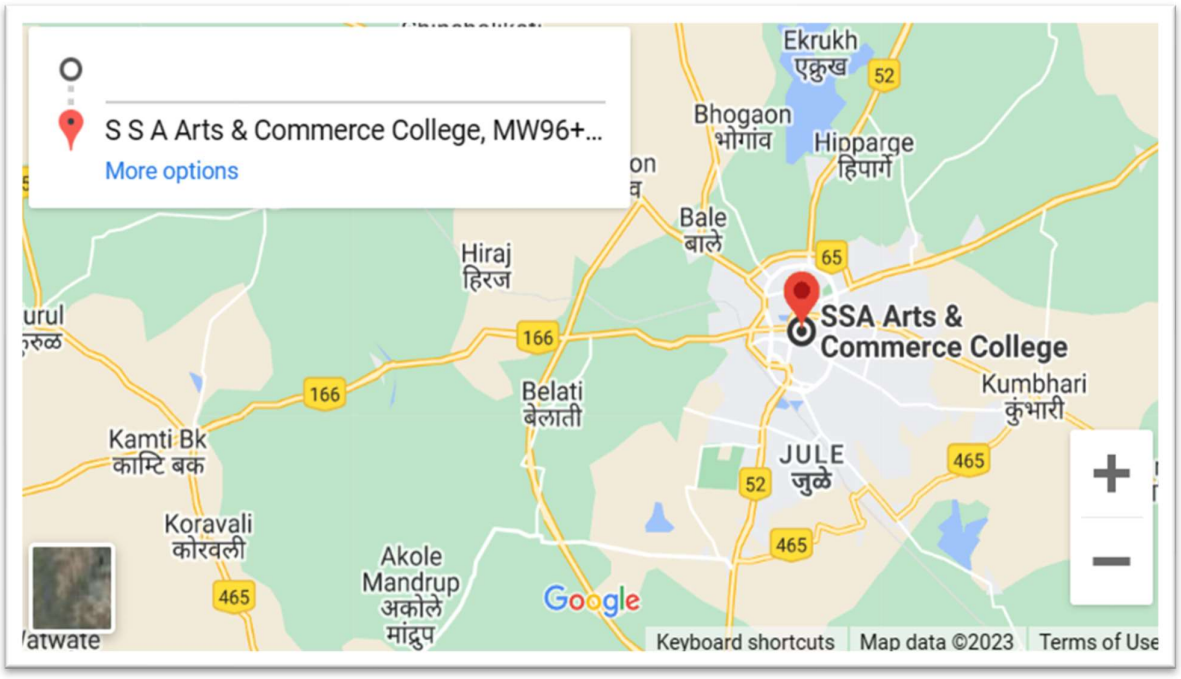
The college of Sholapur Social Association's Arts and Commerce, College Solapur located at center or heart of the Solapur City. The address of college is of New Building, Siddheshwar Peth, Opp. Saifee Hospital, Solapur Maharashtra (India). The college is located in the urban area i.e. Smart City Solapur. The distance from main Solapur Bus Stand and Railway station to this college campus is about 1.5 km. This college is mainly located nearby Laxmi Market, Vijapur and Sidheshwar Peth Market place. It is geographically located at latitudes 17.67078315057433 and longitude– 75.90620707619212 Elevation 1578 ft.

Fig. 1: Location of Sholapur Social Association's Arts and Commerce, College Solapur,

Source: Google Earth

Fig. 2: College Campus Area and Boundaries

Fig.3: College Location and Road Networks



Source: Google Earth

Table1: College Environment and Green Audit Team

Sr. No	Name of the auditor	Area of Expertise
Sholapur Social College of Arts and Commerce, Sholapur - Team		
1	Prin. Dr. I. J. Tamboli	Principal
2	Prof. Dr. Jainoddin K. Mulla	IQAC- NAAC - Coordinator
3	Dr. M.D. Shaikh	NAAC – Criteria –VII Coordinator
4	Dr.D.S. Narayankar and Dr. S.A. Rajguru	NSS Coordinator & College Environment Committee
PAH Solapur University – Team		
1	Dr. Vinayak P. Dhulap Head, Dept. of Environmental Science & Environmental Consultant	Environmental Science - Water Quality, Air Quality, Noise, Biodiversity, Env. Education, Flora and Fauna expert, Geospatial technology
2.	Mr. Pankaj Sutkar (Research Student)	Environmental pollution, Solid waste, environmental microbiology
3	M.Sc Project Students	Environmental Science for Survey, data collection and laboratory analysis

Fig.4: Environment and Green Audit Discussion with Principal Prof. I.J.Tamboli

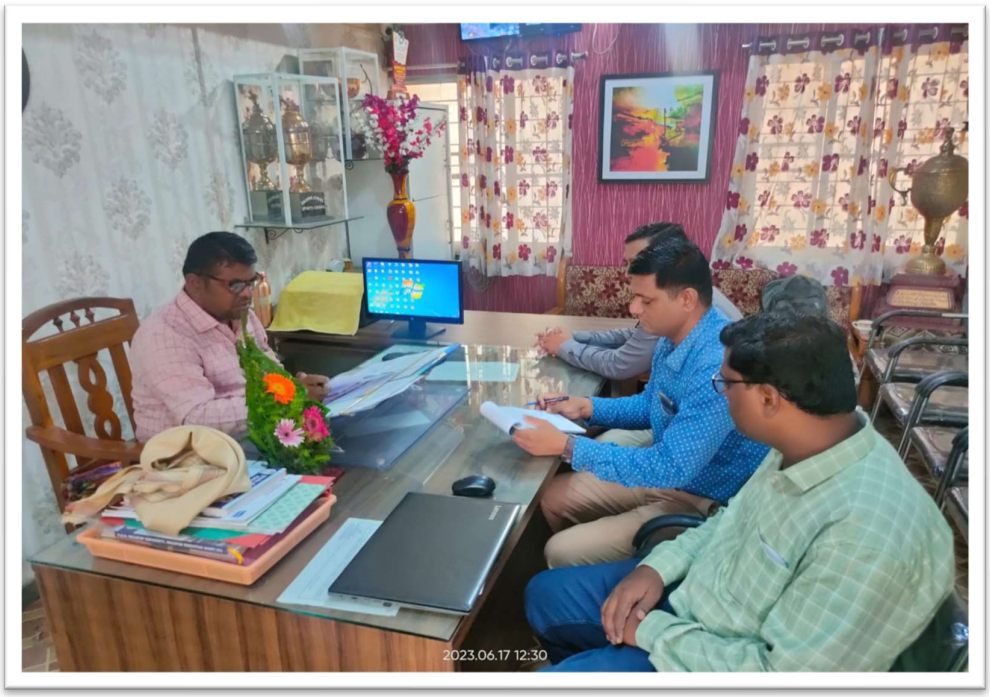
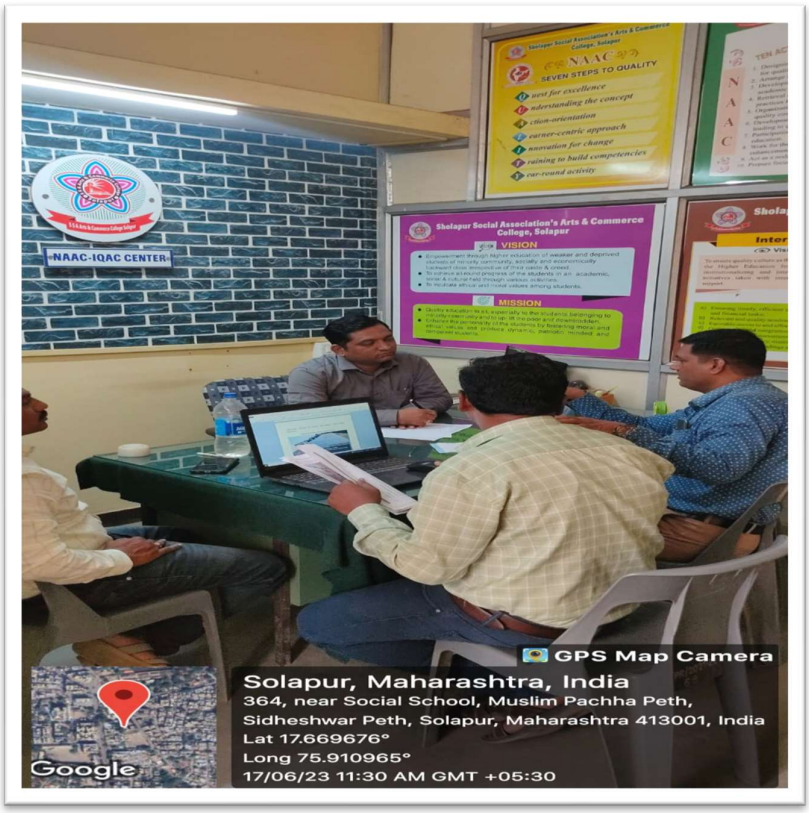


Fig.5 Interaction with IQAC Coordinator Prof. J.K.Mulla during Environment & Green Audit



1.5 College Environment Policy:

Sholapur Social Association's Arts and Commerce, College Solapur has prepared own environmental policy for all stakeholders. This policy prepared to college staff and students for the environment consciousness and awareness.

a. Policy Statement:

Sholapur Social Association's Arts and Commerce, College Solapur has designed 'Environmental (Waste management), Water Management and Green Policy to protect environment and provide healthy teaching learning environment to the students.

b. Policy Objectives:

The main purpose of the policy is identifying and protects environmental values andto create healthy teaching learning environment. Followings are the objectives of the Environment (Waste management) policy.

- ✓ To create awareness among students, teachers, non-teaching staff and others stakeholders regarding air quality, ambient noise, greenery, college urban biodiversity and waste management.
- ✓ To reduce the plastic waste pollution and maintain tobacco and cigarette free campus.
- ✓ To ensure that waste is managed in a way that is consistent with ecologically sustainable.
- ✓ To minimize the waste generated from all sources and to recycle the maximum waste and improve the waste management activities and programmers.
- ✓ To recycle organic or biodegradable waste convert to compost for campus plantation.
- ✓ To reduce health risk and various hazards created due to generation of waste.
- ✓ To promote ICT tools in teaching learning process and administrative work and reduce the use of paper.
- ✓ To create awareness in all stakeholders through Environmental Slogans on the campus walls and notice boards.

Table 2: College Environmental Committee

Sr.No.	Name	Designation
1.	Prin. Dr. I. J. Tamboli	Chairman
2.	Prof. Dr. Jainoddin K. Mulla	Member
3.	Dr. M.D.Shaikh	Member
4.	Dr.D.S. Narayankar – NSS Coordinator	Member
5.	Non -Teaching Staff –	Member
6.	College Student Representative – CR (Boy / Girl)	Member
7.	Dr. S. A. Rajguru	Member Coordinator

1.6 Aim and objectives of college:

The Sholapur Social Association's Arts and Commerce, College Solapur is striving to develop its institution on a self –sustainable basis in the areas of water, noise, energy, waste management, environmental education and cleanliness.

The stakeholders of college have to contribute collectively to develop an Environment Friendly and Sustainable Green -Clean Campus and disseminate the concept of eco-friendly & sustainable culture to the nearby community and wherever possible.

- Awareness creations about local, national and global environmental issues among students and employees.
- Reduce and management of environmental pollution emissions for the improvement of environmental performance in the college campus.

The following major environmental parameters and their objectives have been suggested for the making of *"Green-Clean and Sustainable"* Campus.

a. Climate Change and Energy Conservation:

1. Right action taken to reduce greenhouse gas emissions due to energy consumption and suggest to use of renewable energy source, energy efficient lamps/sensor-based lamps where ever possible like in the college campus corridors, toilets etc.
2. Actions taken to reduce Greenhouse Gas (GHG) emissions.
3. Use of energy efficient equipment's in laboratories/classrooms/canteen, this can range from air -conditioners, refrigerators etc.
4. Regularly monitoring the entry of vehicles in the college in terms of their fuel efficiency/hybrid/ battery operated vehicles.
5. Promoting students, teaching and no teaching staff for the use of public transport

or car polling.

6. Promote to use and harvest more renewable energy i.e. Solar Energy resource in the college campus.
7. To establish environmental emissions inventory in the college premises.
8. Creating awareness by organizing seminars, debates, activities related toclimate change, environmental protection, and environmental issues.
9. Promoting scientific projects' experiments in the education system as part of regular curriculum which is related to environmental aspects.
10. To encourage the concept of Eco-Rangers, Green Army / Green Corps/ Green Warriors etc. so as to maximize the student's involvement for the awareness.

b. Water and wastewater Management:

Adopting following measures in campus to reduce water pollution and control on more water consumption.

1. To minimize the water usage and control on misuse of water in the toilets, bathrooms, college canteen areas etc.
2. To control on over usage of water to generate grey water through flushes or drain.
3. To promote for rain water harvesting structures in the old and new building areas in the college campus for water harvesting.
4. To use sensor-based water tabs in all toilets, bathrooms canteen areas which are more water efficient.
5. To use and construct mini wastewater treatment plant for sewage and runoff generated in the college campus.
6. Use of treated and recycle wastewater for watering to the gardening plants, trees etc.in the college campus and sports ground.
7. To display water management instructions /alerts at prominent/relevant locations inthe campus.

c. Waste Management:

1. To adopt methods for waste segregation, take appropriate actions to reduce or recycle municipal waste inside the campus.
2. To manage, collect and dispose e-waste appropriately to reduce hazardous waste and its management as per Central Pollution Control Board or State Pollution Control, Board.
3. Actions taken to reduce consumption of plastic in the college campus.

4. To adopt practice "No Plastic" or "Ban on Plastic" in the college campus.
5. To encourage paperless work culture and adopt for recycling/ reuse of paper.
6. To adopt 3 R (Reduce, Reuse and Recycle) solid waste management practice for college sustainability.
7. Showcase waste management instructions/ Slogans / notices/ alerts at prominent/relevant locations in the college campus.

d. Green Cover- Clean Campus:

1. To increase the green cover in and around the college campus area.
2. Adopt indigenous or local plants for the plantation in the college campus which will maintain local birds' diversity.
3. Showcase or scientific naming to plants with botanical details and vernacular details for the awareness.
4. Use of buildup or constructed area for the green cover using climbers, creepers, bushy hanging plants which will maintain temperature in the college campus and look natural.
5. Adopt plant pots donation policy under college environment committee to use maximum plants pots in the corridors, open spaces for
6. Display slogans on plants, greenery etc. in the college campus area.

e. Air and Noise Management:

1. College located at center of the city, so need do create awareness on air pollution and noise pollution in the college and to stakeholders.
2. Due to modern society and students' behavior need to adopt strict rule in the college campus and outside area of the college - *"No Honking", "No Horns", "Horns Prohibited"*
3. Instruct to all stakeholders there are silence zones where honking is completely prohibited or not to use horn.
4. Instruct to college non-teaching staff or students "Don't use Open Burning practice" of waste papers, garbage, plant waste / litters or garden waste in the college campus.
5. Promote for more greenery in the campus area to control of dust pollution and noise pollution.
6. Use of sound acoustics / absorbing materials in the college rooms for control of sound or noise.

7. Use sound absorbing long and leafy plants for the control of sound and noise pollution.

Fig.7: Instruct to all stakeholders through Signs and Slogans

Source: Google- Govt of India- Official website

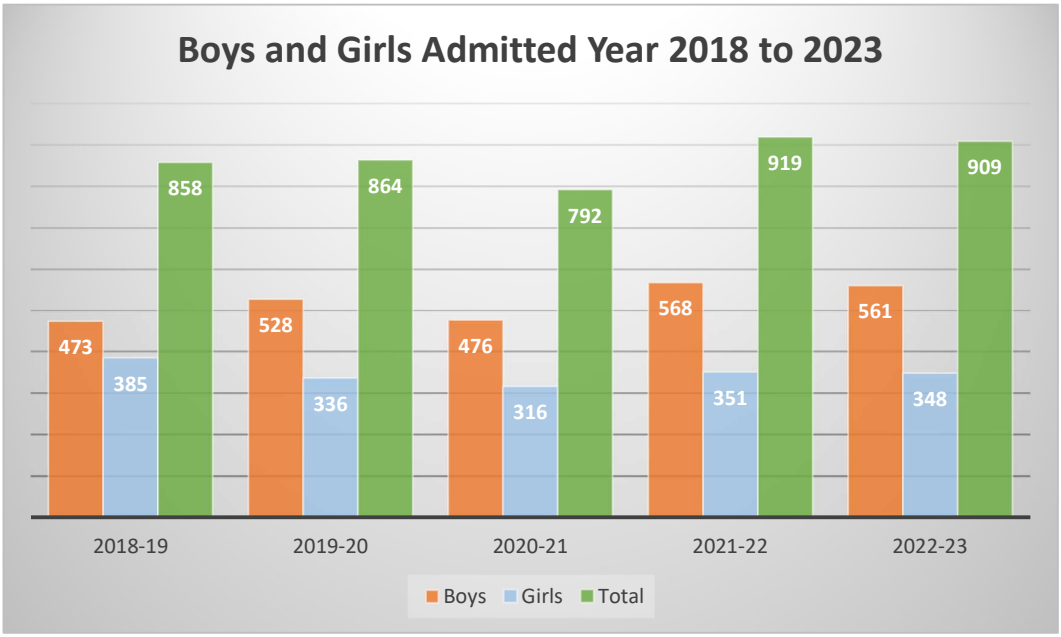
Table 3: Brief information of college

Sr.No	Particulars	Information/data				
1	Name of college	Sholapur Social Association's Arts and Commerce College, Solapur.				
2	Faculty (Arts/commerce/science)	Arts and Commerce				
3	Number Student	Sr. No	Year	Total	Males	Females
	Boys	1	2018-19	858	473	385
		2	2019-20	864	528	336
		3	2020-21	792	476	316
		4	2021-22	919	568	351
	Girls	5	2022-23	909	561	348
4	Location	Sidheshwar Peth, Solapur				
5	Area in acre/Sq.m/ha	2 Acre				
6	Layout along with area statement	Map attached				
7	principle of college	Prof. Dr. I. J. Tamboli				
8	Administrative officer	Mr. Hotgi Altaf				
9	Person responsible for environment activities	Dr. S. A. Rajguru				
10	Contact Number	0217-2723279				
11	Email	socialcollege@gmail.com				
12	Fax	0217-2723279				
13	Website	http://saccollege.com				

Table 4: Year wise Admitted students particulars

B/G	Particulars of the Boys and Girls Admitted year wise				
	2018-19	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Boys	473	528	476	568	561
Girls	385	336	316	351	348
Total	**858**	**864**	**792**	**919**	**909**

Fig.8: Students Admitted from year 2018 to 2023



1.7 College Glimpses:

Fig.9: College Main Entrance

Fig.10: College Separate Entrance for Boys and Girls

Fig.11: College Campus Greenery

Fig.12: College Main Building Entrance

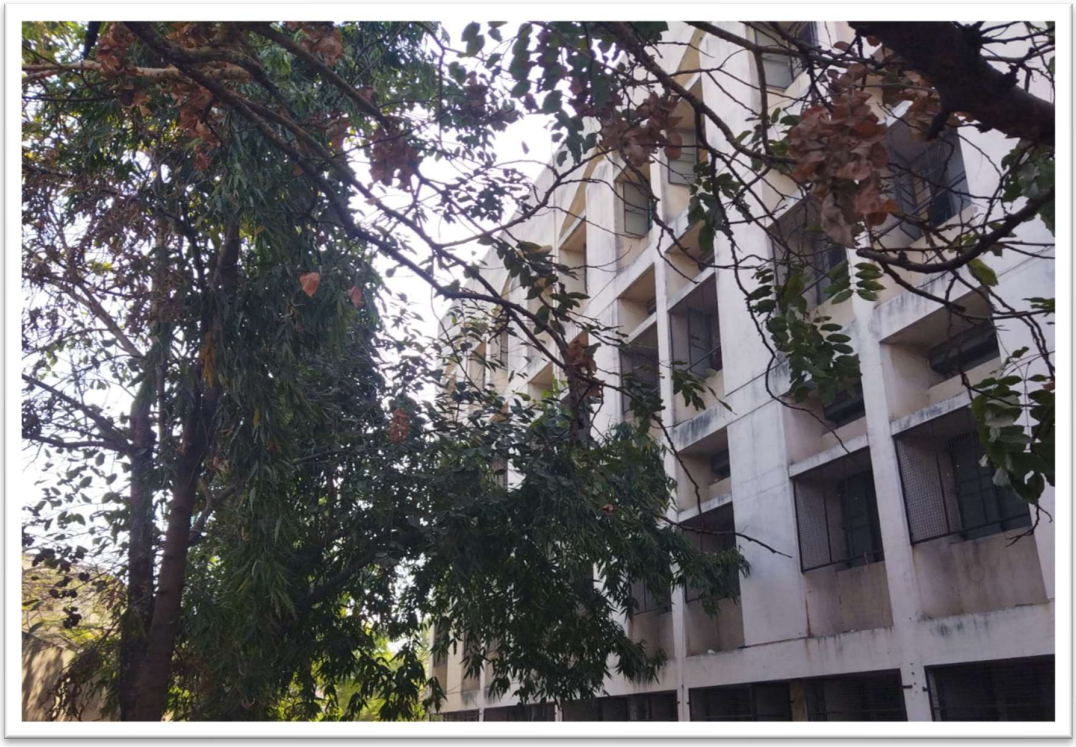


Fig.13: College Main Building Greenery

Fig.14: College Campus Green Parking Bicycle Stand

Fig.15: Study Room

Fig.16: College Open Green Gym for Students

Fig.17: Vending Machine of Sanitary Napkin a, b, c


Ladies Sanitary napkin available
Insert Rs.5 Coin
Fleecy
Sanitary Napkin Vending Machine
COLLECT THE NAPKIN
INSERT COIN
GPS Map Camera
सोलापुर, महाराष्ट्र, भारत
MW96+M65, सोलापुर, महाराष्ट्र 413001, भारत
Lat 17.669414°
Long 75.910465°
01/04/23 08:29 AM GMT +05:30
Google


Burn used napkin..
GPS Map Camera
Solapur, Maharashtra, India
Shop No. 18, Kalyani Towers, Siddeshwar Peth,
Solapur, Maharashtra 413001, India
Lat 17.669112°
Long 75.910168°
19/01/23 12:44 PM GMT +05:30
Google

Fig18: Swachhata Abhiyan and NCC parade under the Green Shadow

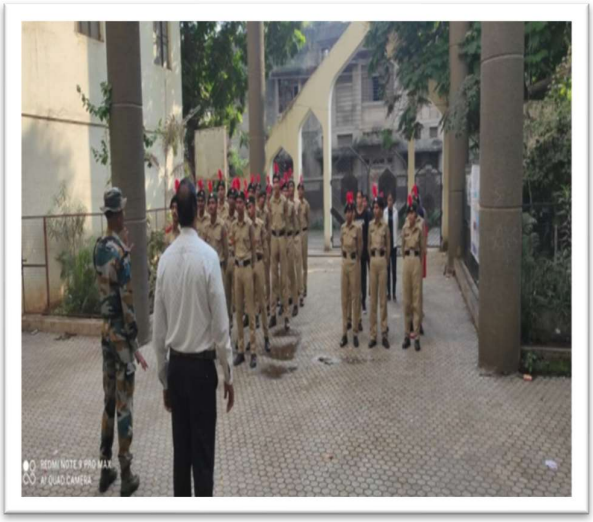


Fig.19: RO Drinking Water Treatment Plant and Green Zone in the College

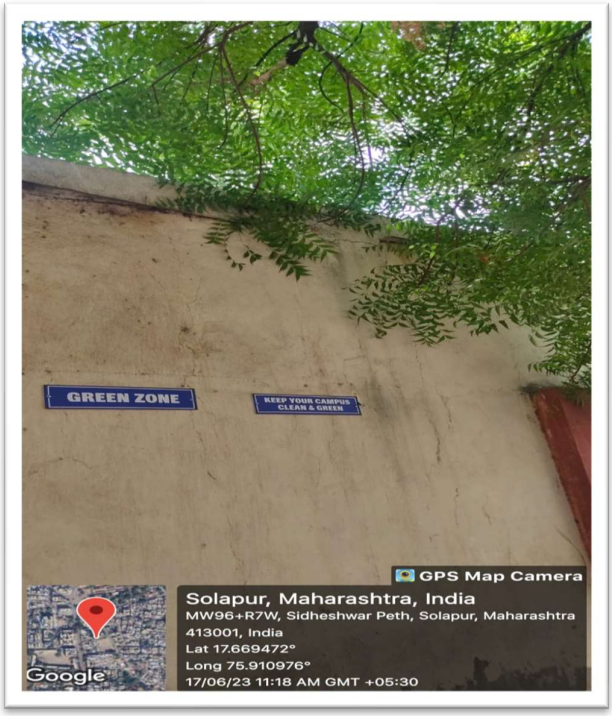


Fig.20: Swachh Bharat Cleanliness Awareness Rally

Fig.21: Plantation drive in the college campus

Fig.22: NSS Volunteers took the oath for tobacco free and spit free India

1.8 ENVIRONMENT AND GREEN AUDIT OBJECTIVES

The main objective of the Environment, Energy and Green audit is to promote the management and conservation of Environment in the College Campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards.

The objectives of carrying out Environment and Green Audit are:

- To map the Geographical Location of the college.
- To document the water and waste management of the college.
- To estimate the Energy requirements of the college.
- To document the ambient environmental condition of weather, air, water and noise of the college.
- To introduce and aware students to real concerns of environment and its sustainability.
- To document the floral and faunal diversity of the college.

1.9 METHODOLOGY

In order to conduct the green audit, the methodology included different tools such as

1. Preparation of questionnaire for Air, Water, Waste, Energy, Biodiversity etc.
2. Preparation of data collection in the given formats.
3. Collection of data through primary and secondary methods.

4. Physical checking of the campus – includes visit to college campus, offices, classrooms, laboratories, library, sports grounds and various centers.
5. Observation and review of the documentation.
6. Interactions / interview of key persons and data analysis, measurements and recommendations.

The study covered the following areas to summarize the present status of environment management in the college campus:

1. *Green area management*
2. *Water management*
3. *Energy Conservation*
4. *Waste management*
5. *E-waste management*
6. *Biodiversity conservation*

1.10 OBSERVATIONS

Major Green and Environmental Initiatives of the college

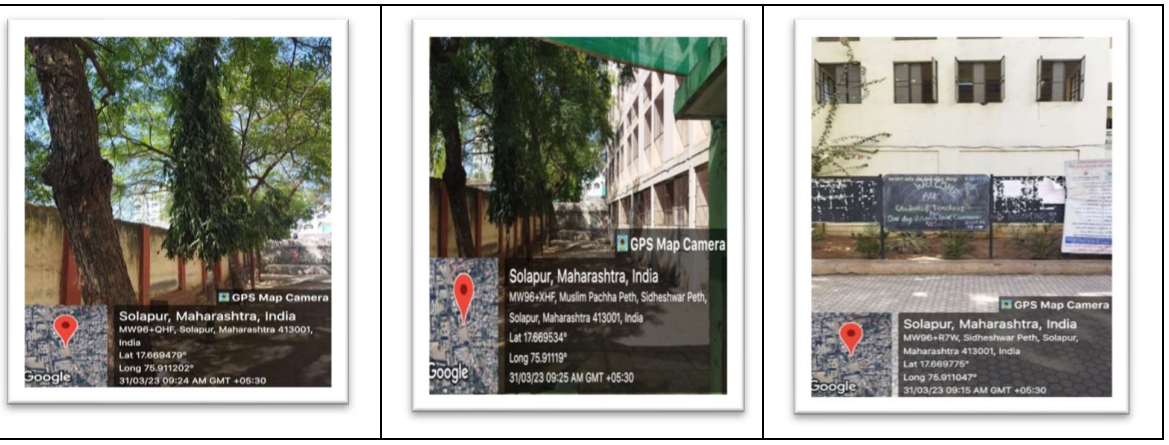
- College has organized a guest lecture to students on to create nature and environmental awareness.
- A guest lecture on World Wild Life Week Celebration.
- Environmental and Social activities such as tree plantation, blood donation, cyclerally for save fuel and international yoga day was also celebrated.
- Every time all students and NSS volunteers were participated in the collegecampus cleanliness drive, plantation drive organized at college.
- No plastic, No Tobacco rally organized by every year and oath taken by NSS volunteers.
- NSS section organized workshop on Eco Friendly Ganesh Idol Making to create environmental awareness among the students.
- NSS Volunteers organized the awareness rally was arranged Swachh Bharat Abhiyan and participated in the Smart City activity Mazi Vasundhara in 2018.
- NSS volunteers organized Tree Plantation was done in the college campus on the occasion of World Environment Day and World Earth day.
- NSS volunteers were participated in Cycle Rally organized by Solapur Municpal Coroporation under Mazi Vasundhara initiatives.
- Government of Mahrashtra targeted the plantation of 33crores of trees. The part of this drive the NSS volunteers and staff of the college planted 50 plants in college playground and ladies graden on 23/7/2019. A total of 25 volunteers (14 female 05 male) participated in this activity.
- As per the order of Director of NSS Unit Solapur University Solapur, NSS unit of college organized swachta Pakhwada Cleanliness drive 15th September to 2nd October during this activity, students and professors of our college cleaned Swachta oath was taken and college campus was cleaned.
- On 23rd July 2021, in association with Social College and Inner Wheel Club of Solapur, tree plantation was done on the playground of the college and in the premises of the college.
- 10^{th} to 16^{th} August observed as cleanliness weak. The college in collaboration with Solapur Municipal Corporation organized cleaning campaign. NSS program officer and volunteers run the campaign of clean college and clean premises. On 10^{th} Aug 2019 the

NSS unit of the college along with Municipal corporation Solapur marched in the city giving the message of cleanliness to the public.

- Tree plantation drive organized by NSS Unit throughout year.

Fig.23: Students, Staff and Teachers participated in the Swachhata Abhiyan a,b

Fig.24: No vehicle Zone at the college campus



2.0 PLANTATION AND GREEN AREA COVER

The Department of Geography and NSS unit of the college, every year organizing plantation drive and planting many indigenous tree species in the college campus. Green area or plantation comprises the plant, greenery and landscaping in the college campus to enhance the college ecosystem and environment of the college campus area. The plantation in college have increased the quality of life, not only in college campus but also the surrounding area in term of temperature control, contributing to improving air quality, soil conservation, water conservation and biodiversity conservation especially habitat for birds and insects, wild animals etc.

This plantation activity helps to increase the green beauty and attraction of the stakeholders in the college campus. The college having diverse with a variety of plant species planted from establishment of the college to till date which are performing a variety of environmental and ecological functions. Most of the plant species are planted under various plantation programs or drives. Thus, plantation will help to increases the faunal diversity especially avifauna (Birds) and also maintains food chains and food webs. Most of the birds are dependent on these trees' species they mainly preferred trees for food and shelter.

The beauty of the college campus is due to only evergreen trees (Ashoka, Neem, Banyan, Pimple and Tamarind etc), flowering plants, indoor and outdoor plants, creepers etc. Various types of plants planted which Nectar of flowers and plants is a favorite of birds and many insects. Leaf – covered branches keep many animals, such as birds and squirrels, out of reach of predators. A thick belt of large shady trees in the borders of the college seems to control of ambient noise and controlled urban dust pollution. Thus, the college has been playing a significant role in maintaining the environment of the entire surrounding area of college and because of this strength, commercial and residentials are benefitted through use of walking tracks and playing grounds daily at sport ground.

2.1 Plant Diversity

Total 207 plant species include 27 tall plants/ trees and 157 small herb and shrub plants are observed during the audit visit in the college campus area. The overall maintenance of garden taken through in charge Mr. Umar Faruq staff of the college. For all the garden, compost is provided from the college vermicompost pit. College has prepared own compost for all the garden.

Table 5: List of plant species observed in the campus during the field visit

Local Name	Scientific Name	Number
Ashoka	*Sacaca asoca*	6
Badam	*Terminalra catapa*	19
Banyan	*Ficus bengalnesis*	3
Bryophyllum	*Bryophyta*	2
Calotropis	*Calotripis drosera*	6
Chafa	*Plumeria L*	8
Coconut	*Cocus nucifera*	3
Cycus	*Cycus revoluta*	2
Euphorbia	*Euphorbia*	9
Ficus	*Ficus benzamine*	3
Guava	*Psidium guara*	4
Gulmohor	*Pettophora petrocarpum*	12
Lemon	*Citrus lemon*	23
Neam	*Azadirachta indica*	3
Nerium	*Nerium olander*	12
Palm	*Palmarica santigo*	9
Parijatak	*Nyctanthus L*	7
Peepal	*Ficus religeosa*	8
Rose	*Rosa L*	7
Saptparni	*Alstonia scholaris*	3
Shevari	*Sesbania sesban*	6
Tamarind	*Tamarindusindica*	19
Apta	*Bahinia racemosa*	3
Total		**207**

2.2 Faunal and other Animal Diversity

About 22 common bird species, 13 insect species, 03 reptiles, 01 amphibians and 06 mammal's species were observed and recorded by the students and teaching staff of Department of Zoology.

Table 6: Avifauna, Insects, Amphibians, Mammals and Reptiles from the college campus l) Aves (Birds)

Sr. No	Common Name	Scientific Name
1	Ashy - crowned Sparrow Lark	*Eremopterix griseus*
2	Barn Swallow	*Hirudo rustica*
3	Brahminy Kite	*Haliastur indus*
4	Brahminy Myna	*Sturnia pagodarum*
5	Common Myna	*Acridotheres tristis*
6	Drongo	*Dicrurus macrocercus*
7	Flycatcher - Shrike	*Hemipus picatus*
8	Greater Coucal	*Centropus sinesis*
9	Green Bee Eater	*Merops orientalis*

10	Hawk	*Accipiter badius*
11	Hoppoe	*Upupa epops*
12	House crow	*Corvus splendens*
13	House Sparrow	*Passer domesticus*
14	Kingfisher	*Alcedo atthis*
15	Laughing Dove	*Streptopelia senegalensis*
16	Parrot / Parakeet	*Psittacula krameri*
17	Rock Dove	*Columba livia*
18	Seven Sisters/ Jungle babbler	*Argya striata*
19	Sunbird	*Cinnyris asiaticus*
20	White Wagtail	*Motacilla alba*

II) Insects

Sr. No.	Common Name	Scientific Name
1	Cockroach	*Periplaneta americana*
2	Ants	*Solenopsis invicta*
3	Termites	*Isoptera*
4	Wasp	*Vespa*
5	Centipede	*Scolopendridae*
6	Grasshoppers	*Omocestus viridulus*
7	Dragon Fly	*Aeshnidae*
8	Stick Insect	*Carousius morosus*
9	Butterflies- i) Common evening brown ii) plain Tiger butterfly iii) Great eggfly	*i) Melanitis leda* *ii) Danaus chrysippus* *iii) Hypolimnas bolina*
10	Spiders	*Parasteatoda tepidariorum*
11	Honey bee	*Apis mellifera*
12	Moths	*Sphingidae and Manduca quinquemaculata*
13	Drosophila	*Drosophila melanogaster*

III) Reptiles

Sr. No.	Common Name	Scientific Name
1	Gecko	*Hemidactylus frenatus*
2	Rocky lizard	*Hemidactylus mabouia*

IV) Amphibians

Sr. No.	Common name	Scientific Name
1	Toad	*Bufo*

V) Mammals

Sr. No.	Common Name	Scientific Name
1	Rat	*Rattus rattus*
2	Squirrel	*Funambulus palmarum*
3	Cat	*Felis catus*
4	Dog	*Canis lupus*

2.3 College Garden

At present the college has no botanical garden but college authority has planned for the development botanical garden with the help of NSS and Geography department. Also staff of the college communicated to the Nursery Department Solapur Municipal Corporation for the College Garden. College provided student's lawn / garden uses for seating and student's multiple activities and for parking. During the visit it is observed that, college administration has planted and maintained this garden and lawns with the help of Mali, Non-teaching staff and NSS, NCC students. Planted endogenous, exotic plants, creepers and grass species for beautification of college area and making green college cover.

Fig.25: Plantation in the College a,b,c

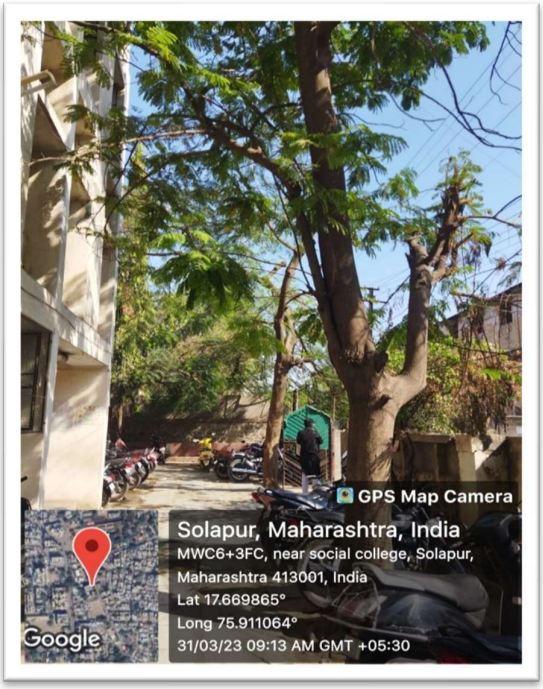


Fig.26: Campus Garden a,b,c

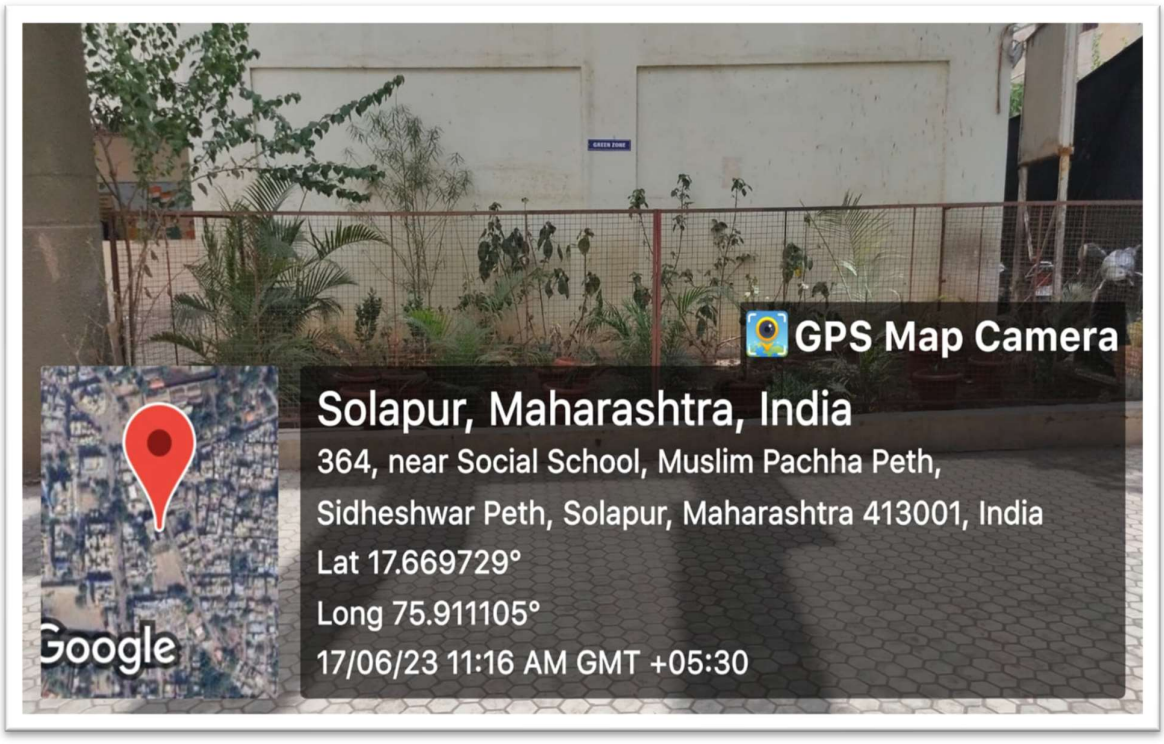


Fig.27: Asoka Plantation and Green Katta at borders of the college building

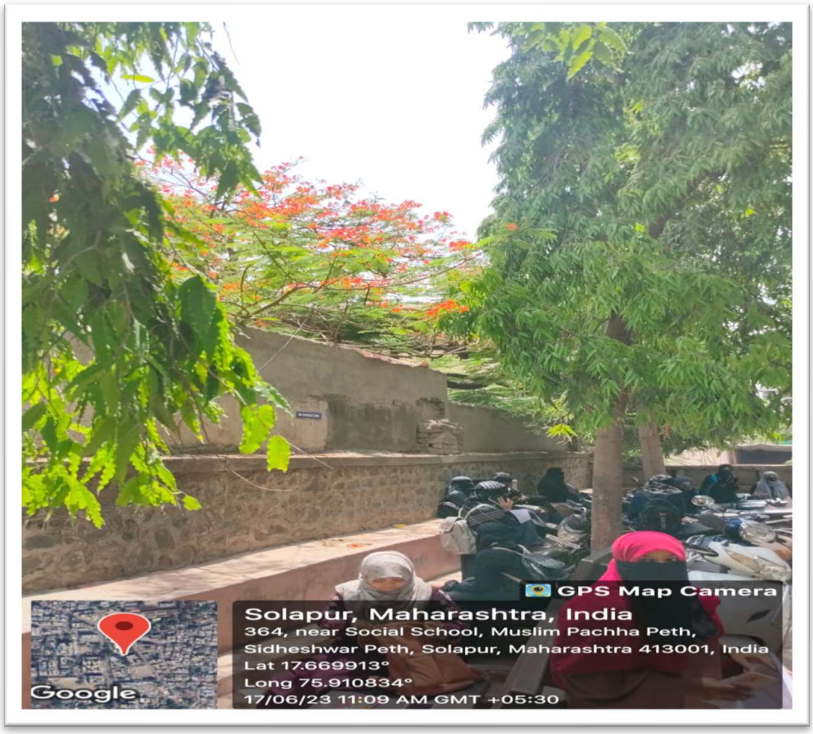


Fig.28: Campus Garden

Fig.29: Flowering pots for beautification of college campus a,b

2.4 Recommendations:

- Promote environmental awareness as a part of course work in various curricular areas, independent student research projects, and involve students in the community service. Eg. Mazi Vasundhara, Swachh Bharat Mission etc.
- Pramote local or indigenous plants for plantation which can maintain urban and college biodiversity.
- Avoid plantation of exotic plant, trees, creepers, shrubs and grass species in college campus.
- Considerations for selection of plant species:
    1. Economically and environmentally important plant species.
    2. Plant species which shows higher adaptability to local climatic and edaphic conditions.
    3. Plant that enhances the aesthetics of the surrounding areas
    4. Plant that serves as nesting, feeding and breeding site for fauna
    5. Plants having maximum ability of fixing carbon emission / sequestration
    6. Plants species having high fodder and fuel value
    7. Plants species having importance in soil binding and water conservation.
- Organize workshops or training programs for the students on local, urban biodiversity and on the values of medicinal plants
- College established Environmental cell, it is suggested that, the members and chairman should focus on environmental days and activities of the college campus.
- Conduct internal audit to ensure that implementation of activities for the environment planned for the year, action is taken on the basis of audit report, recommendation and findings.
- Celebrate every year 5th June as 'Environment Day', wildlife week and plant trees on this day to make the campus greener.
- Establish Green library for the students.
- Prepare five-year planation Programme /Plan in consultation with environment experts, management and students.
- Establish nature club for various environmental friendly activities.
- Organize exhibitions like plant painting, flower painting, flowers, posters etc.

3.0 WATER MANAGEMENT

Water is very important resource for all the stakeholders. City facing the problem of water crises. On this basis college has to focus on the conservation of water and water recycle and reuse management practices in the campus using scientific methods. Water is a natural resource and all living things are depending on water. We need to use water wisely to ensure that drinkable water is available for everyone, now and in the future. Water auditing is conducted for the evaluation of facilities of water requirement, sources and facilities for treatment and its reuse.

3.1 Observations

In college campus following main uses of water

Main water uses in the campus

- ✓ Drinking
- ✓ Cleaning
- ✓ Toilets
- ✓ Garden

3.2 Water Requirement: The main source of water is ground water using borewell and irrigation supply from the Solapur Municipal Corporation. Water requirement is calculated based on student strength and staff.

- Student strength in year 2021-22: 919
- Teaching Staff: 21
- Non-Teaching staff: 13
- Total: 953

As per NBC 209, BIS, water requirement for the Schools/Educational institutions is for flushing standard is 20 Lts /Head/day and Drinking and Domestic 25 Lts / head per day.

3.3 Without Boarding Facility:

- Drinking: 1.9 lit per head per day
- Flushing: 1.5 lit per head per day
- The potable water treated with RO plant for drinking water treatment plant installed in the college building.

For the garden or lawn, drip facility is provided. The college has installed ruff top harvesting systems in the college also rain off storages tanks for the gardens.

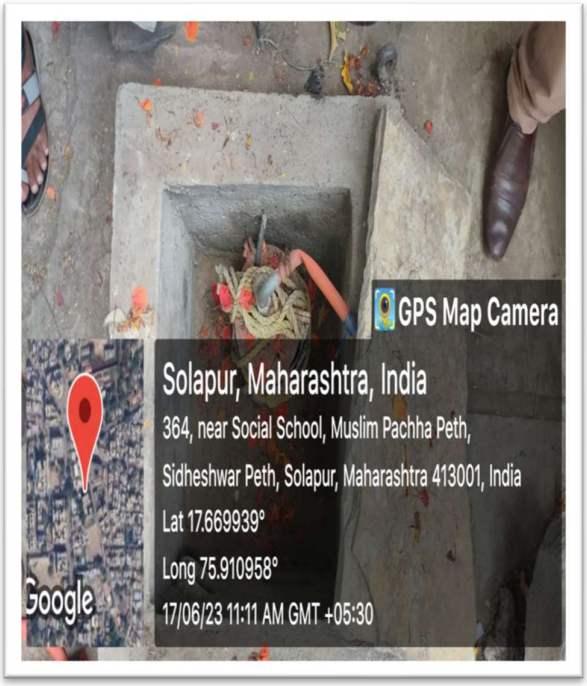
Table 7: Major Uses / Activities of Water in the College

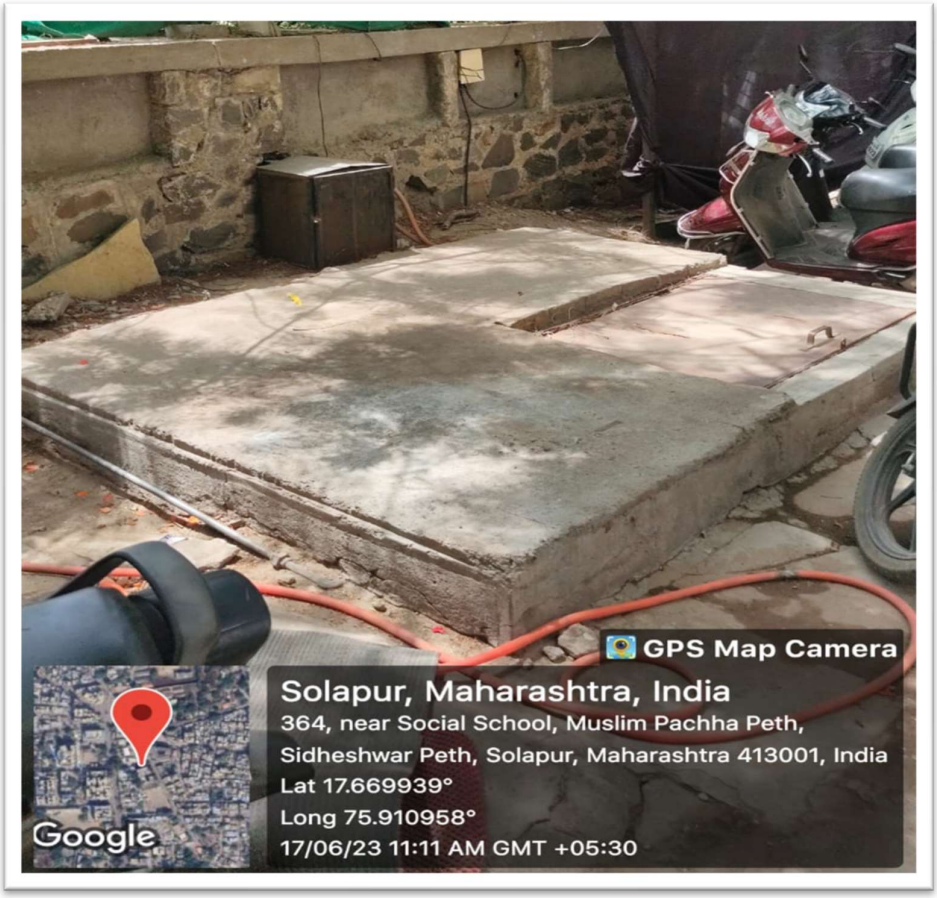
S.N.	Activity	Usage Capacity
1	Drinking	1810 lit/day
2	Flushing	1429 lit/day
3	Cleaning	1224 lit /day
4	Garden & Lawn	3800 lit/day
5	Total Water	8263 lit/day (8.2 KLD)

3.4 Sewage Generation and Treatment:

- About 7.01 KLD sewage generated.
- Treatment system: Septic tank
- No waste water recycling in the campus

Fig.30: RO plant for Drinking Water treatment installed at college building




GPS Map Camera
Solapur, Maharashtra, India
364, near Social School, Muslim Pachha Peth,
Sidheshwar Peth, Solapur, Maharashtra 413001, India
Lat 17.669939°
Long 75.910958°
17/06/23 11:11 AM GMT +05:30
Google


RAIN WATER HARVESTING
GPS Map Camera
Solapur, Maharashtra, India
364, near Social School, Muslim Pachha Peth,
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Lat 17.669939°
Long 75.910958°
17/06/23 11:11 AM GMT +05:30
Google

Fig.31: RO Water plant a,b,c,d

Table 8: Water quality Analysis of treated Bore well water

Sr. No	Parameter	Units	Results
Physical Parameters			
1	Turbidity	NTU	1.1
2	TDS	Ppm	72
Chemical parameters			
3	pH	-	7.3
4	Total Hardness	Mg/lit	107
5	Calcium (as Ca)	Mg/lit	32
6	Magnesium (as Mg)	Mg/lit	27
7	Total Alkalinity	Mg/lit	67
8	Sulphate	Mg/lit	12
9	Nitrate	Mg/lit	0.5
10	Chloride	Mg/lit	39
Elemental Analysis			
11	Iron as Fe	Mg/lit	Nil
12	Arsenic as As	Mg/lit	Nil
13	Lead as Pb	Mg/lit	Nil
14	Zinc as Zn	Mg/lit	Nil
15	Chromium	Mg/lit	Nil

3.5 Rain Water harvesting

- College prepared the rain water harvesting structures for rain water harvesting. Also recharged bore wells through rain water harvesting.

Institutional Plan:

1. Development of infrastructure at institutional level to divert rain water fromroof-tops of the buildings to ore wells on the campus.
2. At present college has started rain water harvesting through roof top of college buildings and connected to the Borewell recharge.
3. Create awareness for rain water harvesting among students and other stakeholders.

Roof Area Covered:

Roof top area: approximately 10000 sq ft. (501 Sq.m)

- Average rainfall Solapur district: 603 mm (0.6M)
- Considering roof area, rainfall and runoff coefficient
- Total rain water harvesting potential will be 501 M3/day

3.6 Implemented the Rain Water Harvesting

- **Water Collection:** 4-inch PVC pipes.
- **Ground Water Recharging:** areacovered with brick and sand material and bore well pipe purported adequately.
- **Operation and Maintenance:** As per requirement.

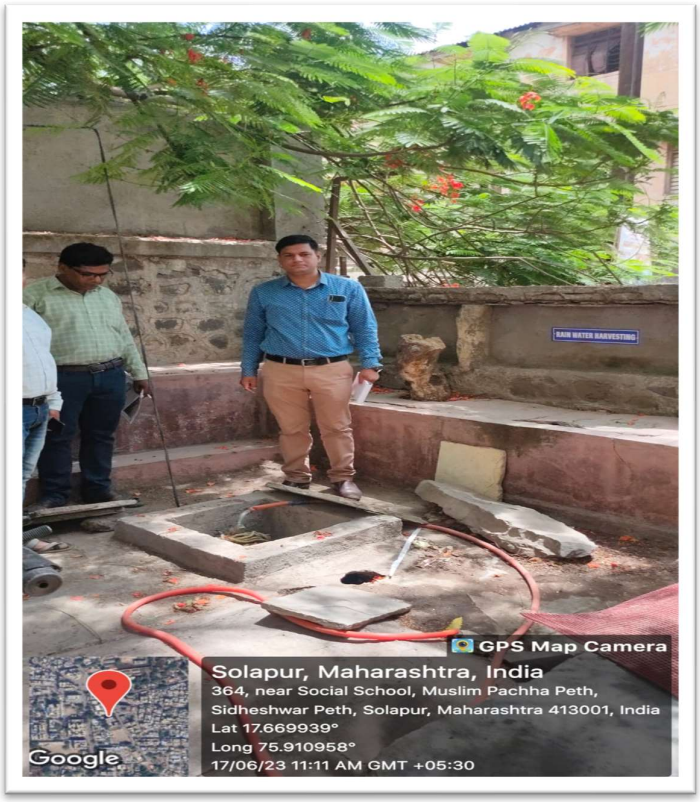


Fig.32: Rain water Harvesting – Water Recharging through Borewell

Fig.33: Waste Water Management at the college Campus

Fig.34: Water harvesting facility

Fig.35: Bore well Recharge

Fig.36: Water tanks

3.7 Recommendation

- ✓ Drip irrigation system should be provided in the college for all garden area to minimize wateruse.
- ✓ Use sensor-based toilet flushing tabs and drinking water tabs provided aerators or pressure reducing devices.
- ✓ In order to use the treated waste water for flushing a separate plumbing system should be provided.
- ✓ Installed sewage treatment plant and recycle the treated water for flushing and gardening
- ✓ Prepare and implement Rain water harvesting plan to recharge ground water and store roof top water in tanks for reuse. Rain water harvesting will help enhance theground water level and roof water will be used for the gardening and flushing purpose.
- ✓ Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water.
- ✓ The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority.
- ✓ Water quality analysis should be carried through Government Institutes, NABL orMOEF accredited laboratory for monthly or quarterly basis.

4.0 ENERGY MANAGEMENT

Energy audit is the key to systematic approach for decision making in the area of energy conservation and management. It attempts to balance the total energy input with its use. This audit would give a positive orientation to the energy cost reduction, prevention, maintenance and quality control programmes which are vital for production and utility activities. This audit focus on variations which occur in the energy cost, availability and reliability of supply of energy, decide on appropriate energy mix, energy conservation equipment etc. The main objective of energy audit is to determine ways to reduce energy consumption or lower operating costs.

4.1 Observations:

- Electricity is supplied from Maharashtra State Electrical Board (MSEB).
- Average energy bill monthly is: Rs. 4000/- to 5000/- per month.
- College starts at morning 7:00 am to 12:00 noon. So college used natural sunlight. The entire campus including common facility centers are equipped with LED lamps and LED tube lights, except at few locations. Awareness board for Energy saving is displayed in the campus.
- Solar Plates are set at the terrace of the college to reduce the energy usage.

Table 9: List of ways that college use for Energy

Sr. No	Names of Tools	Amount
1	Fans	92
2	Tube lights	94
3	LPG	Nil
4	Stove	Nil
5	Microwave	Nil

Table 10: Years wise Energy Bills

SR NO	YEARS	AMOUNT
1	2018-19	37645
2	2019-20	33521
3	2020-21	40850

Table 11: Bulbs used in college, amount and hours of usage

SR NO	CFL BULB'S AMOUNT	HOURSE	DAYS
1	11	6 hrs	27

Table 12: Air conditioners in college and usage, bills

SR NO	NUMBER OF AC	BILLS PER MONTH	HOURS USED
1	1	915	5hrs/day

Table 13: LED bulbs in college

SR NO	NUMBER OF LED BULBS	HOURSE USED
1	11	6HRS/DAY

Table 14: Computers in College

Sr No	Number of Computers	Number of Hours Used
1	11	5 Hrs/.Day

Table 14: Photocopiers in the College

Sr No	Number Of Photocopiers	Number Of Hours Used
1	2	1hr/Day

Table 15: Inverters

Sr No	Number Of Inverters	Number Of Hours Used
1	2	7hrs/Month

Table 16: Electrical Equipment's in Each Department

Sr No	Names Of Departments	Number Of Electrical Equipments	Number Of Hours Used
1	English Department	Smart Board	2 Hrs/ Month
2	Geography Department	Smart Board	2 Hrs/ Month
3	Urdu Department	Smart Board	2 Hrs/ Month
4	Commerce Department	Smart Board	2 Hrs/ Month

Table 17: Fans Are Installed in the College

Sr No	Number Of Fans	Hourse	Days
1	92	5hrs/Day	24 Days/Month

Table 18: Street Lights Used In College

Sr No	Number Of Street Lights	Hourse
1	8	9 Hrs/Day

Table 19: Tv Used in College

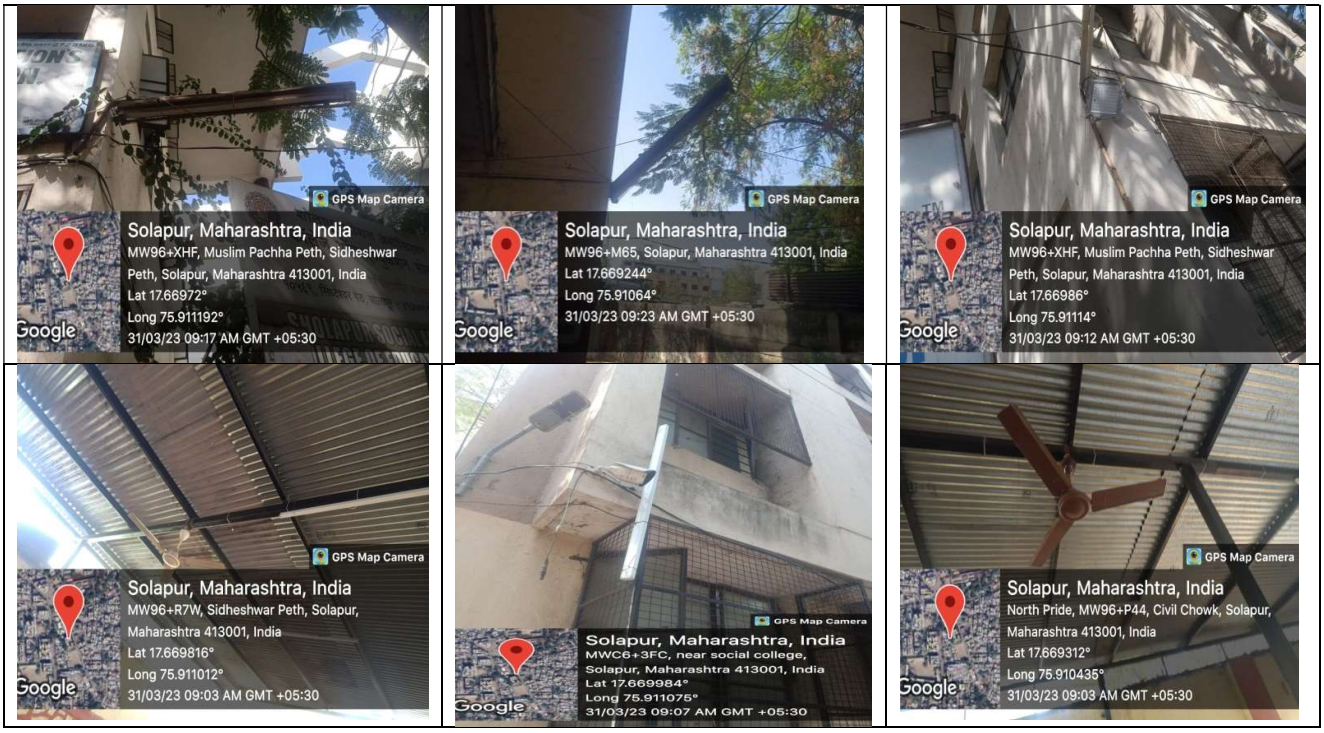
Sr No	Number Of Tv	Hourse
1	Nil	Nil

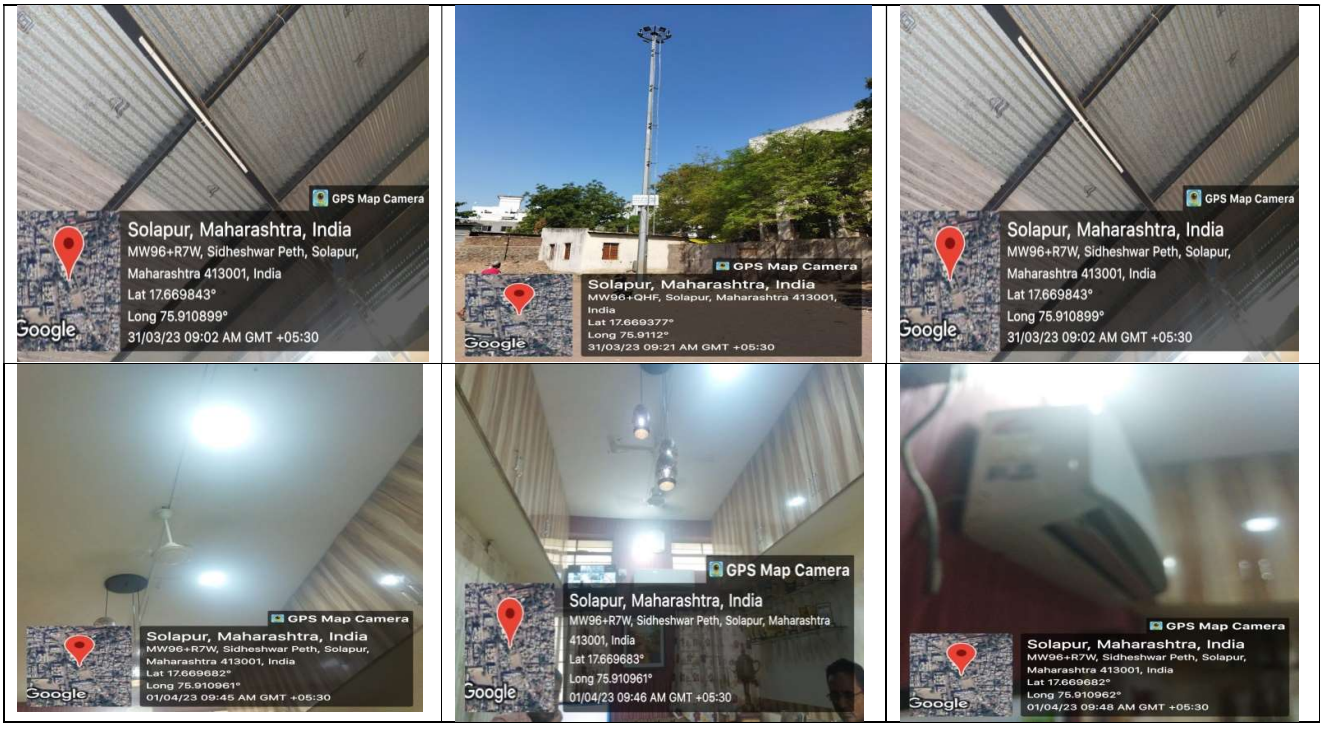
Fig.37: Solar Street LED Light in the College Outside

Fig.38: Solar Panels on the College Building Roof

Fig.39: LCD Projector in the Conference Hall

Fig.40: Bulbs in campus





4.2 Recommendations:

- Adjusting the settings and illumination levels to ensure minimum energy used for desired comfort levels. Design based on flux level calculations.
- Awareness on energy conservation will be raised among the staff and students.
- Constant monitoring of energy consumption and defining targets for energy conservation. Energy monitoring will be done with the help of Energy meters.
- Install maximum solar street light lamp at all location in the campus
- Installation of maximum LED lamps instead of CFL and replacing the old tube lights with the new LED tubes.
- Purchase of energy efficient appliances (CFL FITTINGS)
- Sunscreen films on windows to reduce heating inside the buildings.
- Use of compact fluorescent lamps and low voltage lighting.

5.0 WASTE MANAGEMENT

Today, waste management is the major issue in the colleges. This criterion supports to college making green and clean campus. The reduction of solid waste in the college campus, need to take efforts on recycling and reuse of solid waste. Need proper segregation at the source. College has to adopt 3R principle for waste management. Waste is collected and segregated properly. Students, faculty, and staff are aware and educated on proper waste management practices such as waste source and disposal, plastic waste, paper waste, food waste, and recycling. Solid waste is divided into two categories: dry waste and wet waste

1. Wet waste: biodegradable waste
2. Dry waste: biodegradable and non-biodegradable waste

5.1 Observations

As per observation, the common waste generated in the campus comprises plant wastes, glass, paper waste, metals, wrappers, plastics, etc. Old newspapers, used papers and journal files, workshop scrap etc. are given for recycling to external agencies (Raddiwala). Glass, metals, plastic and other non-biodegradable wastes are also given to external agencies where they are segregated and disposed/ recycled according to the nature of the waste.

The biodegradable waste comprises leaf litter and food waste are decomposed in the composting unit of college. Similarly, plastic waste managed and sends to the recycling vendor. Apart from dry solid waste, the campus generates an average of 50 kgs of organic waste per day and other 10 kg of non-biodegradable. All generated solid waste disposed directly in to the Solapur Municipal Corporation vehicle for proper waste management.

Table 20: Details of Waste Generation in the Campus

Waste Particulars	Total Weights Per Day
Generated waste quantity	10 kg. per day
E-waste	Less amount generated and send to vendors
Hazardous waste (toxic) if any	Nil
Wet waste	7 Kg.
Dry waste	3 Kg.
Canteen waste	3 kg.
Glasses	Nil
Garden waste	5kg
Medical waste if any	Nill
Waste collection facility	SMC (Solapur Municipal Corporation)
Treatment facility	Vermicompost
Disposal of waste method	Vermicompost
Do you use recycled paper in College	Yes- sending to vendors
Any waste management program organized in the college	yes
Initiative for waste management by college	Yes

Fig.41: Collection of Degradable and Non- Degradable Waste Separately

Fig.42: Dust bins used in the corners in the building

Fig.43: Solid waste dumped in the SMC vehicle

Fig.44: Conversion of Biodegradable solid waste into Compost through Vermicomposting method

5.2 Recommendations

1. Avoid or ban on plastics use in the college campus.
2. Display awareness boards / slogans boards, messages of solid waste management.
3. Reduce the waste generation from students, college staff, departments and offices.
4. Segregate dry and wet waste separately.
5. Segregate hazardous waste and send to hazardous site as per State pollution control Board guidelines
6. Send all recycling waste glass, cans, white, colored and brown paper, plastic bottles, batteries, print cartridges, cardboard and furniture to recycling facility or authorized vendor.

6.0 E –WASTE

E- Waste is becoming a major threat to the whole world. Its toxic emissions mixed with virgin soil and air and caused harmful effects to the entire biota either directly or indirectly. Direct impacts of E-Waste which include release of acids, toxic compounds including heavy metals, carcinogenic chemicals and indirect effects such as biomagnification of heavy metals in the food chain and food webs.

6.1 Observations

E-waste generated in the college campus is very less in quantity. The E-waste and defective item from computer laboratory is being stored properly. The college management has decided to contact approved E-waste management and disposal facility in order to dispose E-waste in scientific manner.

6.2 Recommendations:

i. Always purchase recycled resources where these are both suitable and available.
ii. Recycle or safely dispose of computers and electrical equipment's.
iii. Use reusable resources and containers and avoid unnecessary packaging wherepossible.

Fig.45: E-Waste Management at the college campus

7.0 Air Quality:

Ambient air quality monitoring was carried out at main gate of college to understand the baseline air quality.

- The concentrations of PM10, PM2.5, SO2 and NOX samples were collected as 24-hourly average by drawing air at the rate of 1.0 -1.5 m3/min through glass fibre-filter paper and analyzing by the gravimetric method.
- Concentrations of SO2 and NOX were analyzed by absorption & colorimetric method.
- Pre-calibrated fine dust particulate samplers were used for monitoring of PM10 & PM2.5.

The results are given in the following table

Table 21: Air Quality Status in the College campus

Parameters	Unit	Results	NAAQ Standards for 24hrs
PM10	µg/m^3	48	100
PM2.5	µg/m^3	32	60
SO2	µg/m^3	13	80
NOx	µg/m^3	16	80
CO	mg/m^3	0.9	4.0

The above results show the concentrations of PM_{10} $PM_{2.5}$, SO_2 NO_x and CO were found within and below the National Ambient Air Quality Standards (NAAQ).

7.1 Noise Level

Ambient noise standards are prescribed for residential, commercial and industrial areas and silence zone vide 'The Noise Pollution (Regulation and control) Rules, 2000, notified by the MoEF&CC on 14th February, 2000 and amended thereof. The ambient noise standards have been stipulated during day time (6 am to 9 pm) and night time (9 pm to 6 am) keeping in the view the different sensitive and the resultant impacts at community

level during these periods.

The ambient noise levels were monitored at 2 selected locations within the campus during day and night time. Educational Institute come under silence zones. Equivalent noise levels during day and night, The Noise quality monitoring Station presented in Table below

Table 22: Noise level in the college campus

Sr No	Location	DAY Leq	NIGHT Leq
ANQ 1	College – Main Gate	**54**	**36**
ANQ 2	Near Office	**44**	**30**

Values observed at main gate and near officer are well within and bellow the limit of CPCB standards.

Fig.46: Air ambient monitoring at the college campus

Fig.47: Noise Monitoring at the College Campus

8.0 CONCLUSION

Environment, Green and Energy audit is a scientific and professional approach towards accountability in utilization of resources. This audit is a powerful tool to identify the strength and weakness of college in environment and sustainability area. This audit is helpful to the college and all the stakeholders for the identifying, evaluating and managing environmental risks and improvement in waste management, pollution control, energy, water management etc.

The output of this audit report in each area will be serve as a guide for educating and guide book to the college on the environment related practices and resource usage at the college as well as spawn new activities and innovative practices. The college has taken good initiatives for environmental protection and environmental conservation in the college campus area through environment committee or environmental student's forum. It is seen that this college has done a great work in the environmental awareness in the college and among the students. Appreciating various environmental conservation activities carried out by this college in this assessment period. This report will help to making the college "Green and Sustainable".

Key Observations:

- ✓ Executive and implemented objectives of college policy.
- ✓ Review and reevaluated the policy objectives as per requirement.
- ✓ Formed College Environment Management Cell / Forum of the college for the college students.
- ✓ Prepared environmental conservation activities every year in the academic calendar.
- ✓ NSS, Dept of Geography taken initiatives to organize trainings and workshops to teachers and students on environmental issues and environmental education.
- ✓ College has organized many awareness program on the occasion of Great Personalities and as per Environmental Days Calendar for students, teachers and other stakeholder's.
- ✓ Implemented 3 R (Reduce Reuse and Recycle) management systems in the college for making green and clean campus.
- ✓ Adopted "*Mazi Vasundhara"* activity and supported to the Solapur Municipal Corporation, Jilha Parishad Solapur for awareness activity in the college.
- ✓ College given preference to natural and renewable energy resources e.g. Solar Energy.

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Thank you…!!