

GREEN AUDIT REPORT



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Version 02

By: Green Audit Team, Sustainability Solutions

GREEN AUDIT FOR THE ASSESSMENT YEAR 2018-19 IN
LINE WITH NAAC REQUIREMENTS

Green Audit Report

BY: GREEN AUDIT TEAM, SUSTAINABILITY SOLUTIONS

Message from Principal



An Institution has responsibility to become role model of society. In addition to setting benchmarks for quality education, we feel that we have responsibility towards making this world a better place. We therefore took cognizance of the perilous topic of “Climate Change” and its impact on the human beings and the habitat. Global warming is fuelling the bulk mean temperature of our earth, causing rise in sea levels, catalysing extreme weather conditions, acidic rains and an eminent catastrophe is in the making. The cascading effects of climate change are jeopardising the livelihood of larger sections as food and water are becoming scarce.

We therefore decided to take up directed action which are in-line with the United Nations Sustainability Development Goal, precisely UNSDG-13. We are aligning ourselves towards the UNFCCC’s goal of limiting global temperature rise to well below 2°C and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

We sought the help of Green Audit Team (Mr. Swapnil Thanekar and Ms. Bhakti Thanekar) who played key role in this achievement. We have purchased VERs from the VCS registry to offset our emissions. The VCS registry qualifies the “Additional Projects” which cause additional real and measurable emission reductions which are certified by Designated Operational Entities. We also want to set an example for our Peers so that they can also adopt sustainable practices.

A handwritten signature in blue ink, appearing to read 'Priya'.

Dr. Priya D. Wanjari

Acknowledgement

Green Audit Assessment Team thanks the management of Santaji Mahavidyalaya, Nagpur for assigning this important work of Green Audit. We appreciate the cooperation of our Team for completion of study.

Our special thanks to:

Principal – Dr. Priya D. Wanjari

IQAC Coordinator – Dr. Neehal R Sheikh

Faculty – Mr. Amit Rehpande

Team of colleagues as stated under Annexure-I

For giving us necessary inputs to carry out this very vital exercise of Green Audit. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

Profile of Audit Team Members

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Diploma Graduate with 16 years' experience in electrical systems

DISCLAIMER

Green Audit Team has prepared this report for *Santaji Mahavidyalaya, Nagpur* based on input data submitted by the representatives of College and after having complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the calculations are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.



Prepared by: (Bhakti Thanekar)



Technical Review by: (Swapnil Thanekar)

Scope of Work

Topics to be covered as part of the assessment are

✓ Solar Passive Architecture

- How the buildings are constructed to utilize the solar energy efficiently. This includes use of day light as lighting source and avoidance of GHG intensive technology example AC as source of cooling due to solar heat gains.

✓ Implementation of measures to reduce wastage of energy

- This includes effective and objective evidences to create awareness towards wastage of electric energy. Hoardings, placards, messages, posters etc planted at key locations in college, hostels and cafeterias. PCRA (Petroleum Conservation Research Association, Govt of India) and BEE (Bureau of Energy Efficiency) posters are exhibited.
- It can also be extended to include papers presented by the students on avoidance of electricity at college or day to day life.
- Appointment of joint committees of teachers and students to save electricity
- Controlling of Power Factor by installation of APFC and getting rebate (up to 5% or MSEDCL norms) from MSEDCL for maintaining unity Power factor

✓ Energy Efficient Procurement

- This includes evaluation of energy efficient procurement practices. This does not exactly mean that you need to buy the most efficient, but you need to buy the most efficient which is financially viable. Example AC with efficiency star ratings, Transformer etc.
- Replacement of lighting sources to CFL or LED
- Replacement of Copper Ballast with Electronic Ballast
- Centralized controls of lighting, auditorium etc. to avoid any mis-use of electricity
- Procurement of LED monitors to phase-out CRT Monitors
- Shift to paperless regime wherever not required, example attendance muster replaced by biometrics, DG logbook replaced by computerised logbook, daily reports converted from paper to paperless, HoD meetings converted to paperless formats, and all such examples
- Installation of Solar panels, Power Purchase Agreements with Solar Power Plant owners to buy Environmentally friendly energy Source etc
- Documentary evidences as feasible to calculate the above impacts and finally into the value of value of avoidance of tCO₂ emitted to atmosphere.

✓ Rain Water Harvesting

This includes Calculation of Catchment Area (Terrace and ground) and evaluating rough amount of water that is recharged into the water recharge pits.

✓ **Hazardous Waste Management and e-Waste Management**

There are various wastes that are generated within the organization. The report will give the list of the procedures for waste handling.

✓ **Duration of the Green Audit**

The Green audit field observations data collection was carried from 29th April to 30th April 2019 for the session 2018-19. The submitted data was monitored by the college throughout the year and assessed by Assessment Team during the visit.

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Abbreviations

AHU	Air Handling Unit
CFL	Compact Fluorescent Lamp
COP	Coefficient Of Performance
DG	Diesel Generator
ECRM	Energy Consumption Reduction Method
HVAC	Heating, Ventilation, And Air Conditioning
ISO	International Standardisation Organisation
ITHD	Current Voltage Total Harmonic Distortion
Km	Kilometer
kV	Kilo Volt
kW	Kilo Watts
Lab	Laboratory
LED	Light-Emitting Diode
MNRE	Ministry of New and Renewable Energy
MSEDCL	Maharashtra State Electricity Distribution Co. Ltd.
TR	Tons of Refrigeration
VTHD	Voltage Total Harmonic Distortion

Reference list of Websites

Sr. No.	Websites
1	IEEE 519 - http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=2227
2	http://mnre.gov.in/solar-energy/ch2.pdf
3	BEE - http://www.beeindia.in/
4	ECBC - http://beeindia.in/content.php?page=schemes/schemes.php?id=3
5	http://www.energymanagertraining.com/new_index.php
6	http://www.usalighting.com/stuff/contentmgr/files/1/92ffeb328de0f4878257999e7d46d6e4/misc/lighting_comparison_chart.pdf
7	https://www.bijlibachao.com/lights/use-energy-efficient-lights.html
8	http://www.imd.gov.in/section/climate/climateimp.pdf
9	http://www.bijlibachao.com/air-conditioners/air-conditioner-selection-understand-tonnage-eer-cop-and-star-rating.html
10	http://www.thehindubusinessline.com/opinion/time-to-focus-on-more-crop-per-drop/article9778971.ece
11	http://cgwb.gov.in/district_profile/maharashtra/nashik.pdf

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| 12 | http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Roof%20Top%20Rainwater%20Harvesting Presentation 2006.pdf |
| 13 | http://www.imd.gov.in/section/climate/climateimp.pdf |
| 14 | https://vcsregistry2.apx.com/myModule/rpt/myrpt.asp?r=206&h=18325 |
| 15 | http://www.cea.nic.in/tpeandce.html |
| 16 | http://cdm.unfccc.int/ |
| 17 | http://database.v-c-s.org/ |
| 18 | http://santajicollege.ac.in/ |
| 19 | http://www.cea.nic.in/tpeandce.html |
| 20 | https://timesofindia.indiatimes.com/india/power-ministry-may-make-24-degree-celsius-as-default-setting-for-air-conditioners/articleshow/64701707.cms |
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Introduction of the Institute¹

Santaji Mahavidyalaya, run by Shri Santaji Shikshan Vikas Sanstha, Nagpur was founded in June, 1971 and has been included in the list of University Grants Commission under 2F and 12 B. The college has been accredited and assessed by the National Assessment and Accreditation Council, Bangalore thrice. The college has been awarded “A” Grade by the NAAC. At junior college level there are Arts, Commerce, Science and MCVC streams. At senior college there are Arts, Commerce, Commerce (Computer Application), Science and Management streams. There are six Under Graduate and two Post Graduate programmes. Over the years, Santaji Mahavidyalaya has been growing from strength to strength by introduction of new courses, thoughtful expansion of the campus, having well qualified and experienced teaching faculty, timely enhancement and enrichment of the faculty and addition of newer instruments/equipment and facilities for the stakeholders under the youthful and able guidance of Hon. Shri Dinesh G. Wanjari, President, Shri Santaji Shikshan Vikas Sanstha. Today, it is the Recognized Centre of Higher Learning and Research in English and Commerce. The progress of this institute is attributed to Ex-President Late Shri Govindraoji Wanjari.

¹Reference: <http://santajicollege.ac.in/about.php> and College Management

Objective of Green Audit

The Green Audit Team focused on Material² Issues pertaining to college which have the highest influence on the Green Attributes of the College. To evaluate steps taken by college management towards green campus below material issues are discussed chapter wise:

1. Organization Level Efforts
2. Creation of Awareness
3. Lighting
4. Cooling and Ventilation
5. Operation of Electronic Equipment's
6. Water Management
7. Water Quality
8. Renewable Energy
9. Transportation
10. Purchasing Practices
11. Carbon Footprint
12. Waste Management
13. Plantation Details

Checklist approach is adopted for transparent evaluation of the topics and increase readability for independent reader.

² Definition: as per Global Reporting Initiative: **GRI 101: FOUNDATION** 2016

An organization is faced with a wide range of topics on which it can report. Relevant topics, which potentially merit inclusion in the report, are those that can reasonably be considered important for reflecting the organization's economic, environmental, and social impacts, or influencing the decisions of stakeholders. In this context, 'impact' refers to the effect an organization has on the economy, the environment, and/or society (positive or negative). A topic can be relevant – and so potentially material – based on only one of these dimensions.

1. Organizational Level Efforts

Is the college having campus green team?	Yes, the Green Campus Committee is already uploaded on the college website: http://santajicollege.ac.in/administrator/img/pdf/Green_comittee.pdf
If yes, who are the stakeholders?	The below stakeholders are reconfirmed during the surveillance audit. The stakeholders include - o Administration - o Teaching Faculty - o Students - o Facility manager (from Accounts Department) - o Canteen manager - o Volunteers However, Green Campus Team is shared with the Audit Team. Refer Annexure III.
Does it meet regularly?	Based on the review of submitted records, it is confirmed that the Team meets once in a semester.
Can the Green Campus Team suggest new environmental initiatives to College Management?	Suggestions of improvement of environmental performance are always welcomed by Management. Installation of evaporative cooling, faucets to reduce the water wastage in wash basins, discussion on the carbon neutrality of college, water management were prominent topics of discussion.
Have you established an environmental mission/vision for your campus?	The Environmental mission/ vision is integrated part of the philosophy of Management of College. The Green Campus Committee is driven by the visionary thoughts of the Honorable Principal. She is persistent and resolved to make the campus eco-friendlier. Already implementation of solar panels, application of efficient technologies to save energy is implemented. Measures to implement the scope of improvements are also assessed in the relevant chapters of this report.
Is the college encouraging sustainable behaviour via: - o education campaigns? - o Posters, placards, messages - o incentives? - o contests? - o awards?	College conducts various activities to create awareness amongst the students and society on environment safety and protection. College has established 'Nature Club' and 'Botanical Society' which conducts various Environmental Friendly Activities. Tree plantation was carried out on in college premises and university campus with active participation of students, faculties and management. College celebrated the 'World Wet Land Day' on 22 nd February 2019 and students were informed about current global status of water availability and measures to solve water scarcity problems.

College organized Poster competition at Annual Function 'Unnati 2019' with the theme relevant to 'Wildlife Conservation'.

For Poster Competition, the theme was "Protection of Environment, Clean City and Ban on Plastic Bags". This activity created the awareness amongst the teachers and students about the harmful effects of the plastic bags. The relevance of topics to current affairs can be gauged by the following news published in Time of India on date: 03 April 2018 on ban imposed by Government <https://timesofindia.indiatimes.com/city/mumbai/plastic-ban-court-puts-maharashtra-government-on-notice/articleshow/63588135.cms>.

College also celebrated Science day, for the year 2019, Science Day was celebrated on 28th February 2019 with the theme of 'Innovations in Science for Environment Protection'.

- Model making competition was organized on the occasion of Science Day.
- Rangoli competition was organized where students made Rangoli based on Science Topics.

College also visited to carnival of Organic food, Indigenous Seeds, Bio-diversity and Sustainability (06 April to 08 April 2018)

College also visited

- NEERI and interaction with experts on environmental issues.
- Organic farming at Institute of Science where college signed MOU with Institute of Science on Environmental issues.

State level NSS camp was organized where tree plantation was carried out. Soil test technical session at Ambegaon Deoli was organized. 200 students from various universities of Maharashtra and local villages attended it.

The Audit Team has inspected the posters which are placed at designated locations in the college. These posters are designed by students. Students have been asked to prepare projects under environmental studies to generate environmental awareness. The internal marks are awarded to students based on the merit and quality of the projects. Career oriented course on Vermi Composting is also undertaken by the college. The college is taking initiatives towards making academic and administrative work paperless for which training on use of Google forms for collecting information and feedback from students is being conducted.

	Please refer Annexure IV and XIV for details.
Is the college staff modelling sustainable behaviour for students, peers, and community?	It is confirmed that the below good practices 'as observed during the last Assessment' are still practiced: • The Staff of the college utilize the public transport (State Transport) for commuting. • The HoD's are car pulling. • Use of cycle is promoted and college parking is meant for the cycles in the premises. Fossil fuel-based vehicles are not encouraged inside the campus. • Please refer above assessments for additional details.
Do students model sustainable behaviour for staff, peers, and community?	It is confirmed that the below good practices 'as observed during the last Assessment' are still practiced • The students of the college utilize the public transport (State or college contracted) for commuting. • As stated above use of cycles is promoted as parking lot inside the college premise is only for cycles. Students participate in activities conducted by college on environment safety and sustainable development. In addition, please refer above assessments.
Is the college sharing learning internally via: o Posters, placards, messages? o assemblies? o classroom presentations? o training/professional development? o posters/bulletin boards? o newsletter? o website?	Data is shared via posters, placards and messages. The topics include minimization of energy usage by avoiding wastage, improvements on energy efficiency, minimization of water wastages, proper disposal of wastes. Please refer Annexure XIV for details. In addition, College is interacting with the Students, Teachers and Society. Please refer above assessments pertaining to sharing of learning's.
Does the college offer energy conservation lessons?	It is confirmed based on the review of syllabus, that Second Year Students are making projects related to Environment as part of curriculum. The projects are administered by the College Faculty who mentors them. Certificates were issued as a token of appreciation after completion of projects. This year project topics covered by students includes solar energy and its uses, Rainwater harvesting, solid waste management, environment and pollution etc.
Is the college sharing its learning externally via o Paper presentations? o newsletter? o website?	The students are encouraged to present projects on topic related to environmental aspects. The college is also sharing the Green Audit Report to its peers (upon

request) so that learning's of college are shared.

Scope of Improvement from last audit:

At organization level, the college needs to Establish long term improvement objectives to further reduce energy consumption, water consumption and fuel consumption and reflect the same in form of dedicated Environment Policy.

Response of College:

- We replaced the tube-light with LEDs
- We have initiated the program of replacing the tube-light with LEDs at the end of technical life of tube light
- We will replace the existing AC's with the more efficient (higher Star ratings) after the end of technical life
- We have implemented (though on small scale) measures to reduce paper consumption
- We are implementing various programs for petroleum conservation with the help of lectures, awareness etc.
- We have purchased carbon credits from the VCS registered project to offset the calculated CO2 emissions. This allows the college to compensate its Scope-1 and 2 emissions. The traceability of the purchased credits is traceable in the link

<https://vcsregistry2.apx.com/myModule/rpt/myrpt.asp?r=206&h=18325>

Conclusion:

- Active involvement of Organization is observed.
- Adequate awareness amongst the students and other stakeholders (faculty, other staffs, service providers, etc.) is observed and reflected from their behavior.
- Responsible Step taken by offsetting Green Gases by purchase of credits

2. Creation of Awareness

Are there posters/guidance displayed to remind students and staff of good practices?	Yes
Are the students aware of energy sources?	The major source of energy is electricity followed by usage of diesel in the DG as backup in case of failure of grid electricity. Students are aware of these sources of energy which are utilized by the college.
Is college tracking its electrical energy usage?	There are two meters which measures the electricity imported by the college. The reading of annual electricity consumptions are included as part of this report under chapter 11.
Is college offering energy conservation lessons and programs?	- College has created awareness among the faculty and students to reduce energy wastage. - The college has appropriately disabled the screen savers and programmed the computers for sleep mode operations. - The usage policy of photocopiers, fax machines and other equipment users is "POWER ON" when in use and "POWER OFF" when not in use. There is no idle power consumption. Please refer Annexure VI and VIII for details. Recommendation: <i>The Assessment Team observed that CRT monitors act as backup monitors. It is recommended to dispose the CRT monitors. Since additional LCD monitors are available, the CRT monitors should be replaced with existing LCD monitors and the CRT monitors should be completed phased out of campus in responsible manner.</i>
Do students and staff know where their water comes from?	The main sources of water are Municipality Water Supply and borewell water. Borewell water is utilized in the wash rooms and cleaning.
Is college encouraging responsible water use via: o posters, placards? o incentives? o contests? o awards?	Yes, by posters, placards, contests and awards to winner of contest.

How is trash managed outside the campus?	The canteen waste is sent to Nagpur Municipal Corporation disposal site. Also, MOU is signed with company for E waste generated in the college. Please refer Annexure XVI
Recommendation: • The Assessment Team observed that CRT monitors are present in the computer lab. It is recommended to dispose-off all the CRT monitors • Additional measures in form of events can be organized by college • College may calculate the water footprint to compare its performance with national and international consumption standards.	
Response of College: • Action is taken on the recommendation. The CRT monitors are no more utilized, however the same are maintained as backup if the new monitors fail. • Additional events are undertaken. The same are described to the Assessment Team. • This is very big assignment for us. We will implement in due course of time	
Conclusion: • Additional events are undertaken by college. Please refer Annexure IV • Visible communication on environmental issues. • Effective use of notice boards and signs. • Satisfactory steps are undertaken considering the last audit	
Further Recommendations • <i>It is recommended to phase out all the CRT monitors from respective labs</i> • Under long term initiative, college should benchmark its water consumption	

3. Lighting

Is college utilizing any incandescent lights? Can they be replaced with compact fluorescents (energy saving bulbs)?

The college timings are from 8 am to 5 PM. Thus, requirement of daytime lighting is limited.

Energy efficient lighting system is followed. The contemporary best practices with recommendations on lighting by Bureau of Energy Efficiency, Book-3, Chapter 8, table 8.1

Table 8.1 Luminous Performance Characteristics of Commonly Used Lu				
Type of Lamp	Lumens / Watt		Colour Rendering Index	Typical Application
	Range	Avg.		
Incandescent	8-18	14	Excellent (100)	Homes, restaurants, general lighting, emergency lighting
Fluorescent lamps	46-60	50	Good w.r.t. coating (67-77)	Offices, shops, hospitals, homes
Compact fluorescent lamps (CFL)	40-70	60	Very good (85)	Hotels, shops, homes, offices
High pressure mercury (HPMV)	44-57	50	Fair (45)	General lighting in factories, garages, car parking, flood lighting
LED lamps	30-50	40	Good (70)	Reading lights, desk lamps, night lights, spotlights, security lights, signage lighting, etc.

The term reading light³ normally refers to lamps or lights which focus light dedicated for readings, thus LEDs were not considered for class room lightings. Fluorescent lamps were utilized for class rooms (as the same are stated to be suitable for office illumination level requirements).LEDs are installed in Guest room, Principal Office, Chairman Office, Chemistry Lab Conference Hall (new)and Microbiology Department as a measure towards energy conservation during this year. LED lighting survey was also undertaken by the Audit Team. Please refer below assessments in details.

During the onsite visit the Audit Team visited each department and physically counted the installed lights by their types (Fluorescent tube lamp, CFL and LED). It is confirmed that there is no incandescent light installed for lighting purpose.

As per the published article: http://www.usalighting.com/stuff/contentmgr/files/1/92ffeb328de0f4878257999e7d46d6e4/misc/lighting_comparison_chart.pdf

LED light has lumen/ watt in the range of 80-100 whereas CFL has

³<https://www.collinsdictionary.com/dictionary/english/reading-light>

	lumen/ watt in the range of 70-90 Recommendation: <i>As per the replacement policy the college should install LED lights in the class rooms in place of conventional tube lights. The CFL lamps⁴ should be replaced by the LED lamps.</i>
Has the college evaluated existing lighting for opportunities to reduce lighting in over-lit areas?	The lighting arrangements are well balanced with arrangements to switch ON and OFF lights independently. There are therefore practically no over lit areas.
Are the light switched duly labelled to make more obvious which switches relate to which appliances?	Switch arrangements are lucid. The fan switches are adjacent to fan speed regulators. Light switches are arranged in order of lighting.
Are the lights switched off to make use of daylight? (e.g. lights parallel to windows or in corridors)	There is minimum or practically negligible use of lights during day time as the building structure has possibility of daylight usage.
Is the college utilising natural lighting when possible?	Yes, natural lighting is first preference.
For the spaces like store rooms, toilets, kitchen areas, copying rooms, corridors etc is there scope for automatic lighting controls?	The policy of college is to switch off the lights and other electrical equipments when they are not in use. The appropriate usage of the resources and control on its avoidance is one of core responsibilities of the respective HoD. Since, the culture of useful gain is practiced over the years, there is a responsible and natural tendency amongst staff and students to avoid wastage. Every Lab in-charge is responsible for the lab electrical utilities, every faculty including the HoD is responsible for switching off the un-necessary lightings and AC in his / her cabin.
Can main lighting ever be switched off and dedicated lighting be used?	As such there are no dedicated lamps which can replace overhead lighting. However, redundant lighting can be switched off when it is not required. Lights above desk can be operated and other overheads lights can be switched off.
Are the light fittings clean?	Cleanliness is well maintained. In-house light fittings are cleaned regularly. The light fitting in the veranda needs cleaning. The College Team clarified that the excess dust due to the metro construction has caused the dusting of the light fitting and same will be attended soon.
Do windows and skylights need cleaning to allow in more natural light?	The window and skylight are clean. Cleaning is with utmost care and regular cleaning schedules were observed by the Audit Team during the course of Audit.
Has the college installed lighting occupancy sensors?	No, lights are negligibly operated during day time. The lights are operated manually.
Is there mechanism in place to immediately report inoperable occupancy light sensors?	NA as no light sensor is installed.
What is the % contribution of the LED lighting?	As per the BEE guidance we have evaluated the % LED installation at

⁴ The CFL lamps have problem as they contain mercury. Mercury is very toxic to human health and the environment.

	Passage and ground and all other floor. The value is determined and presented under Annexure V.	
Further Scope of Improvement:		
As per the replacement policy the college should install LED lights in the class rooms in place of conventional tube lights. The CFL lamps ⁵ should be replaced by the LED lamps.		
A dedicated stabilizer can be installed and the lighting load can be transferred. With the help of voltage regulation, further energy savings are possible from the fluorescent lamps. Please refer below table which provides impact of energy savings from voltage regulations (reference Bureau of Energy Efficiency, Book 3, Chapter 8).		
Particular	10 % lower Voltage	10% higher voltage
Fluorescent Lamp Light Output	Decreases by 9%	Increases by 8 %
Fluorescent Lamp power consumption	Decreases by 15 %	Increases by 8.1 %
College Response:		
• We adopted the policy of replacement of tube lights by the LED lights, Tube lights will be either replaced by CFL tubes, or by LED or CFL bulbs • Installation of dedicated stabilizer for lighting is presently not economically viable so the same is not implemented		
Conclusion:		
• During this Assessment it is again verified and is confirmed that Santaji Mahavidyalaya, Nagpur is excellent with respect to the usage of day lighting. Sufficient lux levels above 250 are common on the work-stations. Survey was undertaken with students and employees with respect to lighting efficacy and no complains was identified within respect to the sufficiency of lighting measures. • Minimal lighting load is observed during day time as college makes good use of daylight. • Replacement policy to further improve lighting efficiency (as stated above) is implemented.		

⁵ The CFL lamps have problem as they contain mercury. Mercury is very toxic to human health and the environment.

4. Cooling and Ventilation

How are the Air Conditioning Controls? For the local controls, how it is ensured that AC is working only ON when necessary. What is temperature setting of the AC?	The AC usage is very high as the temperature in Nagpur is comparatively higher (Max temperature is above 42 °C ⁶) hottest day in Nagpur was registered with temperature of 47.97 ⁷). The AC temperature is set at 28 °C which is consistent with the guidelines of Ministry of Power ⁸ for HVAC applications.
What is the mechanism of reducing heat in-grace? Are the closing blinds or fitting reflective film to windows installed to reduce solar gain?	The building is designed to make best use of day light and avoid the heat in-grace. Blinds are available to control unnecessary heat in-grace. In addition, it is confirmed that there is no unnecessary operation of the equipment which add up the heat.
Are all external doors and windows closed when air conditioning is on?	Based on interviews, it is confirmed that this practice is maintained.
Is there a scenario where air conditioning is wasted in unused spaces, such as cupboards, corridors?	There are no such instances observed. Arrangements are duly implemented to avoid losses.
Are Efficient and energy labelled AC's utilized for cooling purposes?	Following the sustainability practices, the college has procured 02 number of ACs which have 5 and 3 star ratings by Bureau of Energy Efficiency. These AC run for average 4-5 hours in the summer and rainy season. The newly installed 02 number of ACs are 5 and 3 star rated. The new ACs are installed in the computer lab. These AC's run for 4-5 hours during summer and rainy season.

⁶<http://www.imd.gov.in/section/climate/climateimp.pdf>

⁷<https://timesofindia.indiatimes.com/city/nagpur/Nagpur-records-all-time-high-temperature-at-47-9-C/articleshow/20216419.cms>

⁸<https://timesofindia.indiatimes.com/india/power-ministry-may-make-24-degree-celsius-as-default-setting-for-air-conditioners/articleshow/64701707.cms>

	• 01 number of 5 star rated AC is installed in the Chairman's Office. • 01 number of 3 star rated AC is installed in Principal's Office • 04 number AC's are with 2 star ratings are installed in the computer lab (03 number of AC) and electronic lab (01 number of AC). Recommendation: <i>As evaporative cooling is proved technology in and allows high number of air changes, it is recommended to replace the existing 2-star AC's by evaporative cooling. This will reduce 60-80 % electricity consumption.</i> Evaporative Cooling System Following last year's recommendation college has deployed 04 number of coolers for cooling. Still, is scope for the use of evaporative based cooling which is energy effective compared to the reversed Bryon cycle i.e. Vapour Compression Cycle. The basic reason for the same installed system has COP of 1.5 kW/TR of refrigeration compared to evaporative cycle which draws 0.3-0.5 kW based on the size of installation.
Further Scope of Improvement: College must replace the existing 02-star AC's (04 number) in the college. AC in the computer lab needs to be replaced on priority.	
Conclusion: • PROCUREMENT⁹ and installation of 5 and 3 STAR AC is observed as one of energy conservation measure. The selection of AC follows the publicly traceable selection methodology which is mix of feasibility and performance. • Majority of AC's are 2 star rated. Recommendation is already raised. Please refer the same.	

⁹<http://www.bijlibachao.com/air-conditioners/air-conditioner-selection-understand-tonnage-eer-cop-and-star-rating.html>

5. Operation of Electronic Equipment

Are computers, printers, photocopiers and other equipment switched off at the end of the day?	Yes
Is there any mechanism by which the screens and other equipment be controlled during the day?	The college has appropriately disabled the screen savers and programmed the computers for sleep mode operations. Please refer to Annexure VI.
Are the screen savers disabled?	Yes please refer above assessment.
Are computers programmed to 'power down' mode?	Computers are programmed for the sleep operation.
Is the user entrusted with the rights to modify standby settings? (e.g. TVs, LCD projectors, printers etc.)	No, the college has the administrative rights. Such changes cannot be initiated by users.
What is status of the photocopiers, fax machines and other equipment? Are they programmed on 'Energy Saver' mode during the day?	The equipment's like photocopiers, fax machines are shutdown when not in use, computers are turned to sleep mode whenever not in use.
Are the power management settings enabled on all the computers/ monitors/ all-in-one machines?	All machines are governed by the college. All are equipped by power management settings as already described above.
Conclusion	
It is reconfirmed that the Electrical equipment are well operated. Redundant operations are avoided.	

6. Water Management

Are any water leaks identified?	The urinals are flushed periodically and manually. Simple taps are installed during 2018-19. <i>The urinals need to be equipped with push button taps.</i> Please refer below recommendation.
Are taps left running? Are there any dripping taps? Do taps need maintenance?	No such instance was observed.
Are push button taps utilized?	<i>The toilet washrooms are not equipped with the push buttons.</i> Please refer below recommendation.
Is water escaping from overflows either inside or outside buildings?	No such instance was identified during onsite audit.
Has the college installed low-flow faucets, automatic faucets, and/or faucet aerators?	Recommendation for Improvement: <i>The college Management needs to consider low-flow faucets, automatic faucets, and/or faucet aerators as the replacement for the existing conventional taps.</i>
Has the college installed low-flow shower heads at Hostel?	<i>Please refer above recommendation.</i>
Has the college collected rainwater for onsite watering needs?	Yes, rain water from terrace is collected and percolated in 04 number of underground (8 X 8 X 8 sq ft) tanks. Remaining water is charged into the borewell.
Is the college collecting the condensation from A/C units for onsite watering needs?	Yes, ACs are operated and condensed water is collected and utilized for gardening. Please refer Annexure XII for details
Has the college optimized its irrigation system for gardening to: o operate at night or early morning hours to minimize evaporation? o water the minimum time and frequency necessary for the applicable vegetation?	As per the latest publication from “The Hindu” drip irrigation is one of the most important measures to achieve “more crop per drop”. Share of Agriculture consumption is approximately 83 per cent of India’s water resources, thus approximately 17 per cent water resources are available for domestic and industrial use (http://www.thehindubusinessline.com/opinion/time-to-focus-on-more-crop-per-drop/article9778971.ece). The Assessment Team noted that college is utilizing the RO reject water for watering nearby plants. For rest of gardening area of college, the evaporation losses from soil surface are reduced by watering plants in

	evening. It is noted that there is no drip or sprinkler system implemented by college, however the plants are watered by mug and bucket by dedicated resource. Considering the small size and scattered nature of plantation, it is not practically feasible to implement drip/sprinkler irrigation.
What is amount of rain water harvested?	The rain water harvested from the roof top is collected in the soak pits and then charged into the well. Total area of roof top is 1013 ¹⁰ m ² . The rainfall for Nagpur region is approximately 1000 ¹¹ mm. Total rain water harvested is estimated as 1002 m ³ at the run off coefficient of 0.9 ¹² .
Are there any community-based projects implemented by the college?	• Vermi culture course is taught free of cost to enrolled applicants • Compost manure (though in small quantity) is also given to needy free of cost • Cleanliness drives under “Swachh Bharat” is undertaken by college • NSS unit of college undertakes cleanliness drive, awareness regarding pollution, tree plantation etc • Wall of humanity serves distribution of clothes to needy persons • Blood donation camps are organized by college
Further Scope of Improvement: Long Term Measure: • The college Management needs to consider the low-flow faucets, automatic faucets, and/or faucet aerators as the replacement for the existing conventional taps. • College needs to install the metering arrangement to measure the water drawn from bore well. • College can undertake determination of water footprint and calibrate its specific water consumption with the established National and International Norms.	
Conclusion: • The toilet washrooms are not equipped with the push buttons. • Practically efficient measures are implemented for gardening. • Total rain water harvested is estimated as 1002 m³	

¹⁰Source: As per the calculated area by College

¹¹http://cgwb.gov.in/District_Profile/Maharashtra/Nagpur.pdf (page 4 of 21, Table-3: Rainfall data of Nagpur District (2002-2011) (mm))

¹²http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Roof%20Top%20Rainwater%20Harvesting_Presentation_2006.pdf

7. Water Quality

Is the college campus maintained clean to minimize litter polluting water table?	The college premise is kept clean. Thus the chances of litter polluting water table are negligible
Is the college monitoring drinking water quality regularly? If yes, what is the frequency?	The Chemical Lab is undertaking water testing. In case of any deviant parameters are observed, the water will be tested in a third-party laboratory. Water Quality Test are included as part of Annexure VII to this Report. Recommendation: College should appoint independent third party for drinking water testing at least once in a semester.
Conclusion: The students, staff members and guests have access to clean, safe and potable water.	

8. Renewable Energy

Is the college having solar, wind, or other forms of renewable energy?	The college has solar water heating system. College Management is evaluating the feasibility of introduction of the solar PV generation. The share of renewable energy comes to 0.52 %¹³.
Is the college purchasing renewable power from third party or renewable energy certificates for its electricity use?	Only Grid electricity is purchased. This is verified from the submitted bills.
Is the college offering renewable energy lessons / programs?	Yes. Students are also encouraged to present papers and make assignments of renewable energy. Also, there assignment in second Year for the students. This already assessed under chapter 01 of this report.
Further Scope of Improvement (2017-19 Recommendations): <i>The college needs to chalk out long term strategy towards carbon neutrality and install renewable electricity generation (solar PV) to offset emissions of grid-based electricity generation. College can also buy carbon credits (registered under CDM, VCS) to offset its GHG emissions.</i>	

¹³ = 5 LED light X 15 watt of each light X 10 hours operation/ day X 365 days / 1000 = 273 kWh
Total Electricity imported from grid = 0.52% kWh

Response of College:

- We are still in process of finding solution to increase solar energy
- We have adhered to the recommendation of purchase of carbon credits

Conclusion:

The contribution of the renewable energy needs to be improved from the present value of 0.52 %. College Management needs to develop long term action plan in this regard.

It is however noted that emissions offset are purchased to compensate GHG emissions.

9. Transportation

Is the college providing eco-friendly or less GHG intensive transportation matching services? (Example carpools, college buses etc)

The Staff and students of the college utilize the public transport (State transport) for commuting. The HoD's are car pulling.

What are the good practices pertaining to Transport?

There is no college owned or contracted transport. The students utilize state transport and cycle as means of commutation. The use of cycle is encouraged as parking lot allows only parking of cycles. No fossil fuel based vehicle are allowed other than staff members who are using two wheelers as mode of transport

Conclusion:

The college management, its employees and the students observe good practices of transportation/commutation.

10. Purchasing Practices

Describe the purchasing that confirms the better environmental performance?	Lastly the college has purchased the ACs with 5-star and 3-star labelling. Printers with duplex printing facility is installed at the computer lab and Library. There is culture of the two sided printing. Paper is not wasted.
How does the college limit the purchase of single-serve bottles and containers?	The college has RO system; guests are served with water from RO system. Single serve bottles are not utilized unless requested by the guest.
Is the college having water fountains/stations to promote easy filling of reusable water bottles?	Yes, the water dispensers are connected to output of RO system. Clean and potable water is available to staff, student and guests.

Conclusion:

The GHG intensive technologies are well managed.

Focus on the replacement of lighting as per above stated recommendation needs to be considered

Focus of the recommendation pertaining to the replacement of AC with evaporative cooling needs to be considered.

One sided papers are utilized by college to avoid use of fresh papers

Policy for the disposal of Archived paper Records needs to be formed by college

11. Carbon Footprint

Has the college calculated its carbon footprint?	For the third time college has calculated the carbon footprint. The data applicable to Scope-2 emission (electricity purchase from grid) is available.The Scope 3 data is collected once in three years by undertaking survey of staff commuting.									
How is college promoting zero emission transportation options?	Not applicable. There is no internal transportation within the college.									
What are special energy saving measures undertaken?	Most of the electronic equipment and instruments in science laboratory which utilizes high voltage electricity are shared by more than one department to conserve energy. It includes autoclave, refrigerator, hot air oven, centrifuges, laminar air flow system etc.									
Are all the applicable emission sources calculated?	The emission source pertaining to grid based electricity source is calculated. Scope-01 emission source data pertaining to DG, Gas charging are calculated, for Scope-03 commuting emissions are also calculated for present verification. Scope-01 Emissions: <table><tr><th>HSD Consumption in DG</th><th>LPG consumption in canteen</th><th>Refrigerant Charging (R22)</th></tr><tr><td>lit</td><td>kg</td><td>Kg</td></tr><tr><td>85.43</td><td>684</td><td>1.5</td></tr></table>	HSD Consumption in DG	LPG consumption in canteen	Refrigerant Charging (R22)	lit	kg	Kg	85.43	684	1.5
HSD Consumption in DG	LPG consumption in canteen	Refrigerant Charging (R22)								
lit	kg	Kg								
85.43	684	1.5								

Equivalent Scope-01 Emissions are as below:

HSD Consumption in DG	LPG consumption in canteen	Refrigerant Charging (R22)
tCO ₂	tCO ₂	tCO ₂
0.28	2.26	2.75

Thus, Scope 01 emissions are $5.26/0.9 = 6$ tCO₂

Scope -2 Emissions are tabulated as follows:

Month	kWh From Meter-1	kWh From Meter-2	Grid Emission Factor as per CEA Version 14 (0.91 tCO ₂ /MWh)
Apr-18	3323	1583	4.46
May-18	2188	1894	3.71
Jun-18	2171	1248	3.11
Jul-18	2331	1925	3.87
Aug-18	2796	1714	4.10
Sep-18	3507	1729	4.76
Oct-18	3268	1822	4.63
Nov-18	3025	1659	4.26
Dec-18	3267	1737	4.55
Jan-19	3522	1880	4.92
Feb-19	1898	1040	2.67

Mar-19	2065	1057	2.84
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Total CO2 emissions for financial year 2017-18	47.91
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Scope-02 emissions = $47.91 / 0.9 = 53.23 \sim 54 \text{ tCO}_2$

Scope 03 Emissions for commuting:

Sr. No.	Designation	Commuting Distance in Miles	Emissions (tCO ₂)
1	Principal	1.25	0.076
2	Faculty	8.75	0.532
3	Faculty	2.5	0.152
4	Faculty	1.25	0.076
5	Faculty	3.75	0.228
6	Faculty	0.625	
7	Faculty	1.25	0.076
8	Faculty	2.5	0.152
9	Faculty	3.75	0.228
10	Faculty	5	0.304
11	Faculty	1.25	0.076
12	Faculty	8.75	0.532
13	Faculty	3.75	0.228
14	Faculty	10	0.608
15	Faculty	3.75	0.228
16	Faculty	3.75	0.228
17	Faculty	1.25	0.076

	18	Faculty	1.25	0.076
	19	Faculty	5	0.304
	20	Faculty	2.5	0.152
	21	Faculty	13.75	0.836
	22	Faculty	5	0.304
	23	Faculty	3.75	0.228
	24	Faculty	10	0.608
	25	Faculty	1.25	0.076
	26	Faculty	8.75	0.532
	27	Faculty	0.625	
	28	Faculty	5	0.304
	29	Faculty	1.25	0.076
	30	Faculty	1.25	0.076
	31	Faculty	7.5	0.456
	32	Faculty	10	0.608
	33	Faculty	8.75	0.532
	34	Faculty	2.5	0.152
	35	Faculty	1.25	0.076
	36	Faculty	1.25	0.076
	37	Faculty	5	0.304
	38	Faculty	1.25	0.076
	39	Faculty	2.5	0.152
	40	Faculty	1.25	0.076
	41	Faculty	0.625	

	42	Faculty	2.5	0.152
	43	Faculty	7.5	0.456
	44	Faculty	2.5	0.152
	45	Faculty	1.25	0.076
	46	Faculty	5	0.304
	47	Faculty	6.25	0.380
	48	Faculty	3.75	0.228
	49	Faculty	1.25	0.076
	50	Faculty	7.5	0.456
	51	Faculty	2.5	0.152
	52	Non-Teaching	1.25	0.076
	53	Non-Teaching	3.75	
	54	Non-Teaching	12.5	0.760
	55	Non-Teaching	1.25	0.076
	56	Non-Teaching	5	
	57	Non-Teaching	5	0.304
	58	Non-Teaching	6.25	
	59	Non-Teaching	3.75	0.228
	60	Non-	8.75	0.532

Teaching	
Total Scope-03 Emissions = 16 tCO ₂	
Total CO₂ emissions for financial year 2018-19 = Scope-01 + Scope-02 + Scope-03 émission = (6 + 54 + 16) tCO₂ = 76 tCO₂ Carbon Credits Purchased from the VCS Registry 125 tCO₂	
Reference: https://vcsregistry2.apx.com/myModule/rpt/myrpt.asp?r=206&h=18325	
 The screenshot shows the VCS Registry website interface. At the top, there are logos for APX VCS Registry and VCS. Below the navigation bar, a table titled 'Retired VCs' is displayed. The table has 16 columns: From Vintage, To Vintage, VCU Serial Numbers, Quantity of VCs, Registry ID, Project Database ID, Project Name, Project Type, Additional Project Certifications, Additional Issuance Certifications, Origination Program, Project Site State/Province, Project Country, EMA Project Page, Account Holder, Retirement Reason, Beneficial Owner, and Retirement Reason Details. A single row of data is visible, representing a retirement of 125 VCs from the Adani Enterprises Limited Solar PV Power Project in Gujarat, India, for the session 2018-19.	

12. Waste Management

How the college reduces its paper waste via: - o encouraging digital reading, note-taking, and activities? - o setting printers and computers to default to duplex (double-sided) printing? - o reducing margins and white space on documents that must be printed? - o printing multiple pages per sheet? - o minimizing paper correspondence with families? - o opting out of unwanted mail? Is the college undertaking recycling collection for	• The class room and labs are well ventilated and spacious. This minimizes suffocation to students by improving air changes and hence the air quality. • The college has adopted the duplex printers, which enables the complete usage of the paper areas • The internal correspondences and various functionalities are taken care by the electronic
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additional recyclable materials—like plastic bags, CFL (spiral) light bulbs, batteries, drink pouches, candy wrappers, and electronics?

means like emails, sms and whatsapp. The recycling/ disposal system adopted by the college is as below.

Different types are generated within campus which include

- **Canteen Waste:** Nagpur Municipal Corporation handle the canteen waste. It is authorized government functionality for waste disposal.
- **E-Waste:** The E-waste generally includes the tube-lights, CFL, LED, electronic waste etc are stored into the scrap room of college and stored. MoU is signed with “**Guddu All Computer Scrap**” for e-waste handling and purchase of electronic scrap.
- **Bio-Medical Waste Handling:** The bio-medical wastes are handled by SUPERB Hygiene Disposals. Furthermore, incinerator is installed in the girls common room for disposal of sanitary waste. This allows disposal without any foul smell.
- **Recycling of RO Waste Water:** The waste water from RO is recycled for garden use.

Please refer Annexure XII and XVI for details.

13. Plantation by College

<i>Name of Trees/saplings/plants¹⁴</i>	Type	Quantity
Oxalis	Herb	Many
Mimosa pudica	Herb	1
Ocimum sanctum	Herb	25
Pentascarnea	Herb	3
Cordyline fruticosa	Herb	1
Tradascantia	Herb	3
Chrysanthemum	Herb	3
Coleus	Herb	3
Aglonema	Herb	2
Catharanthus roseus	Herb	2
Tridax	Herb	13
Draceana	Shrub	2
Hibiscus rosa-sinensis	Shrub	6
Ixora	Shrub –	4
Vitex nigundo	Shrub	1
Thujasp	Shrub	3
Cycas revoluta	Shrub	1
Cestrum nocturnum	Shrub	1
Adhatodavasica	Shrub	1
Jatropacurcas	Shrub	1
Nerium	Shrub	4
Azadirectaindica	Trees	1
Mangiferaindica	Trees	3
Cassia siamea	Trees	1
Ficuselastica	Trees	1
Royal palm	Trees	9
Bauhunia variegata	Trees	1
Casuarina	Trees	2
Bixaorellana	Tree	1
Gulmohar blue	Trees	1
Cynodondictylon	Grasses	Many
Bougainvillea	Climber	1
Asparagus	Climber	1
Euphorbia milli	Xerophytes	5

¹⁴ As per College Records.

Aleovera	Xerophytes	25
Opuntia	Xerophytes	1
Bryophyllum	Xerophytes	2
Croton	Xerophytes	4
Terminalia bellerica	Medicinal Plant	01
Mimosa pudica	Medicinal Plant	02
Cymbopogon citratus	Medicinal Plant	01
Adhatodavasica	Medicinal Plant	1
Kadulimb		32
Ashoka		28
Wad		13
Pimpal		17

Annexures

Annexure – I: List of Interviewed College / Students

Sr. No	Interviewee	Designation
1	Dr. Priya D. Wanjari	Off. Principal
2	Dr. Neehal R. Sheikh	IQAC Coordinator
3	Dr. Shrikant Pajankar	Faculty-In-Charge
4	Shri. Jagdish Watmode	NSS Programme Officer
5	Shri. Sachin Mishra	Faculty
6	Shri. Amit Rehpade	Faculty-In- Charge (Comp. Sci)
7	Shri. Nikhil Khandar	Faculty
8	Shri. Sushil Gedam	Faculty
9	Dr. Rajita Lonare	Faculty
10	Dr. Priya Dhote	Faculty
11	Smt. Vidya Banait	Faculty
12	Smt. Archana Sathe	Faculty
13	Smt. Anuja Kotia	Faculty
14	Shri. Madan Bhasme	Head Clerk
15	Shri. Shailesh Bhujade	Canteen Manager
16	Ms. Dhanshri Anthankar	Student and Member Green Campus commmitte
17	Shri. Atish Thool	Student and Member Green Campus commmitte

Annexure –II: Reference Documents / Surveys

Sr. No	Reference Documents / Surveys pertaining to
1.	Functionality of RO water plant
2.	Utilization of RO reject water for gardening
3.	Roof top area by College
4.	Setup for Water Harvesting
5.	Information regarding Canteen Compost Management
6.	Information regarding Garden Waste Management
7.	Information regarding Liquid Waste Management
8.	Measures for maintaining Cleanliness in Campus.
9.	Measures for Garbage Collection and disposal
10.	Plantation Measures
11.	Measures for construction waste management (use of construction waste for filling purpose.
12.	Electricity Bills for duration of April 2017 to March 2018
13.	Green Campus Committee composition
14.	Declaration on Operational Controls Of System Department With Respect To IT Management & Other Electronic Equipments.
15.	Roll Of Staff, Students & Management to Save Electricity In Campus.
16.	Lighting Survey undertaken by the Green Audit Team
17.	AC Survey undertaken by the Green Audit Team
18.	Water Harvesting Survey undertaken by the Green Audit Team
19.	Waste Water Management Survey undertaken by the Green Audit Team

20. Water consumption bills from NMC

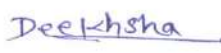
Annexure –III: Green Campus Committee¹⁵

¹⁵ http://santajicollege.ac.in/administrator/img/pdf/Green_comittee.pdf

Santaji Mahavidyalaya, Nagpur

Meeting of Green Campus Committee

The meeting of Green Campus Committee was held on 16/07/2018 at the office of Dr. Priya Wanjari, Principal at 11 am. Following members attended the meeting-

1. Dr. Priya D. Wanjari, Principal- Chairperson- 
2. Ms. Dhanshri Authankar- Member- 
3. Mr. Abhishek Thakre. - Member- 
4. Mr. Atish. B. Thool- Member- 
5. Ms. Harsha Kanojiya- Member- 
6. Shri Madan Bhasme- Member- 
7. Shri. Shailesh Bhujade- Member- 
8. Ms. Deeksha Kamble- Member- 
9. Mr. P. V. Ravi Rajan- Member- 
10. Dr. Neehal R. Sheikh- Member Secretary- 

AGENDA-

- a. Review of Green Audit Report.
- b. Programmes to be designed and implemented.
- c. Tree Plantation and Environment related Activities
- d. Any other matter with the permission of the Chairperson

Annexure –IV: List Awareness Program undertaken by College



Cleanliness Drive By Students In College Campus



Cleanliness Drive By Students In College Campus



Cleanliness Drive By Students In College Campus



Tree Plantation



Tree Plantation



Tree Plantation



Wild Life Conservation Posters made by Students



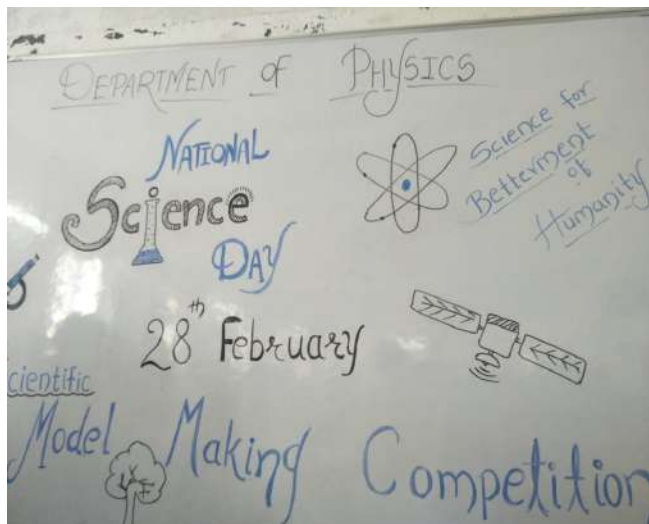
Wild Life Conservation Posters made by Students



Wild Life Conservation Posters made by Students



Wild Life Conservation Posters made by Students



Science Day Celebration



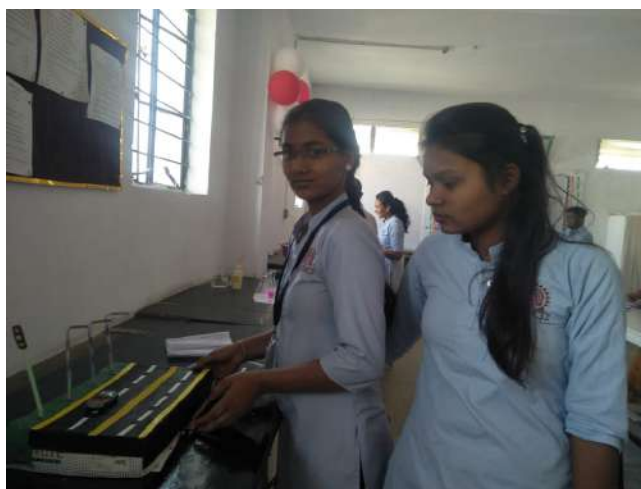
Science Day Celebration



Science diagram made with Rangoli



Science Model Making



Science Model by Students



Models Prepared By Students



Models Prepared By Students



Active participation by students



Blood Donation activity



Blood Donation Camp Under NSS

Annexure –V: Lighting Survey

List of Assumptions:

- During the survey specific hours for each class room was assessed and accordingly average daily hours is calculates under column "Hours"
- The kW ratings of the installed lights is taken from the College data
- The calculations cover the two approaches
 - Approach 01: Calculation of LED contribution amongst the energy efficient lighting options i.e. CFL and LED
 - Approach 02 : Calculation of LED contribution based on the total lighting load
 - **Note: The Lumen/Watt for 28 W tube light is up to 110; which is almost same as LED is: 110-120¹⁶**
 - The Green Audit Team acknowledges the criteria for introduction of LED lights as LED lights do not have disposal problems. Tube lights face problem of mercury contamination.
 - Conversely the college also faces the same problem of disposal of existing tube lights. The sudden disposal of tube lights on large scale and within their service life will lead to huge amount of e-waste which has critical impact on environment. The college management is thus looking for the replacement policy and lighting (tube light, CFL) will be upgraded to eco-friendly LED after failure of existing lighting system.

Particular	Tube-lights	CFL s	LED Lights
Number of Lights	138	27	57
wattage	40,20	15, 36	18,20

¹⁶ <https://www.google.co.in/amp/s/www.bijlibachao.com/lights/comparing-led-lights-with-fluorescent-lights.html%3fisamp=1>

Annexure –VI: Undertaking by the System Department regarding control of Electronic Equipments



Shri Santaji Shikshan Vikas Sanstha's
SANTAJI MAHAVIDYALAYA
(Affiliated to Rashtrasant Tukdoji Maharaj Nagpur University)
ACCREDITED "B" GRADE BY NAAC
website : www.santajicollege.ac.in

Jawaharlal Nehru Marg, Nagpur - 440015. Ph. : (O) 0712-2283953

From : Principal

Date : 06/04/2018

No.

To,

To Whomsoever it May Concern

The System Department Confirms that

There are total 55 number of monitors in college. The Department wise Breakup is given as

Appendix-1

The administrative rights of the computer settings are with the System Department. As part of the sustainable and eco-friendly setting the System Department has initiated below settings in the computes of all the users:

- We have disabled computer screen savers
- When the computers are idle for 5 minutes they are turned into the sleep mode
- The computer settings can not changed permanently as the Administrative Rights are with the System Department

With regards to the usage policy of photocopiers, fax machines and other equipment users "POWER ON" when in use and "POWER OFF" when not in use.

This Statement is issued in response to the Query raised during "Green Audit".

Head Of The Department,

Date: 06-04-2018

Annexure –VII: Water Quality Reports

SantajiMahavidyalayaNagpur-15

Water analysis report

Introduction

Our college provides RO (Aqua Fresh 50 LPH R O water purifier) for drinking purpose. This RO is connected to Muncipal corporation water supply.

Protecting the health of our students and staffs is a top priority of our college. We moved quickly to remedy each problems identified before college started water analysis can be done.

Testing procedure and parameter may be grouped in to physical,chemicalbacteriological and microscopic categories.

- Physical test indicates the properties detectable by the senses.
- Chemical test determined the amount of mineral and organic substances that effects the water quality.
- Bacteriological test show the prensence of bacteria and pollution.

Report for Water analysis

Physical tests

Colour :

Colour in water may be cause by presence of mineral such as iron and magnesium or by the substance of vegetable origins such as algae and weeds.Colour test indicates the efficiency of the water system.

By observing the colour of water sample from RO it is colourless.

Turbidity:

Turbidity in a water is because of suspended solids and colloidal matter. It may be due to eroded soil caused by dredging or due to the growth of micro-organisms. High turbidity makes the filtration expensive. If sewage solids are presents, Pahtogens may be encased in the particals and escapes the action of chlorine during disinfections.

By observing we found that no turbidity was present in water sample.

Odour and test:

Odour and test associated with the presence of of living microscopic organisms or decaying organic matter including weeds algae or industrial wastes containing ammonia, phenols, halogens and hydrocarbon.

By observing we found that no odour and proper taste present in water sample.



AQUA FRESH 50 LPH R O WATER PURIFIER

Chemical test was done by following parameters

Parameter	Source of cause	Significance	WHO range	Observed range
PH	PH is lowered by acids & acids generating salts & free carbondioxide.	PH is measured the acid quality of water. Water with pH below 7 is normally harmful	6.5 to 8.5	6.9
Conductivity	Is an indicator of the dissolved mineral contents of water mostly calcium carbonate & another dissolved salts.	Is measured of the electrical conductivity of water & varies with amount of dissolved solids.	0-0.5 ms/cm Good 0.5-1.5 ms/cm Normal >1.5 ms/cm High	0.85 ms/cm
Hardness	Caused by the presence of Ca & Mg	Hard water forms kidney stones.	0-60 mg/l Soft 61-120 mg/l Moderate 120-180 mg/l Hard >181 very hard	115 mg/l
Chlorides	Dissolve forms rocks & soil.	When combined with sodium gives salty taste to drinking water	300 mg/l	258 mg/l
TDS	Dissolved mineral contents from various rocks formation	Considered general indicator of quality of water.	500 mg/l	320 mg/l

Conclusion:

From above physical and chemical testing water sample RO (Aquaguard Reviva 50 LPH basic) our college is good for drinking purposes.

Dr. Mansha R. Jainwal
(M. Jaiswal)

Annexure –VIII: List of Electronic Equipments in College

Sr. No	Particulars	Value
1	No. of Computers	55
2	Laptop	Sony E series, Intel core i3, RAM 3GB, Windows7 home basic, HDD 320GB
3	Speaker	02
4	Printers	• Dot Matrix (80cols.) 03 • HP Laser jet 1020 plus (B&W) 01 • HP Laser jet P1007 (B&W) 01 • HP Desk jet ink 2010 (color) 02 • HP Desk jet ink 2050 (color) +scan 01 • Canon (copy, scan, fax) 01 • HP Laser Jet M1213NFMF all in one 01 • Brother Laser HL-3221D(two way) 01

Annexure –IX: Solar Panel Installations



Solar Panel I



Solar Panel II



Solar Panel III



Solar Panel IV



Solar Panel V



Solar Panels



Solar Panels



Solar Light Used In Campus



Solar Light Used In Campus



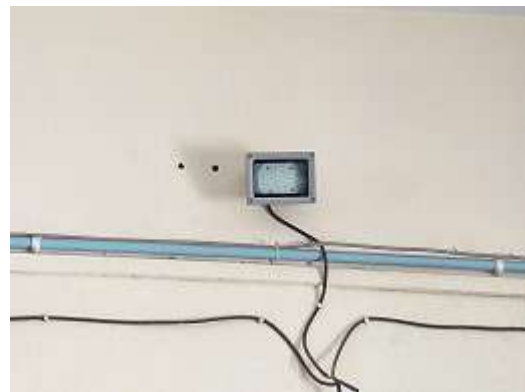
Solar Light Used In Corridors



Solar Light Used In Corridors



Solar Light Used In Office



Solar Light Used In Office

Annexure –X: Water Distribution Data

Month	Water Consumption in 1000 Litres
Apr-18	71
May-18	72
Jun-18	102
Jul-18	109
Aug-18	62
Sep-18	59
Oct-18	65
Nov-18	272
Dec-18	149
Jan-19	278
Feb-19	158
Mar-19	220

Annexure –XI: Solar Passive Structure



False Ceiling at computer laboratory



FL Tube Lights Replaced By LED Lights



Placing the Condenser in shade reduces condenser pressure and hence compressor work



FL Tube Lights Replaced By LED Tube Lights



Condensers installed in Shade that reduces condenser pressure and hence compressor works



Adequate Light In Classrooms

Annexure –XII: Water Management



Rain Water Harvesting system



Rain Water Harvesting Valve



NMC Water Meter



AC Condensed Water used for gardening



Pipeline used to supply AC Condensed water to trees



Toilets with simple taps



New taps installed in toilets

Annexure –XIII: Waste Management



College Waste collected in dust bins



College Waste Given To NMC



Bins Used To Collect College Waste



Compost Pit

Annexure –XIV: Awareness



Save Electricity Awareness



Save Electricity Awareness



Save Water Posters



Awareness Drive For Cleanliness



Save Wildlife Posters



Cooler used for Staff room cooling



Cooler used for Office cooling

Sanitary Napkin Vending Machine



For Girl Students

Sanitary Pads Vending Machine For Girls



Incinerator machine for disposal of sanitary waste

Annexure –XV: Snapshot of annual rainfall data, Grid Emission Factor

Table 3: Rainfall data of Nagpur District (2002-2011)

Taluka	In mm										Average
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Nagpur city	1176.1	1431.5	702.3	973.4	975.7	741	952.9	954.4	1395.3	879.4	1018.2
Nagpur gramin	966.7	1229	689	1274.7	1205.5	966.3	953.2	947.4	1494.7	913.8	1064.0
Kamthli	1035.8	1208.7	707.1	1475.8	1178.2	1205	791.6	1032.6	1098.6	861.3	1059.5
Hingni	479.2	770	583.3	920.4	814.9	806	683.1	724.7	942.2	814.8	753.9
Ramtek	1101.3	822.5	733.9	1435.5	1133	1370.8	865.3	905.2	1184	885.1	1043.7
Parshiwani	850.1	1056.9	858.4	1239.5	1106.2	878.8	1068.6	983.6	1086.6	1043.8	1017.3
Maudha	904	1171.6	631.3	1679.1	1114.3	1030.9	814.1	1280.4	1520.5	1366.2	1151.2
Katol	649.6	920.1	555.1	1092.3	937.4	1271.8	773.2	888.4	1027.9	801.8	891.8
Narkhed	822.8	778	606.7	914.9	768.6	1281.3	671	954.1	1136.9	764.9	869.9
Savner	823.6	1063.6	812.6	1497.2	974.1	1209	873.6	941.6	1078.4	945.8	1022.0
Kalmeshwar	740	1092.9	808.6	1320.9	916.4	1203.4	675.9	780.5	1180.5	855.2	957.4
Umrer	846.2	1296.8	747.1	1856.3	1014.2	1464	1060.36	926.2	1551.2	887.1	1164.9
Bhiwapur	923.3	1146.3	740.4	1431.2	1045.6	1341.8	853.2	993.7	1690.1	1088.4	1125.4
Kuhi	859.2	1057.2	596.4	1543.8	828.6	1286	817.9	950.3	1291.5	1024.7	1025.6
Average	869.9	1074.7	698.0	1332.5	1000.9	1146.9	846.7	947.4	1262.7	938.0	1011.8

(Source: www.agri.mah.nic.in)

CEA Database Version-14

CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE

VERSION	14.0
DATE	Dec 18
BASILINE METHODOLOGY	ACM0002 / Ver 17.0 and "Tool to Calculate the Emission Factor for an Electricity System", Version 6.0

Emission Factors (tCO ₂ /MWh) (incl. Imports)	2017-18
Weighted Average Emission Rate (2)	0.82



Ref.: SHD/NGP/C004/19

Date: 08/04/19

CERTIFICATE

To Whomsoever It May Concern

This is to certify that, M/s. Santaji Mahavidyalaya, (Memb.No.C01262) (Department of Microbiology & Biotechnology & Chemical Hazardous) located at Wardha Road, Nagpur is a regular member of Common Bio-Medical Waste Disposal services since June 2016.

For, Superb Hygienic Disposals,



ARM

Authorised Signatory.

C.J. Forever, Plot No. 50-A, 4th Floor, C.B. Road, Bajaj Nagar, Nagpur MH India 440010.

Off : 99229 41639 | 88888 11958 | www.superbgroup.in | E : superb_bmw@rediffmail.com | info@superbgroup.in

M. : 9579183205

GUDDU ALL COMPUTER SCRAP

All Old Computer Scrap, Monitor, Motherboard, CPU & Battery, A/C

Nal Sahab Road, Qasabpura, Mominpura, NAGPUR-440018

Ref. No _____

Date : 15/10/2018

To,

Principal,
Santaji mahavidhyalaya,
Sneh Nagar,
Wardha Road,
Nagpur.

Purchase Letter for Computers Scrap

Dear Sir/ Madam,

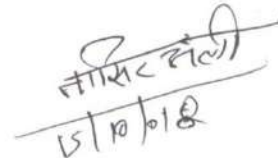
We are accept all computer scrap form your college as it conditions, total amount of these scrap is 11500/-(paid by cash). If any parts of these computer scrap is dead or unused conditions we will not return it.

Materials details is given below,

1. Computer CPU x 15
2. CRT Monitor 15" x 10
3. CRT Monitor 17"x5
4. LCD Monitor 15"x2
5. CRT Monitor 14" x 5
6. Keyboard x 19
7. Mouse x 22
8. UPS x 2
9. Cabinates x 5
10. HDD x 4
11. Freez cover x1

Place: Nagpur

Date: 15- oct -2018


15/10/18

Notes:

