



"Dissemination of Education for Knowledge, Science and Culture."  
- Shikshanmaharshi Dr. Babuji Salunkhe



SHRI SWAMI VIVEKANAND SHIKSHAN SANSTHA'S  
**VIVEKANAND COLLEGE, KOLHAPUR (EMPOWERED AUTONOMOUS)**

2130, 'E' Ward, Tarabai Park,  
Tal. Karveer, Dist. Kolhapur - 416 003.  
Affiliated to Shivaji University, Kolhapur (M.S.)

NAAC Reaccredited : "A" (CGPA - 3.24 in 3rd Cycle)  
College with Potential Excellence by U.G.C., New Delhi  
"Star College" by D.B.T. Govt. of India  
ISO 9001 : 2015

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## 7.1 Institutional Values and Social Responsibilities

### 7.1.4 Water conservation facilities available in the Institution

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PRINCIPAL  
VIVEKANAND COLLEGE, KOLHAPUR  
(EMPOWERED AUTONOMOUS)

# **Green Audit 2015-20**



In. College Regd. No. 1152/JL074/3-2011-14-6-2010  
In. College Code No. 23-01-002

“ ज्ञान, विज्ञान आणि सुसंस्कार यांच्या शिक्षण प्रसार ”  
श्री. विठ्ठलरावजी जी. बापुजी साकुंबे

ESTD. 1993



Shri Swami Vivekanand Shikshan Sanstha's  
**VIVEKANAND COLLEGE, KOLHAPUR [Autonomous]**

(Affiliated to Shivaji University, Kolhapur)

NAAC Accredited - "A" with CGPA 3.24  
College With Potential For Excellence  
ISO 9001-2015



# GREEN AUDIT REPORT (2015-2020)



**Prepared and Certified By**  
Department of Environment Management  
**CHHATRAPATI SHAHU INSTITUTE OF BUSINESS  
EDUCATION AND RESEARCH (CSIBER),**

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Dr. V. B. Patil, Prof. Ms. R. C. Padalkar, Dr. P. M. Patil

2021

## GREEN INITIATIVE REPORT

(ENVIRONMENT AUDIT, ENERGY AUDIT AND GREEN AUDIT)

SHRI SWAMI VIVEKANAND SHIKSHAN SANSHTHA'S  
VIVEKANAND COLLEGE, KOLHAPUR  
(AUTONOMOUS)  
(Affiliated to Shivaji University, Kolhapur)  
NAAC Accredited with 'A' Grade, with CGPA 2.34,  
College With Potential For Excellence (CPE), ISO 9001: 2015



DEPARTMENT OF ENVIRONMENT MANAGEMENT  
CHHATRAPATI SHAHU INSTITUTE OF  
BUSINESS EDUCATION AND RESEARCH (CSIBER), KOLHAPUR



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2021





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**CHHATRAPATI SHAHU INSTITUTE OF BUSINESS EDUCATION  
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An Autonomous Institute under UGC, New Delhi and Shivaji University,  
College with Potential for Excellence (CPE) III<sup>rd</sup> Phase  
Reaccredited by NAAC with 'A+' Grade (CGPA 3.55)

**CERTIFICATE**

This is to certify that, the Green Initiative Report (Green Audit, Energy Audit and Environment Audit) of Vivekanand College Kolhapur has been prepared and certified by the Department of Environment Management based on the documents produced by the College.



Prepared by :

**Dr. V. B. Patil**  
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**Er. D. S. Mali**  
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**Date: 14/09/2021**

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**CHAPTER-1: INTRODUCTION****1.1 About College:**

Vivekanand College, Kolhapur which was established in 1964 is known as one of the best quality colleges in Maharashtra. The U.G.C. granted autonomy to this college from the academic year 2018-19. About 8000 students are enrolled every year for various programmes. Besides the conventional programmes like B.A., B.Com. and B.Sc., the college offers the professional programmes like B.B.A., B.C.A., B.C.S., B.Sc. (Biotechnology), B.Sc. Microbiology, B.Voc. , Community College and M. B. A. The college also provides opportunity to undertake degrees like B.A., B.Com., B. Sc., B. Lib., M. Lib. and M.B.A. of YCMOU, Nashik.

Dr. Bapuji Salunkhe alias Govindrao Dnyanojirao Salunkhe, the great visionary educationalist founded Shri Swami Vivekanand Shikshan Sanstha, Kolhapur in 1954 which is catering the education needs of students belonging to 11 districts of the State of Maharashtra.

The college has also acquired reputation in the fields of dance, drama, music, other arts and sports, besides academics. The college has been securing the first place for last twenty years by winning maximum number of Shivaji University Merit Scholarships. The faculties of the college are not only excellent in teaching but also in research. Till date in all 27 minor and major research projects are undertaken by the faculties.

The college has won the ‘Meghnath Nageshkar Trophy’ of Shivaji University for the Best College in the field of Sports for eleven years continuously. Sandip Tarate and Snehankita Varute are the recipients of the “Chhatrapati Shivaji Award”. Rahi Sarnobat is the winner of the Asian Games held in Indonesia in August 2018. Rahi Sarnobat and Veerdhaval Khade represented India in ‘London Olympics-2012, which is a historic record as both belong to the same college. Till date the college has produced more than 250 national and 10 international sports persons.

The college has also proved its talent in the field of cultural activities by winning General Championship in the Central Youth Festival of the university for seven consecutive years. Our student Usha Jadhav, a film actress, is the winner of ‘The Best Actress National Award-2013’ for her performance in Marathi film ‘Dhag’. Presently, our three girl students are heroines in the five different Marathi films.

Placement Cell is very active as during last five years 537 students are placed in the various organizations like Wipro, Infosys, TCS, Patni Computers, Eton, Reliance Insurance, Federal Bank and South Indian Bank. The students are also guided for State Civil Services examinations at our Competitive Examination Guidance Centre which has produced more than 100 officers during the last five years.

Considering the strengths of the college, the NAAC, Bangalore has reaccredited the college with ‘A’ Grade. The college is identified twice as the “College with Potential for Excellence” by the UGC, and included in “The Star College Scheme” by the DBT, Govt. of India.

**UG & PG Programmes run by Vivekanand College Kolhapur:**

**Table. No. 01: UG & PG Programmes run by Vivekanand College, Kolhapur:**

| Arts & Commerce | Science       | Self Supporting | P.G. Courses       |
|-----------------|---------------|-----------------|--------------------|
| Marathi         | Physics       | B.B.A.          | M.Sc.(Org.Chem)    |
| Hindi           | Chemistry     | B.C.A.          | M.Sc.(Mathematics) |
| English         | Mathematics   | B.C.S.          | M.Sc.(Physics)     |
| History         | Statistics    | Library Science | M.Com.             |
| Geography       | Electronics   | B.Voc.          | M.B.A.(S.U.)       |
| Sociology       | Comp.Science  |                 | M.B.A.(Y.C.M.O.U.) |
| Economics       | Botony        |                 | M.Lib.&Inf.Sci.    |
| Pol.Science     | Zoology       |                 |                    |
| Home Science    | Microbiology  |                 |                    |
| Commerce        | Biotechnology |                 |                    |

The college has always focused on co-curricular activities along with academic programmes. Students and faculty members participated in various social and environmental awareness programmes like Tree plantation, No Vehicle Day, Cleanliness Activities and other cultural activities.

**Table No.2: Students enrollment for academic year-2020-21**

| Junior College | Senior College | Total |
|----------------|----------------|-------|
| 3388           | 4295           | 7683  |

**Table No.3: Teaching/Non-teaching Staff**

| Teaching | Non-Teaching | Total |
|----------|--------------|-------|
| 215      | 131          | 346   |

### 1.2 Vision of the College:

Vivekanand College will be an educational center devoted to the dissemination of “**Education for Knowledge, Science and Culture.**”

### 1.3 Mission of the College:

Mission of the college is to strive hard to realize the vision of our founder Dr. Bapuji Salunkhe i.e. to make education accessible to the masses, and to mold responsible citizens by inculcating noble values and a thirst for knowledge.

### 1.4 Goals and Objectives of the College:

1. To provide equal opportunity of quality education to all by means of sheer hard work, dedication and devotion.
2. To promote scientific attitude and inculcate cultural values into the students.
3. To enhance the commitment of faculty, staff and students towards diversity, social justice, truth, honesty, character and democratic citizenship.
4. To aim at overall personality development through various activities.
5. To provide a platform to develop skills necessary to grab new opportunities and face challenges in the ever-changing society.
6. To provide a substantive, supportive, safe, affordable and accessible teaching-learning environment.
7. To motivate the teachers and students to attain community and social development through various activities.

The vision and mission statements of the college are clearly indicative of the objectives of the National Policy on Education demanding that centers of higher education should perform multiple roles like creating new knowledge, acquiring new capabilities and producing an intelligent human resource pool, through teaching, research and extension activities. The college plans and executes its curricular, co-curricular and extracurricular activities to translate the vision and mission statements into reality.



### 1.5 Environmental Policy:

Vivekanand College is aimed at balancing environmental protection and the conservation of natural resources with other policy goals, such as affordable energy, air and drinking water quality monitoring, rainwater harvesting. Green Campus Committee of the college has established clean and green campus with awareness and protection and in fulfilling sustainable development goals set forth to implement environmental policies given by government from time to time.

### 1.6 Motto of the Vivekanand College, Kolhapur:

“Dnyan Vidnyan ani Susanskar Yasathi Shikshan Praser” (The spread of education is with a view to diffusing knowledge, science and bud breeding) is the motto of the sanstha. Bapuji defines “dnyan as the knowledge of truth, character, integrity, demolition of the exploitative tendencies, service and dedication. “vidyan consists in the application of the aforesaid principles to life which, in turn will lead to good breeding.

### 1.7 Logo of the Vivekanand College, Kolhapur:



**Table No. 4 Name and Address of the Institution:**

|         |   |
|---------|---|
| Name    | Shri Swami Vivekanand Shikshan Sanshtha's<br>Vivekanand College, Kolhapur<br>Affiliated to Shivaji University Kolhapur, Autonomous, NAAC<br>Accredited with 'A' Grade, with CGPA 2.34,<br>College With Potential For Excellence (CPE), ISO 9001- 2015 |
| Address | 2130, E Ward, Tarabai Park, Kolhapur, Maharashtra 416003  |
| City    | Kolhapur  |
| E. Mail | info@Vivekanandcollege.org  |
| Website | http://www.Vivekanandcollege.org  |

**Location:**

|                           |          |
|---------------------------|----------|
| Location                  | Urban    |
| Campus area               | 7.0 Acre |
| Built up area in sq. mts. | 4775.63  |

**Coordinates:** 160 42`17" N 740 13'44.9" E



**Plate No.01: The Google Earth Image of the Vivekanand College, Kolhapur**

**1.8 Infrastructure:****1. Buildings:**

- a. Senior College: 37 Classrooms
  - b. Junior College: 13 Classrooms
  - c. Biotech, B. Voc. & B.C.S. Building: New Building 4 Classrooms
  - d. Separate Library: 3 storied building with 8800 sq. feet area
  - e. Auditorium: One Auditorium having 1500 seating capacity, one auditorium/Seminar hall in the library.
- 2) Number of Classrooms: 50
  - 3) Library having multi-storeyed building:
    - No. of Books - 1,08,542
    - Periodicals - 107
    - Reprographic Centre
    - Internet Facility for students
  - 4) Drinking Water Facility: Four water coolers with aqua guard
  - 5) Four separate washrooms for girls and boys
  - 6) Playground
    - Area - Playground: Length - 85.60 meter X width - 32.00 meter
    - Indoor Facility - Table Tennis, Badminton, Carom, Chess, Wrestling, Judo, Yoga, etc.
    - Outdoor Facility - Volley Ball, Basketball, Kabaddi and Kho-Kho ground
  - 7) Separate Gymnasium hall for boys and girls
  - 8) Labs for Science Departments – 20 numbers
  - 9) Four Computer Labs having 255 computers
  - 10) Separate Ladies room
  - 11) Two separate hostel buildings for girls - Intake capacity 200 girls
  - 12) Separate Canteen, health centre
  - 13) Separate Auditorium having 1500 intake, Mini theatre



**CHAPTER-2: GREEN AUDIT****2.1 Conceptual Framework:**

Green Audit is the process of assessing the environmental impact of an organization, process, project, product, etc. Green means eco-friendly environment. Schools and Colleges are playing a key role in development of human resources worldwide. Higher education institutes run various activities with aim to percolate the knowledge along with practical dimension among the society. Likewise, higher education institutes/colleges are also try to give different technological solution for issues related to environment. Types of evolutionary methods used to assess the problem concerning environment, includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green Audit, etc.

Green audit is a tool to assess general practices implemented by organization in term of its impact on environment. Green audit shows strength and weakness of organization towards conservation of environment. It also pinpoints the adverse practices of natural resources utilization. It shows the path to build, implement and test new innovative system for better utilization of natural resource and minimization of waste generation. It helps to achieve the goal of college to become a role model in higher education of sustainable campus in environmental views. Green audits are useful to ensure that their environmental performance is in compliance with applicable laws and regulations, to identify potential liabilities, to align with environmental performance with their stated goals and strategy, to identify opportunities to reduce costs or increase revenue, to improve process and materials efficiency, and in response to stakeholder's requests for increased disclosure.

Environmental audits are the tools that organizations use to identify their full range of environmental aspects and impacts. It also serves as a means to identify opportunities to save money, enhance work quality, improve employee health and safety, reduce liabilities, and achieve other forms of business value.

Recently, increased attention has been paid towards environmental auditing by companies, government agencies and academic organizations. The recent growth of environmental auditing fits with a variety of business and social trends.

In keeping with the need of the National interest of Swachta and Swastha Bharat, Vivekanand College, Kolhapur is well aware about environmental issues and has gone through its environmental audit for better understanding of environmental aspects and impacts of the activities carried out in the College campus on the environment.

### 2.2 Objectives of Green Audit:

- To implement *Go green* policy for Environment Management in the campus.
- To identify opportunities to save and conserve energy.
- To see that proper steps have been taken to maintain sustainability and to prevent adverse effects of Air, Water, Noise and Solid Waste pollution on environment.
- To reduce, recycle, reuse waste and dispose waste scientifically under 5 R principles of Solid Waste Management.
- To see that proper steps have been taken for maintaining health and welfare of the students and staff of the Vivekanand College, Kolhapur.

### 2.3 Implementation of the Environmental Policy:

Vivekanand College is aimed at balancing environmental protection and the conservation of natural resources with other policy goals, such as affordable energy, air and drinking water quality monitoring, rainwater harvesting. Green Campus Committee of the college has established clean and green campus with awareness and protection and in fulfilling environmental goals and sustainable development goals set forth to implement environmental policies given by government from time to time. NSS and NCC students are frontiers and other students and staff members are supporting the implementation of the environmental policy.

### 2.4 Environment Awareness Activities:

#### 2.4.1. Tree Plantation in the college campus:

Trees give us clean air to breathe, shade and food to humans, animals and plants. They provide habitats for numerous species of fauna and flora, firewood for cooking and heat, materials for buildings and places of spiritual, cultural and recreational importance. They increase aesthetic value and scenery of an area. To make people aware about importance of tree in the economy of the nature and human lives, students and staff of Vivekanand College, Kolhapur takes efforts for plantation of trees.

Thus trees gives us host of their productive functions, protective functions and regulatory functions. As green plants are autotrophs and primary producers, they maintain biodiversity of flora and fauna of a particular area. They have great place in the economy of nature.



Plate No.02: Plantation in the college campus



Plate No. 03: Plastic free Campaign and Cleanliness drive by NCC students of Vivekanand College, Kolhapur.





**Plate No.04: Plastic free Campaign and Cleanliness drive at Jayanti Nala Kolhapur by staff of Vivekanand College, Kolhapur.**

#### **2.4.2 Workshop on Plastic Eradication and Cleanliness drive:**

Plastics are synthetic polymers of carbon and other elements with high molecular mass. Polymers are long chains of monomers. Plastics are malleable and can be converted into solid objects also. It is used in boxes, packaging, carry bags, switches, utensils, electrical wires, fire resistant fabric etc. Numerous advantages and uses of plastic is responsible for spread of plastic waste every where.

**( Annexure-I)**

It is everybody's responsibility and one should keep themselves and their surroundings clean and hygienic. It also brings good and positive thoughts in the mind which slows down the occurrence of diseases. In relation to this plastic eradication and cleanliness drives are frequently organized by college. **(Annexure-II)**



**Plate No. 05: Plastic free Campaign and Cleanliness drive near Khanvilkar petrol pump, Dasara Chowk, Kolhapur**



**Plate No. 06: Distribution of Cloth bags under Plastic-Free India Campaign, 16.1.2019**



Disadvantages of plastic bags are well known, this is the reason behind restricted use of plastic bags in most of the countries. Plastic free campaign was, organized on Jan.16, 2019. Under this activity cotton bags were distributed.

Cotton bags are made from renewable natural fibers which are strong in nature as compared to those plastic bags which are made from polyethylene which are derived from natural gas and petroleum. If we look into the process of making the plastic bags, it releases many harmful and polluted by-products into the atmosphere, which itself takes thousand years to decompose and hence is harmful for the environment. But, these cotton bags are woven from thread procured from the plants and since cotton is a plant product, it is ultimately biodegradable.

Cotton bags are thicker and can be used repeatedly as compared to the single-use plastic or paper bags. In general, cotton bags are larger than any other plastic bags, so they are capable of holding more items. Plastic grocery store bags can also be reused but only once or twice because those bags can easily damage due to overloading and cannot be reused further. Same with the paper bags, they won't get damaged or will take time to tear out but it loses its integrity if they become wet.

Nowadays, these cotton bags are in the race with other bag material alternatives to make a style statement. Shapes and sizes in cotton bags that can easily match your personal style and preferences. Cotton bags are not only used for shopping purposes, they make an attractive tote for carrying a variety of everyday items as well. People carry them in their day to day life, to classes, to their workplace or to outings. Designer cotton bags with some motivational quotes or peppy slogans can be bought from retailers or online stores, whereas some consumers sew their own personalized bags.

#### **2.4.3 Workshop on Apiculture:**

Apiculture is important and provides products such as honey and wax that are used commercially. Honeybees are responsible for pollination and thus help in increasing the yield of the several plants. Many domestic and imported fruits and vegetables and flowering food crop require pollination which is reliant on bees in total. Even if a crop is not directly pollinated by a honey bee, the crop still benefits indirectly from being in an environment in which honey bees are working, due to the increased biodiversity in the area which stimulates the crop. So honey bees are key factor for maintenance of biodiversity and for sustainability of ecosystems.

Honey has its importance in healthy foods. In addition to the honey produced by the honey bee there are also a number of valuable non-food apiary products, such as pollen, queen substance, and beeswax, many of them are used in cleaning and beauty products.



**Plate No. 07: One day workshop on Apiculture - Business Opportunities on 18<sup>th</sup> August, 2018**

**2.4.4 Weather Monitoring Station:**



**Plate No. 08: Weather monitoring station at Geography Department**

Weather Monitoring Station are facilities with instrumentation and equipment intended to measure and record different meteorological elements, such as ambient temperature, atmospheric pressure, rainfall, relative humidity and wind direction, among others, for different usages, including weather forecasting and climate study.

Meteorological stations are spread along a particular area in order to set up a network, they are placed in strategic locations for the sake of data collection, according to the ultimate objective for which the network is specifically designed.

Geography Department of Vivekanand College has Weather Monitoring Station which works on the use of solar energy through photovoltaic cells. Students of Geography Department take advantage of it for studying meteorological conditions of our area. Day to day meteorological data is displayed on Departmental board.

**2.4.5 One day seminar on cleanliness, 01-08-2018 Organized by Mr. H. P. Patil**

Cleanliness means that there is no dirt, no dust, no stains and no bad smells. The goals of cleanliness are health, beauty, absence of offensive odour and to avoid the spreading of contaminants. With the help of cleanliness, we can keep our physical and mental health clean, which will make us feel good. Cleanliness gives rise to a good character by keeping body, mind, and soul clean and peaceful. Maintaining cleanliness is the essential part of healthy living because it is the cleanliness only which helps to improve our personality by keeping clean externally and internally. With these objectives one day seminar on cleanliness was organized by Vivekanand College on August 01, 2018.



**Plate No. 09: View of Instruction board about cleanliness**

Cheap production, mould ability, light weight, resistance to corrosion and appearance and easy availability make plastic very useful, but it has many shortfalls and its harmful effects are cause of huge concern for us to save our earth and ourselves.

Disadvantages include persistence of plastic, from 400-1000 years and few types are non-degradable as well. Plastic materials clog waterways, oceans, seas, lakes etc. 1 in 3 species of marine mammals have been found entangled in marine litter. Many animals eat plastic materials and die. Over 90% of all seabirds have plastic pieces in their stomachs. Plastic is widely used in packaging. Eating food out of plastic containers may cause cancer. Both creation and recycling of plastic produce toxic gases and residues which causes air and water and land pollution. Few additives such as phthalates etc. which are added in plastics to prevent its structure may cause serious hormonal imbalance in males and females. Plastic causes many fire hazards. Its cost of recycling is also very high. So awareness about this is created in college campus with oral instructions and sign boards.

#### **2.4.6. Campus Cleanliness on 02, 03, 04 Aug, 2018**

Sanitation and neatness play an important role in our day to day routine. It is important as it prevents dangerous diseases like dengue, typhoid, hepatitis, and other diseases caused by mosquito bite, etc. Diseases like Jaundice, Cholera, Leptospirosis, Ringworm, Scabies, etc. can be spread due to eating contaminated food, drinking contaminated water or living in an unhygienic conditions. Trash also spread bad odour which is difficult to tolerate. There will also be an accumulation of trash and dirt if clean measures are not taken. So campus cleanliness drive was organized by Vivekanand College on 02- 04 August, 2018.

#### **2.4.7 Environmental Awareness: 17-09-2018**

Sustainable management of our life supporting natural resources is a need of time. Degradation of natural resources has serious environmental consequences. It may result in upset ecological cycles and ecosystem interactions. To avoid this damage to the environment Vivekanand College is continuously creating the awareness among the students and public through NSS, NCC and other various activities.

#### **2.4.8. Starting of Pollution free Panchaganga River, 22-07-2018 at Panchaganga Ghat**

Cleanliness programme was organized at Panchaganga Ghat on 22 July, 2018 by staff and students of Vivekanand College, Kolhapur.

**2.4.9. Collection of Ganesh Idol & Nirmalya**

During the celebration Gouri- Ganesh festival Idols and Nirmalya are immersed in nearby water resources like well, river and lake. This result in the deterioration of water quality. Material used for idols including colours contain harmful chemicals. There are chances of entry of these persistent chemicals in the ecosystem. To avoid these threats collection of Ganesh Idol and nirmalya is done by students of Vivekanand College every year.

**2.4.10. AIDS awareness Rally, 01-12-2018, Chhatrapati Pramila Raje (CPR) Hospital**

To avoid spread of AIDS like contagious diseases awareness rally was organized by Vivekanand College on 01<sup>st</sup> December, 2018 on the occasion of World AIDS Day.

**2.4.11. Plastic Free Awareness, January, 2019**

Disadvantages of plastic bags are well known. Plastic is responsible for environmental degradation. Human being animals and plants are affected by plastic contamination of natural resources. To avoid this campaign was organized in January, 2019 under the heading Plastic Free Awareness.



## CHAPTER-3: ENVIRONMENTAL ASPECTS

### 3.1 Energy Audit:

Energy management includes planning and operation of energy production and energy consumption units as well as energy distribution and storage. Objectives are resource conservation, climate protection and cost savings, while the users have permanent access to the energy they need. Energy management is the process of tracking and optimizing energy consumption to conserve usage in a building. The process of energy management includes, collecting and analyzing continuous data, identifying optimizations in equipment schedules, setting points and flow rates to improve energy efficiency, calculating return on investment. Units of energy saved can be metered and calculated just like units of energy delivered. Execute energy optimization as a solution, to continue energy efficiency.

Energy management is the means to controlling and reducing a building's energy consumption, which enables owners and operators to, Reduce costs – energy represents 25% of all operating costs in an office building, Reduce carbon emissions in order to meet internal sustainability goals and regulatory requirements, Reduce risk – the more energy you consume, the greater the risk that energy price increases or supply shortages could seriously affect your profitability. With energy management solutions you can reduce this risk by reducing your demand for energy and by controlling it so as to make it more predictable.

Energy is an important parameter that has to be studied while going through green audit. We use different forms of energy such as electricity, LPG, petrol, diesel, wood etc. to carry out our day to day activities. On the background of climate change and Paris Agreement, India has intended to reduce its carbon emission by various ways. Reduce, Reuse and Replace are the three R's for efficient use of energy. Electricity and LPG are the forms of energy majorly used in higher education institutes. Use of LED lights instead of incandescent lamp and tube lights is one of the important green practices followed by college. Along with use of LED lamps use of natural ventilation, natural light are useful practices to carry out in the college to reduce the use of electricity. Following is the data related to energy consumption and conservation practices analyzed under audit process of Vivekanand College, Kolhapur.



**3.1.1 Energy Consumption:**

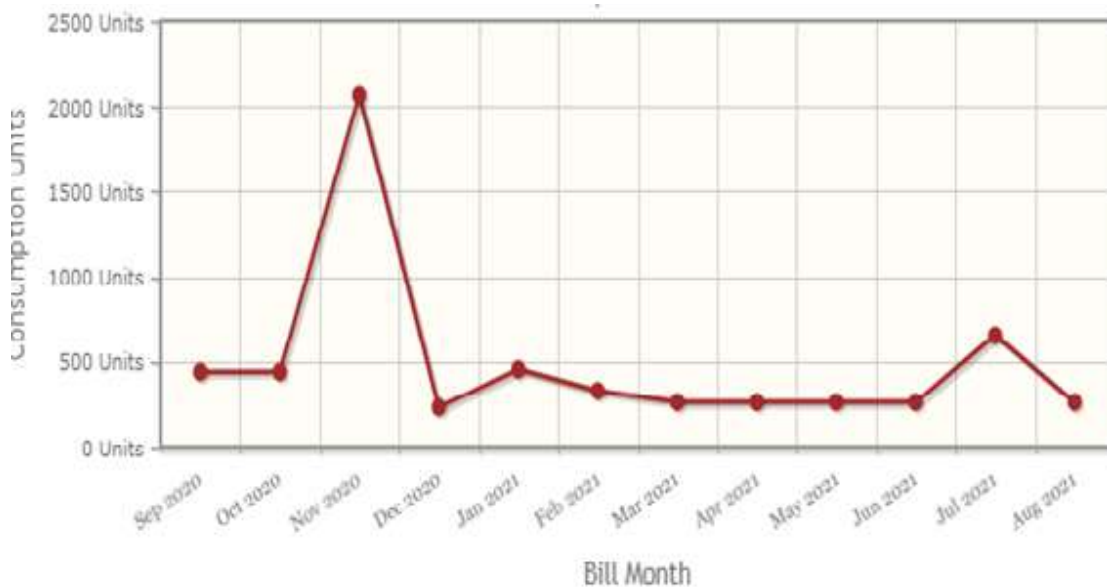
**Table - 05: Electricity consumption by Meter No. 01, 266511811601**

| Month          | Consumption (in units) | Bill amount(Rs.) | Payment Date |
|----------------|------------------------|------------------|--------------|
| Sep-20         | 1,263                  | 10,300.00        | 15-Dec-20    |
| Oct-20         | 1,263                  | 10,320.00        | 16-Oct-20    |
| Nov-20         | 4,616                  | -48,740.00       | 17-Nov-20    |
| Dec-20         | 512                    | -44,290.00       | 16-Dec-20    |
| Jan-21         | 1,290                  | -37,800.00       | 18-Jan-21    |
| Feb-21         | 802                    | -31,130.00       | 16-Feb-21    |
| Mar-21         | 697                    | -25,290.00       | 16-Mar-21    |
| Apr-21         | 1,263                  | -15,080.00       | 16-Apr-21    |
| May-21         | 1,263                  | -5,930.00        | 17-May-21    |
| Jun-21         | 697                    | -310             | 16-Jun-21    |
| Jul-21         | 1,222                  | 9,290.00         | 15-Jul-21    |
| Aug-21         | 697                    | 15,100.00        | 20-Aug-21    |
| <b>Average</b> | 1298.75                |                  |              |



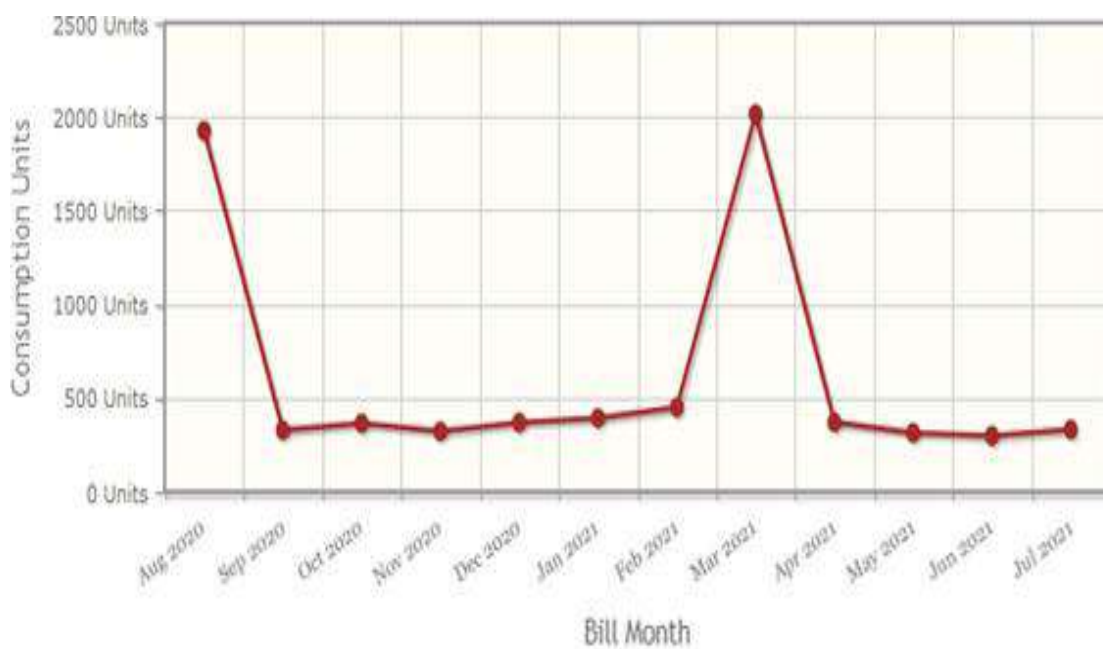
**Table - 06: Electricity consumption by Meter No. 02, 266511811597**

| Month          | Consumption ( in units) | Bill amount(Rs.) | Payment Date |
|----------------|-------------------------|------------------|--------------|
| Sep-20         | 439                     | 5,810.00         | 19-Sep-20    |
| Oct-20         | 439                     | 5,770.00         | 19-Oct-20    |
| Nov-20         | 2,067                   | -1,230.00        | 19-Nov-20    |
| Dec-20         | 229                     | 1,750.00         | 19-Dec-20    |
| Jan-21         | 454                     | 2,930.00         | 20-Jan-21    |
| Feb-21         | 327                     | 4,020.00         | 20-Feb-21    |
| Mar-21         | 260                     | -720             | 19-Mar-21    |
| Apr-21         | 260                     | 2,550.00         | 19-Apr-21    |
| May-21         | 260                     | 2,910.00         | 19-May-21    |
| Jun-21         | 260                     | 6,190.00         | 19-Jun-21    |
| Jul-21         | 654                     | 7,400.00         | 19-Jul-21    |
| Aug-21         | 260                     | 10,740.00        | 23-Aug-21    |
| <b>Average</b> | 492.4167                |                  |              |



**Table - 07: Electricity Consumption by Meter No. 03, 266511546168**

| Month          | Consumption (in units) | Bill amount(Rs.) | Payment Date |
|----------------|------------------------|------------------|--------------|
| Aug-20         | 1,925                  | 26,870.00        | 21-Sep-20    |
| Sep-20         | 327                    | 12,580.00        | 23-Oct-20    |
| Oct-20         | 364                    | 13,060.00        | 18-Nov-20    |
| Nov-20         | 321                    | 12,550.00        | 18-Dec-20    |
| Dec-20         | 368                    | 26,880.00        | 18-Jan-21    |
| Jan-21         | 392                    | 13,290.00        | 15-Feb-21    |
| Feb-21         | 449                    | 800              | 17-Mar-21    |
| Mar-21         | 2,013                  | 31,070.00        | 15-Apr-21    |
| Apr-21         | 369                    | 13,440.00        | 17-May-21    |
| May-21         | 313                    | -36,940.00       | 19-Jun-21    |
| Jun-21         | 297                    | -23,580.00       | 22-Jul-21    |
| Jul-21         | 331                    | -12,720.00       | 26-Aug-21    |
| <b>Average</b> | 622.4167               |                  |              |



Electricity supplied from the Maharashtra State Electricity Board (Mahavitaran) is the main source of energy for the activities on the campus like illuminating rooms, operating fans computers, instruments, motor and for water coolers. It is depicted from above tables and graphs that the average electricity consumption by college is 804.5 unit per month. Diesel operated Green power Kirloskar generator is used as an alternating source of Energy during emergency conditions.



**Plate No. 10: Green Power Generator operated on Diesel at college campus.**

### **3.1.2 Energy Conservation:**

#### **3.1.2.1 Use of LED bulbs:**

Effective energy conservation measures are taken up by Vivekanand College, Kolhapur and these are.

1. Increased use of LED bulbs which consume less electrical energy against incandescent lamps.
2. Use of renewable energy like solar energy through Solar Photovoltaic Systems which converts light energy into electricity, solar street lamps and solar water heaters at hostels.
3. Creating awareness among students and staffs regarding power saving (Avoiding unnecessary use)

In Vivekanand College Carbon footprints for indoor lighting in office building and in other rooms is taken into account. Use of LED and LCD lights reduces carbon footprints. Energy conversion

efficiency of normal incandescent lamp is very low. LED lamps consume low power and are efficient in conversion electrical energy into light energy.

LED lamps does not contain mercury like chemicals and hazardous gases, they does not generate hazardous waste. Thus an LED lamp emerges as the best option to reduce carbon footprints.



**Plate No. 11 & 12: Replacement of incandescent bulbs by LED tubes.**



- Replacement of old incandescent bulb and tube lights by LED lamps has been followed and will be continued in the phase manner by college as a response towards green practices of energy conservation ( **Annexure- III**)
- Workshop on Assembling of LED bulbs was organized by Electronics Department of Vivekanand College Kolhapur, to create awareness regarding importance of LED bulbs over ordinary bulbs and assembling of LED bulbs. Resource person was Mr. D. M. Panhalkar sir guided the participants regarding assembling of LED bulbs.



**Plate 13:** Inaugural function of Assembling of LED bulbs organized by Electronics Department



**Plate 14 :** Presence of students for workshop



**Plate 15:** Guidance of how to assemble of LED by Mr. D. M. Panhalkar Sir



**Plate 16 :** Guidance of how to assemble of LED by Mr. N.P. Mote Sir



**3.1.2.2 Harnessing Solar Energy: Solar Photovoltaic Applications (PVC)**

Vivekanand College Kolhapur has installed solar Photovoltaic panel for harnessing solar energy. Electricity generated by solar panels is used in college premises.



**Plate No. 17: Solar Photovoltaic Application at Vivekanand College, Kolhapur**

Photovoltaic (PV) is the conversion of light into electricity using the photovoltaic effect is commercially utilized for electricity generation.

Fixed PV installations rooftop-mounted systems are employed at Vivekanand College Library. Capacity of solar system is 35 KW. These solar panels are working in full capacity. It is depicted from Mahavitaran electricity bills of Vivekanand College that, there is reduction bills by 70%. Thus solar photovoltaic panels installed on rooftop of library building are efficient in harnessing solar energy throughout the year.

Such kind of installations for harnessing renewable energy resources has a potential to mitigate the global warming by CO<sub>2</sub>. Solar PV has specific advantages as an energy source- once installed, its operation generates no pollution and no greenhouse gas emissions, it shows simple scalability in respect of power needs and silicon has large availability in the Earth's crust, although other materials required in PV system manufacture such as silver will eventually constrain further growth in the technology. The use of PV as a main source requires energy storage systems or distribution.

Solar power is pollution-free during use, which enables it to cut down on pollution when it is substituted for other energy sources. PV installations could ideally operate for 100 years or even more, with little maintenance or intervention after their initial set-up, so after the initial capital cost of building any solar power plant, operating costs are extremely low compared to existing power technologies. Grid-connected solar electricity can be used locally thus reducing transmission/distribution losses.

Solar Photovoltaic street lamps are also installed at Vivekanand College campus. Compared to fossil and nuclear energy sources, very little research money has been invested in the development of solar cells, so there is considerable room for improvement.



**Plate No. 18: Solar Photovoltaic street lamps at Vivekanand College, Kolhapur**

Nevertheless, experimental high efficiency solar cells are already have efficiencies of over 40% in case of concentrating photovoltaic cells and efficiencies are rapidly rising while mass-production costs are rapidly falling.

**3.2 Water Audit:**

Water plays a key role in every environmental system. Water is an amazing material with unique properties that affect life on earth. The earth holds the same water in the same quantity as it did when it was formed. The earth’s water continuously circulates from the ocean to the atmosphere, then to the land and back. The atmospheric water cycle helps us to get a regular supply of fresh water every year. Thus fortunately the worlds freshwater supply is continually collected, purified, recycled and distributed in the earth’s hydrological cycle.

Water is so integral to life that we frequently take it for granted. Freshwater is an irreplaceable resource that we are managing poorly. Despite its importance, water is one of our most poorly managed resources. Even if the Vivekanand College gets assured good amount of rainfall, the water

is not retained in the ground due to the limitations like topographical features and seasonal rains. hence regulation of water cycle by nature is proper In the area covered by build structures and roads, the rainwater does not percolate into the ground. Hence water conservation measures should be adopted.

**3.2.1: Water Consumption:**

Requirement of water for domestic purpose is calculated at the rate of 100 lit/person/day and for drinking purpose is calculated at the rate of 10 lit/person/day. At workplace the water requirement is 5lit/person/day, thus the water demand analysis of Vivekanand College shows that on an average requirements of water is 40145 lit/day (for Population of 8029 including students and staff for domestic and drinking purpose). Daily requirements are fulfilled through water supply from Kolhapur Municipality supply, borewell water and harvested rain water.

**3.2.2 Water Quality:**

In college water is used for domestic and drinking purpose. The students which utilize water for drinking purpose must be monitored frequently to avoid the spread of waterborne diseases like Dysentery, Typhoid, Gastro etc. In the Vivekanand college the water is supplied by corporation is treated in water filters and then filled in the water coolers for drinking purpose.

Water quality of drinking water from cooler and mixed water is periodically monitored by staffs and



|   |           |          |             |          |
|---|-----------|----------|-------------|----------|
|  | Type      | Degress  | DMS         | overcast |
|   | Latitude  | 16.71254 | 16°42'45... | clouds   |
|   | Longitude | 74.23872 | 74°14'19... | 28.0 °C  |

**Plate No. 19: Water filter and Cooler at Vivekanand College, Kolhapur.**



routine water analysis is done from laboratory for necessary parameters. It is evident from the reports of water analysis for potability study that the required parameters are within the limits of BIS standards. (**Annexure-IV**)

### **3.2.3 Water Conservation:**

Clean, fresh water is a limited resource. With all the severe droughts happening in the world, the limited supply of fresh water is becoming one of our most precious resources. Every person on earth needs water to survive. Without it, many of us would get sick and even result in death.

While almost 70% of the Earth is made up of water, many parts of the world suffer from clean water shortage. Conserving water is important because it keeps water pure and clean while protecting the environment.

Conserving water means using our water supply wisely and be responsible. As every individual depends on water for livelihood, we must learn how to keep our limited supply of water pure and away from pollution. Keeping our water supply safe and pure will protect the water for the generations to come

Many believe that our water supply infinite. However, our supply is quite the opposite. It is important that we must not pollute your water as many do not realize just how important and scarce water is.

Humans are not the only species on Earth that requires water for survival. In fact, every species on this planet needs water to live and survive. Without water, the aquatic life will stand no chance of survival. It is highly important that we save water that is essential to our sustainability.

#### **3.2.3.1 Efficient use of water:**

Enormous amounts of water is wasted, without reason, through leaking taps and open taps waste. In many cities, more than half the available supply is lost through these leakages and rotting of pipelines. In Vivekanand College campus instruction boards are displayed at every washroom to avoid wastage of water. Students are instructed to close the taps when they are not in use. Taps and pipelines are regularly checked for leakages and repaired if needed. Leaking taps are immediately replaced by new handy taps.

Sensor based Auto switch is used for bore well motor. When water reservoir is overflowing motor is automatically shut off and it saves water and electricity also.



Plate No. 20: Sensor based Auto switch is used for bore well motor

**3.2.3.2 Rain Water Harvesting:**

Rain water harvesting is done by collecting and storing rain water. This is very effective method for collection of pure water for many cities. The rain water that falls on the roof can be collected, filtered and stored. As Kolhapur is getting assured rainfall surprisingly large amount of water can be collected in this way. Rain Water harvesting is also done at Vivekanand College Kolhapur. Harvested rainwater is stored in tanks, and used in laboratories and whenever required. Harvested roof top rainwater is also used is used in washrooms and for recharging of ground water in the campus.





Plate No. 21: Rain water collection and storage at Vivekanand College

**3.3 Air and Noise Quality:**

Air and noise quality plays an important role in student’s concentration and ability to learn. In noisy environment it is difficult to focus on the subject for students and also it is difficult to teaching faculty. Furthermore, noise pollution it can cause an increase in blood pressure, hypertension, and other stress-related health issues. In many cases, noise pollution can cause a disturbance in a person’s state of mind, which further causes disturbance in sleep pattern, stress, aggressiveness, and other related issues. In very noisy environment sometimes teacher has to talk very loudly that he or she may suffer from occupational hazards like pain in throat. As the location of college is in the in the city so there is such sources to create pollution of air and noise. Samples for air quality testing and noise level measurement are done. The values of air and noise pollution parameters are observed within the prescribed limits. (Annexure- V & VI)

These parameters are slightly elevated in the campus but are under the prescribed limit of CPCB. Noise level inside the college is below the limit and in suitable range. The college has planted some trees and planning to plant some more to screen the noise and to filter the suspended particulate matters.



**Plate No: 22: Air sample collection at College campus**

**3.4 Green Cover:**

The college has planted many trees in the campus through NCC, NSS, other students and faculty members. Though the college has limitation of open space, the planting is done inside the pots and in available open space. Hostel campus is another space available for tree plantation where a student has planted trees. Following is the list of plants with year of plantation. Total 45 plant species are planted in college, hostel campus. Many ornamental and medicinal plants are planted in campus.

Table No. 8 : List of Plant Diversity at Vivekanand College, Kolhapur

| Sr. No | Common / Local Name | Botanical Name                   |
|--------|---------------------|----------------------------------|
| 1      | Jestmadh            | <i>Glycyrrhiza glabra</i>        |
| 2      | Sarpagandha         | <i>Pauwolfia Serpentina</i>      |
| 3      | Aswhgandha          | <i>Withania Somnifera</i>        |
| 4      | Gulvel              | <i>Tinospora Cordifolia</i>      |
| 5      | Adulsa              | <i>Adhatoda Vasaka</i>           |
| 6      | Korpad              | <i>Aloe vera</i>                 |
| 7      | Aavala              | <i>Phyllanthus emblica</i>       |
| 8      | Hirda               | <i>Terminalia chebula</i>        |
| 9      | Behada              | <i>Terminalia bellirica</i>      |
| 10     | Rui                 | <i>Calotropis gingantea</i>      |
| 11     | Lavang              | <i>Syzygium aromaticum</i>       |
| 12     | Kapur               | <i>Cinnamomum oliveri</i>        |
| 13     | Bel                 | <i>Aegel mermelos</i>            |
| 14     | Kawad               | <i>Wood apple</i>                |
| 15     | Kamal               | <i>Sauaaurea obvallata</i>       |
| 16     | Kapalfodi           | <i>Cardiospermum halicacabum</i> |
| 17     | Vaghat              | <i>Capparis Moonii</i>           |
| 18     | Gholi               | <i>Portulaca oleracea</i>        |
| 19     | Nagkeshar           | <i>Mesua ferrea</i>              |
| 20     | Murudsheng          | <i>Helicteres isora</i>          |
| 21     | Satab               | <i>Bauhinia racemosa</i>         |
| 22     | Kadulimb            | <i>Azadrachta indica</i>         |
| 23     | Sevaga              | <i>Moringa oleifere</i>          |
| 24     | Papaya              | <i>Carca papaya</i>              |
| 25     | Bahawa              | <i>Cassia fistula</i>            |
| 26     | Chinch              | <i>Temarindus Indica</i>         |
| 27     | Panafoti            | <i>Brayaphyllum calycinum</i>    |
| 28     | Shingada            | <i>Trapa natans</i>              |
| 29     | Fashion Flower      | <i>Passiflora</i>                |
| 30     | Kadu Indrayan       | <i>Citrallue colocynthis</i>     |
| 31     | Kadamb              | <i>Rubiaceae cadamba</i>         |
| 32     | Baratond            | <i>Morida citrifolia</i>         |
| 33     | Pandra kuda         | <i>Halarrhena pubescens</i>      |
| 34     | Kala kuda           | <i>Wrightia tinctoria</i>        |
| 35     | Anantvel            | <i>Hemidesmus indicus</i>        |
| 36     | Tulus               | <i>Ocimum gratissimum</i>        |
| 37     | Manamula            | <i>Coleus barbatus</i>           |
| 38     | Aghada              | <i>Achyranthes aspera</i>        |
| 39     | Mayalu              | <i>Malabar spinach</i>           |
| 40     | Shatavari           | <i>Asparagus racemosus</i>       |
| 41     | Surat               | <i>Ornamental Grass</i>          |
| 42     | Nagarmota           | <i>Caperus rotundus</i>          |
| 43     | Gavati Chaha        | <i>Cymbopogon citrtus</i>        |
| 44     | Safed musuli        | <i>Chlorophytum borivilianum</i> |
| 45     | Brahmi              | <i>Hydrocotyle asiatica</i>      |

**3.5 Solid Waste Management:**

Proper solid waste management is an essential part of society's public and environmental health. Solid waste generation and its management is a burning issue in current days. The rate of generation of solid waste is very high and yet we do not have adequate system to manage the generated waste. Unscientific handling of solid waste can create threats to public health, unintended environmental safety issues. So, it is necessary to manage solid waste properly to reduce the load on waste management system. The purpose of this audit is to find out the quantity, volume, type and current management practices of solid waste generated in the Vivekanand College Kolhapur campus. The College follows the practice of segregation of waste at source by putting different coloured collection bins in the college campus. This will help for further solid waste management and to go for green campus development.

**3.5.1 Biodegradable Waste:**

The main source of biodegradable waste in educational institute is generally from student's tiffin and eatables. Garden waste generated from pruning of trees, fallen leaves, etc. is also important source of biodegradable waste in Vivekanand College Campus. The college has taken good care of biodegradable waste by creating vermicomposting pit for garden waste. The garden waste is collected and kept for vermicomposting at a designed site. The prepared waste is then utilized for gardening purpose.

Vermicomposting reduces waste sent to our dump sites, reduces environmental pollution. When organic wastes decomposes at dump sites in the absence of oxygen, a hazardous liquid known as leachate (the liquid that runs from a dump) and odour are produced.

Vermicompost helps to improve soil structure, texture, porosity, water holding capacity, drainage, and aeration and reduce erosion in addition to plant nutrient supply. It improves plant growth by enabling the growth of new shoots and leaves, thereby increasing productivity. It helps to buffer the pH of the soil. In Vivekanand College the clean, dark tan coloured odourless vermicompost formed at plant is applied to the college garden plants. It results in the improvement of soil health.

**3.5.2 Paper Waste:**

Major part of the solid waste generated at the college campus is a paper. Though paper is biodegradable material, it is having good potential of recycling thus will help in conserving the





**Plate No. 23: Vermicomposting Unit at college campus**

resources and trees indirectly. The Vivekanand College Kolhapur follows the green practice by giving the paper waste to recycling purpose. The waste paper is sold to specific vender. Other green practices like use of one sided paper, paperless activities like e-mailing all notices instead of printing it of paper, putting the information on what’s app groups are also practiced in the college to reduce the use of paper. Thus, Reduce, Reuse and Recycle, 3 R principles of solid waste management are followed in the Vivekanand College Kolhapur for waste management.

**3.5.3 Other waste:**

Other kinds of waste like e-waste, plastic waste, metal waste generated in the campus has serious unintended environmental consequences. In Vivekanand College it is collected, stored and properly disposed off. Plastic and metal waste is sent for the recycling and recovery practices. Management of E- waste is done by the outsourced agencies. The vender comes and purchases the waste at contract rate. It creates revenue for college along with scientific management of waste.

**(Annexure - VII)**



## CHAPTER 4.0: BEST ENVIRONMENTAL PRACTICES

Vivekanand College, Kolhapur follows all possible green practices to conserve the nature and reduce its ecological footprints. Some of the green practices are discussed below.

### 4.1. No Vehicle Day:

The college practices No Vehicle Day on last Saturday of every month to reduce carbon footprints. On this day the faculty and students try to come by walk, by bicycle or by public transport and keep the college campus clean and free from air and noise pollution.



Plate No. 24: No Vehicle Day (Use of Bicycles)

### 4.2. Ganesh Moorti and Nirmalya Daan during Ganapati Visarjan:

During Gauri Ganesh festival, due to visarjan/emersion of Ganesh Moorti and Nirmalya in nearby water reservoirs is done by local people. This will add in the deterioration of water reservoirs. To avoid this Ganesh Moorti and Nirmalya Daan collection campaign is organized every year by College. Collected Moorti were given for recycling of material and Nirmalya is processed for composting.

### **4.3 Plantation:**

Though the open campus is limited to college, college students and faculty follow plantation activity to nurture the affection towards nature among the students. Plantation has been done at empty places. Small plants like shrubs and herbs are planted in pots and kept inside the corridors of the college building.

**CHAPTER- 5: FINDINGS AND SUGGESTIONS**

After a thorough analysis of green practices and environmental aspects of Vivekanand College, Kolhapur the audit team has come with following findings and suggestions.

**5.1 Findings :**

- The college campus strictly follows green practices. All students, staff and faculty members participate actively in keeping campus clean and Green.
- Though the campus is small the college has tried to keep it green by planting trees in the premises.
- Solar photovoltaic systems installed in college campus are efficiently working in harnessing renewable solar energy into electric energy. They are reducing the carbon footprints.
- Solid waste segregation and management is followed in the premises. Vermicomposting is done for biodegradable waste.
- Drinking water quality is maintained as per the standards by frequent water quality analysis.
- Rain water harvesting has been done in the college campus, harvested rain water is used in college laboratories and other purpose.

**5.2 Suggestions :**

- More frequent testing of drinking water is required to maintain drinking water quality.
- More paperless activities like E.mail/ whats app should be followed which are ecofriendly.
- Installation of Biogas plant and composting units should be done at ladies hostel.
- Whenever possible harvesting of rain water and recharging of ground water should be done to avoid runoff and wastage of rain water.
- Recycling of water should be set, and may be used for irrigation of gardens in college campus.
- Display name of all the trees/ plants with their common name, scientific name and importance.
- Construct Sewage Treatment Plant in college premises.

**Overall the performance of College is good on Green Initiative Front  
and can take some more green initiatives for sustainable future**

## Annexure-I

“Dissemination of Education for Knowledge, Science & Culture”

-Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

**VIVEKANAND COLLEGE (AUTONOMOUS),  
KOLHAPUR  
NATIONAL CADET CORPS  
5 &6 (SD/SW) MAH BN NCC, KOLHAPUR**



### PLASTIC FREE CAMPAIGN AND CLEANLINESS DRIVE

Plastic is the one of the greatest innovation by man himself . It is a boon to man. It having multipurpose uses , It has reduced the stress of minerals. But it has one limitation. It has a problem of disposal, which creates different problems. As a first citizen of the Kolhapur city the Dr. Mallinath Kalshetti , the CEO of Kolhapur Municipal Corporation has organized the Plastic Free drainages and cleanliness drive at Jayanti Nala ,one of the biggest drainage which carries the lots of sewage . Most of rhe time it get chocked by plastic though Kolhapur Municipal corporation has organized this drive. For this drive the principal Dr. S Y Hongekar has present . It organized under the guidance of the Commanding Officers of 05 and 06 Mah Bn NCC, Kolhapur. For this function 34 SD & 60 SW cadets present with Captain Sunita Bhosale And Lt. J.R.Bharamgonda .

ANO

Dr .S.Y.Hongekar



## Annexure-II

“Dissemination of Education for Knowledge, Science & Culture”

-Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's



**VIVEKANAND COLLEGE (AUTONOMOUS),  
KOLHAPUR  
NATIONAL CADET CORPS  
5 &6 (SD/SW) MAH BN NCC, KOLHAPUR**



### NOTICE

NCC 2019/20

Date : 29/07/2019

It is informed to all NCC SD/SW cadets that NCC department is going to participate the PLASTIC ERADICATION AND CLEANLINESS DRIVE organized by the Dr. Mallinath Kalshetti , the CEO ,Kolhapur Muncipal Corporation.on Sunday 21 July 2019 near Khanvilkar Petrol Pump ,Dasara Chowk Kolhapur.(institutional/ Community Development And social welfare activity) .All should present at 08:30 AM /PM . without any fail.

ANO

Dr. S.Y. Hongekar



Shri Swami Vivekanand Shikshan Sanstha's,

**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR.**

## Department of Electronics

### NOTICE

Date : 2/4/2019

All the students of B.Sc and B.Sc.Computer Science (Entire) are hereby informed that, Department of Electronics is going to organise one day workshop on "Assembling of LED bulbs" on 4<sup>th</sup> April 2019 at 11.30 am. So please attend the workshop.

**Place: Department of Electronics.**

(Mr.D.M.Panhalkar )

Head

Department of Electronics  
Vivekanand College, Kolhapur.  
Copy to:

( Dr.S.Y.Hongekar )  
PRINCIPAL  
Vivekanand College  
Kolhapur

- 1) Head, Dept. of Maths. *for [Signature]*
- 2) Head, Dept. of Chemistry *[Signature]*
- 3) Head, Dept. of Stat. *W. Pawar 02.4.19*
- 4) Head, Dept. of Physics *[Signature]*
- 5) Head, Dept. of Computer Science *[Signature]*
- 6) Head, Dept. of Botany *[Signature]*
- 7) Head, Dept. of Zoology *[Signature]*
- 8) Head, Dept. of Microbiology *for [Signature]*
- 9) Head, Dept. of B.C.S. *[Signature]*
- 10) Head, Dept. of B.B.A.
- 11) Head, Dept. of B.C.A.
- 12) Head, Dept. of Biotechnology *[Signature]*
- 13) Head, Dept. of Graphic Faculty *[Signature]*
- 14) Head, Dept. of B.Voc. *for [Signature]*

Shri Swami Vivekanand Shikashan Sanstha's,  
VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

Department of Electronics  
Workshop on  
**“ Assembling of LED bulb”**

Date: 04 April 2019

Time: 11.30 am

Venue: Department of Electronics

**Programme Schedule**

Welcome & Introduction

**Mr.D.M.Panhalkar**

Assistant Professor

HOD, Electronics Department

Vivekanand College,

Kolhapur

Chief guest

**:Dr.S.Y.Hongekar**

Principal

Vivekanand College, Kolhapur

Co-ordinator

**: Mr.D.M.Panhalkar**

Assistant Professor

HOD, Electronics Department

Vivekanand College, Kolhapur

Organizing Committee

:Mr.P.R.Bagade

Mr.N.P.Mote

Mr.S.D.Jadhav

Miss.S.B.Demanna

Miss.D.H.Kore

Shri Swami Vivekanand Shikashan Sanstha's

**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR**

**Department of Electronics organized**

**Workshop on**

**“ Assembling of LED bulb”**

**4th April 2019**

□ **Workshop Schedule** □

|                      |                        |
|----------------------|------------------------|
| 11:00 am to 11:30 am | : Inauguration         |
| 11:30 am to 12:00 am | : Technical Session-I  |
| 12:00 am to 01:00 pm | : Technical Session-II |

Vivekanand College (Autonomous), Kolhapur  
Department of Electronics

Workshop on  
"Assembling of LED Bulbs"

Date:04.04.2019

Time:11.00 am

| Sr.No | Name                      | Class    | Sign                      |
|-------|---------------------------|----------|---------------------------|
| 1     | Satwik R. Gawas           | Bsc-III  | S.R.Gawas..               |
| 2     | Alkash P. Nigavekar       | BSC II   | A                         |
| 3     | Sohan D. Apaeraj          | B.SC II  | Sohan D. Apaeraj.         |
| 4     | Aasim Y. Jamaders         | B.Sc-III | Aasim Y. Jamaders         |
| 5     | Akanksha P. Patil         | BCS-II   | Akanksha P. Patil         |
| 6     | Akshata M Patil           | BCS-II   | Akshata M Patil           |
| 7     | Swati G. mandavkar        | BCS-II   | Swati G. mandavkar        |
| 8     | Hareha H. Nair            | BCS-II   | Hareha H. Nair            |
| 9     | Srushti S. Desai          | BCS-II   | Srushti S. Desai          |
| 10    | Shiwani S. Gheumri        | BSC-II   | Shiwani S. Gheumri        |
| 11    | Amruta P. Dorekar         | BSC-II   | Amruta P. Dorekar         |
| 12    | sonal. S. Patil           | BSC-II   | sonal. S. Patil           |
| 13    | Pranali. R. Patil         | BSC-II   | Pranali. R. Patil         |
| 14    | Harshada. T. Mohite       | BSC-II   | Harshada. T. Mohite       |
| 15    | Vinita. D. Jadhav         | BSC-II   | Vinita. D. Jadhav         |
| 16    | Supnali. S. More          | BSC-II   | Supnali. S. More          |
| 17    | Saloni. S. Vaedhamane     | BSC-II   | Saloni. S. Vaedhamane     |
| 18    | Santosh G. Chavhan.       | B.SC-III | Santosh G. Chavhan.       |
| 19    | ARIF. Desai               | BSC-III  | ARIF. Desai               |
| 20    | Vedika Sanjay kadam.      | Bsc-II   | Vedika Sanjay kadam.      |
| 21    | Manasi Khanderao Jayadale | BSc II   | Manasi Khanderao Jayadale |
| 22    | Shital A. Vhannure        | BCS-II   | Shital A. Vhannure        |
| 23    | Neha M. Chavan.           | B. sc II | Neha M. Chavan.           |
| 24    | Rohan Arjun Tibile,       | BSC-II   | Rohan Arjun Tibile,       |



Vivekanand College (Autonomous), Kolhapur  
Department of Electronics

Workshop on  
"Assembling of LED Bulbs"

Date:04.04.2019

Time:11.00 am

|    |                            |           |                  |
|----|----------------------------|-----------|------------------|
| 25 | Priyanka S. Karande.       | BCS-II    | Karande          |
| 26 | Nishigantha Nivarsoo Patil | BSC-II    | <del>Patil</del> |
| 27 | Nishigantha Namdev Jethav  | B.Sc-III  | <del>Patil</del> |
| 28 | Vaate Samradny Dnyandev    | B.Sc. III | Abate            |
| 29 | Bagadi Asha kundlik        | B.Sc. III | AB               |
| 30 | Kumbhar Gauri Eknath       | B.Sc II   | gsk              |
| 31 | Pratiksha Prasad Mane      | B.Sc II   | Mane.            |
| 32 | Moze Nilesh Tanaji         | BSc III   | <del>Patil</del> |
| 33 | Shelake Mahesh Bibhishan   | BSC - III | MJ               |
| 34 | Devane Suresh Nivars       | Bsc - III | S.N.D.           |
| 35 | Koli Abhijeet Sanjay       | BSc III   | <del>Patil</del> |
| 36 | Patil Santosh Rongzao      | BSc III   | Patil Santosh    |
| 37 | Padaval Tejaswini Vitthal  | B.Sc-II   | Padaval.         |
| 38 | kumbhar Gauri Eknath       | BSC II    | gsk              |
| 39 |                            |           |                  |
| 40 |                            |           |                  |
| 41 |                            |           |                  |
| 42 |                            |           |                  |



## Report on “ Assembling of LED bulb”

(Held on: 4<sup>th</sup> April 2019)

- **Venue :Department of Electronics**
- **Time: 11.00 – 1.00 pm**
- **Objective:**
  1. To enhance the students’ understanding and technical skill of assembling and disassembling the hardware components of LED bulbs.
  2. To families with advantages of LED bulbs like energy efficiency, long life cycle and eco-friendly nature of LED.

“Assembling of LED bulb” workshop was organized by the Department of Electronics, on 04<sup>th</sup> April, 2019. B.Sc-III year students are actively involved in this workshop. Total 38 participants from all years and various streams attended this workshop.

The inaugural of the workshop witnessed the presence of Dr.S.Y.Hongekar, Principal, Vivekanand College(Autonomous), Kolhapur along with the faculty members Prof.D.M.Panhalkar (HOD), Prof.P. R.Bagade, Prof.N.P.Mote, Miss.D.H.Kore and Miss.S.B.Demanna of Department of Electronics. Mr.D.M.Panhalkar, Coordinator of this workshop, gives welcome and introduction of this workshop. Dr.S.Y.Hongekar Sir explains the important and need of LED bulb in our life. Mr.P.R.Bagade gives vote of thank of this inaugural session.

The first session of workshop began with Mr. N.P.Mote in detail the theory behind LED(Light Emitting diode) and connection of single LED with D.C.battery. The first session end at 12.00 pm with demonstration of battery operated LED. In Second session of workshop, Mr.P.R.Bagade gives theory of a.c. operated LED and explain each component of the LED bulb along with its function and role in the device and its effect on. The workshop ended with a complete understanding of the hardware requirements and assembling of LED bulb and a positive response from all participants involved.



**CSIBER Trust's**  
**CHHATRAPATI SHAHU INSTITUTE OF BUSINESS EDUCATION**  
**AND RESEARCH (CSIBER), KOLHAPUR**

An Autonomous Institute under UGC, New Delhi and Shivaji University,  
Kolhapur College with Potential for Excellence (CPE) III<sup>rd</sup> Phase

Reaccredited by NAAC with 'A+' Grade (CGPA: 3.55)

**DEPARTMENT OF ENVIRONMENT MANAGEMENT**

Dr. C. S. Dalvi  
Director

Late Dr. A. D. Shinde  
Founder, CSIBER Trust

Dr. R. A. Shinde  
Secretary & Managing Trustee

**Annexure-IV**

**WATER ANALYSIS REPORT**

Name of the party : Vivekanand College  
2130, 'E' ward, Tarabai park, Kolhapur

Sample collected by : Party

Nature of sample : Tap Water

Sample collected on : 09/08/2021

Sample received on : 09/08/2021

| Sr. No. | Parameter      | Value  | Highest Desirable Limit | Maximum Permissible Limit |
|---------|----------------|--------|-------------------------|---------------------------|
| 1       | pH             | 7.67   | 7.0-8.5                 | 6.5-9.2                   |
| 2       | Total Hardness | 120.00 | 100.00                  | 500.00                    |
| 3       | Calcium        | 32.06  | 75.00                   | -                         |
| 4       | Magnesium      | 9.75   | 50.00                   | 150.00                    |
| 5       | Chlorides      | 31.24  | 200.00                  | 600.00                    |
| 6       | MPN/100ml      | 00     | 00                      | 10                        |

**NOTE:** All values unless otherwise stated are in mg/l ; except pH.

**MPN:** Most Probable Number of Coliform Bacteria

Analysed by

(Mr. V. B. Kadam)

Checked by

(Mr. S. S. Gaddi)



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**DEPARTMENT OF ENVIRONMENT MANAGEMENT**

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Director

Late Dr. A. D. Shinde  
Founder, CSIBER Trust

Dr. R. A. Shinde  
Secretary & Managing Trustee

**WATER ANALYSIS REPORT**

Name of the party : Vivekanand College  
2130, 'E' ward, Tarabai park, Kolhapur

Sample collected by : Party

Nature of sample : Borewell Water

Sample collected on : 09/08/2021

Sample received on : 09/08/2021

| Sr. No. | Parameter      | Value  | Highest Desirable Limit | Maximum Permissible Limit |
|---------|----------------|--------|-------------------------|---------------------------|
| 1       | pH             | 7.33   | 7.0-8.5                 | 6.5-9.2                   |
| 2       | Total Hardness | 148.00 | 100.00                  | 500.00                    |
| 3       | Calcium        | 44.80  | 75.00                   | -                         |
| 4       | Magnesium      | 8.77   | 50.00                   | 150.00                    |
| 5       | Chlorides      | 39.73  | 200.00                  | 600.00                    |
| 6       | MPN/100ml      | 540    | 00                      | 10                        |

**NOTE:** All values unless otherwise stated are in mg/l ; except pH.

**MPN:** Most Probable Number of Coliform Bacteria

Analysed by

Checked by

(Mr. V. B. Kadam)

(Mr. S. S. Gaddi)



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**CHHATRAPATI SHAHU INSTITUTE OF BUSINESS EDUCATION**  
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**DEPARTMENT OF ENVIRONMENT MANAGEMENT**

Dr. C. S. Dalvi  
Director

Late Dr. A. D. Shinde  
Founder, CSIBER Trust

Dr. R. A. Shinde  
Secretary & Managing Trustee

**Annexure-V**

**NOISE MONITORING REPORT**

Name of the party : Vivekanand College  
2130, 'E' ward, Tarabai park, Kolhapur

Monitoring Station : College Campus

Instrument Used : Sound Level Meter(6010)

Monitoring Type : Ambient Noise Monitoring

Monitoring Date : 09/08/2021

| Sr. No | Location               | (Leq) Values in dB(A) |
|--------|------------------------|-----------------------|
| 1      | Principal Cabin        | 54.80                 |
| 2      | Staff Room             | 64.10                 |
| 3      | Administrative Office  | 62.80                 |
| 4      | Meeting Hall           | 42.00                 |
| 5      | Corridors              | 60.20                 |
| 6      | Class Room (out side)  | 58.80                 |
| 7      | Class Room (in side)   | 56.60                 |
| 8      | Library                | 44.50                 |
| 9      | Reading Room           | 40.80                 |
| 10     | IQAC Cell              | 40.20                 |
| 11     | Computer Lab           | 48.00                 |
| 12     | Chemistry Lab          | 50.80                 |
| 13     | Multipurpose Hall      | 40.10                 |
| 14     | Ladies Common Room     | 46.60                 |
| 15     | Backside campus        | 51.30                 |
| 16     | Campus(Near main gate) | 70.60                 |

Monitoring carried out by

(Mr. V. B. Kadam)

Checked by

(Mr. S.S. Gaddi)



**CSIBER Trust's**  
**CHHATRAPATI SHAHU INSTITUTE OF BUSINESS EDUCATION**  
**AND RESEARCH (CSIBER), KOLHAPUR**

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Kolhapur College with Potential for Excellence (CPE) III<sup>rd</sup> Phase  
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**DEPARTMENT OF ENVIRONMENT MANAGEMENT**

Dr. C. S. Dalvi  
Director

Late Dr. A. D. Shinde  
Founder, CSIBER Trust

Dr. R. A. Shinde  
Secretary & Managing Trustee

**Annexure-VI**

**AIR MONITORING REPORT**

Name of the party : Vivekanand College  
2130, 'E' ward, Tarabai park, Kolhapur

Monitoring Station : College Campus

Monitoring Period : 10.00 am to 6.00 pm (08 hrs)

Instrument Used : High Volume Sampler (NPM-HVS)

Monitoring Type : Ambient Air Monitoring

| Sr. No. | Parameter                               | Values               | CPCB Standards<br>(24 hrs) |
|---------|---|----------------------|----------------------------|
|         |   | August<br>09/08/2021 |                            |
| 1       | Suspended Particulate Matter (SPM)      | 52.00                | 100                        |
| 2       | Respirable Particulate Matter<br>(RSPM) | 25.20                | 50                         |
| 3       | Oxides of Nitrogen (NO <sub>x</sub> )   | 13.52                | 30                         |
| 4       | Sulphur Dioxide (SO <sub>2</sub> )      | 3.86                 | 30                         |

**NOTE:** All values are in ug/m<sup>3</sup>

Monitoring carried out by

Checked by

(Mr. V. B. Kadam)

( Mr. S. S. Gaddi)



**Memorandum of Understanding for E waste disposal**

This is a Memorandum of mutual understanding between **Mahalaxmi e Recyclers Pvt.Ltd. Kolhapur**, hereafter termed as ewaste dismantler and **Vivekanand college, Kolhapur** hereafter termed as client, made with an intention of environment friendly disposal of e waste collected by the client and to be disposed by the dismantler with following terms:

1. The client will inform the dismantler through mail or phone about such collection of e waste at their office and the dismantler will collect it from the said location after properly testing the same at mutually contracted rates.
2. The payment of the collected e waste will be made by the dismantler against delivery.
3. Once disposed to the dismantler, the client will not have right on any of the material disposed.
4. The dismantler will issue FORM13 of such disposal to the client for every delivery made by the client, in prescribed format and enter the same in the passbook issued by M.P.C.B.
5. All the legal issues will be dealt in the legal jurisdiction of Kolhapur District.

**Agreed & Signed Mutually**

  
f/Manoj Mehta

**Chairman & Managing Director,  
Mahalaxmi e Recyclers Pvt. Ltd.**



**Mahalaxmie-Recyclers Pvt. Ltd.**  
**Plot No. J-5(Part),MIDC, GokulShirgaon,**  
**Kolhapur 416234**  
**Mobile: +91-72764 11826**  
**Email : [manoj@erecyclebin.com](mailto:manoj@erecyclebin.com) | [www.erecyclebin.com](http://www.erecyclebin.com)**

**MPCB REGN. NO. : MPCB/RO(HQ)/REG-15/EWASTE/HWMD-257/Date-9<sup>th</sup> Oct. 2015, Valid till 8<sup>th</sup> Oct. 2020**

## Report on " E-Waste Collection and Management" :

E-Waste management program conducted in college in two phase. In first phase we collect e-waste in our college from different departments. E-waste is collected in the forms of Computer monitor, CPU, Power supply, Various Electronics instruments like CRO, function generator ,Keyboard, Mouse, C.Ds etc. This collected e-waste is handed over to Mahalaxmi e-recycler Pvt.Ltd. Gokul Shirgaon MIDC, Kolhapur. In second phase we conduct e-waste awareness programmes and collect e-waste from students in the forms of mobile chargers, calculators, batteries, LED bulbs etc. and send to recycling process.

In academic year 2019-20, we hand over the following quantities to Mahalaxmi e-recycler Pvt.Ltd for recycling purpose on 10-01-2020

| Sr. No | Component Name   | Quantity |
|--------|--|----------|
| 1      | <b>BCA Dept.</b><br>Lenovo Computer : CPU<br>Keyboard  | 1        |
| 2      | <b>Chemistry Dept.</b><br>A) Weight Measurement<br>instrument                                  | 1        |
| 3      | <b>BBA/BCA Dept.</b><br>Inverter Batteries   | 5        |
| 4      | <b>Karpe Sir Old CRT TV</b>  | 1        |
| 4      | Other materials like CDs, mobile phones, mobile chargers, T.V. Remote Printer toner parts etc. | --       |







Apart from that, we also use the this collect E-waste for the development of student's project and departmental instruments like Power supply. In this current academic year, we developed the Dual power supply (+24 v and +5v ) for the practical purpose in our Electronics lab under the guidance of Prof. D. M. Panhalkar and Prof. N. P. Mote.



← Development of Dual Power Supply (+24v and +5v )

*Prof. N. P. Mote*  
**Head**  
**Department of Electronics**  
**Vivekanand College, Kolhapur.**



|                          |                         |        |            |
|--------------------------|-------------------------|--------|------------|
| Certificate No.          | MERPL/19-20/70          | Date : | 13/01/2020 |
| Date of Material Receipt | 10/01/2020              |        |            |
| Weight                   | 20 Kgs                  |        |            |
| Customer Reference No.   | By Email Communications |        |            |



## CERTIFICATE OF E-WASTE RECYCLING

*This is to Certify that e-waste received for recycling  
from*

**Vivekanand College**

2130, "E" Tarabal Park, Kolhapur-416003

*has been safely disposed at our registered facility in an environment friendly manner.*

**For Mahalaxmi e Recyclers**

Authorized Signatory



MPCB Reg. No. : MPCB/RO(HQ)/REG/14/E-Waste/HWMD-182 | Date : 31st July 2014

Renewed Reg. No. : MPCB/RO(HQ)/REG-15/EWASTE/HWMD-257/Dt. 9th Oct. 2015 Valid till 8th Oct. 2020

Mahalaxmi e-Recyclers Pvt. Ltd. Plot no: J-5 (Part), Gokul Shinguan MIDC, Tal : Karveer, Dist : Kolhapur | Website : [erecyclebin.com](http://erecyclebin.com)



# **Green Audit 2020-21**





CSIBER Trusts  
**CHHATRAPATI SHAHU INSTITUTE OF BUSINESS EDUCATION  
AND RESEARCH (CSIBER), KOLHAPUR.**

An Autonomous Institute under UGC, New Delhi and Shivaji University,  
College with Potential for Excellence (CPE) III<sup>rd</sup> Phase  
**Reaccredited by NAAC with 'A+' Grade (CGPA 3.55)**

## CERTIFICATE

This is to certify that, the Green Audit Report of Vivekanand College Kolhapur (Autonomous) has been prepared and certified by the Department of Environment Management of CSIBER, Kolhapur based on the observations during audit team visit and documents produced by the College.

Prepared by :

**Dr. V. B. Patil**  
(Associate Professor)

Certified by :

**Er. D. S. Mali**  
Head,  
Dept. of Env't. Mgt.

**Date: 14/09/2021**  
**Place: Kolhapur**



# **Green Audit 2021-22**

# GREEN AUDIT REPORT

2021-22

SHRI SWAMI VIVEKANAND SHIKSHAN SANSTHA'S

VIVEKANAND COLLEGE, KOLHAPUR

(AUTONOMOUS)

(Affiliated to Shivaji University, Kolhapur)

NAAC Accredited with 'A' Grade, with CGPA 2.34,

College With Potential For Excellence (CPE), ISO 9001: 2015



Certified by

**Mr. Manohar Shivthare Mr. Vijay Sawant**

(MS Enviro Pollution Control Services & Consultant)

**On behalf of Institute**

**Mr. A.S.Kadam Mr. S.G.Bhosale**

**2021-22**



" प्रदूषण हटवा, पर्यावरण वाचवा "

**MS ENVIRO**  
POLLUTION CONTROL SERVICES & CONSULTANT  
Reg. No. UDYAM-MH-30-0002061

Manohar Shivthare  
B.Sc. (Microbiology)  
M.Sc. (Environment)  
☎ 907 588 1115

Ref. No:-909(A)

Date: 02-03-2022

## CERTIFICATE

This to certify that,

the Green Audit Report of Vivekanand College, Kolhapur (Autonomous)

has been prepared and certified by the MS Enviro Pollution Control Services

& Consultant based on the documents produced by the college.

Date:

Place:

Thanking you,

Yours faithfully,

**MS ENVIRO**  
POLLUTION CONTROL SERVICES & CONSULTANT  
*Manohar*  
Proprietor



📍 Reg. Office : 144, Diskal, Tal. Khatav, Dist. Satara 415 504  
✉ manohar.shivthare@gmail.com | msenviro2020@gmail.com

Satara Office : S.No. 637, Flat No. 101, Padmavati Niwas,  
Manglwar Peth, Satara - 415 001  
Sangali Office : 5-23, Urmila Plaza, Zunjar Chowk Goanbhag,  
Sangli - 416 416



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| Plate No. 7 | Best from the Waste Exhibition                             |
| Plate No. 8 | Pollution free Panchganga river Campaign                   |



## Chapter 1 Introduction

### 1.1 About College:

Vivekanand College, Kolhapur which was established in 1964 is known as one of the best quality colleges in Maharashtra. The U.G.C. granted autonomy to this college from the academic year 2018-19. About 8000 students are enrolled every year for various programmes. Besides the conventional programmes like B.A., B.Com. and B.Sc., the college offers the professional programmes like B.B.A., B.C.A., B.C.S., B.Sc. (Biotechnology), B.Sc. Microbiology, B.Voc., Community College and M. B. A. The college also provides opportunity to undertake degrees like B.A., B.Com., B. Sc., B. Lib., M. Lib. and M.B.A. of YCMOU, Nashik.

Dr. Bapuji Salunkhe alias Govindrao Dnyanojirao Salunkhe, the great visionary educationalist founded Shri Swami Vivekanand Shikshan Sanstha, Kolhapur in 1954 which is catering the education needs of students belonging to 11 districts of the State of Maharashtra. The college has also acquired reputation in the fields of dance, drama, music, other arts and sports, besides academics. The college has won the „Meghnath Nageshkar Trophy“ of Shivaji University for the Best College in the field of Sports for eleven years continuously. The college has also proved its talent in the field of cultural activities by winning General Championship in the Central Youth Festival of the university for seven consecutive years.

Considering the strengths of the college, the NAAC, Bangalore has reaccredited the college with „A“ Grade. The college is identified twice as the “College with Potential for Excellence” by the UGC, and included in “The Star College Scheme” by the DBT, Govt. of India. The college has always focused on co-curricular activities along with academic programmes. Students and faculty members participated in various social and environmental awareness programmes like Tree plantation, No Vehicle Day, Cleanliness Activities and other cultural activities.

### 1.2 Vision of the College:

Vivekanand College will be an educational center devoted to the dissemination of “**Education for Knowledge, Science and Culture.**”

### 1.3 Mission of the College:

Mission of the college is to strive hard to realize the vision of our founder Dr. Bapuji Salunkhe i.e. to make education accessible to the masses, and to mold responsible citizens by inculcating noble values and a thirst for knowledge.

### 1.4 Goals and Objectives of the College:

1. To provide equal opportunity of quality education to all by means of sheer hard work, dedication and devotion.
2. To promote scientific attitude and inculcate cultural values into the students.
3. To enhance the commitment of faculty, staff and students towards diversity, social



- justice, truth, honesty, character and democratic citizenship.
4. To aim at overall personality development through various activities.
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  6. To provide a substantive, supportive, safe, affordable and accessible teaching-learning environment.
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The vision and mission statements of the college are clearly indicative of the objectives of the National Policy on Education demanding that centers of higher education should perform multiple roles like creating new knowledge, acquiring new capabilities and producing an intelligent human resource pool, through teaching, research and extension activities. The college plans and executes its curricular, co-curricular and extracurricular activities to translate the vision and mission statements into reality.

### **1.5 Motto of the Vivekanand College, Kolhapur:**

“Dnyan Vidnyan ani Susanskar Yasathi Shikshan Prasar” (The spread of education is with a view to diffusing knowledge, science and bud breeding) is the motto of the sanstha. Bapuji defines “dnyan as the knowledge of truth, character, integrity, demolition of the exploitative tendencies, service and dedication. “Vidnyan consists in the application of the aforesaid principles to life which, in turn will lead to good breeding.

### **1.6 Environmental Policy:**

Vivekanand College is aimed at balancing environmental protection and the conservation of natural resources with other policy goals, such as affordable energy, air and drinking water quality monitoring, rainwater harvesting. Green Campus Committee of the college has established clean and green campus with awareness and protection and in fulfilling sustainable development goals set forth to implement environmental policies given by government from time to time.

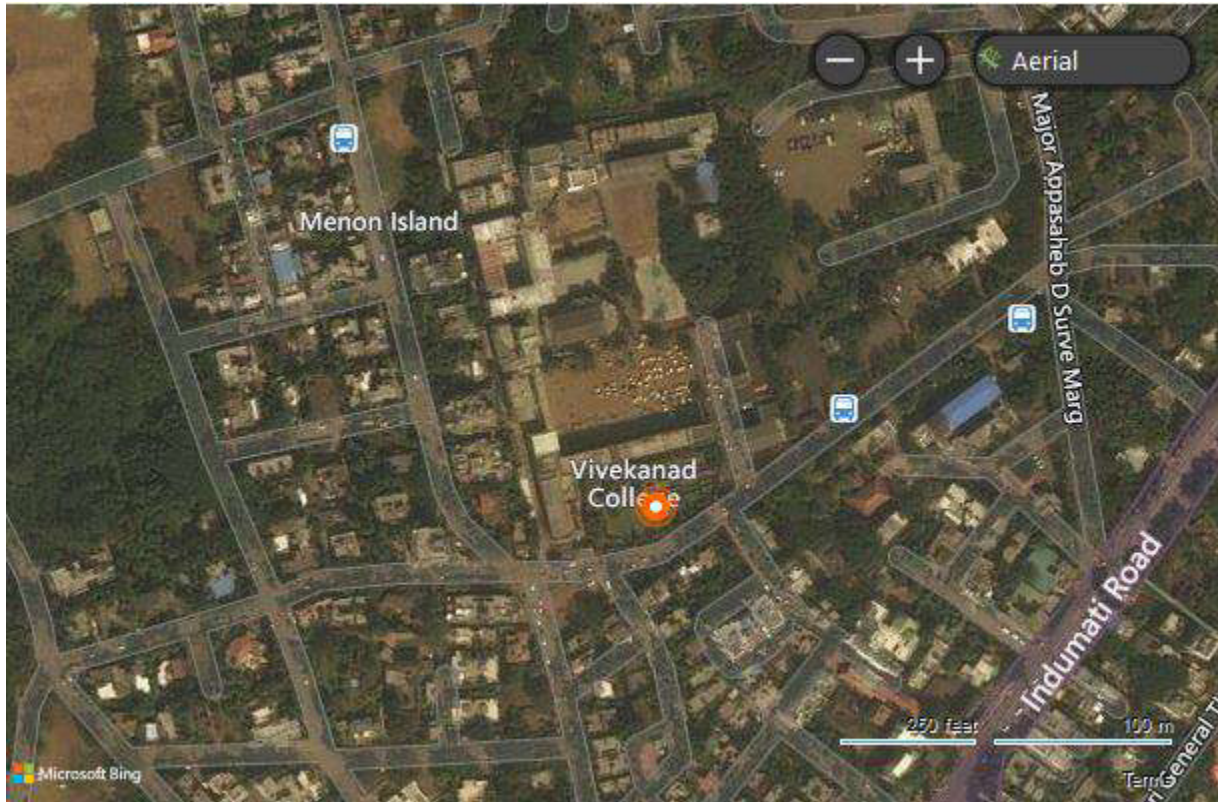
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| City    | Kolhapur  |
| E. Mail | <a href="mailto:info@Vivekanandcollege.org">info@Vivekanandcollege.org</a>  |
| Website | <a href="http://www.Vivekanandcollege.org">http://www.Vivekanandcollege.org</a>   |

**Location:**

|                           |          |
|---------------------------|----------|
| Location                  | Urban    |
| Campus area               | 7.0 Acre |
| Built up area in sq. mts. | 4775.63  |

**Coordinates:** 160 42`17” N 740 13`44.9” E



**Plate No.01: The Google Earth Image of the Vivekanand College, Kolhapur**

## **Chapter 2 Green Audit**

### **2.1 Conceptual Framework:**

Earth is the only planet in the universe to sustain life because of its environment. No life can exist without suitable environment and so no human being. Increasing population, civilization, industrialization and urbanization on the earth have brought this environment under the great pressure. India is a developing country and adapting science and technology for its progression. There is improvement in the life style but on the other side it is creating exploitation of the environment. Luxurious life style is becoming environmental risk which may render it unsuitable for future generation. Generally, every constituents of our society is responsible for environment crises and it is the duty of each of us to strive hard for its conservation. If we start with ourselves, it will definitely create a positive benchmark of the success in the journey of environment protection. Green audit is the prime solution of this scenario.

Green audit is the tool of management system used methodologically for protection and conservation of the environment. It is also used for the sustenance of the environment. The green audit was first implemented in the United States in the early 1970s by some companies in commensuration with Clean Air and Clean Water Act. By realizing the need of responsibility towards environment, NAAC, an autonomous body under UGC has added the concept of environmental audit in accreditation methodologies of universities and colleges.

### **2.2 Objectives of Green Audit:**

- To implement *Go green* policy for Environment Management in the campus.
- To identify opportunities to save and conserve energy.
- To see that proper steps have been taken to maintain sustainability and to prevent adverse effects of Air, Water, Noise and Solid Waste pollution on environment.
- To reduce, recycle, reuse waste and dispose waste scientifically under 5 R principles of Solid Waste Management.
- To see that proper steps have been taken for maintaining health and welfare of the students and staff of the Vivekanand College, Kolhapur.

### **2.3 Implementation of the Environmental Policy:**

Vivekanand College is aimed at balancing environmental protection and the conservation of natural resources with other policy goals, such as affordable energy, air and drinking water quality monitoring, rainwater harvesting. Green Campus Committee of the college has established clean and green campus with awareness and protection and in fulfilling environmental goals and sustainable development goals set forth to implement environmental policies given by government from time to time. NSS and NCC students are frontiers and other students and staff members are supporting the implementation of the environmental policy.



## 2.4 Environment Awareness Activities:

### 2.4.1 Tree plantation in college campus:

To make people aware about importance of tree in the economy of the nature and human lives, students and staff of Vivekanand College, Kolhapur takes efforts for plantation of trees. Trees increase aesthetic value and scenery of an area.



Plate No. 2 Tree plantation in college campus

### 2.4.2 Plastic awareness in campus:

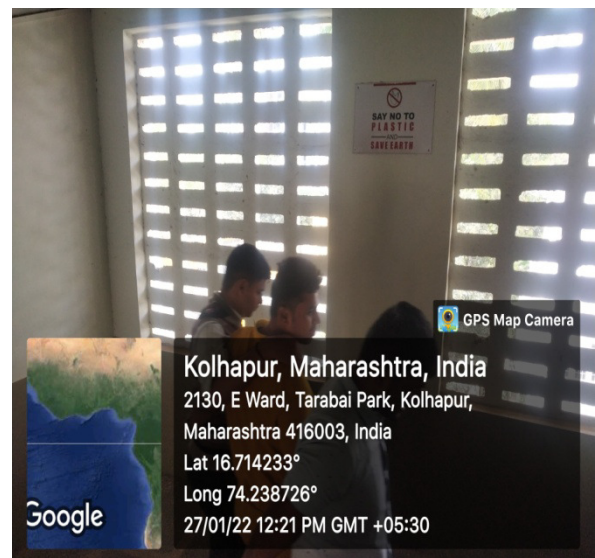


Plate:3 Boards regarding Plastic awareness

### 2.4.3 Guest lecture on Forest Day:

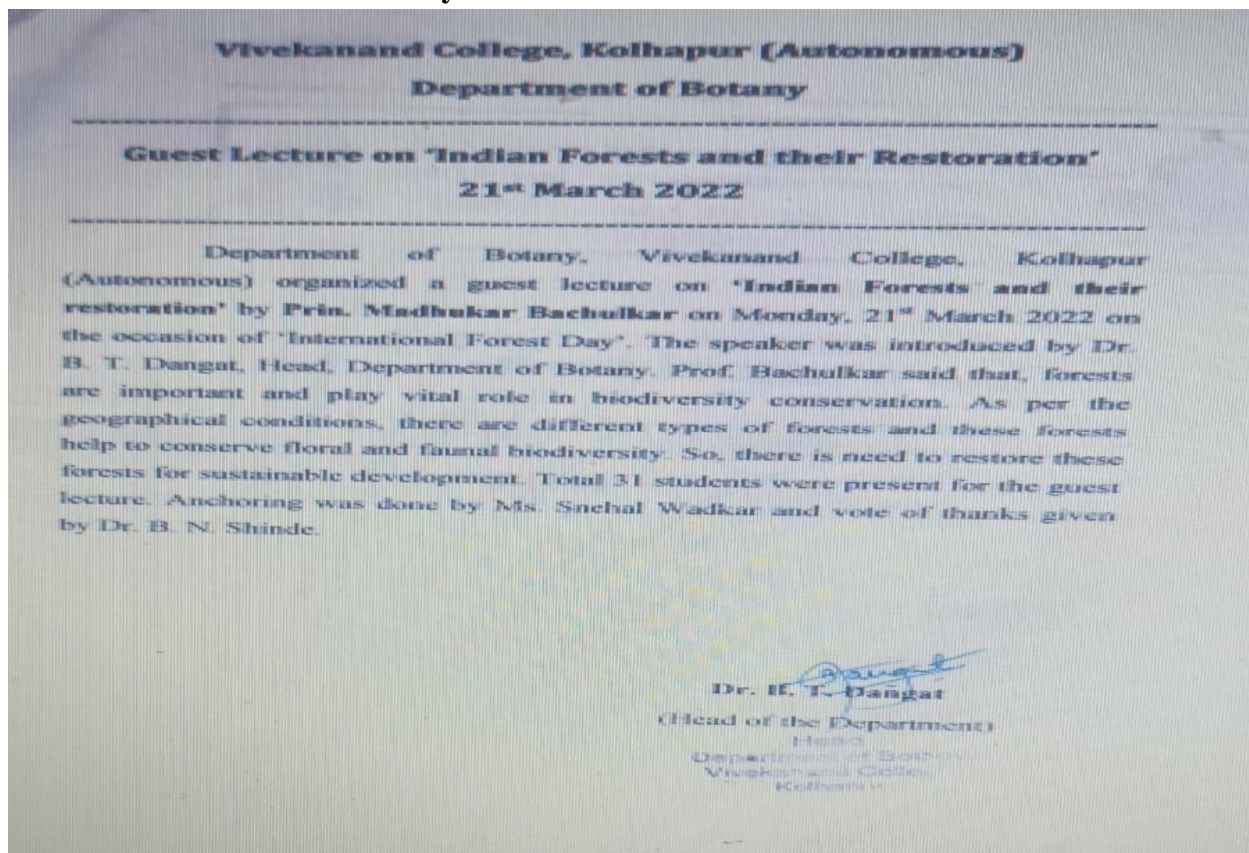


Plate No. 4 Guest lecture on Forest Day



#### 2.4.4 Kisan Din:

The Kisan Din celebrated on 23<sup>rd</sup> December by students of Vivekanand college at Kotoli Tal. Panhala. Students prepared 'Jeevamrut' and the bottles of 'Jeevamrut' distributed to the farmers of Kotoli village.

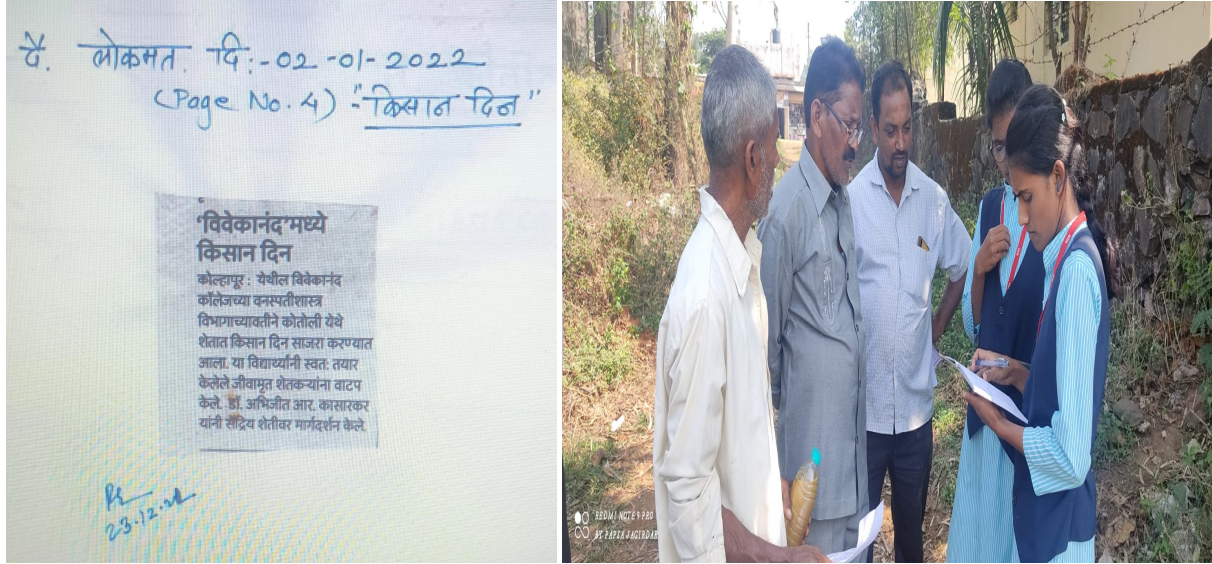


Plate No.5 Kisan Din at Kotoli Tal: Panhala

#### 2.4.4 Selfie point inauguration:

This is launched to give students more knowledge about growing and cultivating plants, fill them with excitement and raise their awareness of protecting trees as well as the environment.

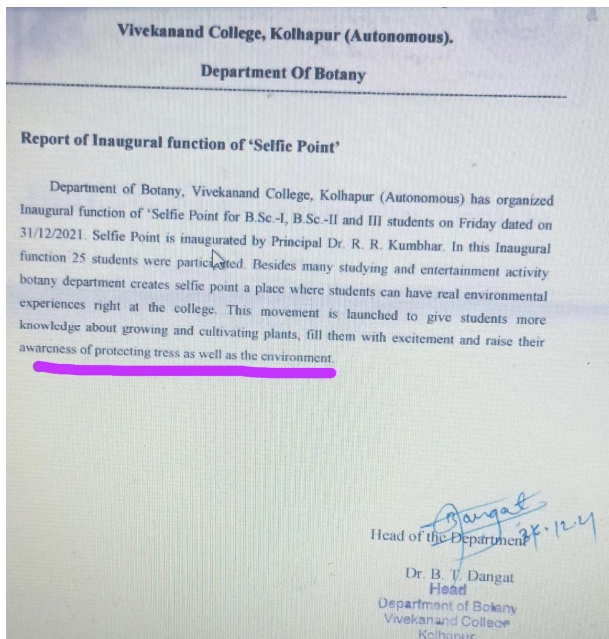


Plate No.6: Inauguration of selfie point



### Chapter 3 Best Environmental Practices

#### 3.1 Best from the Waste:

Department of Botany, Vivekanand College (Autonomous) has organized exhibition on 'Best from Waste' on 5<sup>th</sup> April, 2022, to promote the skills of students and to create awareness about recycling of the waste material for the production of useful products. In this exhibition 235 students were involved with their own handcrafted models, which were prepared from waste material.







**Plate No. 7 Best from the Waste Exhibition**



### 3.2 Pollution free river Panchganga campaign:

As Panchganga river water pollution is one of the most important issue in the Kolhapur, regarding this continuous work is to be done. By considering this, college always supports the activities related to this and continuously participating in the campaign. To create awareness among people, communities, businesses and governments about Panchganga pollution, Govt. of Maharashtra and Kolhapur Municipal Corporation organizes environmental awareness programs on 22<sup>nd</sup> April, 2022 at Panchganga ghat.



Plate No.8 Pollution free Panchganga river Campaign



## **Chapter 5**

### **Summary, Conclusion and Recommendations**

#### **Summary:**

Green Audit is one of the important tool to check the balance of natural resources and its judicial use. Green auditing is the process of identifying and determining whether institutional practices are eco-friendly and sustainable. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. The MS Enviro, Diskal, Satara has conducted a “Energy Audit” of Vivekanand College, Kolhapur in the academic year 2021-22. The main objective to carry out green audit is to check the green practices followed by college and to conduct a well defined audit report to understand whether the college is on the track of sustainable development.

After completing the audit procedure of college for green practices, there are following conclusions and recommendations which can be followed by college in future for keeping campus environment friendly.

#### **Conclusion:**

From the green audit following are some of the conclusions:

1. Activities carried out in college campus are very useful to create awareness.
2. Best from Waste activity is proving to be more useful in reducing the waste material and to promote the recycling of the waste.
3. On Farmer day, distribution of ‘Jeevamrut’ is an unique activity done by the college, which has given the students training of preparation and field work experience.
4. Tree Plantation Drives are organized regularly.

#### **Recommendations:**

Following are some of the key recommendation for improving campus environment:

1. Plant Ownership Program should be initiated – Several Trees should be planted and owned by visitors as well as students. The names of such visitors / students should also be displayed near the plants.
2. An environmental policy document has to be prepared with all the recommendations and current practice carried by college.
3. Rules to protect the environment needs to be prominently displayed and are available on the college website.

# **Green Audit 2022-23**



(स्वायत्त) कोल्हापूर

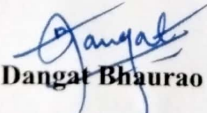
Vivekanand College, Kolhapur  
(Autonomous)



**Green & Clean Campus**

Green, Water and Energy Audit  
2022-23

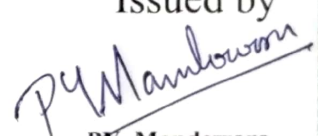
Prepared by

  
Dr. Dangat Bhaurao T

Coordinator



Issued by

  
PY. Mandowara.  
(D.CE., B.E.(Env.), L.LB.)  
Principal Consultant.

SkyIN Environmental Consultancy.

1

## Our Patron

### President



**Hon. Chandrakant (Dada) Bacchu Patil**

### Chairman



**Hon. Prin. Abhaykumar Govindrao Salunkhe**

### Secretary



**Hon. Prin. Shubhangi Muralidhar Gawade**



- Green Audit Report Committee -IQAC

To fulfil the goal of green campus policy the following committee was formed to workout various activities.

### Composition of the Committee

| Sr. No | Name of the faculty   | Department         | Designation |
|--------|-----------------------|--------------------|-------------|
| 1      | Dr. Dangat Bhaurao T  | Botany             | Coordinator |
| 2      | Dr. Joshi Shruti      | IQAC               | Member      |
| 3      | Dr. Shirke Sunita D   | Chemistry          | Member      |
| 4      | Dr. Ubale Govardhan   | Geography          | Member      |
| 5      | Dr. Kadam Abhijeet    | Env. Science       | Member      |
| 6      | Mr. Jog Raghunath     | Office Supridan    | Member      |
| 7      | Dr. Sunil Bhosle      | Geography          | Member      |
| 8      | Dr. Sandip Mangalekar | Environment Expert | Member      |

## Message from Chairman



In era of rapid industrialisation and heavy population the problems are also increasing in short span of time. Increasing population leads to create demand in open market. To match the demand more no of supply industry started in the same way. Along with that the environment degradation also takes place An environmental audit's mission is to compare an organization's environmental performance to its explicit, written environmental policies and objectives. One of the various environmental management instruments used to analyse, assess, and handle sustainability and environmental challenges is the environmental audit (DEAT, 2004). Not only is environmental auditing mandated by law in certain situations, but it also offers numerous advantages to an organisation. Among the various goals of environmental audits include confirming adherence to best practice standards, identifying any issues with the organization's operations, calculating the environmental effect of any processes or activities, and offering a database for remedial action.

## FOREWORD



Principal Message

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development.

The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit/energy Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through carbon footprint reduction measures.

Green audit, energy Audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of green impact on campus. Green auditing promotes financial savings through reduction of resource use. It gives an opportunity for the development of ownership, personal and social responsibility for the students and teachers. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future.

From last few years college has accepted various new and advanced, eco-friendly technologies such as roof top rainwater harvesting, solar energy projects, vermicomposting, etc. Plantation of number of plants has been done in the campus, which will be helpful to reduce carbon dioxide in the campus.

I am very happy to forward this Green Audit Report 2022 – 23 of Vivekanand College, Kolhapur. I must congratulate the Audit team for efforts taken for the completion of report. I am very optimistic that the report will be helpful to all concerned in the college and will motivate all to put green steps ahead in future.

(Dr. R. R. Kumbhar)

Principal

## Message from Coordinator



I am very thankful to our Principal Dr. R R Kumbhar to help in all means regarding preparation of the report. I am also thankful to Dr. Shruti Joshi madam (IQAC Coordinator) for valuable inputs in preparing the report. I am also thankful to committee members to being clear and punctual in achieving the goal of green and clean campus initiative.

### **Process of audit: -**

Vivekanand college Kolhapur (Autonomous) continuedly engage in achieving green campus goals set by the institute. To tune with the flow of environment conservation the green campus committee undergoes green, water, energy and environment audit in 2022-23. This process consists of preparation of report with proper documentation and submit to concern agency. After submitting report, the committee visit the college campus for inspection. After evaluating the submitted documents the committee submit their report with various suggestions to the authority.



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## 1.0 Background

Colleges and Universities have broad impacts on the world around them, both negative and positive. The activities pursued by colleges can create a variety of adverse environmental impacts. But colleges are also in a unique position as educational institutions to be leaders in pursuing environmentally sustainable solutions (Cochran *et. al.*, 2004).

Green audit was initiated with the beginning of 1970s with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. It exposes the authenticity of the proclamations made by multinational companies, armies and national governments with the concern of health issues as the consequences of environmental pollution. It is the duty of organizations to carry out the Green Audits of their ongoing processes for various reasons such as; to make sure whether they are performing in accordance with relevant rules and regulations, to improve the procedures and ability of materials, to analyze the potential duties and to determine a way which can lower the cost and add to the revenue. Some of the incidents like Bhopal Gas Tragedy (1984) have cautioned the industries that setting corporate strategies for environmental security elements have no meaning until they are implemented.

Green Audit is a methodical examination of environmental information about an organization, a facility or a site, to verify whether, or to what extent, they conform to specialized audit criteria. The criteria may be based on local, national or global environmental standards. It is “a management tool used by industry to evaluate its environmental performance” (United Nations Environmental programme, 1989).

Green Audit is assigned to the Criteria 7 of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India that declares the institutions as Grade A, Grade B or Grade C according to the scores assigned at the time of accreditation. The intention of organizing Green Audit is to upgrade the environment condition in and around the institutes, colleges, companies and other organizations. It is carried out with the aid of performing tasks like waste management, energy saving and others to turn into a better environmentally friendly institute (<http://www.spectro.in/>, 2017).

## **1.1 About Shri Swami Vivekanand Shikshan Sanstha**

Dr. Bapuji Salunkhe alias Govindrao Dnyanojirao Salunkhe, the great visionary educationist founded Shri Swami Vivekanand Shikshan Sanstha, Kolhapur in 1954 which is catering to the education needs of students belonging to 11 districts of the State of Maharashtra. Presently Shri Swami Vivekanand Shikshan Sanstha is a multidimensional educational institution spread over 13 Districts of Maharashtra and Karnataka with its network of 406 branches, consisting of 23 multi-faculty colleges imparting higher education in the faculties of Arts, Commerce, Science, Law, engineering, nursing and Education, 66 Jr. Colleges, 3 English Medium schools, 14 Primary Schools and 25 other branches. At present nearly 2 lakh students are learning through these branches. Most of these education centers are situated in the rural, backward, hilly, drought-hit and remote parts of the state of Maharashtra. Nearly, more than two lakhs of students are receiving their lessons in the Sanstha's different centers. All these centers of the Sanstha are manned with well-qualified, experienced and dedicated faculty, administrative and menial staff. In the fifties on October 19, 1954 saw the beginning of a new phase in Bapuji's career when he laid the foundation of a new education institute in the presence of his colleagues in Murlidhar temple at Karad. In November, 1954, the proposed educational institute was named after Shri Swami Vivekanand at the instance of Swami Ramanand Bharti, the first president of the sanstha. Shri Swami Vivekanand Sanstha was duly registered on 31st of December 1954; and started functioning on the 5<sup>th</sup> of June 1955. Bapuji and his colleagues set up highschool at Kolhapur, Tasgaon, Chaphal, Tarale and Undale; a training college for women at Karad, Boys'. Hostels at Kolhapur and Chaphal. This was only the modest beginning of Shri Swami Vivekanand Shikshan Sanstha that was soon to be developed in to 88652 students into the states of Maharashtra and Karnataka. The sanstha has the most impressive number of 3160 teaching staff, 1221 non-teaching and office staff. The sanstha owns 176 buildings and 70 new buildings are being constructed along with the construction of the new head office. The sanstha has also opened a credit society for its employees.

## **1.2 About VCK,**

The VCK was established in 1964 is known as one of the best quality colleges in Maharashtra. The U.G.C. granted autonomy to this college from the academic year 2018-19. About 5000 students are enrolled every year for various programs. Besides the conventional programs like B.A., B.Com. and B.Sc., the college offers the professional programs like B.B.A., B.C.A., B.C.S., B.Sc. (Biotechnology), B.Sc. Microbiology, B.Voc, Community College and M. B. A. The college also provides opportunity to undertake degrees like B.A., B.Com., B.Sc., B.Lib., M.Lib. and M.B.A. of YCMOU, Nashik.

The college has also acquired reputation in the fields of dance, drama, music, other arts and sports, besides academics. Our college has been securing the first place for last twenty years by winning maximum number of Shivaji University Merit Scholarships. The faculties of the college are not only excellent in teaching but also in research. Till date in all 43 minor and major research projects are undertaken by the faculties. Considering the strengths of the college, the NAAC, Bangalore has reaccredited the college with ‘A’ Grade. The college is identified twice as the “College with Potential for Excellence” by the UGC, and included in “The Star College Scheme” by the DBT, Govt. of India

## **1.3 Mission**

“Our mission is to strive hard to realize the vision of our founder Dr. Bapuji Salunkhe i.e. to make education accessible to the masses, and to mold responsible citizens by inculcating noble values and a thirst for knowledge.”

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#### **1.7 Environmental Policy:**

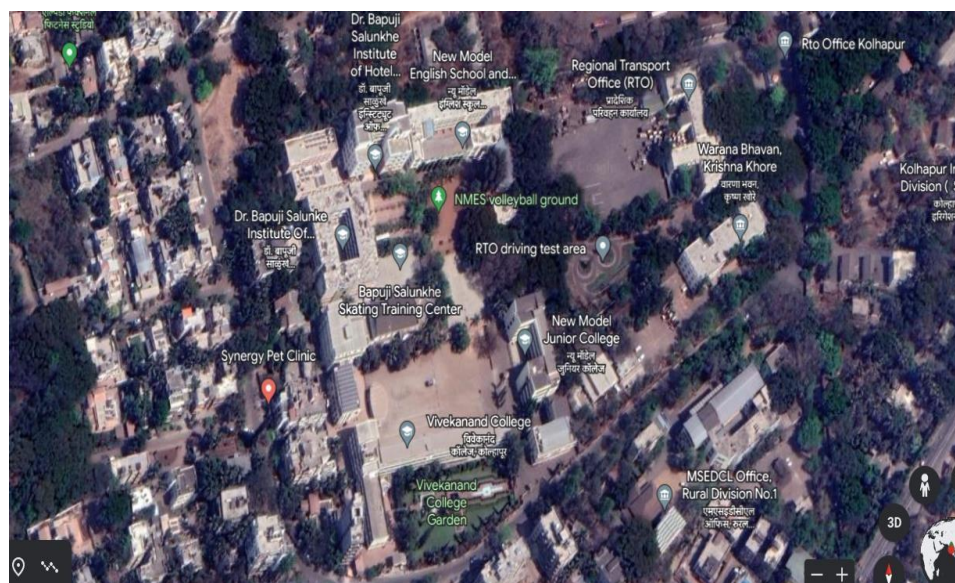
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| Website | <a href="http://www.vivekanandcollege.ac.in/default.aspx">http://www.vivekanandcollege.ac.in/default.aspx</a>  |

**Location:**

|                           |   |
|---------------------------|---|
| Location                  | Urban                                   |
| Campus area               | 7.0 Acre                                |
| Built up area in sq. mts. | 4775.63                                 |
| Coordinates:              | 16 <sup>0</sup> 42` 17” N 74 13“44.9” E |



**Plate No.01: The Google Earth Image of the Vivekanand College, Kolhapur**

**1.7 The Goals of Green Audit**

- The objective of carrying out Green Audit is securing the environment and cut down the threats posed to human health.
- To make sure that rules and regulations are taken care of sustainable development
- To avoid the interruptions in environment that are more difficult to handle and their correction requires high cost.
- To suggest the best protocols for adding to sustainable development.

## **1.8 Identification of Green Indicators**

1. Solid Waste
2. Electricity and Energy Audit
3. Water and Waste Water Audit
4. Hazardous Waste Audit
5. E-Waste
6. Environmental Quality
7. Risk and Hazard Analysis
8. Green Area Management
9. Environmental Management Plan

## **2.0 Materials**

The different methodology formats were achieved from several government and non-governmental observations. The suitable formats of different aspects were selected and used in the preparation of the Green Audit report. In order to perform green audit, the methodology included different tools which are as follows.

### **2.1 Preparation of Questionnaire**

The present study is based on onsite visits, personal observations and questionnaires and survey tools. Initially, based on data requirement, sets of questionnaires about electricity consumption, Water consumption, fuel waste, solid waste collection, chemical waste, e-waste, air pollution and noise pollution etc were prepared. Such filled questionnaires are collected from each department in the year 2016-17.

Questionnaires prepared to conduct the green audit in VCK campus is based on the guidelines, rules, acts and formats prepared by Ministry of Environment and Forest, New Delhi, Central Pollution Control Board and other statutory organizations and guidelines from proposed strategy on the Greening concept approved by the IIT (Annexure - Audit forms A to G).

### **2.2 Interviewing, Inspection and Observation of VCK Campus**

The Green Audit committee members then visited to all three streams viz Arts, commerce, science and professional courses along with Gymkhana and Exteriors.

### **2.3 Review of the Documentation**

All buildings and parts of campus were visited by the Green Audit committee members to check the present condition. They are checked with the help of the filled questionnaires of departments and verified on site. Personal observations were made during the onsite visit and data recorded in the respective list. The data related to energy survey, lighting survey, vehicle survey, solid waste generation, e-solid waste generation, water waste etc is verified personally by committee and several other documentations were reviewed for data achievement.



## **2.4 Environmental Monitoring**

Green Audit Committee is periodically monitoring water storage, water requirements, water losses and water leakages in campus. Team of experts periodically monitored and recorded the information regarding the air, water and noise quality at the campus.

Ambient Air Quality Monitoring (AAQM) was done at three locations (24 hours) by using Respirable Dust Samplers (Envirotech-APM 460) and (Envirotech-APM 550 MFC Sampler) for SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> parameters respectively by considering the meteorological conditions of the campus area. The ambient air samples are analyzed as per Indian standard Method of Measurement of Air Pollution namely IS: 5182 Part 4, 2019 (PM<sub>10</sub>); IS: 5182 Part 24, 2019 (PM<sub>2.5</sub>); IS: 5182 Part 2, 2017 (SO<sub>2</sub>); IS: 5182 Part 6, 2018 (NO<sub>x</sub>). Waste water samples were collected and analyzed as per the procedures specified in Standard Methods for the Examination of Water and Wastewater™, 24th edition (2022). The noise levels measurements were carried out using precision Sound Level Meter (Envirotech- SLM 100).

## **2.5 Data Analysis and Report Preparation**

The generated data is subsequently gathered together, tabularized and the tabulated data is then used for further analysis. For better understanding of the results and to avoid complications, averages and percentages of the Tables were calculated. From the outcome of the overall study recommendations were given and final report is prepared.

The study covered the following areas to summaries the present status of environment management in the campus water management, energy conservation, waste management, e-waste management green area management and risk and hazard analysis etc.

### 3.0 Solid Waste

Waste generation, both domestic and industrial, continues to increase world-wide in tandem with growth in consumption. In developed countries, per capita waste generation increased nearly three-fold over the last two decades, reaching a level five to six times higher than that in developing countries (UNEP, 2005).

Solid waste” refers to the refuse, the solid and semi solid waste matters of a community except the night soil. Solid waste contains organic as well as inorganic matters. Solid waste management includes the entire process of dealing with solid waste, starting from the collection from the primary source to ultimately disposing off it hygienically, so that it may not be a nuisance or create any harmful effect on nearby community. The solid waste management involves management at waste generation level, storage at the source of generation, primary collection, street cleansing, temporary storage at locality level, regular and periodic transportation of this temporarily collected waste to disposing sites and treatment plants (Kumar and Pandit, 2013). Solid waste can be classified into different types depending on their source. It includes (a) House hold waste (b) Industrial waste (c) Biomedical waste or hospital waste or infectious waste.

As per Municipal solid waste Management and Handling rules-2000, solid waste management is in the obligatory function of urban local bodies , but in actual practice the solid waste management is given the last priority and the duties are either not performed or poorly performed consequently the city has to face numerable problems related to environment and sanitation.

#### 3.1 Status of Solid Waste Generation in VCK Campus

**Paper** has an indisputable place in establishment of civilizations, saving information and passing it to next generations and its consumption has been increasing (Yılmaz, 2015). **Biodegradable waste** (bio-waste) means biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants. But, the composition of bio-wastes can be very different, variable and the determination of production factors can be complicated (Horsak and Hrebicek, 2014). It is responsible for the main pollution risk and greenhouse gas emissions associated with landfill disposal of waste (<https://spiral.imperial.ac.uk/>, 2017).

**Plastics** have made significant contribution in almost every field of human activity today agriculture, medical, transportation, piping, electrical and heat insulation, packaging, manufacturing of household and electronic goods, medical products, furniture and other items of daily or specific use. Plastics are blamed for series of health, safety and environmental problems. Non-biodegradability of plastics is attributed towards causing waste management problems and choking of the drains in urban cities (Siddiqui and Pandey, 2013). According to eleventh five year plan, **Construction** industry is the second largest economic activity after agriculture in India and the impact caused by high volume of raw materials and products to the environment by it is also large. The waste generated mainly having high density, very often occupy considerable storage space consists of inert and non-biodegradable materials such as concrete, plaster, wood, metal, broken tiles, bricks, masonry etc. (Thomas and Wilson, 2013).

Due to modernization of lifestyle, the electronic waste or **e-waste** generation is one of the fastest growing issues in the world. The e-waste containing toxic material may cause an adverse impact to human health and environment, if not treated properly. The composition of e-waste is very diverse and contains over thousand different substances, which falls under organic and inorganic fractions (Yoheeswaran, 2013). A large amount of **glass waste** from industry has been an urgent subject at both national and global levels. Nearly 10 million tons of glass wastes have been generated every year around the world. Glass recycling can save energy and decrease environmental waste. In research, considering the post-consumer waste glass, there is effort to recover and use waste glass or otherwise its end up at disposal landfill (Vasudevan and Pillay, 2013).

**Hazardous waste** defined as liquid, solid or combination of solid waste whose concentration, due to its quantity, or physical, chemical or infectious characteristics may cause or considerably contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness or pose a substantial hazard to human health or the environment when improperly treated, stored, transported, disposed, or otherwise managed. It arises from a wide range of different sources including households, commercial activities and industry. The main disposal route of hazardous waste is incineration, physical or chemical treatment and landfill. On the

recovery side, a significant quantity of hazardous waste is recycled or burned as a fuel (Ulinskaite *et. al.*, 2006).

To analyze the total solid waste in various units and departments in college, it is categorized into groups viz.

#### I. Aided Programs:

- A. B.A. (1. Marathi 2. Hindi 3. English 4. History 5. Geography 6. Sociology 7. Economics 8. Political Science 9. Home Science).
- B. B.Sc. (1. Physics 2. Chemistry 3. Mathematics 4. Statistics 5. Electronics 6. Computer Science 7. Botany 8. Zoology. 9. Microbiology (Unaided) 10. Biotechnology (Unaided).
- C. B.Com (1. Advance Accountancy 2. Industrial Management).

#### II. Unaided Programmes

- A. B.B.A.
- B. BCA
- C. B.Sc. Computer Science (Entire)
- D. B.Sc. Biotechnology (Entire).

#### III. UGC Funded B. Voc. & Community College Programmes (UG)

- 1. B. Voc. Foundry Technology 2. B. Voc. Graphic Design 3. B. Voc. Animation & Film Making 4. Community College Adv. Diploma in Photography 5. Community College Foundry Technology 6. B. Voc. Dip. Photography & Videography 7. Comm. College Dip. In Cinematography 8. Community College Dip. In Event Photography.

#### IV. UGC Funded P. G. Programmes

- 1. M. Voc. Graphic Design 2. M. Voc. Foundry Technology.

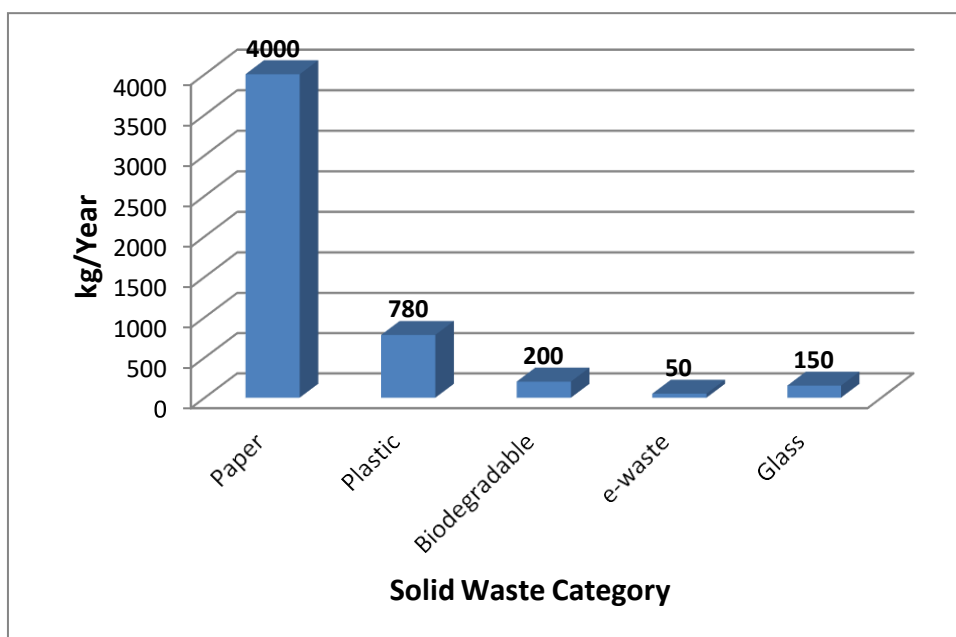
#### V. Unaided P. G. Programmes

- 1. M.Sc. (Organic Chemistry) 2. M.Sc. (Mathematics) 3. M.Sc. Physics (Solid State Physics) 4. M.Com.

Total solid waste is measured in category like paper (envelops, newspapers (Marathi & English), answer sheets (printed-blank), magazines, notebooks, books (small and big), out dated records, journals, ruled papers, tissues etc.), plastic,



biodegradable, glass waste and other. The solid waste collection in different department/units of college is shown below graph no. 3.1 (Annexure-B).



**Graph No. 3.1.** Category Wise Solid Waste Generation at VCK (Kg/Year)

Graph No. 3.1 shows that the category wise solid waste generation at different department in college. Among the total waste generated 5600 kg/year slightly high amount of total paper waste i.e 4000 Kg/year i.e. 333 kg/ Month i.e. 8 kg/course/month considering 40 educational courses in college, but quantity of paper waste vary department to department. Also approximately 62 kg/month i.e. 780 kg/year of plastic waste (Pet, HDPE, LDPE, MLP, Carton boxes, PP, Tetra Pack, thermocol, PS, Polythene black Bags, unwanted and other), 200 kg/year of biodegradable waste (Tiffin-food waste, canteen waste, tree leaves, flowers and other parts etc.), 50 kg/year of e-waste (electrical and electronics write out materials), 50 kg/year of metal, 50 kg/year glass wastes (lab materials) and 500 kg/year of, very negligible amount of construction waste (during maintenance of building) and metal waste. And 420 litre of hazardous wastes generated in VCK College.

### 3.2 Hazardous Waste

Hazardous wastes are substances which are potentially hazardous to human health and/or the environment. As such, they typically require special disposal techniques to eliminate or reduce the hazards they pose (Meakin, 1992). Hazardous wastes refer to wastes that may, or tend to cause adverse health effects on the ecosystem and human beings. These wastes pose present or potential risks to human health or living organisms, due to the fact that they: are non-degradable or persistent in nature; can be biologically magnified; are highly toxic and even lethal at very low concentrations (<http://nptel.ac.in/>, 2017).

From the data obtained from different departments/Units shows in VCK campus hazardous chemical waste is generated only in Chemistry Department. No other department or unit/section of the college generates any type of Hazardous Waste. Here hazardous waste (HCL, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, bromine, Formaldehyde, o- phosphoric acid, Ethen alcohol is approximately 420 litre /year and liquid hazardous waste is negligible (Annexure-D).

### 3.3 E-waste

E-waste is defined as “waste electrical and electronic equipment, whole or in part or rejects from their manufacturing and repair process, which are intended to be discarded” whereas electrical and electronic equipment has been defined as ‘equipment which is dependent on electrical currents or electro-magnetic fields to be fully functional’. There is a need for e-waste management as e-waste components may cause severe health risks and environmental damage, when crude, unscientific methods are applied for recovery of useful components. There is a need to encourage recycling of all useful and valuable material from e-wastes to preserve the natural resources (<http://tec.gov.in/pdf/>, 2017).

Data collected shown in above table reveals that, major source of e-waste are generated in office, Computer, IT, Electronics and other department generated highest amount of e-waste (50 Kg/year) as compared to other departments. Other departments/sections generates negligible amount of e- waste. The Gymkhana of our college doesn't generate any E- waste. But in 4 to 5 years the e-waste from dead stock (Desktop, printers, scanners etc.) all the departments / units are transferred to the e-waste recyclers (Mahalaxmi Recyclers, Kolhapur). In the year 2022-23, about

50 kg of e-waste is handed over to the Mahalaxmi Recyclers, Kolhapur (Annexure-E).

### **3.4 Current Solid Waste Management on VCK Campus**

Our college administration always give prime importance to the solid waste management as it creates unsanitary conditions in the scenario of college and its dangerous for human health where the collection, treatment and removal of solids is inadequate. The solid waste management is complex technical challenge in present condition. Large size dustbins are kept all over the campus for segregated disposal of waste. The Kolhapur municipality provides the facility of garbage truck to collect the solid degradable and non-degradable waste and has special dumping ground for this waste. The college and administration are constantly invoking the students' teachers and non-teaching staff to use cloth bags instead of plastic bags. Incinerators are provided in ladies washrooms for hygienic and safe disposal of used sanitary napkins. Separate dustbins are kept in the canteen and hostels for collection of food waste.

Solid waste in college campuses is mainly waste paper. The waste generated in college is sold every year to the scrap yard. In offices and other places we use one-sided used paper for reprinting.

The college is constantly invoking to use cloth bags instead of plastic bags. Incinerators are provided in ladies washrooms for hygienic and safe disposal of used sanitary napkins. Solid waste in college campuses is mainly waste paper. The waste generated in college is sold every year to the scrap yard. In offices and other places, we use one-sided used paper for reprinting.

College campus has proper drainage system for the waste liquid. College has waste water recycling unit in the area of ladies hostel.

The college has installed 6 sanitary vending and disposal machines for the careful disposal of sanitary napkins. For practical purpose students requires cotton balls on large scale. We disposed these cotton balls through these machines. The ash generated from this disposal machines were used as manure in year 2021-22.

E-waste generated in the college is collected in the department of electronics. Our college has entered into a MoU with Mahalakshmi Recyclers, an agency for

proper disposal. Almost every year department of Electronics conducting E-waste management workshop for to make awareness about the E-waste.

Mostly concentrated acids or chemicals are not used in the college. If necessary to use concentrated chemicals, proper dilution is made before disposal.



## 4.0 Energy

Energy is the ability to do work and work is the transfer of energy from one form to another. Energy comes in diverse forms heat (thermal), light (radiant), mechanical, electrical, chemical, and nuclear energy. For sustainable development, we need to adopt energy efficiency measures. Nowadays, 85% of primary energy comes from non-renewable and fossil sources (coal, oil, etc.). These reserves are persistently diminishing with growing consumption and will not exist for future generations. Energy can be classified into various types based on primary and secondary energy, commercial and non-commercial energy and renewable and non-renewable energy (Deshmukh and Patil, 2013).

Energy sources utilized by all the departments of college include electricity, liquid petroleum, LPG and spirit/alcohol in the laboratory in fewer amounts. Major use of the energy is at office, canteen, and laboratories for lighting, transportation, cooking and laboratory work. The campus recently using environmental friendly renewable sources like LED bulbs and solar energy. Along with Green Audit, Private firm MS Enviro Pollution Control Services & Consultant is doing Energy Audit of VCK campus for the year 2022-23.

### 4.1 Electricity Consumption in Departments of VCK Campus

#### Energy Consumption:

**Table No. 4.1** Electricity Bills in the campus

| Sr. No. | Month          | Meter No       |               |               |
|---------|----------------|----------------|---------------|---------------|
|         |                | 266511811601   | 266511811597  | 266511971969  |
| 1       | April 22       | 1051           | 243           | 423           |
| 2       | May-22         | 1891           | 1159          | 1542          |
| 3       | June – 22      | 1000           | 456           | 666           |
| 4       | July – 22      | 1000           | 456           | 964           |
| 5       | August – 22    | 1844           | 1223          | 731           |
| 6       | September – 22 | 602            | 357           | 747           |
| 7       | October – 22   | 680            | 561           | 1031          |
| 8       | November – 22  | 676            | 671           | 583           |
| 9       | December- 22   | 1301           | 615           | 659           |
| 10      | January – 23   | 1504           | 727           | 753           |
| 11      | February – 23  | 1377           | 603           | 561           |
| 12      | March- 23      | 1773           | 614           | 568           |
|         | <b>Average</b> | <b>1227.92</b> | <b>640.42</b> | <b>769.00</b> |

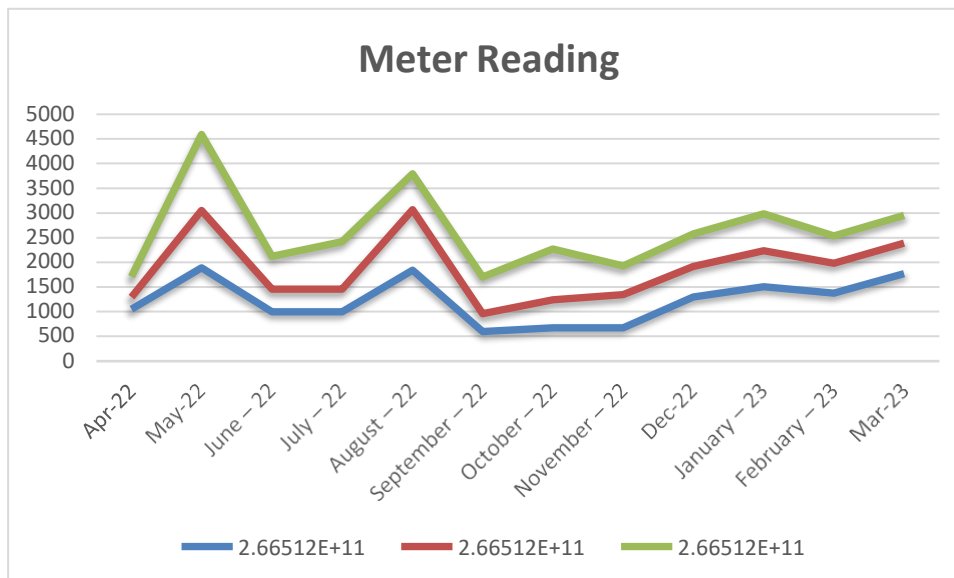


Figure No. 4.1 Comparison between 03 meter readings.

#### Annual Electricity Use in Units for 03 Meters

- A) Electricity consumption by Meter No. 01- 266511811601 Avg. consumption = **1227.91**units.
  - B) Electricity consumption by Meter No. 02- 266511811597 Avg. consumption = **640.41** units.
  - C) Electricity consumption by Meter No. 03- 266511971969 Avg. consumption = **769.00** units.
- Total=2637.32 units**

Electricity supplied from the Maharashtra State Electricity Board (Mahavitaran) is the main source of energy for the activities on the campus like illuminating rooms, operating fans computers, instruments, motor and for water coolers. It is depicted from above tables and graphs that the average electricity consumption by college is 804.5 unit per month. Diesel operated Green power Kirloskar generator is used as an alternating source of Energy during emergency conditions. (Annexure-A I & II).

#### 4.2 Fuel Consumption in VCK Campus

According to the questionnaire survey (Annexure-A-III & A-IV) mainly fuel consumption on college campus for 5000 students, 360 staff (teaching=130 & non-teaching =230) is by vehicles, it is also an important criterion for energy audit. Average count of two wheelers is 400 and of four wheelers it is 25. It is seen that number of two wheelers is more than that of four wheelers. The fuel utilized by

two wheelers is 4800 liters/month and by four wheelers is 1250 Liters/Month. Collected data also shows that number of four wheelers is maximum for teaching staff & institution while minimum for students and non-Teaching staff.

About 50% students are using State Transportation (ST), about 2% students are using bicycle and about 30% students use the walking mode (Resident and Hostel) while only 15% students use their own two wheeler vehicle. Parents of 5% students drop them to the college. It reveals that percentage of girl students adopting State Transportation (ST), walking is greater than that of the percentage of boy students. The absence of students was the main reason for the less transportation activity.

The use of vehicle by staff of our college was about 10% of staff is using four wheeler, 70% staff is using two wheeler vehicles while about 5% are come by walking, about 15% staff use ST for transportation. In the college LPG gas required for practical purpose in all departments nearly 2 (45 kg) Cylinders/Month and in canteen for cooking and domestic purpose i.e. 8 Cylinders/Month.

## 5.0 Water

Water is the only substance that exists naturally on Earth in all three physical states of matter solid, liquid, and gas and it is always on the move among them. The Earth has oceans of liquid water and Polar Regions are covered by solid water (<http://scifun.chem.wisc.edu/>, 2017). The purpose of a water audit is to quantify the amount of water that is being produced or supplied by a water system, but that is not being delivered or billed to customers. By examining in detail the areas water is being used in a system, sources of lost water can be identified, and an action plan can be developed to control or reduce water losses (Rowley- Massachusetts, 2016).

### 5.1 Water Audit

Water Audit comes into picture in late 80s to overcome a drought related problem, shortage, leakages and losses. The goal of an audit is to express an opinion on the person / organization / system etc., in question, under evaluation based on workdone on a test basis. Water audits provide a rational, scientific framework that categorizes all water use in your system. It is a tool to overcome drought related problem, shortage, leakage and losses (Ganorkar *et. al.*, 2013). A wastewater audit determines the water flowing through a water supply system for transport and treatment. The intention of the wastewater audit is to help align the amount you pay for wastewater services with your actual volume of discharge(<https://www.watercare.co.nz/>, 17.08.2017).

### 5.2 Water Consumption at VCK Campus

Ground water is main water sources in the form of two private bore wells and wells. Although the municipal water supply is available however it is used in very less quantity. The water from the well is used for the English Medium School and office which was not under the scope of audit hence the well water consumption not considered. The main sources of water source are

- Bore well back side of Sr. Building,
- Bore well Girls Hostel &
- Well near institution building
- Water supply from Municipal Corporation (Annexure-C, F & G).

The Water source, storage and usage are shown in the schematic diagram 1, 2 & 3.



## 1. Bore well back side of Sr. Building,

Sr. College building is having ground and three floors, first and second floor have laboratories of Chemistry, Botany, Micro biology, Physics, Zoology, etc. Where in washbasins are provided with the taps, number of taps are 126. Also the washbasins are provided in staff rooms, library, offices, etc the numbers are 28. At the first floor the water fountain is installed however it was not in operation at the time of water survey. Library water mainly use for washbasins and in toilets. The toilets and urinals are available at various locations across the college like adjacent to senior college building, basement, 1<sup>st</sup>, 3<sup>rd</sup> floor, library, junior college building staff room and offices. In total there are 60 urinals and 26 toilets, the toilets are connected to cisterns of capacity of 10 liters. The water is used for purpose of flushing and face/hand washing.

The water is also used for the purpose of cleaning, mopping and washing of Sr. College building and surrounding area activity once in week. The canteen has separate water supply line from bore well which supplies water continuously to canteen. The canteen has 6 taps and basins for hand washing. The water is treated and used for drinking purpose. The canteen is operated for 8 hour's day. The water is also used for the purpose of cleaning, mopping and washing activity once in day.

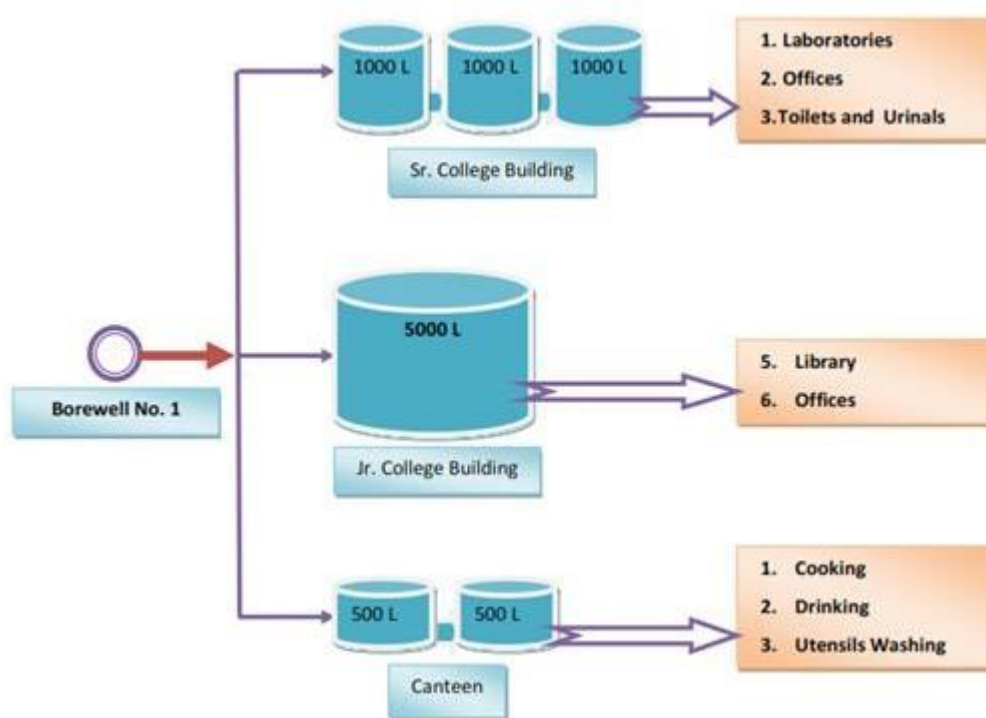
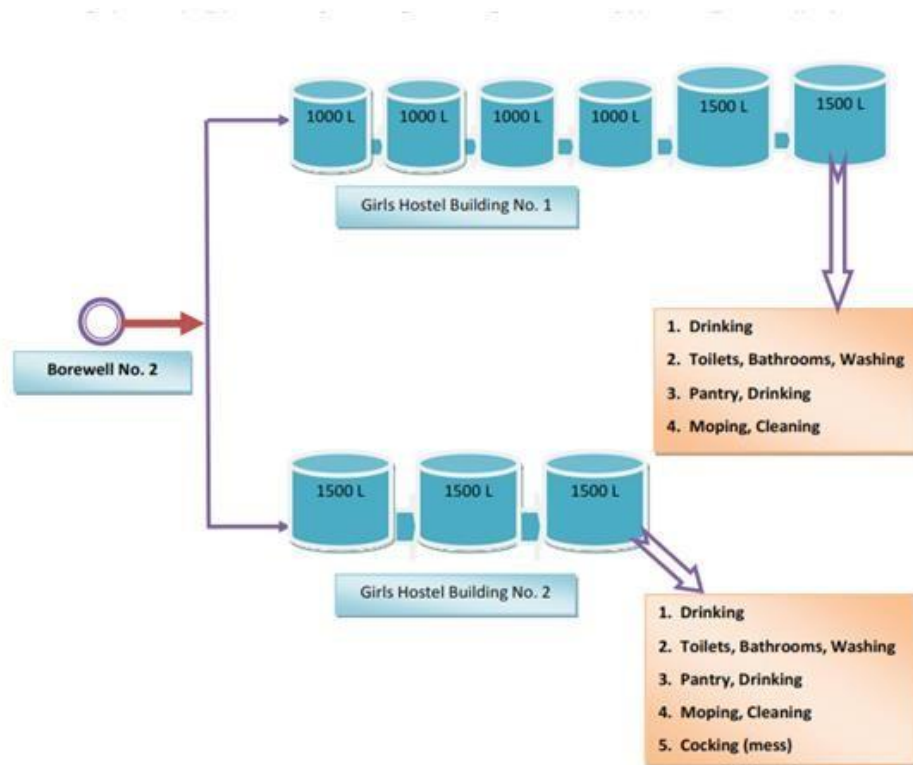


Figure No.5.1 Schematic diagram of Water Source, Storage and Usage for Bore Well

01

Two girls hostels buildings with ground and two floors accommodating 200 girl students and 5 staff. The water is stored on the terrace of the building in plastic tanks; the water is used for drinking, bathing, washing and moping, cleaning, cocking purpose.



**Figure No.5.2** Schematic diagram of Water Source, Storage and Usage for Bore Well

02

### 3. Well Near Institutions Building:

Another source of ground water this water is used for the gardening purpose. The water is extracted using the submersible pump provided.

### 4. Municipal Water Supply:

Municipal water is sourced from surface water and supply for 3 to 4 hours a day and stored in two plastic tanks of 500 liter each. This water is mainly used for drinking purpose through the cooler placed at the ground floor of Sr. building. The water is also used for the washing purpose. Water meter is provided on the municipal water line inside college premises however the water readings are not recorded to measure the water consumption.



**Figure No.5.3** Schematic diagram of Water Source, Storage and Usage for Municipal water Supply

The strength of the college is 8385 students and 441 staff, The average working days for the college is 25 days a month and average class hours is 6 per student in a day during which the average visit to washroom is about 1.5 times.

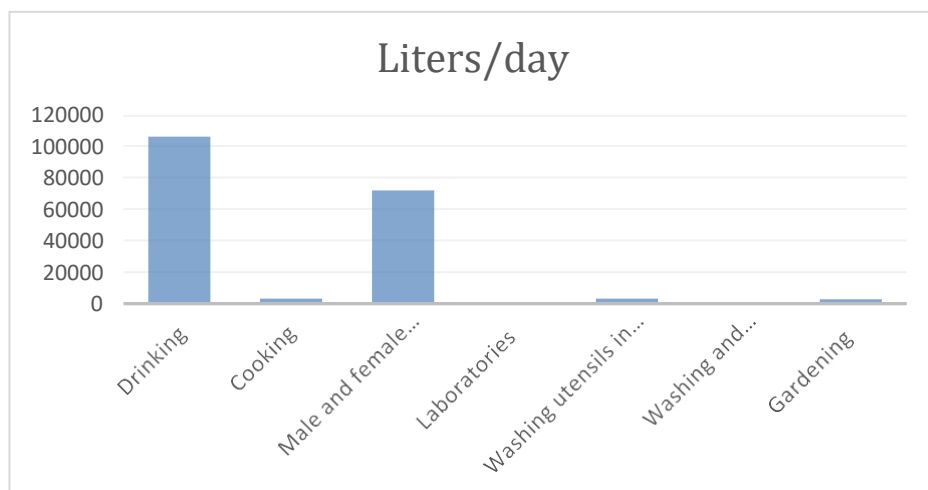
### 5.3 Data Comparison and Analysis

**Table no. 5.1** Summary of water consumption (Except girl's hostel)

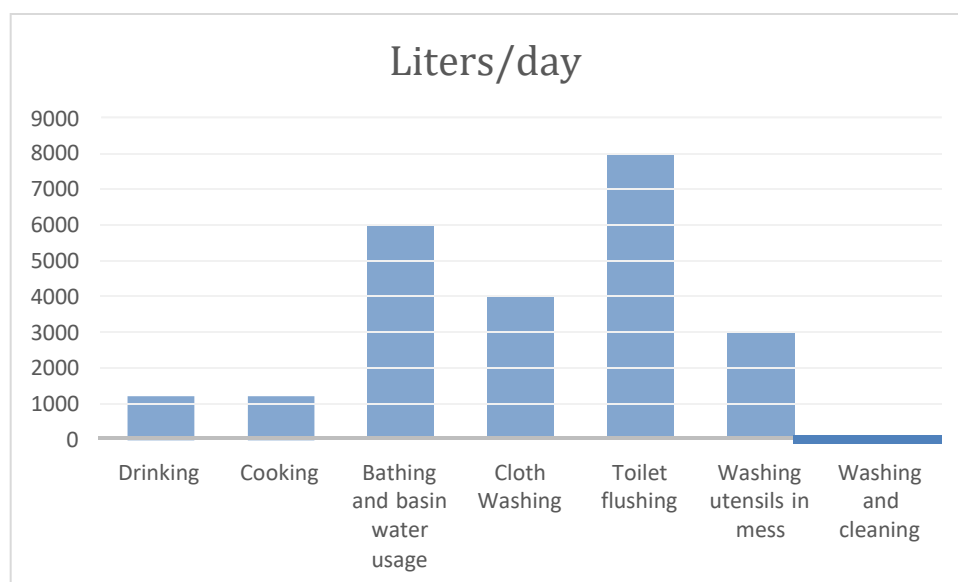
| Sr. No. | Activity                                   | Liters/day   | Liters per capita per day (lpcd) | Percentage of total usage |
|---------|--|--------------|----------------------------------|---------------------------|
| 1.      | Drinking                                   | 105921       | 1.20                             | 11.53                     |
| 2.      | Cooking                                    | 3000         | 0.34                             | 3.27                      |
| 3.      | Male and female Toilet and urinal flushing | 71701        | 8.12                             | 78.09                     |
| 4.      | Laboratories                               | 625          | 0.07                             | 0.68                      |
| 5.      | Washing utensils in canteen                | 3000         | 0.34                             | 3.27                      |
| 6.      | Washing and cleaning                       | 200          | 0.02                             | 0.22                      |
| 7.      | Gardening                                  | 2700         | --                               | 2.94                      |
|         |  | <b>91817</b> | <b>10.10</b>                     |                           |

**Table no. 5.2** Summary of water consumption (Girl's hostel)

| Sr. No. | Activity                      | Liters/day   | Liters per capita per day (lpcd) | Percentage of total usage |
|---------|-------------------------------|--------------|----------------------------------|---------------------------|
| 1.      | Drinking                      | 1230         | 6                                | 5.09                      |
| 2.      | Cooking                       | 1230         | 6                                | 5.09                      |
| 3.      | Bathing and basin water usage | 6150         | 30                               | 25.45                     |
| 4.      | Cloth Washing                 | 4100         | 20                               | 16.97                     |
| 5.      | Toilet flushing               | 8200         | 40                               | 33.93                     |
| 6.      | Washing utensils in mess      | 3075         | 15                               | 12.73                     |
| 7.      | Washing and cleaning          | 180          | 0.88                             | 0.74                      |
|         |                               | <b>24165</b> | <b>177.88</b>                    |                           |



**Graph No. 5.1** Water Consumption Activity in VCK Campus (except girls Hostel)



**Graph No. 5.2** Water Consumption Activity in Girls Hostel.

From the table 5.1 & 5.2 based on the above data recording, monitoring and calculations the total water consumption at Vivekanand College

- 91817 liters per day and the per capita use is 10.10 lpcd considering the student strength 5000 and staff 441 per day.
- The potable water consumption in 13591 liters for drinking and cooking purpose, the per capita consumption of potable water is 1.54 lpcd.

- The total consumption of non-potable water for toilet, hand washing, lab use, mopping, and gardening is 78226 liters/day, the per capita consumption for non-potable usages is 8.56 lpcd.
- 78 % water is consumed only for toilet and urinal flushing.

**College:** There is a slight variation in the average amount of water that is pumped to the overhead tank and water used. The average water pumped to the overhead tanks is 91800 liters/day and the average consumption calculated is 89117 liters/day. The water used for gardening purpose having separate line from same borewell. The difference of 2683 liters could be due to certain assumptions were taken while calculating water consumption, e.g. the presence of staff and students, in addition the floor cleaning not done daily and the watering to plant sometimes twice a day.

**Girls Hostel:** Due to unavailability of water meters the exact quantity of water pumped to overhead tank is not possible measure, hence the basis of interaction with hostel staff the overhead tank filled twice in a day. The water pumped to the overhead tank is considered 23000 liters per day and the average water consumption calculated is 24165 liters per day.

#### 5.4 Water losses

- ☐ At many places it was observed that taps were leaking.

**Table no. 5.3** Total Water Supply and Use at College

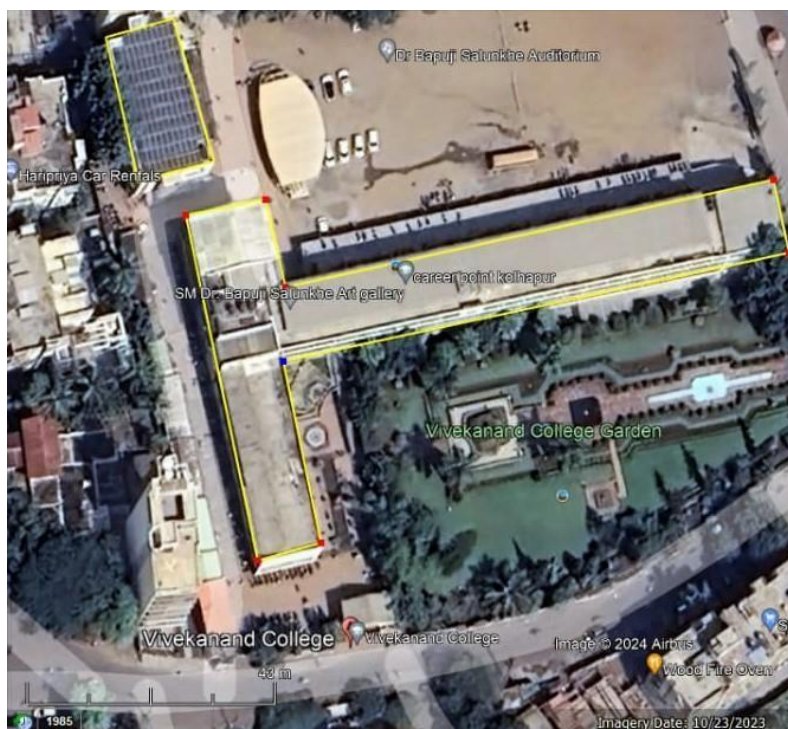
| Sr. No. | Heads  | Water Use (litres) |
|---------|--|--------------------|
| 1.      | Average daily water supply, to the overhead tanks  | 91800              |
| 2.      | Total calculated water consumption from the water audit  | 89117              |
| 3.      | Difference between water consumption from overhead tanks and actual water use for various purposes | 2693               |



**Table no. 5.4** Total Water Supply and Use at College

| Sr. No. | Heads  | Water Use (litres) |
|---------|--|--------------------|
| 1.      | Average daily water supply, to the overhead tanks  | 23000              |
| 2.      | Total calculated water consumption from the water audit  | 24165              |
| 3.      | Difference between water consumption from overhead tanks and actual water use for various purposes | 1165               |

## 5.2 Rain Water Harvesting in VCK Campus



**Figure No. 5.3** Rain Water Harvesting in VCK Campus Main Building + Library

- Annual Rainwater Endowments from Rain water Harvesting
  - Main Building 905.69 m<sup>2</sup> (Roof: Corrugated metal sheets) = 731.34 m<sup>3</sup>.
  - Main Building 905.69 m<sup>2</sup> (Roof: Concrete Slab) = 602.28 m<sup>3</sup>.
  - Library 338 m<sup>2</sup> (Roof: Solar Concrete) = 272.94 m<sup>3</sup>.

Total Annual Rainwater Endowments from Rain water Harvesting= 1606.56 m<sup>3</sup>.

The available quantity of water from the area is 1606.56 m<sup>3</sup>; part of it could be effectively harvested, by providing a recharge of wells, for recharging the subsurface shallow and deep aquifers, at the locations inside or around VCK campus.

## 6.0 Air Quality

Urban air pollution poses a significant risk to human health, the environment and the quality of life of millions of people in some of the world's biggest cities which has remained to be challenge in many parts of the world, both in the developed and developing nations, owing to anthropogenic activities. Ambient air quality monitoring provides knowledge on sources, chemical composition and dispersal of air pollutants. This is important in programmes aimed at controlling pollution levels in a given environment. Air pollutants are frequently associated with many respiratory diseases in humans and loss of plant and animal productivity (Shilenje *et. al.*, 2015; <http://www.vaisala.com/>, 18.08.2017). An assessment by World Health Organisation's (WHO) International Agency for Research on Cancer (IARC) in 2013 observed that outdoor air pollution is carcinogenic to humans, pointing out particulate matter (PM) component of air pollution to be most closely linked to increased cases of cancer, especially cancer of the lungs (WHO, 2013). The most abundant components of air pollution in urban areas are Sulphur dioxide, Nitrogen dioxide, and Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>).

**Table No. 6.1** Ambient Air Quality Monitoring Locations

| Sr. No. | Sample Code | Station Name          | Description as per CPCB |
|---------|-------------|-----------------------|-------------------------|
| 1.      | A1          | Near Main Gate        | Residential             |
| 2.      | A2          | Inside College Campus | Residential             |
| 3.      | A3          | Backside of College   | Residential             |

**Table No. 6.2** Ambient Air Quality Monitoring Results (24 hourly Average)

| Date of Sampling                         | Sampling location | SO <sub>2</sub> (µg/m <sup>3</sup> ) | NO <sub>x</sub> (µg/m <sup>3</sup> ) | PM <sub>2.5</sub> (µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> ) |
|--|-------------------|--------------------------------------|--------------------------------------|--|---------------------------------------|
| 10.01.2023                               | A1                | 8.64                                 | 15.50                                | 22.59                                  | 61.33                                 |
|  | A2                | 7.05                                 | 13.39                                | 17.11                                  | 55.86                                 |
|  | A3                | 6.59                                 | 10.86                                | 15.77                                  | 53.13                                 |
| 11.01.2023                               | A1                | 9.15                                 | 17.29                                | 23.05                                  | 62.66                                 |
|  | A2                | 8.07                                 | 14.00                                | 16.51                                  | 53.63                                 |
|  | A3                | 7.34                                 | 13.89                                | 14.94                                  | 51.49                                 |
| 12.01.2023                               | A1                | 9.55                                 | 16.01                                | 24.06                                  | 63.33                                 |
|  | A2                | 7.81                                 | 14.67                                | 18.34                                  | 57.66                                 |
|  | A3                | 7.00                                 | 13.05                                | 16.92                                  | 55.83                                 |
| CPCB Standard (µg/m <sup>3</sup> ), 2009 |                   | 80                                   | 80                                   | 60                                     | 100                                   |
| Max                                      |                   | 9.55                                 | 17.29                                | 25.05                                  | 64.66                                 |
| Min                                      |                   | 6.59                                 | 10.05                                | 13.77                                  | 49.49                                 |
| Average                                  |                   | 7.91                                 | 13.74                                | 18.59                                  | 56.44                                 |

|    |      |      |      |      |
|----|------|------|------|------|
| SD | 1.03 | 2.43 | 4.28 | 5.73 |
|----|------|------|------|------|

The average concentration of SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, observed was 07.91 µg/m<sup>3</sup>, 14.30 µg/m<sup>3</sup>, 18.81 µg/m<sup>3</sup> and 57.21 µg/m<sup>3</sup> with standard deviation 1.03, 1.03, 2.43, 4.28 and 5.73 respectively. Maximum concentration was observed near main road of the area. The all parameters levels monitored at all the locations confirms to the standards as shown in the table no. 6.2.

## 6.1 Water Quality

Due to increase in population, agriculture, and industries, water pollution is a serious problem in India as about 70% of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, poisonous, organic, and inorganic pollutants. The degraded water quality can contribute to water shortage as it limits its availability for both human use and for the ecosystem (Sagar *et al.*, 2015). Drinking and waste water sample was examined for physico-chemical parameters in order to assess the characteristics of the laboratory waste. The result of the analysis is shown in the table no.6.3 and 6.4 respectively.

**Table No. 6.3 VCK Drinking Water Analysis Results**

| Sr. No. | Parameters                   | Results | Unit       | BIS Standard |
|---------|------------------------------|---------|------------|--------------|
| 1.      | pH                           | 7.62    | ----       | 6.5-8.5      |
| 2.      | Turbidity                    | BDL     | NTU        | 1            |
| 3.      | Total Dissolved Solids (TDS) | 102     | mg/l       | 500          |
| 4.      | Hardness                     | 35      | mg/l       | 200          |
| 5.      | Chloride                     | 9       | mg/l       | 250          |
| 6.      | Sulphates                    | 5       | mg/l       | 200          |
| 7.      | Nitrate                      | 0.1     | mg/l       | 45           |
| 8.      | MPN                          | Nil     | per 100 ml | Nil          |

**Table No. 6.4 VCK Laboratory Waste Water Analysis Results**

| Sr. No. | Parameters                     | Results | Unit | CPCB Standard |
|---------|--------------------------------|---------|------|---------------|
| 1.      | pH                             | 7.39    | ---- | 6.5-8.5       |
| 2.      | Total Suspended Solids (TDS)   | 15      | mg/l | 100           |
| 3.      | Total Dissolved Solids (TDS)   | 582     | mg/l | 2100          |
| 4.      | Chemical Oxygen Demand (COD)   | 48      | mg/l | 250           |
| 5.      | Biological Oxygen Demand (BOD) | 15      | mg/l | 30            |
| 6.      | Chloride                       | 99      | mg/l | 250           |
| 7.      | Sulphates                      | 65      | mg/l | 200           |
| 8.      | Oil and Grease (O & G)         | BDL     | mg/l | 10            |

From the table no. 6.3 it is cleared that the drinking water quality is good as it agreed the BIS standard: 2005 for all five analysed parameters. The laboratory waste of the campus causing no threat to environment as the analysis report of the waste (table no. 6.4) showed that all the parameters are well within the CPCB limits of discharge of effluents. This is because of lots of water is used in the laboratory along with the chemicals causing dilution in the waste water. This diluted water is then discharged into sewer line of Kolhapur Municipal Corporation.

## 6.2 Noise Environment

Noise pollution has been recognized growing as a new threat to the inhabitants of cities. Continuous high level of noise can cause serious stress on the auditory and non-auditory, and nervous system of the city dwellers. It is also leading cause of great annoyance for exposed population due to the poor conditions of engine, exhaust etc. The long-time exposure to noise could result in lasting cardiovascular changes such as atherosclerosis, and increase cardiovascular risk as well as hypertension (Keerthana *et. al.*, 2013). The noise level survey was carried out at seven locations, located within the in campus and out campus of VCK being an educational area which is categorised as silence zone. The major source of noise identified in the study area has been predominantly the due to the transportation activities.

**Table No. 6.5** Noise Monitoring Results in and around VCK Campus

| Sr. No.   | Sampling Location         | Noise Levels dB(A) |           |
|---|---------------------------|--------------------|-----------|
|   |                           | Day                | Night     |
| 1.  | Near Main Gate            | 58.4               | 48.2      |
| 2.  | Inside Campus Near Garden | 56.0               | 40.7      |
| 4.  | East of the College       | 56.7               | 47.9      |
| 5.  | West of the College       | 55.1               | 45.6      |
| 6.  | South of the College      | 56.4               | 45.5      |
| 7.  | North of the College      | 57.6               | 46.4      |
| <b>CPCB Ambient Noise Standard dB (A), 2010</b> |                           | <b>50</b>          | <b>40</b> |

The noise levels were observed in the range of 56.4 - 53.1 dB (A) and 46.2 – 38.71 dB (A) in day time and night time respectively (Table No. 6.5). From the noise level monitoring it was observed that all seven the noise levels for day time are well above the CPCB standards. The higher noise levels in day time are due to vehicular traffic in the area while at night time noise levels were reduced drastically due to very less transportation and urban activities in and around VCK campus.

## **7.0 The Purpose of Risk and Hazard Analysis Plan of VCK campus**

1. Protect life and property by reducing the potential for future damages and economic losses;
2. Make the college campus a safer place to live, work, and learn;
3. Identify hazards;
4. Identify critical facilities;
5. Qualify for grant funding in pre-disaster and post-disaster environments;
6. Speed response, recovery, and redevelopment in disaster situations;
7. Demonstrate a commitment to hazard mitigation principals;
8. Increase awareness and education of hazard mitigation;
9. Comply with state and central regulations for hazard mitigation plans.

### **7.1 Risk Assessment**

The Risk Assessment begins by identifying hazards that threaten the campus. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, loss estimation methodology is used to evaluate known hazard risks by their relative long-term cost in expected damages. It determines the most appropriate mitigation actions to pursue and implement enabling it to prioritize and focus its efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risks.

### **7.2 Mitigation Strategy**

The Mitigation Strategy provides the foundation for a detailed Mitigation Action Plan which links specific mitigation actions for each area of the campus to implementation mechanisms and target completion dates. Together, these sections are designed to make the Plan both strategic, through the identification of long-term goals, and functional, through the identification of immediate and short-term actions that will guide day-to-day decision-making and project implementation.



### **7.3 Multi-Objective Planning**

The concept of multi-objective planning was emphasized throughout the planning process, particularly in identifying ways to link, where possible, hazard mitigation policies and programs with complimentary community goals related to disaster recovery, housing, economic development, recreational opportunities, transportation improvements, environmental quality, land development, and public health and safety (Adopted from Disaster Resistant University Plan of University of South Carolina.2017).

## **8.0 Environment Management Plan (EMP)**

EMP is the mechanism for delivering on the aims and objectives of the environmental policy, and provides strategies and actions to ensure the college actively addresses environmental sustainability. The staff and students at the college campus aspire to: work towards being self-sufficient in energy and water use; and work towards achieving zero waste to landfill. These aspirations will be achieved through a targeted program of minimisation of non-renewable resource use through the implementation of R4 (Rethink, Reduce, Reuse, Recycle) via structural and behavioural changes and then through offsetting what we cannot reduce or eliminate (University of Wallongong, 2016).

### **8.1 Green Practices in VCK Campus**

Green spaces are as a complement of urban physical structure. These spaces are a type of urban land use that has ecologic and social traits. Alternatively, today planning and design is adaption green space networks. At present, urban green spaces are introduced as appropriate method for encouragement of life quality due to impressive social and ecological influences. Appropriate planning and effective management in urban green section are essential for eliminating environmental problems. Some countries in world are successful to decline shortage of green spaces by implementing different strategies of developing green spaces (Ebrahimpour *et. al.*, 2013).

The VCK campus is an entity that consumes a considerable amount of energy, and the level of energy saving living practices on campuses remains lesser than in housing environments, partly because individuals' practices are not directly tied to economic incentives. The campus is a scaled-down form of an urban system. It contains buildings and has systems that use energy and discharge waste products. Because of this, a university campus can serve as a test bed to analyze the effectiveness of green systems and green features that could be applied to future cities. The multilateral categories for green campus are administration, energy, water, climate action, green buildings, green purchasing, waste reduction and recycling, transportation, land use, No vehicle day, Earth hour, and other educational activity etc.

## 8.2 Initiatives taken by VCK to Make the Campus Eco-Friendly

➤ Energy conservation

➤ **Solar energy:**

Rooftop solar water heaters systems is cost-effective and eco-friendly way to generate hot water. They can be used in any climate, and the input energy it uses is sunshine which is always free to us. In our college hostel solar heaters are used to prepare hot bathing water for the students. It reduces our electricity bill. Solar street light systems are installed in the campus for along the roads in the campus for energy conservation.

➤ **Wheeling to the Grid:**

Solar Energy Project- 400 KW Solar Roof Top solar panel College has installed 400 KW Solar Roof Top solar panel as a green energy project to make the campus eco- friendly. In sunny days generating power from solar panel which is more than energy requirement of the campus. The surplus power is export to Maharashtra State Electricity Distribution Company Limited (MSEDCL). Almost all the hostels have solar water heater facility for hot water purpose.

➤ **Use of LED bulbs/ power-efficient equipment:**

The college is using CFL, LED bulbs and star rated power electrical equipment's which uses lesser energy. In newly constructed buildings and renovated areas we have totally used LED bulbs. 5 STAR electronic gadgets like rated air conditioners, freeze etc. are used and maintained regularly to achieve energy conservation. Slogans and Signages are posted in the campus for the awareness.



**Picture 4 : Use of LED lamps**

➤ **Solar Photovoltaic Street lamps**

Solar Photovoltaic Street lamps are also installed at Vivekanand College campus. Compared to fossil and nuclear energy sources, very little research money has been invested in the development of solar cells, so there is considerable room for improvement. College has installed Solar Street lights in the campus.



**Picture 3. Solar lamp in college campus**

➤ **Power station for electric bikes:**

College always tries to make awareness in students to use public transport or electrical vehicles. Many students are using electrical vehicles. College has mounted six electrical charging stations for EV.





- **Energy Saving Strategies**
  - Use of natural lighting and ventilation to avoid day time lights.
  - Florescent bulbs are replaced with Compact Florescent Light bulbs/LEDs.
  - Optimal usage of Air -Conditioners
  - Old monitors are replaced with energy efficient models.
  - Conscious efforts are made to check whether the electrical and electronic devices of the campus are duly switched off when not in use.
  - Installation of solar panels provides a very useful alternative of electricity.
  - Electrification of street lights by solar power has been done in campus.
  - Use of bicycles proving to be one of the good practice to save the fuel and help for green and
  - Clean environment on the campus. The use of electrical cars and e-bikes will be good initiatives to save fuel.
  - Electricity is saved by the use of CFL/LED bulbs for illumination and switched off when not in use.

### 8.3 Water Saving Strategies

#### Potentials for water saving

Based on the water audit information collected and observations, the following can be recommended to reduce water use and increase its efficiency.

- **Water Meters:** Installation of water meters on the bore well to measure the daily water withdrawal.
- **Taps with sensors:** Replace the existing taps with ‘Auto close’ function taps (either electronic sensor activated or mechanical ‘Push type’), especially for taps of wash basins. This will reduce the wastage of water considerably. (Generally tap remains open during the time between applying soap and rinsing with water).
- **Small capacity cistern:** Review the present toilet flush cistern/tanks, if the capacity is 10 liter then need to change to 6 liter capacity. Municipal authorities also recently advised new construction buildings to install smaller capacity flush tanks.
- **Dual flush cistern:** Replacement of single flush cisterns with dual flushcisterns, at all the toilets. At present the toilets commodes have 10 liters flush which can be replaced with 3/6 liters dual flush cisterns. The smaller button

operates for shorter duration of 3 liters which is adequate for liquid waste, while the larger button of 6 liter flush for more substantial waste. This can reduce water use by 30 to 40 %.

- **Rainwater Harvesting:** Rainwater harvesting can be done to recharge the ground water level. Sewage Treatment Plant: Almost 90 % of sewage is generated of total water use; by treating this water in STP there will be a drastic reduction in fresh water usage. This treated water can be used for gardening & toilet flushing.
- It is observed that canteen/caterer boys in the kitchen room/canteen wash the plates under running tap water resulting in wastage of lot of water. The wastage can be reduced by explaining the canteen boys not to keep the tap running.
- All leaked taps and joints to be attained immediately to avoid water losses.
- To avoid the overflow of tanks floats to be install on tank inlet pipes or other mechanism to be installed.

#### 8.4 Promoting Environmental awareness

| Sr No | Activity   | Department      | Date        |
|-------|--|-----------------|-------------|
| 1     | Campus Cleanliness Activity  | NSS             | 06-08- 2022 |
| 2     | One day teachers training workshop on Climate Education and Green Campus for a Safer Plant | Botany and IQAC | 16-09-2022  |
| 3     | Celebration of Eco-Friendly Dasara   | Botany          | 04-092022   |
| 4     | Plantation Activity  | Botany          | 10-01-2023  |
| 5     | Green college clean college competition  | Botany          | 24-01-2023  |
| 6     | Water literacy week  | Geography       | 16-03-2023  |
| 7     | Guest lecture on Energy Sever  | Home Science    | 11-04-2023  |

## 8.5 Efforts for Carbon Neutrality

- The college has trees (40) on barren land and ornamental plants in campus area (Refer Photograph) that make the environment carbon dioxide free.

**Table No.8.1** Plantation details of VCK on barren land

| Sr. No. | Common Name | Scientific name            | Number |
|---------|-------------|----------------------------|--------|
| 1.      | Nilgiri     | <i>Eucalyptus globulus</i> | 02     |
| 2.      | Neem        | <i>Azadirachta indica</i>  | 02     |
| 3.      | Mango       | <i>Mangifera indica</i>    | 12     |
| 4.      | Vad         | <i>Ficus benghalensis</i>  | 03     |
| 5.      | Pimpal      | <i>Ficus religiosa</i>     | 02     |
| 6.      | Shirish     | <i>Samanea saman</i>       | 01     |
| 7       | Peru        | <i>Psidium guajava</i>     | 06     |
| 8.      | Chikku      | <i>Manilkara zapota</i>    | 04     |
| 9.      | Chinch      | <i>Tamarindus indica</i>   | 03     |
| 10.     | Aawala      | <i>Emblica officinalis</i> | 05     |

- Despite the constraints of space VCK maintains a substantial green cover.
- The green foliage includes a well maintained garden of flowering plants and crotons.
- A full time gardener is appointed to take care of the garden.

## 8.6 Carbon Sequestration by Green Belt Plants

Carbon sequestration can be defined as the capture and secure storage of carbon that would otherwise be emitted to, or remain, in the atmosphere. For Green belt development total 10 native tree species have been selected. These species were planted in 2022-23 academic year on barrel land. An estimate of amount of CO<sub>2</sub> that is captured by these trees has been done. As per the procedure given (Pandya *et. al.*, 2013 and Henry *et. al.*, 2011) by the CO<sub>2</sub> sequestration in Kg is calculated with help of the Estimated Girth in cm, Total Girth in cm, Estimated Height in, Total Height, Tree volume, Biomass in Kg/ M<sup>3</sup> and Carbon sequestration in Kg. This shows that a total of 40 full grown trees were roughly captured about 3.66 Kg of CO<sub>2</sub>.

## **8.7 E- Waste Management**

- The non-working computer spare parts and other non-working equipment's are safely disposed outside.
- Reuse of one-side-printouts and the cartridges of laser printers are refilled outside the college campus.
- UPS Batteries are recharged / repaired / exchanged by the suppliers.
- All e-waste is disposed to the Mahalaxmi Recycler, Kolhapur
- The college has emphasis on paperless office to save carbon emission in printers.

## **8.8 Initiatives taken for Risk and Hazard Management**

- Mock drills for Natural (Earthquake, Flood etc.), Anthropogenic Disasters (Fire, Terrorist Attack etc.) and Different Fire extinguishers are installed in VCK.
- Police Department, Hospitals, Ambulances, Firefighting services are well in contact.
- Co-ordination between different NGO like White Army to educate, aware about hazard/ disaster.
- Conference/Workshop/Field visits for the preparedness and mitigation of hazard/ disaster.

## **8.8 Proposed Green Policy**

- Reduce energy consumption, especially of electrical and fuel energy in VCK campus.
- Maximize the proportion of waste that is recycled and minimize the quantity of non recyclable refuse.
- Minimize consumption of water and reduce waste water quantity.
- Minimize the use of chemicals both in college by staff and students.
- To motivate faculties and students for good air quality in VCK campus.
- To create environmental awareness among staff and students.
- Ensure that the Green Policy is enacted, enforced and reviewed.

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## 9.0 Conclusions:

From the green audit following are some of the conclusions which can be taken for improvement in the campus.

- Students and staff of the college are encouraged for to minimize fuel energy consumption.
- Dispose confidential paper waste properly by supplying for recycle.
- LPG is handled by various departments practical for educational purpose but its consumption.
- In all departments electricity was shut down after occupancy time is one of greening practices for energy conservation.
- Biodegradable waste is not used for composting and vermin-composting.
- Electricity consumption is more at some departments.
- CFL lamps are rarely used in some department.
- Toilets and bathrooms are consuming more water.
- Good ground water management is in practice with help of a well in campus.
- The college campus requires trees/plants of local varieties.

## 9.1 Recommendations:

- Institution should do water audit and energy audit regularly that has helped to save water and energy.
- Pipes, overhead tanks and plumbing system should be maintained properly to reduce leakages and wastages. Responsibility of monitoring the overflows of water tank and wastage is fixed on peons/ non-teaching staff in the concerned department.
  - Instead of Normal Split AC system, VRV System to be adopted. Load is to be equally balanced on all three phase. Save electricity by proper maintenance of the wiring and electrical equipment (e.g. old lifts must have microprocessor controller with variable voltage and variable frequency).
- Air-conditioners in the various area should be shift from 18-20°C to 25-26°C for human working areas it will save substantial power. Avoid high intensity bulbs and preference given to the most energy efficient and environmentally sound appliances such as energy saving CFL, LED bulbs and LED tubes with reflectors.
- The earthing resistance is poor. New earthings to be done in few areas from safety point of view.
- Sufficient big waste bins are placed where essential (classrooms, laboratories and office etc)



and monitored periodically.

- Segregation of solid waste in to wet, dry, glass and constructional manner at source.
- College should purchase recycled resources where they are both suitable and available.
- An environmental Green policy has to be prepared with all the conclusions, recommendations and current green practices (tree plantation and garden preparation) should carried by college.
- A frequent visit should be conducted to ensure that the generated waste is measured, monitored, recorded regularly and information should make available from concerned staff.
- At laboratories large amount of water wasted during the process practical, design small water recycle system. Adopt the principles of green chemistry to reduce chemical wastes. A proper method of disposal / recycle to be followed for hazardous waste treatment.



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**SkyIN Environmental Consultancy**

## CERTIFICATE

*This is to certify that the **Energy Audit** Report of Vivekanand College Kolhapur (Autonomous) for the academic year 2022-23 has been prepared and certified by SkyIN Environmental Consultancy based on the observations during the audit team visit and documents produced by the College.*

**Date of Certification: 19/03/2023**



Issued by

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