



JEEVAN VIKAS MAHAVIDYALAYA, DEVGRAM

Tah. Narkhed, Dist. Nagpur-441301 (M.S.)

(Permanent Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)

College Code: 341

(NAAC Accredited in Cycle II with 'B++' Grade, CGPA 2.93)

ISO 9001:2015 Certified, NIRF Participated

Website: www.jvmd.co.in

E-mail: jvmthugaondeo@gmail.com


JVMD/2022/14
01/01/2022

Date:


Declaration

This is to declare that the information, reports, true copies and numerical data etc. furnished in this file as supporting documents is verified by IQAC and found correct.

Hence this certificate.


Convener
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Dist. Nagpur (M.S.)




Principal
Jeevan Vikas Mahavidyalaya
Devgram (Thugaondeo)
Tah. Narkhed, Dist. Nagpur

7.1.6.1 - The institutional environment and energy initiatives are confirmed through the following

- 1. Green audit**
- 2. Energy audit**
- 3. Environment audit**
- 4. Clean and green campus recognitions/awards**
- 5. Beyond the campus environmental promotional activities**

A. Any 4 or all of the above



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ENERGY AUDIT REPORT

CONSULTATION REPORT



Jeevan Vikas Mahavidyalaya,
Devgram (Thugaondeo),
Nagpur - 441 301,
Maharashtra State, India

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, OM Apartment, 214 Indrapuri Colony,
Bhawarkuan, Indore – 452 001 (M. P.), India
0731-4948831, 7869327256
Email ID: eempirical18@gmail.com
www.eeplgroups.com

Year: 2020-21



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo), Nagpur** for giving us an opportunity to conduct energy audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.



Rajesh Kumar Singadiya

(Director)


M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



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CERTIFICATION OF ACCREDITATION

 **BUREAU OF ENERGY EFFICIENCY**

Examination Registration No.: **EA- 7271**

Accreditation Registration No.: **AEA-284**



Certificate of Accreditation

This is to certify that Mr./Ms. **Shri. Rajesh Kumar Singadiya** having its trade/registered office at has been given accreditation as accredited energy auditor. The certificate shall be effective from **9th** day of **May, 2018**


The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **284** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **5th** day of **October, 2018**


Secretary,
Bureau of Energy Efficiency
New Delhi



EXECUTIVE SUMMARY

The executive summary of the energy audit report furnished in this section briefly gives the identified energy conservation measures and other recommendation during the project that can be implemented in a phased manner to conserve energy, increase productivity inside the college campus.

ENERGY MANAGEMENT INITIATIVE TAKEN BY COLLEGE

✚ Energy awareness & poster Presentation

Implementing energy saving techniques is ensured by checking that all the lights and fans are switched off by floor peons and staff after completion of the work of the day. Classrooms are having small green patches adjacent to each room for freshness and are made with sufficient cross ventilation and light so that the use of electricity can be minimized. Slogans like “Save Power”, “To save Energy is to create Energy” are displayed in the classrooms. This shows the institution’s commitment towards energy conservation.

RECOMMENDATION FOR IMPROVEMENT

✚ Alternate Energy Initiatives (Renewable energy sources)

The college campus has total power requirement of 3KW. Out of which 2.2 KW is required for bulbs and near about 0.3 KW is required for others. The Institute has planned to install Solar Power Energy set up for the entire college building and campus.

It is recommended

✚ LIGHTING SYSTEM:

Management has adapted procurement policy for energy efficiency / BEE star rated product in the collage premises. **It’s APPRECIABLE.**



AREA OF IMPROVEMENT

GRID CONNECTED ROOF TOP SOLAR PV SYSTEM

There is good potential for installation of 4 KWp grid connected roof solar system under “Net Metering Polices of Maharashtra Government”. Expected solar energy generation by recommended system will be 5,760 unit per year @ 4 units per day per KWp.

Case Study No.	Section	Identification	Observation	Recommendation	Annual energy saving (kWh)	Annual cost saving (Rs.)	Investment (Rs.)	Simple payback Period (Year)
01	Electrical room	Potential for solar project as per Net Metering policy	100 % Energy taken from MSEDCCL	4 KWp grid connected solar roof top system .	5,760 KWh Generation annual	55,000	1,80,000/	3.2
Total						55,000	1,80,000/	3.2



✚ Replacement of conventional Lighting

- Replace old AC's with BEE star rated air conditioners to save electricity.
- Reduce/ optimized adjust the power, standby, and sleep settings for printer & laptop PC to save electricity.

✚ TIMER CONTROLLED STREET LIGHTS

Installation of “Timer control on street lighting” in college campus is recommended.

✚ CEILING FAN AND EXHAUST FAN:

- Replacement of “conventional ceiling fan (80W)” by energy efficient star rated fan or BLDC based energy efficient fan (28W) in “all departments classes” have great potential for energy saving.
- Replacement of “conventional exhaust fan (60 Watt)” by energy efficient star rated fan or BLDC based energy efficient Fan (20 Watt) in all departments classes and faculties cabin have great potential for energy saving.

✚ IOT BASED ENERGY MONITORING SYSTEM AT MAIN FEEDER

- Installation of “Cloud based (IoT based) energy monitoring system” including harmonic measurement (total voltage and current harmonic distortion %) in power house will be good initiate for energy monitoring as well as student demo project for management. Expected energy saving potential about 2 to 4%.

✚ Energy Management Workshop and Training:

- Develop energy management policies for college. Establish a procurement policy that is energy saving and eco-friendly.
- Conduct awareness and training programs for faculty, student and non-teaching staffs. Conduct seminars, workshops and exhibitions on energy management education.
- Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in energy management system.



CHAPTER-1

INTRODUCTION

1.1 About College

Jeevan Vikas Mahavidyalaya, Devgram is run by the society, “Antyoday Mission”, established by Hon’ble Dr.BhausahabBhoge in 1972. The college was started in 1996 with mere 40 students in Arts faculty and now it has Arts, Commerce, Science & B.Voc faculties including PG Courses serving more than 1300 students under the guidance of Dr. Devendra S. Bhongade, Principal. It is constantly marching in all fronts bringing laurels at state and national level. It is the matter of great proud that at present the college runs thirteen subjects at BA – Marathi, English, Marathi Literature, English Literature, Economics, Pol. Science, Sociology, History, Geography, Music, Home Economics, Library Science and Military Science; four subjects at MA- English, Marathi, Economics and Political Science; six subjects at B.Com (Marathi Medium)- English, Marathi, Financial Accounting, Business Organization, Business Economics and Company Law; nine subjects at B.Sc. (English Medium)- English, Marathi, Physics, Chemistry, Mathematics, Botany, Zoology, Computer Science and Zoology; four subjects at UGC sponsored skill-based B.Voc. Degree Programme- Food Processing & Engineering, Software Development, Building Technology and Automotive; three subjects at UGC Funded Community College- Automotive, Software Technology and Dress Designing. At Junior College level, the college has six subjects in Arts Faculty (Marathi Medium) – English, Marathi, Economics, History, Political Science and Sociology; six subjects in Commerce Faculty (Marathi Medium) – English, Marathi, Economics, Secretarial Practice, Co-operation, Book-keeping & Accountancy. In science (English Medium), the college runs two groups. Group – I (General Science) has six subjects- English, Marathi, Chemistry, Biology, Physics and Mathematics and Group – II (Bi-focal) has five subjects in Fishery- English, Chemistry, Biology, Physics, Fresh Water & Fish Culture and five subjects in Computer Science – English, Chemistry, Physics, Mathematics & Computer Science. Apart from these, the college conducts few Career oriented Value-added Courses, Add-on Courses and Self-finance Certificate, Diploma and Advance Diploma Courses. The college has widened its aura starting YCMOU courses in Arts and Commerce faculties affiliated to Nashik Deemed College. All these courses are efficiently enhancing the profile of the college. UGC sponsored skill-based and Career oriented courses opened many new career avenues for the students in global scenario. The college has the pride to have Permanent Affiliation; 2(f) & 12(B); ISO 9001: 2015 Certification, NIRF Participation and



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accredited by NAAC in Cycle-II at 'B++' Grade (CGPA 2.93). CLL and NSS Wings add feather in the hat. The college boasts on well- qualified and experienced teachers involved in promoting the research culture. Auditorium, Open Gymnasium and Green Gym, vast playground & lush green campus with Wi-Fi connectivity and CCTV protected campus add to the beauty of the institution and make the campus safe and secured from girls' point of view. Advanced Library and modern Computer Lab are always open 24 *7 for students preparing for competitive examinations. The college has become an educational hub coping the demands and satisfying the needs of the region and hence it has got new coinage as one of the best Educational Institutions in the college and Vidarbha region working for Antyoday students. The college is situated at Jalalkheda –Mowad State Highway in Nagpur district of Maharashtra 5 Kms towards North of Jalalkheda. The nearest railway station Narkhed is 18 Kms and the nearest airport Nagpur is 90 Kms from the college. Apart from these, the regular MSRTC buses and private taxis ply continually.

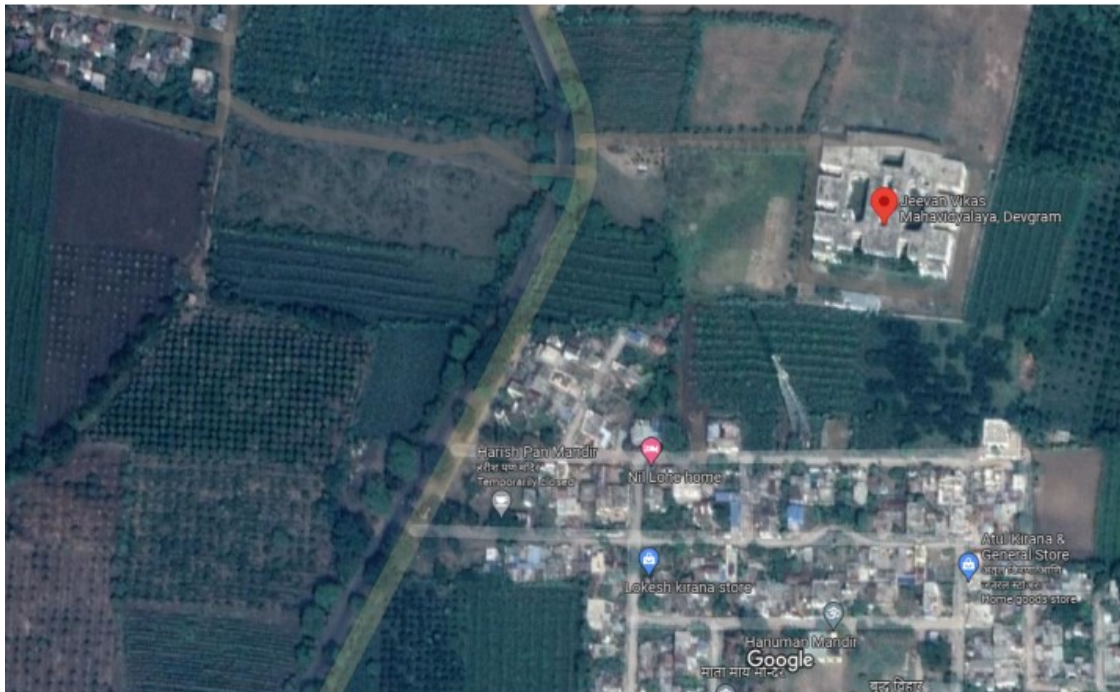


Figure 1.1: - Satellite Image of college from Google map



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Vision

The vision of the institution is “Unto the Last”. i.e. To provide academic services to financially backward, deprived students and specially girls students of local community and nearby villages through qualitative and valuable education and work for Antyodaya (poor, needy and downtrodden) people in the community.

Mission

The mission of our institution is in tune with the objectives of higher education policies of the nation. For instance, the institute provides qualitative and valuable higher education to the students of rural, tribal and hilly areas. Through the curricular and extra-curricular activities, the college is pledged to develop overall skills and personality of the students to make them self-reliant and ideal citizen by discharging social and moral responsibilities.

The following mission statements aim at translating college-vision into missionary activities-

1. To impart qualitative and valuable service in the field of education to the residents of Devgram and nearby areas in general language.
2. To attempt community and social development through infrastructure facilities of the institution.
3. To ensure and inculcate perfect discipline in terms of regularity, sincerity and punctuality amongst the students. So that they contribute to the society and nation as the most responsible and respectable citizen.
4. To aim at overall personality development of the students through extra-curricular activities.
5. To provide platform for the students by giving them an opportunity to face all the challenges of the competitive world with utmost utilization of their potential in sports and other events.
6. To adopt Antyodaya students in rural, tribal and hilly areas to give them social justice, opportunities.



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1.2 College Layout Of Various Buildings

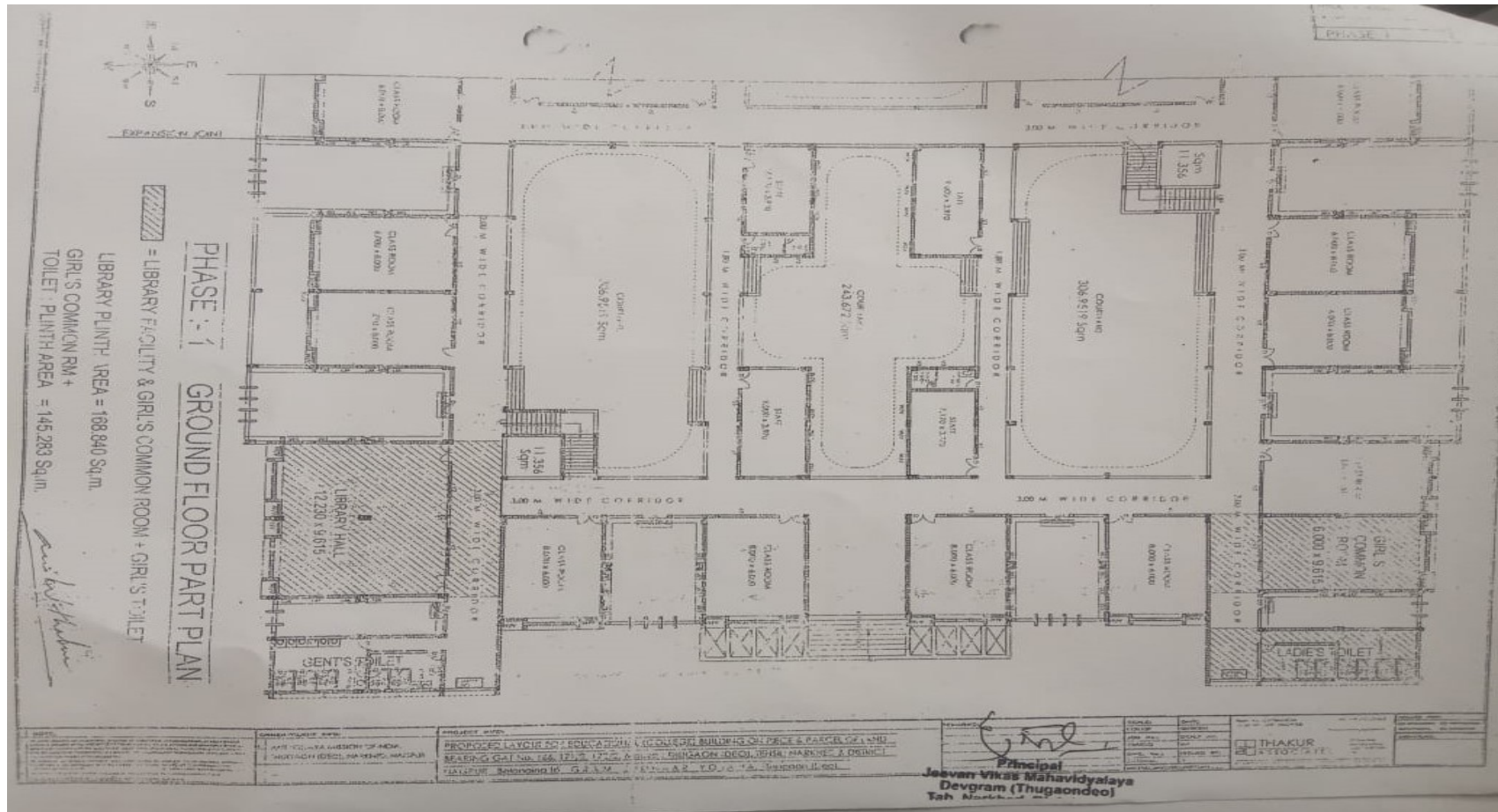


Fig-1.2 Layout map of college




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1.3 Green Monitoring Committee

Antyoday Mission's
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Tah. Narkhed, Distt. Nagpur- 441 301 (M.S.)
(Permanent Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)
College Code: 341
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Website: www.jvmd.co.in E-mail: jvmthugaondeo@gmail.com


JVMD/ Q/2021 Date:- 02/07/2021

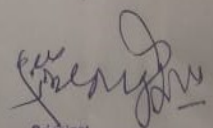
Energy, Environmental & Green Audit Committee:

Energy, Environmental & Green Audit Committee will consist of the following faculty and staff.

Sr. No.	Name of the Faculty	Designation
1	Dr. Devendra Bhongade	Chairperson
2	Dr. Deepak Arajpure	Member
3	Dr. Mangesh Acharya	Member
4	Dr. Yogesh Sarode	Member
5	Miss. Pranali Ingole	Member
6	Dr. Kalyani Thakre	Member
7	Mr. Pritam Sukhdeve	Member
8	Mr. Raju Ingale	Member
9	Mr. Devendra Wasade	Member
10	Mr. Sachin Darokar	Member
11	Mr. Rupesh Shekar	Member

Time duration for this committee is 03 years after which the committee will be reconstituted.




Principal
Jeevan Vikas Mahavidyalaya
Devgram (Thugaondeo)
Tah. Narkhed, Dist. Nagpur




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1.4 Integrated Energy, Environmental Green & waste management policy

Antyoday Mission's
Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo)

 **Tah. Narkhed, Distt. Nagpur- 441 301 (M.S.)**
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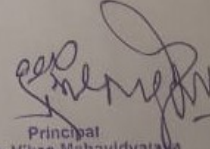
JVMD/ Date:- 10/03/2019

Integrated Energy, Environmental Green and Waste Management Policy

Management of our institution is committed to go green for making our nation to *Atma-Nirbhar* (i.e., Self-Sustainable) in the area of energy and environment.

Our Emphasis is to:

1. Ensure continual enhancements in our energy and water conservation methods and usage.
2. Procure and use energy efficient equipment and products.
3. Continuously monitoring the energy consumption patterns through periodic reviews & using latest information systems.
4. Create awareness regarding necessity of energy conservation and making environment pollution free to all staff and students on a regular basis by arranging trainings, workshops, seminars, quiz, competitions, etc.
5. Carry out regular energy, environment and green audits by certified auditors to identify key areas of improvements.

 
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1.5 The Audit Team

The study team constituted of the following senior technical executives from Empirical Exergy Private Limited,

- ✚ Mr. Rajesh Kumar Singadiya, [Director & Accredited Energy Auditor , AEA-0284]
- ✚ Mr. Rakesh Pathak, [Director]
- ✚ Mrs. Laxmi Raikwar Singadiya, [Energy Engineer]
- ✚ Mr. Lokesh Kumar Verma, [Project Engineer]
- ✚ Mr. Ajay Nahra, [Site Engineer]

1.6 About Energy Audit

Energy audit helps to understand more about the ways energy is used in any plant and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to final consumer becomes 50%. Hence one unit saved in the end user is equivalent to two units generated in the power plant.

Energy audit is the most efficient way to identify the strength and weakness of energy management practices and to find a way to solve problems. Energy audit is a professional approach in utilizing economic, financial, and social and natural resources responsibility. Energy audits “adds value” to management control and is a way of evaluating the system.

Empirical Exergy Private Limited (EEPL), Indore M.P. carried out the “Energy Audit” at the site to find gaps in the energy consumption pattern for Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo), Nagpur. A technical report is prepared as per the need and the requirement of the project.

1.7 Objectives of Energy Auditing

An energy audit provides vital information base for overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures. It aims at:

- Identifying the quality and cost of various energy inputs.
- Assessing present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of thermal and electrical energy economy.
- Highlighting wastage in major areas.



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- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.

1.8 Methodology:

Methodology adopted for achieving the desired objectives viz.: Assessment of the current operational status and energy savings include the following:

- ✚ Discussions with the concerned officials for identification of major areas of focus and other related systems.
- ✚ Team of engineers visited the site and had discussions with the concerned officials / supervisors to collect data / information on the operations and load distribution within the plant and same for the overall premises. The data was analyzed to arrive at a base line energy consumption pattern.
- ✚ Measurements and monitoring with the help of appropriate instruments including continuous and / or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- ✚ Trend analysis of costs and consumptions.
- ✚ Capacity and efficiency test of major utility equipment's, wherever applicable.
- ✚ Estimation of various losses
- ✚ Computation and in-depth analysis of the collected data, including utilization of computerized analysis and other techniques as appropriate were done to draw inferences and to evolve suitable energy conservation plan/s for improvements/ reduction in specific energy consumption.

1.9 Present Energy Scenario:

College uses energy in the form of electricity purchased from grid connected system. The electricity bill is based on the 73/LT-X B10-20 KW Public service oth. The college has contract demand of 4KW.

Total billing amount of electricity bill of College has been found to be about INR 3,09,410/- for 12 months analysis period from July - 2020 to June- 2021.



CHAPTER- 2 ELECTRICITY BILL ANALYSIS

2.1 Annual Energy Consumption of College (2 Year)

Electricity bills of last One years were analysed. Detailed of unit consumption, annual average power factor and annual per unit charges are determined as follow:

Table -2.1 Annual Energy Consumption of College (2 Year)

SR.NO.	Year	Annual Energy Consumption (KWh)
1	2019-20	3,734
2	2020-21	6,846

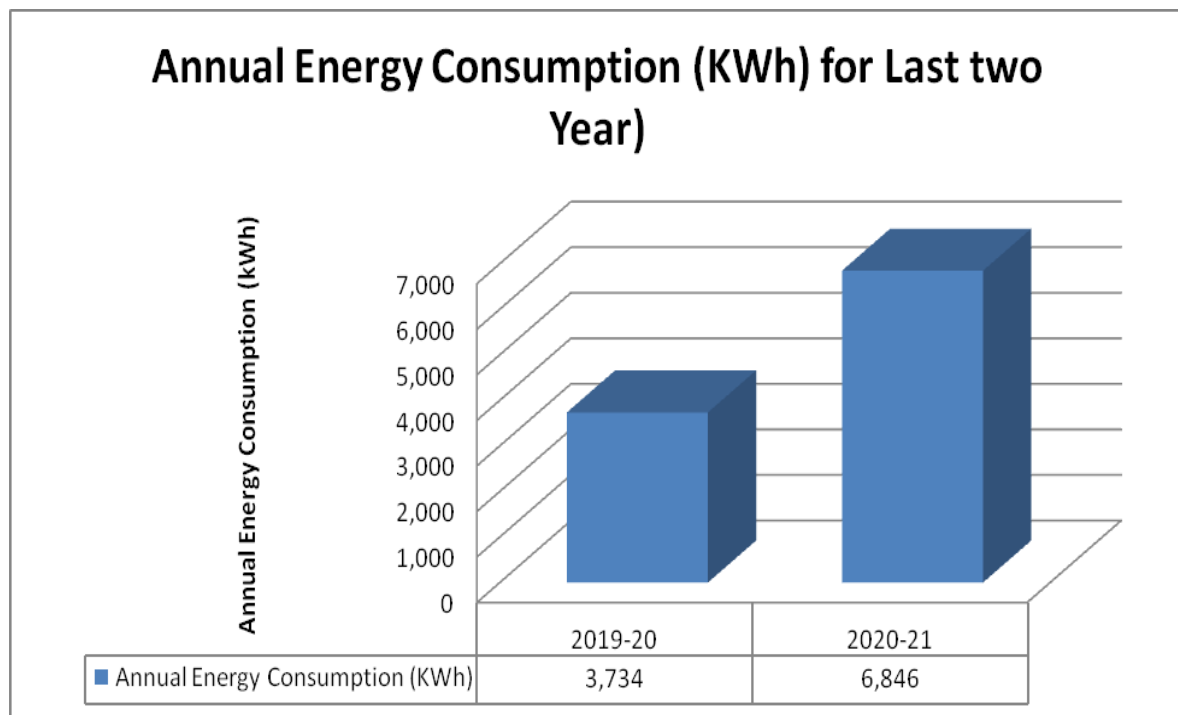


Figure 2.1–Yearly electrical Consumption for last two year



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2.2 Monthly Energy Consumption of College (Year 2020-21)

Table 2.2 Energy consumption and billing amount (year 2020-21)

Sr. No	Month & Year	Total Unit (kWh)
1	Jul-20	487
2	Aug-20	364
3	Sep-20	454
4	Oct-20	405
5	Nov-20	218
6	Dec-20	848
7	Jan-21	590
8	Feb-21	242
9	Mar-21	1150
10	Apr-21	977
11	May-21	881
12	Jun-21	230
		Total =6,846

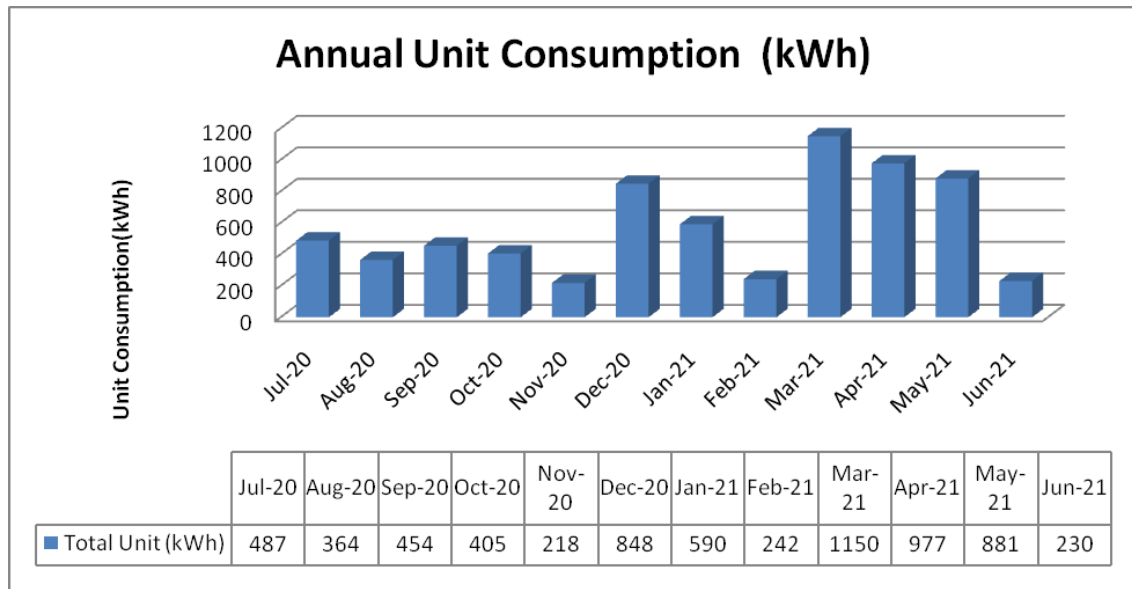


Fig.2.2- Graphical Presentation for Monthly Energy Consumption (kWh)



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2.3 Monthly Load factor analysis:

The monthly load factor for the college is given in the following table:

Table 2.3- Load factor of college year 2020-21

Sr. No	Month & Year	Average Load Factor (%)
1	Jul-20	17
2	Aug-20	13
3	Sep-20	14
4	Oct-20	14
5	Nov-20	08
6	Dec-20	30
7	Jan-21	18
8	Feb-21	08
9	Mar-21	35
10	Apr-21	33
11	May-21	31
12	Jun-21	8
	Average	19

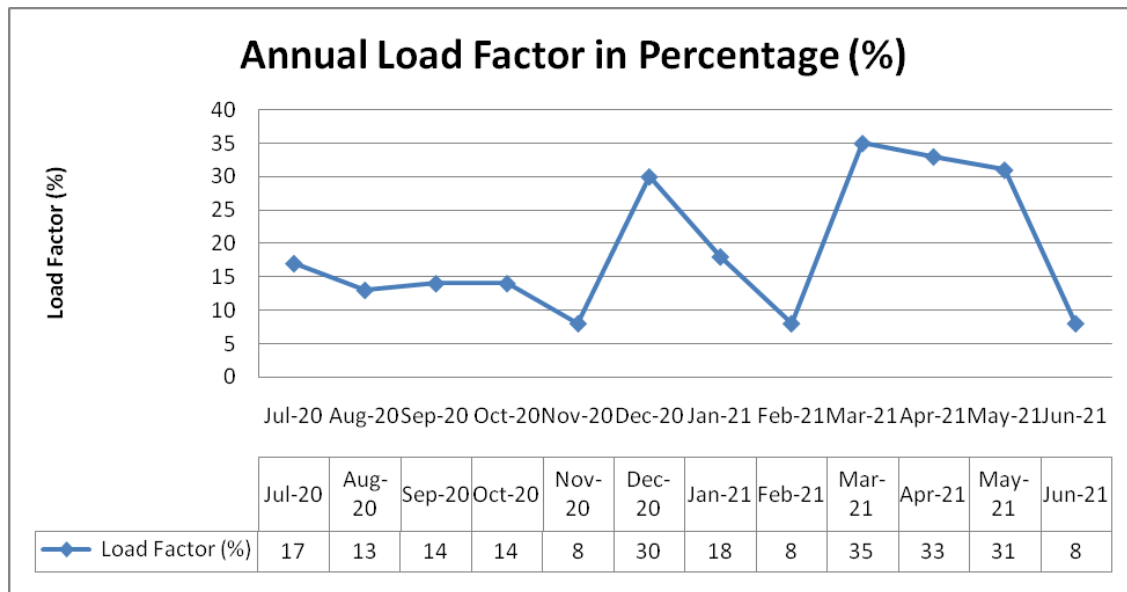


Fig.2.3 – Graphical Presentation for Annual Load Factor

Observation:

Average load factor is 19 % in last 12 months.



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2.4 ON Site power measurement in College campus

Table 2.4 ON Site power measurement in college campus

Sr. No.	Building Name	Volt (V)	Amp	Power (KW)
1	Admin Building (Main Panel)	355	5.8	2.45
2	Borewell	359	70.3	4.71

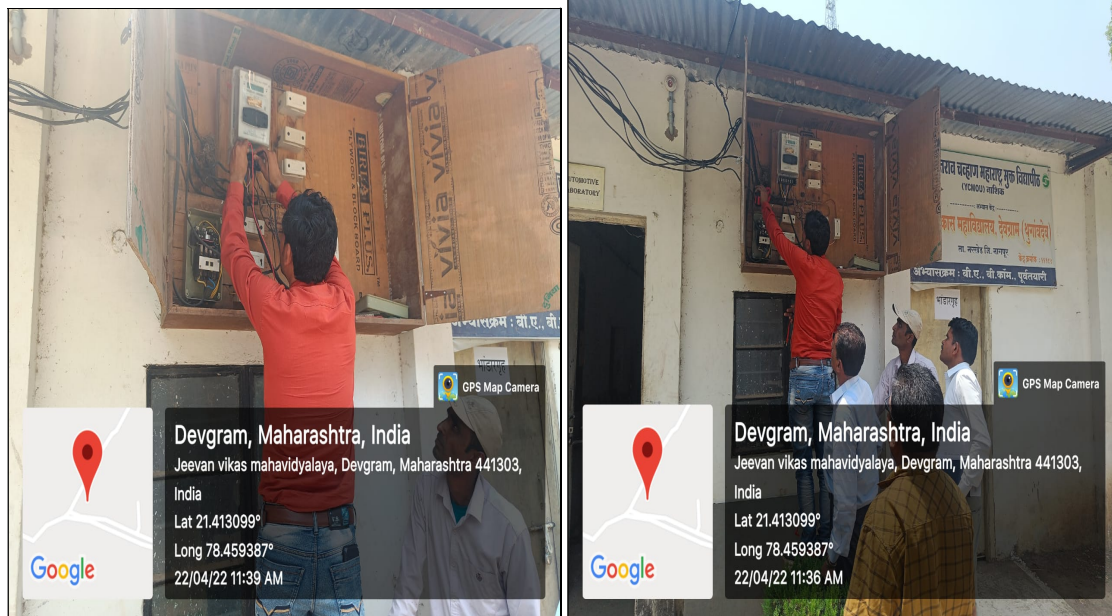


Fig.-2.4 Photograph of ON Site power measurement in college campus



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CHAPTER -3
CONNECTED LOAD DETAILS

3.1 Connected Load of college:

Table 4.1 :- Connected load of college

Sr. No	Location/ Name of Building	Type of Electrical Equipment	Rated (watt)	Quantity (no)	Total Watt	Load (%)
1	College Campus	Tube Light (LED)	20	18	360	2.80
		Ceiling Fan	60	58	3,480	27.07
		Exhaust Fan	60	07	420	3.26
		Split AC	1.5 Ton	01	1400	10.89
		PC	70	58	4,060	31.58
		Laptop	71	04	284	2.20
		Printer	150	08	1200	9.33
		Photocopy M/c	550	03	1650	12.83
Total Connected Load					12,854	100.00

Street Light Detailed

Sr. No	Location	Type of Light	Rated Watt	Quantity (NO)	Total Watt	Load (%)
1.	Main Gate	HPSV Lamp	400 Watt	2	800	64.0
		Metal Halide	250 Watt	1	250	20.0
		LED	100 Watt	2	200	16.0
Total Connected Load					1,250	100.00

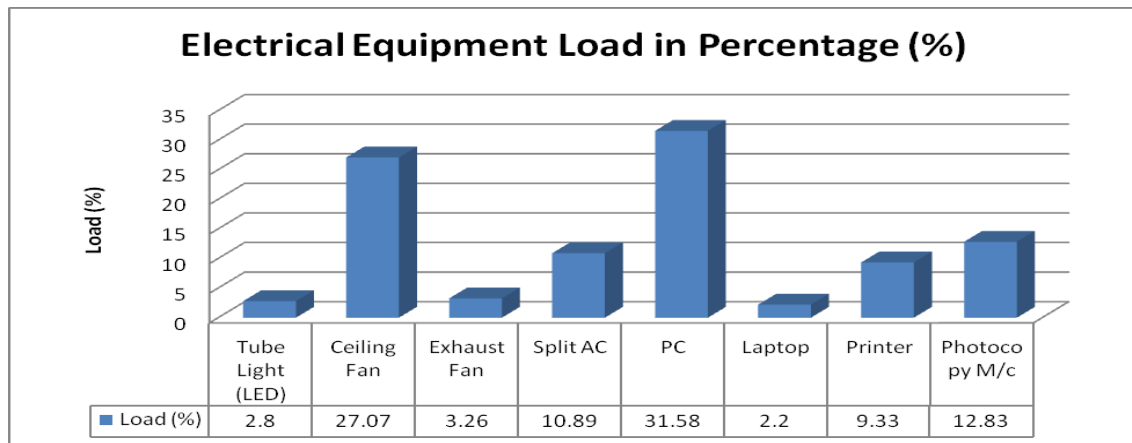


Fig.3.1- Electrical Equipment Load in Graphical Presentation



CHAPTER- 4 ENERGY CONSERVATION MEASURES

4.1 Case Study No.-1 Grid Connected Roof Top Solar Pv System (4 KWp):

There is good potential for installation of 4 KWp grid connected roof solar system under “Net Metering Polices of Maharashtra State Government”. Expected solar energy generation by recommended system will be 5760 unit per year @ 4 units per day per KWp

Table-4.1 Grid Connected Roof Top Solar Pv System (4 KWp)

Case Study No.	Section	Identification	Observation	Recommendation	Annual energy saving (kWh)	Annual cost saving (Rs.)	Investment (Rs.)	Simple payback Period (Year)
01	Electrical room	Potential for solar project as per Net Metering policy	100 % Energy taken from MSEDCL	4 KWp grid connected solar roof top system .	5760 KWh Generation annual	55000	1,80,000/	3.2
Total						55000	1,80,000/	3.2



4.2 Case Study No.-2

Replacing (400 W) HPSV Lamp on street Light with 150 W LED Street lights

Sr. No	Items	Parameters	Units
1	Total (400W) HPSV Lamp	No.	02
2	Rated Power	Watt/ unit	400
3	Operating Hrs	Hrs/day	12
4	Operating Annual Days	Days/Year	365
5	Unit Consumed Annually (AI*All*B*C)/1000)	kWh/Year	3504
6	REPLACEMENT		
7	Replacement with 150 W LED Street Light	Watt/unit	150
8	Unit Consumed Annually	kWh/Year	1314
9	Energy Saving (Old- New Annual Consumption)	kWh	2190
10	Annual Energy Cost Saving @ Rs. 6.20 per unit	INR	13,578
11	COST BENEFIT CALCULATION		
12	Capital Cost @Rs4,250/- per item	INR	8,500/-
13	TOTAL INVESTMENT	INR	8,500/-
14	Net Annual Saving	INR	13,578/-
15	Simple payback (Investment/annual savings)	Month	7.5

4.3 Case Study No.3

Replacing (250W) Metal halide Lamp on street Light with 100 W LED Street lights

Sr. No	Items	Parameters	Units
1	Metal halide Lamp (250W)	No.	01
2	Rated Power	Watt/ unit	250
3	Operating Hrs	Hrs/day	12
4	Operating Annual Days	Days/Year	365
5	Unit Consumed Annually (AI*All*B*C)/1000)	kWh/Year	1095
6	REPLACEMENT		
7	Replacement with 100W LED Street Light	Watt/unit	100
8	Unit Consumed Annually	kWh/Year	438
9	Energy Saving (Old- New Annual Consumption)	kWh	657
10	Annual Energy Cost Saving @ Rs. 6.20 per unit	INR	4,073/-
11	COST BENEFIT CALCULATION		
12	Capital Cost @Rs3500/- per item	INR	3,500/-
13	TOTAL INVESTMENT	INR	3,500/-
14	Net Annual Saving	INR	4,073/-
15	Simple payback (Investment/annual savings)	Month	10.3

Note : simple pay back period depend on working hours & load factor of the system.



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4.4 Case Study No.4

Replacing Ceiling Fan 60W by 28 W BLDC Ceiling Fan

Sr. No	Items	Parameters	Units
1	Ceiling Fan (80W)	No.	58
2	Rated Power	Watt/ unit	60
3	Operating Hrs	Hrs/day	12
4	Operating Annual Days	Days/Year	330
5	Unit Consumed Annually (AI*AII*B*C)/1000)	kWh/Year	13781
6	REPLACEMENT		
7	Replacement with 28 W BLDC Ceiling Fan	Watt/unit	28
8	Unit Consumed Annually	kWh/Year	6431
9	Energy Saving (Old- New Annual Consumption)	kWh	7350
10	Annual Energy Cost Saving @ Rs. 6.20 per unit	INR	45,569/-
11	COST BENEFIT CALCULATION		
12	Capital Cost @1800 per item	INR	1,04,400/-
13	TOTAL INVESTMENT	INR	1,04,400/-
14	Net Annual Saving	INR	45,569/-
15	Simple payback (Investment/annual savings)	Month	27.4

4.5 Case Study No.5

Replacing 225MM EX Fans by 250MM BLDC EX Fans

Sr. No	Items	Parameters	Units
1	225MM EX Fans (60 W)	No.	07
2	Rated Power	Watt/ unit	60
3	Operating Hrs	Hrs/day	12
4	Operating Annual Days	Days/Year	300
5	Unit Consumed Annually (AI*AII*B*C)/1000)	kWh/Year	1512
6	REPLACEMENT		
7	Replacement with 20W (250MM BLDC) EX Fans	Watt/unit	20
8	Unit Consumed Annually	kWh/Year	504
9	Energy Saving (Old- New Annual Consumption)	kWh	1008
10	Annual Energy Cost Saving @ Rs. 6.20 per unit	INR	6,250/-
11	COST BENEFIT CALCULATION		
12	Capital Cost @2000 per item	INR	14,000/-
13	TOTAL INVESTMENT	INR	14,000/-
14	Net Annual Saving	INR	6,250/-
15	Simple payback (Investment/annual savings)	Month	26.8

Note : simple pay back period depend on working hours & load factor of the system.





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Annexure -1



Maharashtra State Electricity Distribution Company Limited

Web Self Service Home > Make Payment

Web Self Service

Make Payment

Home

- New User Registration
- Login
- Forgot Login Name/Password?
- View/Pay Bill
- Consumption Calculator
- Energy Bill Calculator
- New Connection Request
- Complaint Registration
- Complaint Status
- Submit Reading
- Shri Vilasrao Deshmukh Abhay Yojana
- View ASD Details
- View HT Consumer Info
- View RE Consumption
- Track Status, Upload Documents and Pay Charges
- *Online Payment of Other Charges
- *Register / Update Mobile number, Email, Aadhar number, TDS and PAN No
- Process Flow for Shri Vilasrao Deshmukh Abhay Yojna (Help Manual & Video)

Consumer Information

Consumer Number	426890476951	BU	0560 JALAKHEDA
Name	SHRI ANTODAY MISSION OF INDIA THUGAMDEO	Connection Type	LT
Address	THUGAMDEO THUGAMDEO 441304	Contact Numbers	9823421427

Consumer No. **BU / Circle Code** **Bill Month** **Consumption (Units)** **Bill Amount** **Bill Due Date** **Status**

426890476951	0560 JALAKHEDA	Apr 2022	1043	7,010.00	02 May 2022	LIVE
--------------	----------------	----------	------	----------	-------------	------

Now you can also make additional advance payment in multiples of Rs. 500 , up to a maximum of Rs. 10,000.

Benefits of Additional Advance Payments

- You can pay a lump sum amount in advance, and avoid paying every month.
- Never miss a due date by keeping sufficient credit balance.
- Receive Prompt Payment discount when your advance payment sufficiently covers your next bill.
- Your monthly bill will reflect the balance amount.

For information related to online payment please click on given link [Help](#)

To proceed with payment please verify the details below choosing your payment option:

Bill Details

Consumer Number	426890476951
BU/Circle	0560 JALAKHEDA
Processing Cycle	3
Consumption	1043
Due Date	02 May 2022
Bill Amount	7010
Prompt Payment Discount Date	4/18/2022 12:00:00 AM
Prompt Payment Discount Amount	68.27

Energy Bill [Other Payment](#) **Additional Security Deposit**

Mobile Number* [Register/Update Mobile Number](#)

Amount to Pay*

You have chosen to pay an amount of Rs 7,010 from your credit card/specified bank account for Maharashtra State Electricity Distribution Co. Ltd.

Conditions for Online Payment:

- International cards are blocked for paying MSEDCCL bills.
- Please note that a convenience fee i.e. Gateway charges levied by Master/Visa/others will be applicable for credit card exceeding Rs. 500 . Gateway charges are waived Off for Net Banking , Debit card , UPI, Digital Wallet & Cash Card payments.
- In case of duplicate/multiple payment and advance payment for a single bill, credit for the extra amount paid will be passed on in the subsequent bill.
- To avoid fraudulent transaction, it is recommended not to reveal details of your card to anybody; make payment yourself without going through any channels/agents.
- Do not open multiple payment windows simultaneously. For multiple consumer numbers, make payments one at a time.
- In case of Online payment after due date, Consumer agrees to the conditions mentioned in disclaimer.
- If consumer choose corporate Banking option for payment , Checker final approval date will be considered as receipt date.
- Please note transaction completion date will be treated as receipt date for credit/updation to consumer ledger.
- You can choose an alternate Payment Gateway, in case of online payment failure.

agree to the above conditions for Online Payment.

Go green registration Benefits:

- Consumer will get discount of Rs. 10 on every Electricity Bill.
- In Go green Facility, consumer will receive E-Bill on registered email address and will not receive physical copy.
- For More Details Check Go Green [FAQs](#).
- Do you want to register for Go Green ? If yes, please [Click here](#).

If you are finding any difficulty to make payment. Please refer help Manuals on Block or allow pop-ups, before clicking on **PAY NOW** button. [Document](#) [Video](#)



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**ENVIRONMENT AUDIT REPORT
CONSULTATION REPORT**



Jeevan Vikas Mahavidyalaya,
Devgram (Thugaondeo),
Nagpur - 441 301,
Maharashtra State, India

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, OM Apartment, 214 Indrapuri Colony,
Bhawarkuan, Indore – 452 001 (M. P.), India
0731-4948831, 7869327256
Email ID: eempirical18@gmail.com
www.ceplgroups.com

Year: 2020-21



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo), Nagpur** for giving us an opportunity to conduct environment audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.



**Rajesh Kumar Singadiya
(Director)**

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



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EXECUTIVE SUMMARY

The executive summary of the Environment audit report furnished in this section briefly gives the identified water conservation measures that can be implemented in a phased manner to water conservation and increase the productivity of the college.

Environmental Management Initiative Taken by College

- ✚ Maximum Oxygen providing trees are planted in the campus, Oxygen Park is maintained, the entire campus is lush and green, pollution-free, plastic-free and noise-free that gives the feeling that we are in the lap of Nature. Green audit is conducted in college campus.
- ✚ Environmental Awareness Programme is conducted in college campus to create awareness among students about the importance of water conservation, natural resources and Solid Waste Management.
- ✚ Awareness Programme for people regarding Idol Immersion in small ponds during “Ganesh Festival” is conducted to make students aware about the cleanliness and conservation of river Ecosystem and to make students socially active. Every year, the immersion of the College Lord Ganesha is done in the tank available in the college campus to spread awareness and to show model.
- ✚ The garbage, tree-leaves generated from Campus is collected and dumped to unused area in the campus and that is later used for Vermi compost fertilizer with the help of supporting staff.

SPRINKLER IRRIGATION SYSTEM FOR GARDENING.

- ✚ Use Sprinkler water irrigation system for gardening.



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AREAS FOR IMPROVEMENT AND RECOMMENDATION

WATER MONITORING SYSTEM:

- ✚ Installation of “**Cloud based (IoT based) ground water extraction monitoring system**” for well to quantify fresh water consumption per day in the college.

RAIN WATER HARVESTING SYSTEM

- ✚ Install rain water harvesting system in college. It was observed that there is good potential for rain water harvesting systems.

DIP WATER IRRIGATION SYSTEM FOR GARDENING.

- ✚ Use dip water irrigation system for gardening.

WATER QUALITY TEST.

- ✚ Conduct water test for Drinking and Ground Water.



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CHAPTER-1 INTRODUCTION

1.1 About the College

Jeevan Vikas Mahavidyalaya, Devgram is run by the society, “Antyodaya Mission”, established by Hon’ble Dr. Bhausaheb Bhogde in 1972. The college was started in 1996 with mere 40 students in Arts faculty and now it has Arts, Commerce, Science & B.Voc faculties including PG Courses serving more than 1300 students under the guidance of Dr. Devendra S. Bhongade, Principal. It is constantly marching in all fronts bringing laurels at state and national level. It is the matter of great pride that at present the college runs thirteen subjects at BA – Marathi, English, Marathi Literature, English Literature, Economics, Pol. Science, Sociology, History, Geography, Music, Home Economics, Library Science and Military Science; four subjects at MA- English, Marathi, Economics and Political Science; six subjects at B.Com (Marathi Medium)- English, Marathi, Financial Accounting, Business Organization, Business Economics and Company Law; nine subjects at B.Sc. (English Medium)- English, Marathi, Physics, Chemistry, Mathematics, Botany, Zoology, Computer Science and Zoology; four subjects at UGC sponsored skill-based B.Voc. Degree Programme- Food Processing & Engineering, Software Development, Building Technology and Automotive; three subjects at UGC Funded Community College- Automotive, Software Technology and Dress Designing. At Junior College level, the college has six subjects in Arts Faculty (Marathi Medium) – English, Marathi, Economics, History, Political Science and Sociology; six subjects in Commerce Faculty (Marathi Medium) – English, Marathi, Economics, Secretarial Practice, Co-operation, and Book-keeping & Accountancy. In science (English Medium), the college runs two groups. Group – I (General Science) has six subjects- English, Marathi, Chemistry, Biology, Physics and Mathematics and Group – II (Bi-focal) has five subjects in Fishery- English, Chemistry, Biology, Physics, Fresh Water & Fish Culture and five subjects in Computer Science – English, Chemistry, Physics, and Mathematics & Computer Science. Apart from these, the college conducts few Career oriented Value-added Courses, Add-on Courses and Self-finance Certificate, Diploma and Advance Diploma Courses. The college has widened its aura starting YCMOU courses in Arts and Commerce faculties affiliated to Nasik Deemed University. All these courses are efficiently enhancing the profile of the college.



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UGC sponsored skill-based and Career oriented courses opened many new career avenues for the students in global scenario. The college has the pride to have Permanent Affiliation; 2(f) & 12(B); ISO 9001: 2015 Certification, NIRF Participation and accredited by NAAC in Cycle-II at 'B++' Grade (CGPA 2.93). CLL and NSS Wings add feather in the hat. The college boasts on well-qualified and experienced teachers involved in promoting the research culture. Auditorium, Open Gymnasium and Green Gym, vast playground & lush green campus with Wi-Fi connectivity and CCTV protected campus add to the beauty of the institution and make the campus safe and secured from girls' point of view. Advanced Library and modern Computer Lab are always open 24 *7 for students preparing for competitive examinations. The college has become an educational hub coping the demands and satisfying the needs of the region and hence it has got new coinage as one of the best Educational Institutions in the college and Vidarbha region working for Antyoday students. The college is situated at Jalalkheda –Mowad State Highway in Nagpur district of Maharashtra 5 Kms towards North of Jalalkheda. The nearest railway station Narkhed is 18 Kms and the nearest airport Nagpur is 90 Kms from the college. Apart from these, the regular MSRTC buses and private taxis ply continually.

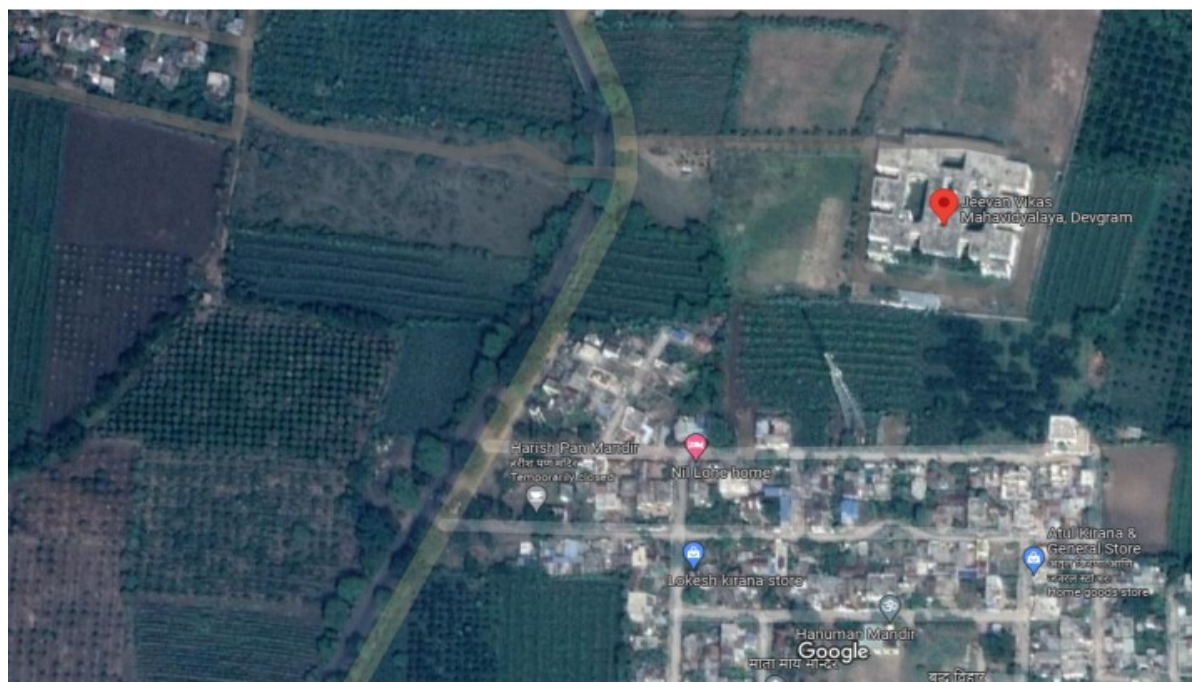


Figure 1.1: - Satellite Image of college from Google map



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Vision

The vision of the institution is “Unto the Last”. I.e. To provide academic services to financially backward, deprived students and specially girls students of local community and nearby villages through qualitative and valuable education and work for Antyodaya (poor, needy and downtrodden) people in the community.

Mission

The mission of our institution is in tune with the objectives of higher education policies of the nation. For instance, the institute provides qualitative and valuable higher education to the students of rural, tribal and hilly areas. Through the curricular and extra-curricular activities, the college is pledged to develop overall skills and personality of the students to make them self-reliant and ideal citizen by discharging social and moral responsibilities.

The following mission statements aim at translating college-vision into missionary activities-

1. To impart qualitative and valuable service in the field of education to the residents of Devgram and nearby areas in general language.
2. To attempt community and social development through infrastructure facilities of the institution.
3. To ensure and inculcate perfect discipline in terms of regularity, sincerity and punctuality amongst the students. So that they contribute to the society and nation as the most responsible and respectable citizen.
4. To aim at overall personality development of the students through extra-curricular activities.
5. To provide platform for the students by giving them an opportunity to face all the challenges of the competitive world with utmost utilization of their potential in sports and other events.
6. To adopt Antyodaya students in rural, tribal and hilly areas to give them social justice, opportunities.



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1.2 Master Plan of Campus:-

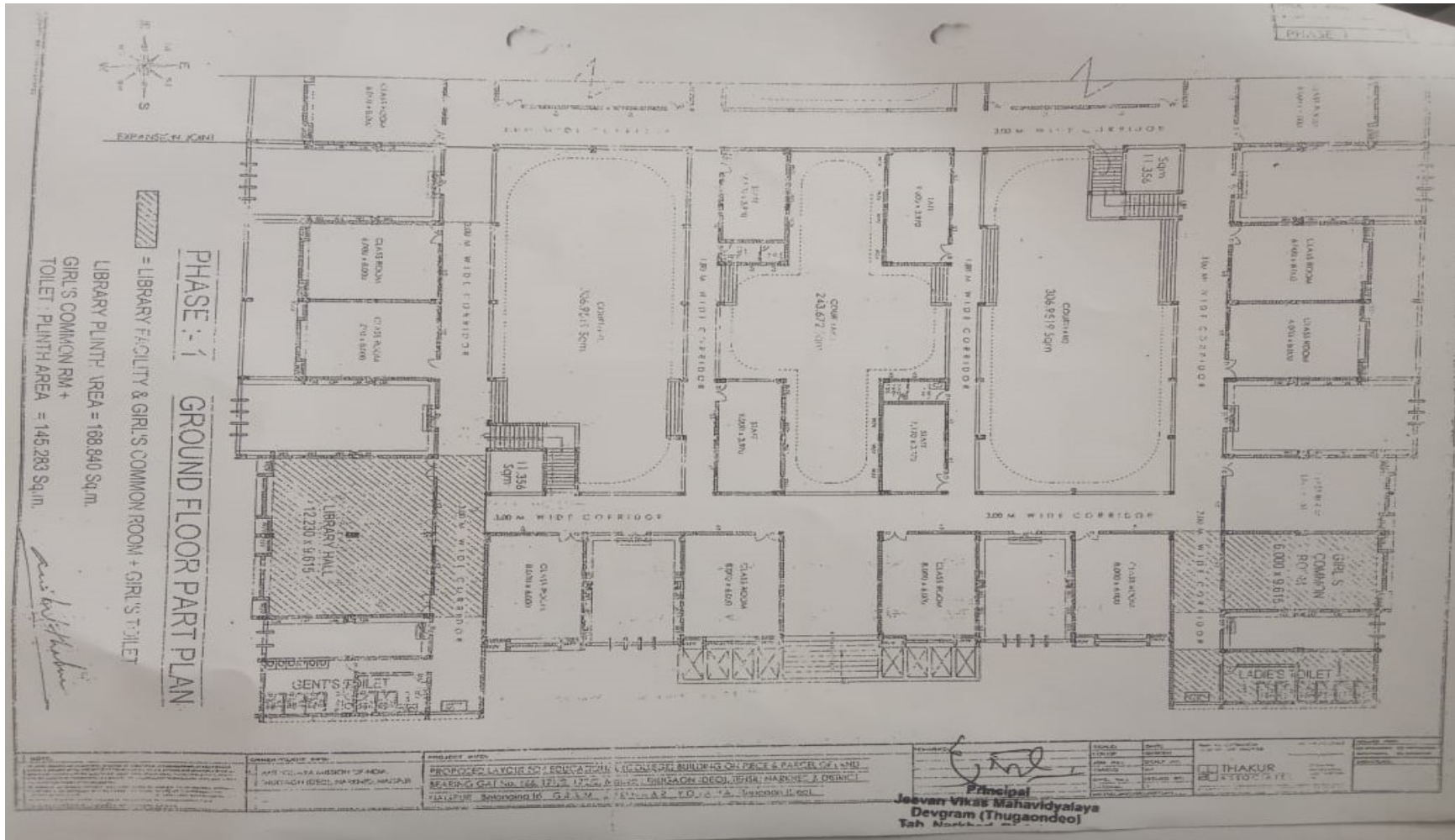


Figure 1.2: - Master Plan of Campu



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1.3 Green Monitoring Committee

Antyoday Mission's
Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo)
Tah. Narkhed, Distt. Nagpur- 441 301 (M.S.)
(Permanent Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)
College Code: 341
(NAAC Accredited in Cycle II at 'B++' Grade, CGPA 2.93)
ISO 9001:2015 Certified, NIRF Participated

Website: www.jvmd.co.in E-mail: jvmthugaondeo@gmail.com


JVMD/ Q/2021 Date:- 02/07/2021

Energy, Environmental & Green Audit Committee:

Energy, Environmental & Green Audit Committee will consist of the following faculty and staff.

Sr. No.	Name of the Faculty	Designation
1	Dr. Devendra Bhongade	Chairperson
2	Dr. Deepak Arajpure	Member
3	Dr. Mangesh Acharya	Member
4	Dr. Yogesh Sarode	Member
5	Miss. Pranali Ingole	Member
6	Dr. Kalyani Thakre	Member
7	Mr. Pritam Sukhdeve	Member
8	Mr. Raju Ingale	Member
9	Mr. Devendra Wasade	Member
10	Mr. Sachin Darokar	Member
11	Mr. Rupesh Shekar	Member

Time duration for this committee is 03 years after which the committee will be reconstituted.


Principal
Jeevan Vikas Mahavidyalaya
Devgram (Thugaondeo)
Tah. Narkhed, Distt. Nagpur



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1.4 Integrated Energy, Environmental Green & waste management policy

Antyoday Mission's
Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo)
Tah. Narkhed, Distt. Nagpur- 441 301 (M.S.)
(Permanent Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)
College Code: 341
(NAAC Accredited in Cycle II at 'B++' Grade, CGPA 2.93)
ISO 9001:2015 Certified, NIRF Participated

Website: www.jvmd.co.in E-mail: jvmthugaondeo@gmail.com


JVMD/ Date:- 10/03/2019

Integrated Energy, Environmental Green and Waste Management Policy

Management of our institution is committed to go green for making our nation to *Atma-Nirbhar* (i.e., Self-Sustainable) in the area of energy and environment.

Our Emphasis is to:

1. Ensure continual enhancements in our energy and water conservation methods and usage.
2. Procure and use energy efficient equipment and products.
3. Continuously monitoring the energy consumption patterns through periodic reviews & using latest information systems.
4. Create awareness regarding necessity of energy conservation and making environment pollution free to all staff and students on a regular basis by arranging trainings, workshops, seminars, quiz, competitions, etc.
5. Carry out regular energy, environment and green audits by certified auditors to identify key areas of improvements.


Principal
Jeevan Vikas Mahavidyalaya
Devgram (Thugaondeo)
Tah. Narkhed, Dist. Nagpur

1.5 The Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- ✚ Mr. Rajesh Kumar Singadiya, [Director & Accrediated Energy Auditor , AEA-0284]
- ✚ Mr. Rakesh Pathak, [Director]
- ✚ Mrs. Laxmi Raikwar Singadiya, [Energy Engineer]
- ✚ Mr. Lokesh Kumar Verma, [Project Engineer]
- ✚ Mr. Ajay Nahra, [Site Engineer]



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1.6 About Environment Auditing

Environment audits can be a highly valuable tool for institute in a wide range of ways to improve their energy, environment and economic performance. While reducing wastages and operating costs. Water audits provide a basis for calculating the economic benefits of water conservation projects by establishing the current rates of water use and their associated cost.

1.7 Objectives of Environment audit

The general objective of Environment audit is to prepare a baseline report on water conservation measures to mitigate consumption, improve quality and sustainable practices.

The specific objectives are:

-  To monitor the water consumption and water conservation practices.
-  To assess the quantity of water, usage, quantity of waste water generation and their reduction within the college.

1.8 Target Areas of Environment audit

This indicator addresses water sources, water consumption, irrigation, storm water, appliances and fixtures aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.






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1.9 Methodology followed for conducting Environment audit



Step 1: Walk through survey

-  Understanding of existing water sourcing, storage and distribution facility.
-  Assessing the water demand and water consumption areas/processes.
-  Preparation of detailed water circuit diagram.








Step 2: Secondary Data Collection

-  Analyses historic water use and wastewater generation
-  Field measurements for estimating current water use
-  Metered & unmetered supplies.
-  Understanding of “base” flow and usage trend at site
-  Past water bills
-  Wastewater treatment scheme & costs etc.




Step 3: Site Water Audit Planning (based on site operations and practices)

-  Preparation of water flow diagram to quantify water use at various locations
-  Wastewater flow measurement and sampling plan

Step 4: Conduction of Detailed Environment Audit & Measurements

-  Conduction of field measurements to quantify water/wastewater streams
-  Power measurement of pumps/motors
-  Preparation of water balance diagram
-  Establishing water consumption pattern
-  Detection of potential leaks & water losses in the system
-  Assessment of productive and unproductive usage of water
-  Determine key opportunities for water consumption reduction, reuse & recycle.

Step 5: Preparation of Environment Audit Report

-  Documentation of collected & analyzed water balancing and measurement details
-  Projects and procedures to maximize water savings and minimize water losses.
-  Opportunities for water conservation based on reduce/recycle/reuse and recharge options



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**CHAPTER- 2
WATER CONSUMPTION AND WASTE WATER SOURCES**

2.1 Details of Source of Fresh Water and Use Areas:

The main source of freshwater is bore-wall for the college. The freshwater is mainly used for drinking, housekeeping, gardening, domestic activity, and new construction project. Details of the Bore-Wall are given in table.

Table: 2.1:- Details of Fresh water sources

Sr. No	Source of Water (Bore-well)	Location	Depth (feet)	Type of pumps	Rated flow (m3/hr)	Running hr/day	Remark
1	7.5 HP 3phase	College campus	400	Submersible	NA	3	Drinking, Irrigation, Construction work

Table: 2.2:- Bore-Wall Flow Measurement on the site

Sr. No	Source of Water (Bore-well)	Location	Type of pumps	Rated flow (m3/hr)	Remark
1	7.5 HP 3phase	College campus	Submersible	2.2	Drinking, Irrigation, Construction work



Fig.-Fresh water sources (Bore-Wall) & Bore-Wall Flow Measurement

Fig.-2.1 Details of Source of Fresh Water and Use Areas



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(Thugaondeo), Nagpur, Year 2020-21



2.2 Water Accounting & Metering system:

It was observed that there is requirement of water flow meters on Bore-well to quantify per day ground water extraction from different sources.

Table 2.3: Water accounting & metering system

Sr. No	Source of Water (Bore-well)	Location	Type of meter (Mechanical /Electronic)	Regularly recorded (Yes/No)	Remark
1	7.5 HP 3phase	College campus	NA	No	Required

2.3 Water Storage Capacity in College Campus: -

There is different type of tank available in college for water storage like Underground RCC tank, Overhead RCC tank and PVC type (Sintex) etc.

Table 2.4:- Water Storage tank in college campus

Sr. No	Type of Storage System (Over Head Tank, Underground Tanks, Reservoir etc.)	Location	Storage Capacity (ltr)
1	Sintex	College campus	2000
2	Sintex	College campus	2000
3	Sintex	College campus	2000
4	Sintex	College campus	2000
8	Under ground Fire (RCC)	College campus	76,861



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(Thugaondeo), Nagpur, Year 2020-21



Fig. -Syntax tank



Fig.-2.2 Water Storage Capacity in College Campus



2.4 Water distribution layout of college:

Audit team studies the water sources and prepared water distribution flow system in college campus. Fresh water distribution in college campus

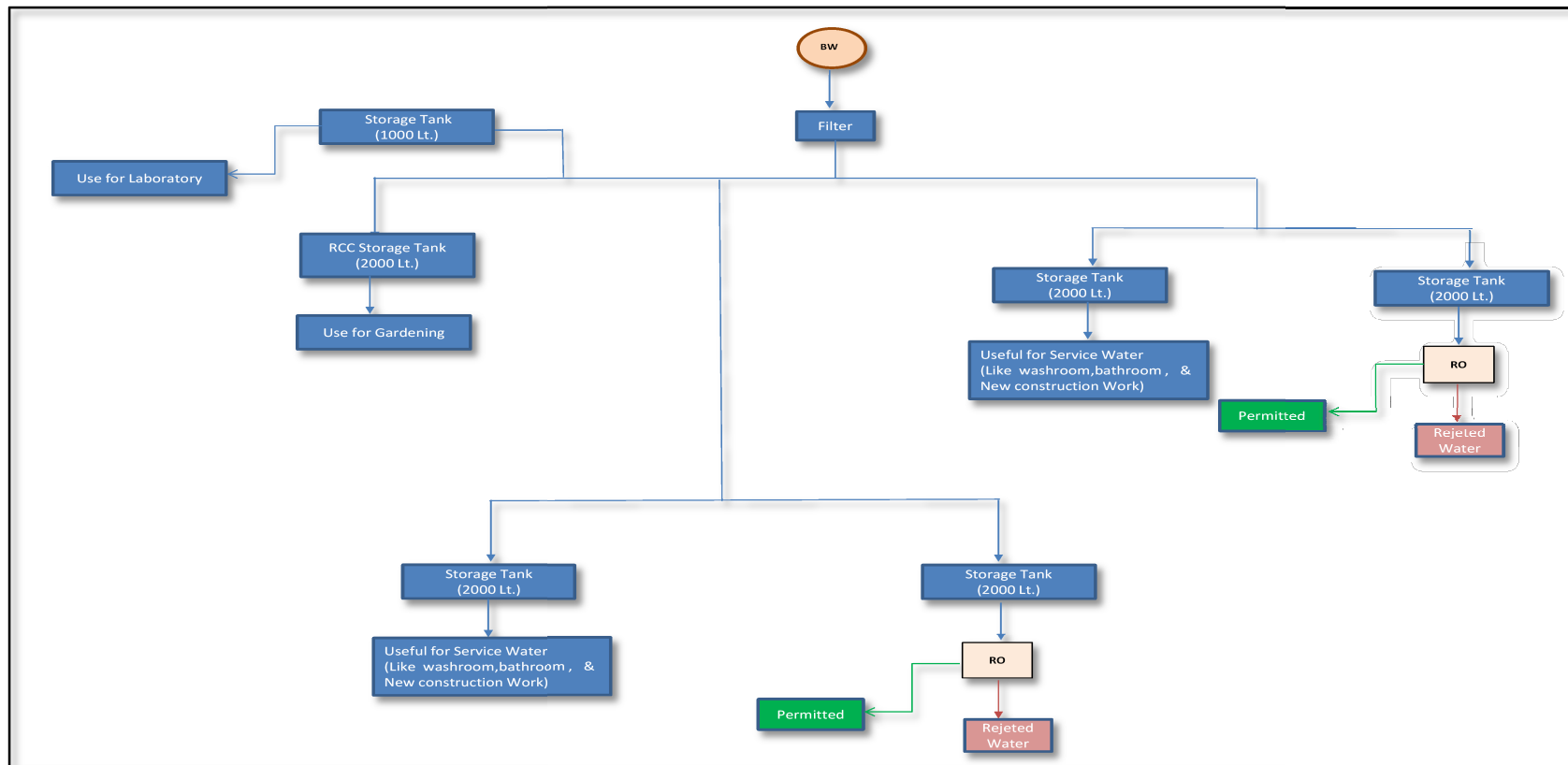


Fig.-2.3 Water distribution layout of college



2.5 Efficient water taps and urinal: -

College has installed high water consumption basin and urinal. Average water consumption on per flash is 04 to 06 Litters. So, it is recommended installed automatic sensor-based urinal and basin it is reduced water consumption on per flash.

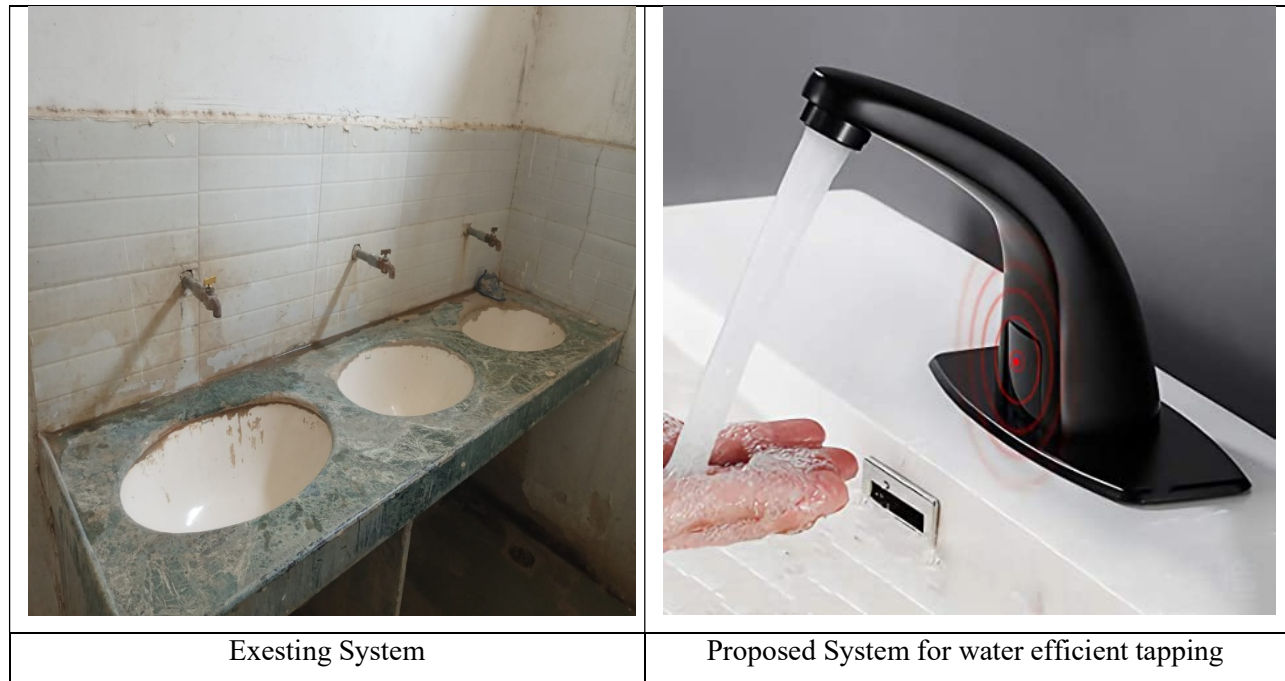


Figure 2.4:-Recommended Efficient water taps use on existing system

CHAPTER- 3 RECOMMENDATION

3.1. Rain water harvesting systems

The rainwater harvesting is a technique to capture the rainwater when it precipitates, store that water for direct use or charge the groundwater and use it later.

There are typically four components in a rainwater harvesting system:

- ✚ Roof Catchment.
- ✚ Collection.
- ✚ Transport.
- ✚ Infiltration or storage tank and use.

If rainwater is not harvested and channelized its runoffs quickly and flow out through storm-water drains. For storm-water management the recharge pits, percolation pits and porous trenches are constructed to allow storm water to infiltrate inside the soil.



Figure: - 3.1 Components of a rooftop rainwater harvesting system

3.2 Rainwater Harvesting Potential of the College: -

The college has total build-up area is about 11406.25 m^2 . The average annual rainfall 2.07 m and runoff coefficient 0.88 are considered for commercial building. Accordingly, above figures and consideration, estimated rainwater harvesting potential for the College is about $20,778 \text{ m}^3/\text{year}$. The following Mathematical Equation is used for the calculation.

RWH Potential = Rainfall (m) x Area of catchment (m^2) x Runoff coefficient

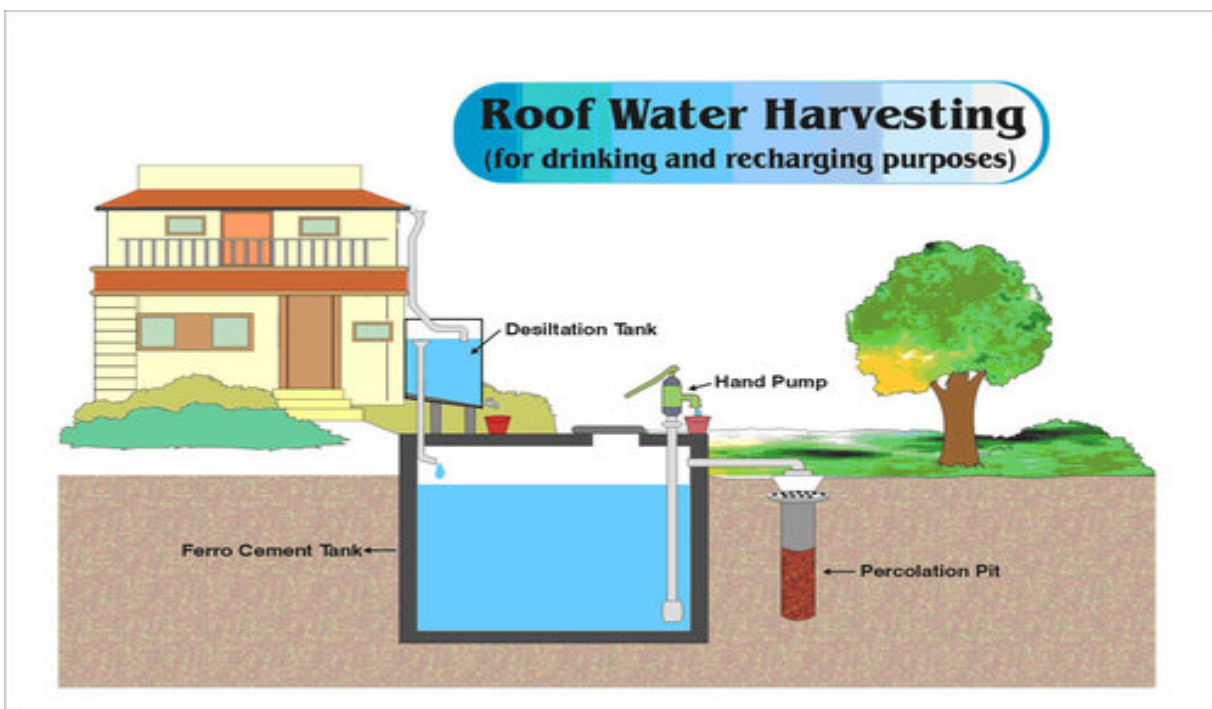


Fig.-3.2 Rainwater Harvesting Potential of the College



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GREEN AUDIT REPORT
CONSULTATION REPORT



Jeevan Vikas Mahavidyalaya,
Devgram (Thugaondeo),
Nagpur - 441 301,
Maharashtra State, India

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, OM Apartment, 214 Indrapuri Colony,
Bhawarkuan, Indore – 452 001 (M. P.), India
0731-4948831, 7869327256
Email ID: eempirical18@gmail.com
www.eeplgroups.com

Year: 2020-21



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo), Nagpur** for giving us an opportunity to conduct green audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.



Rajesh Kumar Singadiya
(Director)

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS] from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



EXECUTIVE SUMMARY

Green Audit is the most efficient way to identify the strength and weakness of environmentally sustainable practices and to find a way to solve problem. The executive summary of the Green Audit report furnished in this section briefly gives the identified green initiative taken by college and further recommendation for green campus, solid waste management and their impact on carbon foot print in the campus.

GREEN INITIATIVE TAKEN BY THE COLLEGE

✚ CAMPAIGN OF PLANTATION AND GREEN CAMPUS

- ❖ College has around **1504** no of plant & trees in the campus. Its good initiative taken by management for green campus under the campaign of plantation. **It's APPRECIABLE.**

❖ **sprin**

❖ **Liquid waste management**

- Soak pits are made in all buildings of the college and lady's hostel. The waste is drained after reasonable treatment. The drainage is maintained to collect urinals which are connected with these pits. The outlets of the urinals maintained such a way that the urine is collected through pipelines for inorganic fertilization pits.

❖ **E-Waste management**

- Computers, printers and other ICT equipment which cannot be used are sold to vendors for recycling or buy back schemes.

❖ **The Biomedical Waste Management**

- For Biomedical waste, we either recycle it or dispose it scientifically as per the need without harming the society.

❖ **Hazardous chemicals and radioactive waste management**

- Some of the chemicals are neutralized in lab and disposed them safely.



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- Some hazardous chemicals such as cyanide which are of no longer use are returned back to the chemical laboratories.

❖ **Solid waste Management**

- There are total 8 no. of dustbin in college campus. The details of list of dustbin has provided in chapter-5.

Recommendation for Improvement

✚ **Recommendation for Herbal & medicinal plants:**

- ❖ List of recommended of herbal & medicinal plant in annexure list. College management can be purchase above recommended plants in future plantation.

✚ **SOLID WASTE MANAGEMENT:**

Adopt 5 no's. Dustbin systems:

- ❖ College has single dustbin for collection of different type of waste generated by different activity in the campus. The basic principle of good waste management practice is based on the concept of 3Rs, namely, reduce, recycle, and reuse. All the degradable and non-degradable waste material are collected and processed in environmentally friendly way in the College campus.
- ❖ It is recommended to adopt 5 no's dustbin systems for collection of different type of waste material.

Organic converter for canteen area:

- ❖ There is good potential to install organic converter for kitchen waste generated in canteen area. The output of the organic converter is good manure for plant.

✚ **QR CODE SYSTEM ON TREE: -**

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, College can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.



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**CHAPTER-1
INTRODUCTION**

1.1 About College

Jeevan Vikas Mahavidyalaya, Devgram is run by the society, “Antyoday Mission”, established by Hon’ble Dr.Bhausahab Bhoge in 1972. The college was started in 1996 with mere 40 students in Arts faculty and now it has Arts, Commerce, Science & B.Voc faculties including PG Courses serving more than 1300 students under the guidance of Dr. Devendra S. Bhongade, Principal. It is constantly marching in all fronts bringing laurels at state and national level. It is the matter of great proud that at present the college runs thirteen subjects at BA – Marathi, English, Marathi Literature, English Literature, Economics, Pol. Science, Sociology, History, Geography, Music, Home Economics, Library Science and Military Science; four subjects at MA- English, Marathi, Economics and Political Science; six subjects at B.Com (Marathi Medium)- English, Marathi, Financial Accounting, Business Organization, Business Economics and Company Law; nine subjects at B.Sc. (English Medium)- English, Marathi, Physics, Chemistry, Mathematics, Botany, Zoology, Computer Science and Zoology; four subjects at UGC sponsored skill-based B.Voc. Degree Programme- Food Processing & Engineering, Software Development, Building Technology and Automotive; three subjects at UGC Funded Community College- Automotive, Software Technology and Dress Designing. At Junior College level, the college has six subjects in Arts Faculty (Marathi Medium) – English, Marathi, Economics, History, Political Science and Sociology; six subjects in Commerce Faculty (Marathi Medium) – English, Marathi, Economics, Secretarial Practice, Co-operation, and Book-keeping & Accountancy. In science (English Medium), the college runs two groups. Group – I (General Science) has six subjects- English, Marathi, Chemistry, Biology, Physics and Mathematics and Group – II (Bi-focal) has five subjects in Fishery- English, Chemistry, Biology, Physics, Fresh Water & Fish Culture and five subjects in Computer Science – English, Chemistry, Physics, and Mathematics & Computer Science. Apart from these, the college conducts few Career oriented Value-added Courses, Add-on Courses and Self-finance Certificate, Diploma and Advance Diploma Courses. The college has widened its aura starting YCMOU courses in Arts and Commerce faculties affiliated to Nashik Deemed University. All these courses are efficiently enhancing the profile of the college. UGC sponsored skill-based and Career



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oriented courses opened many new career avenues for the students in global scenario. The college has the pride to have Permanent Affiliation; 2(f) & 12(B); ISO 9001: 2015 Certification, NIRF Participation and accredited by NAAC in Cycle-II at 'B++' Grade (CGPA 2.93). CLL and NSS Wings add feather in the hat. The college boasts on well-qualified and experienced teachers involved in promoting the research culture. Auditorium, Open Gymnasium and Green Gym, vast playground & lush green campus with Wi-Fi connectivity and CCTV protected campus add to the beauty of the institution and make the campus safe and secured from girls' point of view. Advanced Library and modern Computer Lab are always open 24 *7 for students preparing for competitive examinations. The college has become an educational hub coping the demands and satisfying the needs of the region and hence it has got new coinage as one of the best Educational Institutions in the college and Vidarbha region working for Antyoday students. The college is situated at Jalalkheda –Mowad State Highway in Nagpur district of Maharashtra 5 Kms towards North of Jalalkheda. The nearest railway station Narkhed is 18 Kms and the nearest airport Nagpur is 90 Kms from the college. Apart from these, the regular MSRTC buses and private taxis ply continually.

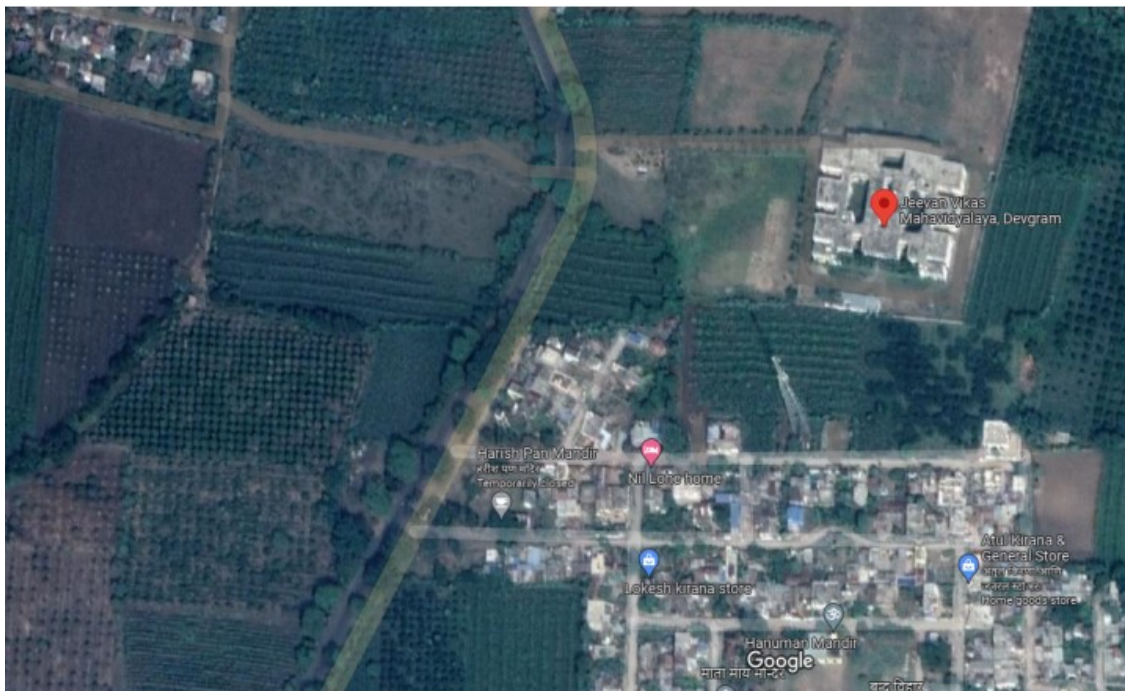


Figure 1.1: - Satellite image of college from Google map



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Vision

The vision of the institution is “Unto the Last”. i.e. To provide academic services to financially backward, deprived students and specially girls students of local community and nearby villages through qualitative and valuable education and work for Antyodaya (poor, needy and downtrodden) people in the community.

Mission

The mission of our institution is in tune with the objectives of higher education policies of the nation. For instance, the institute provides qualitative and valuable higher education to the students of rural, tribal and hilly areas. Through the curricular and extra-curricular activities, the college is pledged to develop overall skills and personality of the students to make them self-reliant and ideal citizen by discharging social and moral responsibilities.

The following mission statements aim at translating college-vision into missionary activities-

1. To impart qualitative and valuable service in the field of education to the residents of Devgram and nearby areas in general language.
2. To attempt community and social development through infrastructure facilities of the institution.
3. To ensure and inculcate perfect discipline in terms of regularity, sincerity and punctuality amongst the students. So that they contribute to the society and nation as the most responsible and respectable citizen.
4. To aim at overall personality development of the students through extra-curricular activities.
5. To provide platform for the students by giving them an opportunity to face all the challenges of the competitive world with utmost utilization of their potential in sports and other events.
6. To adopt Antyodaya students in rural, tribal and hilly areas to give them social justice, opportunities.



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Name of Department

Teaching Departments	Course Name
B.A.	B.A.
Marathi	B.Com.
English	B.Sc.
Economics	Building Technology
Political Science	Food Processing & Eng.
Sociology	Software Development
MLT	Automotive
ELT	Marathi
Music	English
Library Science	Economics
Military Science	
B.Com.	
B.Sc.	
Physics	
Chemistry	
Mathematics	
Computer Science	
Microbiology	
Botany	
Zoology	
Building Technology	
Food Processing & Eng.	
Software Development	
Automotive	
Marathi	
English	
Economics	





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1.2 About Infrastructure:

The college is spread over with plenty of open space and sports area interspersed within academic buildings. The details of various department and building are given in Table 1.1.

Table 1.1 :- Name of the various building in the college

Sr.No.	Block
1	Admin building
2	Academic section
3	New building , Class room, Principal office , Administration office
4	Sports & extension block
5	Sports ground

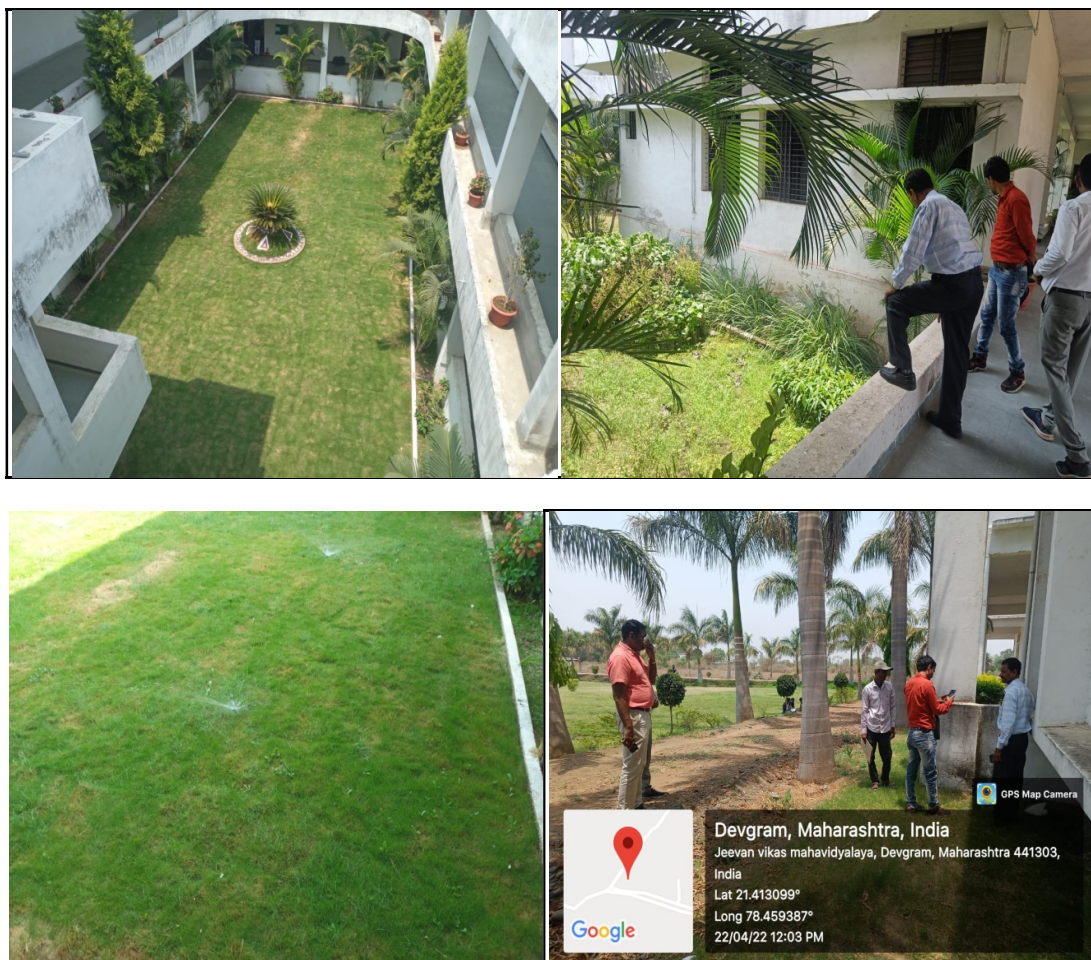


Fig. - Some pics of college campus




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1.4 Green Monitoring Committee

Antyoday Mission's
Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo)



Tah. Narkhed, Distt. Nagpur- 441 301 (M.S.)
(Permanent Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)
College Code: 341
(NAAC Accredited in Cycle II at 'B++' Grade, CGPA 2.93)
ISO 9001:2015 Certified, NIRF Participated

Website: www.jvmd.co.in E-mail: jvmthugaondeo@gmail.com


JVMD/ Q/2021 Date:- 02/07/2021

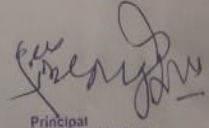
Energy, Environmental & Green Audit Committee:

Energy, Environmental & Green Audit Committee will consist of the following faculty and staff.

Sr. No.	Name of the Faculty	Designation
1	Dr. Devendra Bhongade	Chairperson
2	Dr. Deepak Arajpure	Member
3	Dr. Mangesh Acharya	Member
4	Dr. Yogesh Sarode	Member
5	Miss. Pranali Ingole	Member
6	Dr. Kalyani Thakre	Member
7	Mr. Pritam Sukhdeve	Member
8	Mr. Raju Ingale	Member
9	Mr. Devendra Wasade	Member
10	Mr. Sachin Darokar	Member
11	Mr. Rupesh Shekar	Member

Time duration for this committee is 03 years after which the committee will be reconstituted.




Principal
Jeevan Vikas Mahavidyalaya
Devgram (Thugaondeo)
Tah. Narkhed, Distt. Nagpur



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1.5 Integrated Energy, Environmental, Green & waste management policy

Antyoday Mission's
Jeevan Vikas Mahavidyalaya, Devgram (Thugaondeo)
Tah. Narkhed, Distt. Nagpur- 441 301 (M.S.)
(Permanent Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)
College Code: 341
(NAAC Accredited in Cycle II at 'B++' Grade, CGPA 2.93)
ISO 9001:2015 Certified, NIRF Participated

Website: www.jvmd.co.in E-mail: jvmthugaondeo@gmail.com


JVMD/ Date:- 10/03/2019

Integrated Energy, Environmental Green and Waste Management Policy

Management of our institution is committed to go green for making our nation to *Atma-Nirbhar* (i.e., Self-Sustainable) in the area of energy and environment.

Our Emphasis is to:

1. Ensure continual enhancements in our energy and water conservation methods and usage.
2. Procure and use energy efficient equipment and products.
3. Continuously monitoring the energy consumption patterns through periodic reviews & using latest information systems.
4. Create awareness regarding necessity of energy conservation and making environment pollution free to all staff and students on a regular basis by arranging trainings, workshops, seminars, quiz, competitions, etc.
5. Carry out regular energy, environment and green audits by certified auditors to identify key areas of improvements.


Principal
Jeevan Vikas Mahavidyalaya
Devgram (Thugaondeo)
Tah. Narkhed, Dist. Nagpur

1.6 The Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- Mr. Rajesh Kumar Singadiya, [Director & Accredited Energy Auditor , AEA-0284]
- Mr. Rakesh Pathak, [Director]
- Mrs. Laxmi Raikwar Singadiya, [Energy Engineer]
- Mr. Lokesh Kumar Verma, [Project Engineer]
- Mr. Ajay Nahra, [Site Engineer]



Green Audit Report **Jeevan Vikas Mahavidyalaya, Devgram** **(Thugaondeo), Nagpur, Year 2020-21**



1.7 About Green Auditing

Eco campus is concepts implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment.




Green audit means to identify opportunities to sustainable development practices, enhance environmental quality, improve health, hygiene and safety, reduce liabilities achieve values of virtue. Green audit also provides a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of college enables to assess the life style, action and its impact on the environment. This green audit was mainly focused on greening indicators like utilisation of green energy (solar energy) and optimum use of secondary energy sources (petrol and diesel) in the College campus, vegetation, and carbon foot print of the campus etc. The aim of green auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

1.8 Objectives of Green Auditing

The general objective of green audit is to prepare a baseline report on Plant & Trees, Alternative energy sources (solar energy), measures to mitigate resource wastage and improve sustainable practices.

The specific objectives are:

-  To inculcate values of sustainable development practices through green audit mechanism.
-  Providing a database for corrective actions and future plans.
-  To identify the gap areas and suggest recommendations to improve the green campus status of the College.

1.9 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Target areas included in this green auditing is plant trees, green energy and carbon foot print.



CHAPTER- 2
GREEN CAMPUS & SUSTAINABLE DEVELOPMENT

2.1 Green Audit

In the survey, focus has been given on assessment of present status of diversity in form of plants, in college campus and efforts made by the college authorities for nature conservation. Campus is located in the vicinity of 1504 trees/ medicinal herbs/ ornamental plants.



Fig- 2.1 Green Campus of College



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2.2 Details of Name of Tree/Plant with Quantity in College Campus

Table -2.1 Details of Name of Tree/Plant with Quantity in College Campus

Sr. No	Location/ Name of Building	Plant Name	Quantity (no)
1	Admin Building	Areca, Euphorbia, Cyprus, Gulab Toro, Nagchafa, Cycus	28
2	Academic Zone	Areca Palm, Euphorbia, Cyprus, Cycus, Rose, Nagchafa,	28
3	Sports & Extension Wing	Gulmohor, Bahawa, Royal Palm, Pulish Palm, Drooping Ashoka, Areca Palm, Euphorbia, Bahuniya Kanchan, Chafa	38
4	Sports Ground	Neem, Royal Palm	62
5	Garden	Royal Palm, Black Ficus, Ashoka, vidya, Madhumalti, Euphorbia	162
6	Parking Zone	Babool, Saptarni, Banyan tree, Gulmohor, Bogun Velia	07
7	Back Yard	Royal Palm, Neem Tree	36
8	Management Zone	Royal Palm, Kardali, Cycus, Rose Garden	43
9	Nursery & Botanical Garden	Sita Ashoka, Medicinal Plants Varity	905
10	Oxygen Park	Pandharpuri Tulasi, Green Tulasi, Black Tulasi	85
11	Corridor	Areca, Euphorbia, Cyprus, Silver Oak, Nagchafa, Cycus	110



Fig.2.2 - Some photograph of green campus

2.3 CO₂ Sequestration calculation: Based on list of tree & plant in the campus CO₂ Sequestration is calculated in table 2.2.

Table: 2.2 - CO₂ Sequestered by the trees having age between 05 to 15 Years

Sr. no	Common Name	Average Diameter (25 to 100) in cm	AGB	BGB	Total	Carbon Storage	Amount of CO ₂ Sequestered	No of Tree	Total Amount of CO ₂ Sequestered	Annually CO ₂ Sequestered amount
1	Areca	75	6354168.6	86663.5	6354168.6	86663.5	6354168.6	86663.5	6354168.6	86663.5
2	Euphorbia	60	475084.2	6479.6	475084.2	6479.6	475084.2	6479.6	475084.2	6479.6
3	Cyprus	50	1089253.5	14856.2	1089253.5	14856.2	1089253.5	14856.2	1089253.5	14856.2
4	Gulab Toro	50	1327265.2	18102.4	1327265.2	18102.4	1327265.2	18102.4	1327265.2	18102.4
5	Nagchafa	40	334759.3	4565.7	334759.3	4565.7	334759.3	4565.7	334759.3	4565.7
6	Cycus	55	121325.2	1654.7	121325.2	1654.7	121325.2	1654.7	121325.2	1654.7
7	Areca Palm	40	72334.9	986.6	72334.9	986.6	72334.9	986.6	72334.9	986.6
8	Euphorbia Cyprus	65	65178.0	889.0	65178.0	889.0	65178.0	889.0	65178.0	889.0
9	Cycus	30	83348.5	1136.8	83348.5	1136.8	83348.5	1136.8	83348.5	1136.8
10	Rose	30	74843.5	1020.8	74843.5	1020.8	74843.5	1020.8	74843.5	1020.8
11	Nagchafa	30	73993.0	1009.2	73993.0	1009.2	73993.0	1009.2	73993.0	1009.2
12	Gulmohor	35	35686.6	486.7	35686.6	486.7	35686.6	486.7	35686.6	486.7
13	Bahawa	45	430052.1	5865.4	430052.1	5865.4	430052.1	5865.4	430052.1	5865.4
14	Royal Palm	50	84004.1	1145.7	84004.1	1145.7	84004.1	1145.7	84004.1	1145.7
15	Pulish Palm	36	36824.9	502.3	36824.9	502.3	36824.9	502.3	36824.9	502.3
16	Drooping Ashoka	35	15997.5	218.2	15997.5	218.2	15997.5	218.2	15997.5	218.2
17	Areca Palm	45	165404.6	2255.9	165404.6	2255.9	165404.6	2255.9	165404.6	2255.9
18	Euphorbia	60	2358604.0	32168.6	2358604.0	32168.6	2358604.0	32168.6	2358604.0	32168.6
19	Bahuniya	45	381533.4	5203.7	381533.4	5203.7	381533.4	5203.7	381533.4	5203.7



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20	Kanchan	40	713255.9	9728.0	713255.9	9728.0	713255.9	9728.0	713255.9	9728.0	
21	Chafa	30	425247.3	5799.9	425247.3	5799.9	425247.3	5799.9	425247.3	5799.9	
22	Neem,	65	1644490.5	22429.0	1644490.5	22429.0	1644490.5	22429.0	1644490.5	22429.0	
23	Royal Palm	65	265725.6	3624.2	265725.6	3624.2	265725.6	3624.2	265725.6	3624.2	
24	Royal Palm	25	39021.8	532.2	39021.8	532.2	39021.8	532.2	39021.8	532.2	
25	Black Ficus	35	6152.9	83.9	6152.9	83.9	6152.9	83.9	6152.9	83.9	
26	Ashoka, vidya	36	24988.4	340.8	24988.4	340.8	24988.4	340.8	24988.4	340.8	
27	Madhumalti,	30	53581.2	730.8	53581.2	730.8	53581.2	730.8	53581.2	730.8	
28	Euphorbia	27	132015.4	1800.5	132015.4	1800.5	132015.4	1800.5	132015.4	1800.5	
29	Babool	28	3592.5	49.0	3592.5	49.0	3592.5	49.0	3592.5	49.0	
30	Saptarni,	30	68039.6	928.0	68039.6	928.0	68039.6	928.0	68039.6	928.0	
31	Banyan tree	54	36602.0	499.2	36602.0	499.2	36602.0	499.2	36602.0	499.2	
32	Gulmohor	35	57837.0	788.8	57837.0	788.8	57837.0	788.8	57837.0	788.8	
33	Bogun Velia	37	115016.5	1568.7	115016.5	1568.7	115016.5	1568.7	115016.5	1568.7	
34	Royal Palm	45	22054.0	300.8	22054.0	300.8	22054.0	300.8	22054.0	300.8	
35	Neem Tree	15	15493.7	211.3	15493.7	211.3	15493.7	211.3	15493.7	211.3	
36	Royal Palm	26	52619.6	717.7	52619.6	717.7	52619.6	717.7	52619.6	717.7	
37	Kardali	75	1013380.3	13821.3	1013380.3	13821.3	1013380.3	13821.3	1013380.3	13821.3	
38	Cycus	45	15437.8	210.6	15437.8	210.6	15437.8	210.6	15437.8	210.6	
39	Rose Garden	30	227932.6	3108.7	227932.6	3108.7	227932.6	3108.7	227932.6	3108.7	
40	Sita Ashoka	30	91853.4	1252.8	91853.4	1252.8	91853.4	1252.8	91853.4	1252.8	
									Total=1504	25902300.0	353277.4

College has **1504 trees** in the campus. This is good initiative taken by management for green campus under the campaign of plantation. **It's Appreciable**



Chapter-03

Carbon Foot print

3.1 About carbon foot print.

Climate change is one of the greatest challenges facing nations, governments, institutions, business and mankind today. The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO₂).

Carbon footprint is a measure of the impact your activities have on the amount of carbon dioxide (CO₂) produced through the burning of fossil fuels and is expressed as a weight of CO₂ emissions produced in tonnes.

We focus on consumption in each of our five major categories: housing, travel, food, products and services. In addition to these we also estimate the share of national emissions over which we have little control, government purchases and capital investment.

For simplicity and clarity all our calculations follow one basic method. We multiply a use input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet and spending behaviour.

Although working out you inputs can take some investigation on your part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in your calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint...

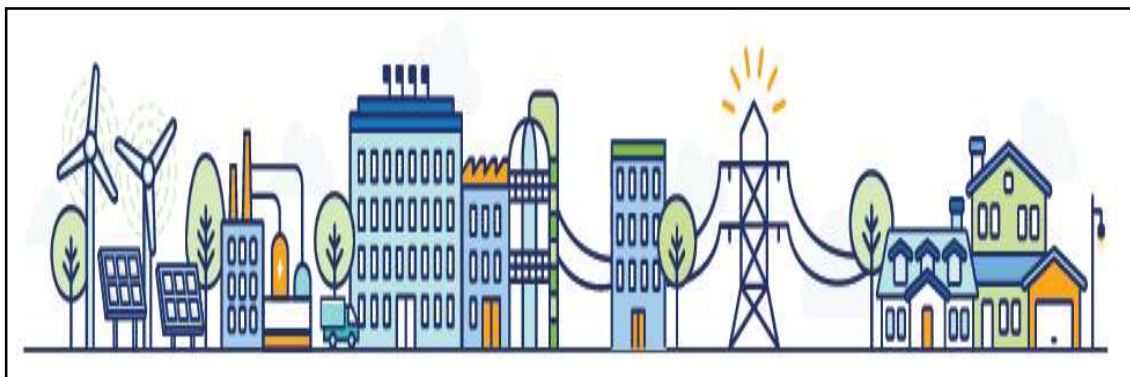


Fig.-3.1 About carbon foot print



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3.2 Methodology and Scope

The carbon footprint gives a general overview of the college greenhouse gas emissions, converted into CO₂ -equivalents and it is based on reported data from internal and external systems.

The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders.

The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the “Greenhouse Gas Protocol Corporate Accounting and Reporting Standard” (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions -ISO 14064.

This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the College Campus. This involves accounting for, and reporting on, the GHG emissions from all those activities for which the company is directly responsible.

The items quantified in this study are as classified under the ISO 14064 standards:

The report calculates the greenhouse gas emissions from the College. This includes electricity, as well as emission associated with diesel consumption in the institute vehicle. The emission associated with air travel, waste generation, administration, and marketing related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2 or 3 areas classified under the ISO 14064 standards.



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3.3 Carbon emission from electricity

Direct emissions factors are widely published and show the number of emissions produced by power stations in order to produce an average kilowatt-hour within that grid region

Unlike with other energy sources the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use comes from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is the significant contributors towards GHGs emission from the unit. Electricity used onsite is the most direct, and typically the most significant, a contributor to a unit's carbon footprint. Thus, using an average fuel mix of generating electricity, carbon dioxide intensity of electricity for national grid is assumed to be 0.9613 KgCO₂/kWh

(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_CO2/database_11.zip) Electricity

Purchased from the grid

Electricity purchase of the college from grid

SR.NO.	Year	Annual Energy Consumption (kWh)
1	2019-20	1,921
2	2020-21	2,827

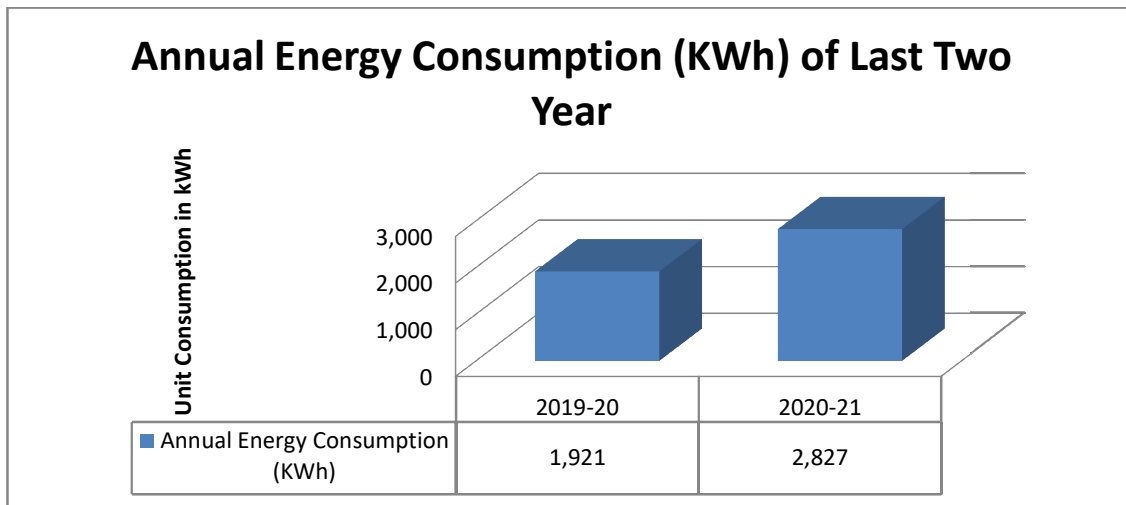


Fig.3.2 - Annual Unit Consumption (From Year 2019 to Year 2021)



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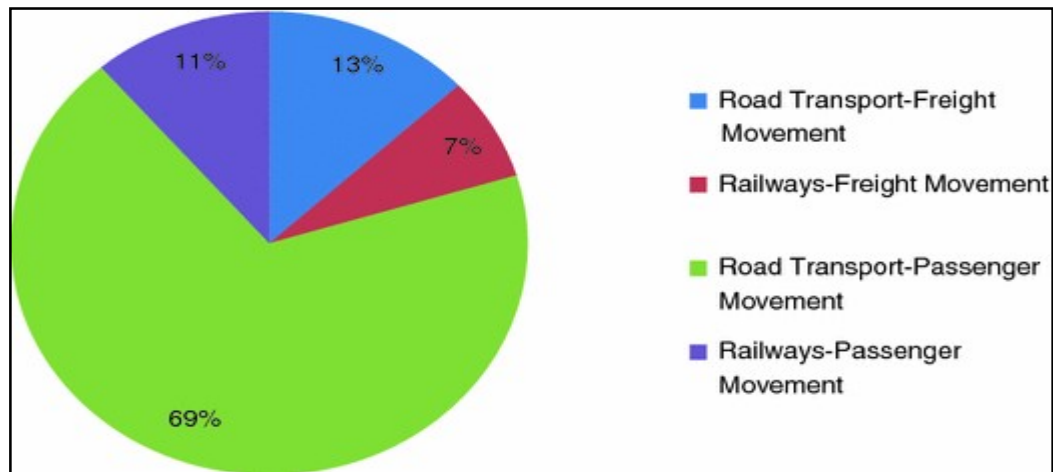


Table:- 3.2 Electricity Purchased from the grid and Emissions from the electricity Import

Sr. No	Parameter	Value	Unit	Emission Factor kg CO ₂ e/kWh	Emission ton CO ₂ e/year
1	Electricity 2020-21	6,846	kWh	0.91	6.22
				Total	6.22

Carbon emission from vehicles

In India, it is the third most CO₂ emitting sector, and within the transport sector, road transport contributed more than 90% of total CO₂ emissions (IEA, 2020; Ministry of Environment Forest and Climate Change, 2018)



Transportation (29 percent of 2019 greenhouse gas emissions) – The transportation sector generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes.

3.4 List of vehicles in college

We have also considered the total GHGs emission done by transportation facilities available in campus like Cars, Buses etc. We consider the different type of vehicles which are operated on petrol and diesel fuels. Energy team was analysed following vehicles are movement for campus.



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3.5 Calculation of Carbon foot print in campus: -

As per discussion by concern department in the college and data provided by management 150 KM per day travel done by all vehicles. Also, we have estimated value considered 250 bikes run per day approx. 1000 KM by other services like college staff, housekeeping staff, and other

Following details are given in table: 3.3 -

Sr. No	Vehicle Type	Fuel Type	Average Mileage (Per Litter)	Quantity (Nos.)
1	Car	Diesel	17	1
2	Bus	Diesel	13	1

- ❖ CO₂ Emissions from a gallon of gasoline: 8,887 grams CO₂/ gallon
- ❖ CO₂ Emissions from a gallon of diesel: 10,180 grams CO₂/ gallon
- (1 US Gallon = 3.7854 liters)**
- ❖ CO₂ Emissions from a Litter of gasoline: 2347.95 grams CO₂/ Litter.
- ❖ CO₂ Emissions from a Litter of diesel: 2689.56 grams CO₂/ litter.

$$\text{Total CO}_2 \text{ Emissions} = \frac{\text{CO}_2 \text{ Per litter}}{\text{Average Mileage (Km/Litre)}} \times \text{Distance (in km)}$$

$$\text{Total CO}_2 \text{ Emissions} = \frac{2689.59}{17} \times 150 = \mathbf{23,731.67 \text{ gram or } 23.731\text{Kg/day}}$$

When Vehicle travelling in 320 Days in Year =

$$23.731 \times 320 = 7593.92 \text{ Kg/year or } \mathbf{7.593 \text{ ton/year}}$$



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3.6 Other Emissions Excluded

This study did not evaluate the carbon sequestration potential of existing plantation activities and emission from the staff commuting, food supply, official flights, paper products, water supply, and waste disposal and recycling due to limited data availability. The current study identifies areas where data monitoring, recording and archiving need to be developed for enlarging the scope of mapping of GHGs emission in the future years. Accordingly, a set of tools and record keeping procedure will be developed for improving the quality of data collection for the next year carbon footprint studies.

Total Carbon Footprint generated = Carbon footprint by electricity
By the campus +
Carbon foot print by vehicle

Total Carbon Foot
Print by campus: - $6.22 + 7.59 = 13.82 \text{ tons/year}$



CHAPTER- 4 WASTE MANAGEMENT

4.1 About Waste:

Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed of, which can pose risks to the environment and to public health. Waste management is important for an eco-friendly campus. In college different types of wastes are generated, its collection and management are very challenging.

Solid waste can be divided into three categories: bio-degradable, non-biodegradable and hazardous waste. A bio-degradable waste includes food wastes, canteen waste, wastes from toilets etc. Non-biodegradable wastes include what is usually thrown away in homes and schools such as plastic, tins and glass bottles etc. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals, acids and petrol.

Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated in the college. Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Table-4.1 Different types of waste generated in the college campus.

Sr. No.	Types of Waste	Particulars
1	Solid wastes	Damaged furniture, paper waste, paper plates, food wastes etc
2	Plastic waste	Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc
3	E-Waste	Computers, electrical and electronic parts etc
4	Glass waste	Broken glass wares from the labs etc
5	Chemical wastes	Laboratory waste etc
6	Bio-medical Waste	Sanitary Napkin etc



4.2 Waste management Practices adopted by the college

College is implemented “Single dust Bin” waste collection system. All kind of waste generated from various activity is collected.



Figure 4.1: - Waste collection bin in college campus

Recommendation:

It is recommended adopted 5 Bin Waste Collection System for collect different type of waste generated in college premises.

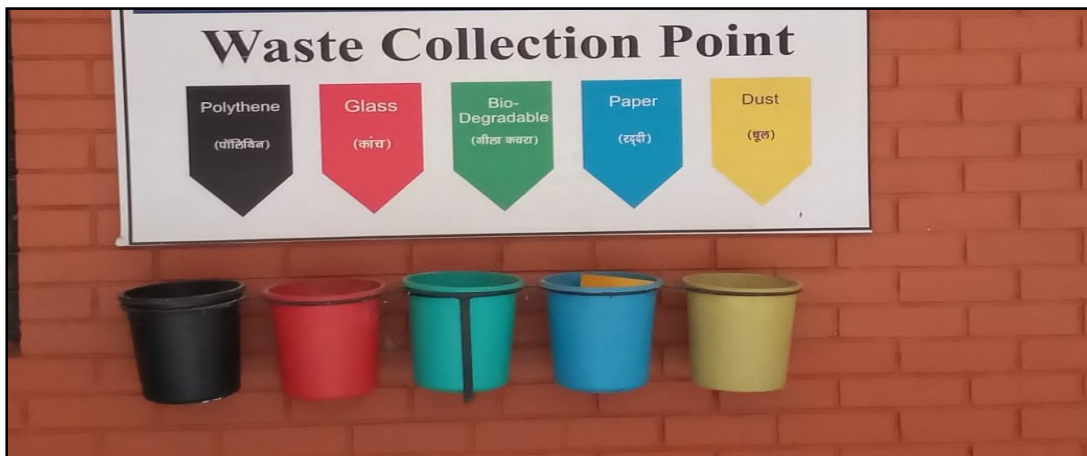


Fig. 4.2: Recommended 5 Dust Bin waste collection System



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4.3 Waste Collection Points:

Audit team also visited various departments, and find out waste generation area and waste collection points for further improvement.

Table:4.2 Detailed of Waste collection Dust bin system in College Campus

Sr. No	Location/ Name of Building	Type of waste	Type of Colour	Quantity (no.)
1	Admin Building	Pages, Register cover, files, plastic file covers, pen, refills, markers, stapler pins, CD	Green	1
2	Academic Zone	Paper files, threads, pins, gloves, glass wares, aprons, needles, pen, pencils waste, covers, syringe, laboratory equipment, chemical bottles	Green	1
3	Sports & Extension Wing	Woods, wood powder, broken bods, crush balls, sticks, ropes, bandages, water bottles, gloves, boxes, clothes (sport), socks, shoes, waste sport material	Green	1
4	Sports Ground	Organic wastes, water bottles, glucose bottles, bandages, fruit wastes, pipes, broken instruments, nets	Green	1
5	Garden	Broken Plants, leaves, organic waste, rappers, water can, pots, sapling covers, sapling pots, fertilizer and medicinal bottles	Green	1
6	Parking Zone	Tyre tubes, oil, petrol bottles, sponges, seat covers, vehicle spare parts, water bottles, polyethene	-	0
7	Back Yard	Snack pockets, Candy packets, unusable pen and pencils, waste stationeries	-	0
8	Management Zone	Pages, Register cover, files, plastic file covers, pen, refills, markers, stapler pins, CD	Green	1
9	Nursery & Botanical Garden	Broken Plants, leaves, organic waste, rappers, water can, pots, sapling covers, sapling pots, fertilizer and medicinal bottles	Green	1
10	Oxygen Park	Dry leaves, plastic, broken pipe	-	0
11	Corridor	Pages, pen wastes, refills, markers, stapler pins, dry leaves	Green	1

Observation

There is no dustbin in Parking zone, Back yard & Oxygen Park.



CHAPTER- 5

RECOMMENDATIONS AND SUGGESTIONS

5.1 QR Code Systems

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, College can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.



Fig: 5.1 QR Code System for plants

These codes can give students all the information they need to know about the tree from its scientific name to its medicinal value. They only need to put their smart-phones to use. QR codes to them, making it easier for everybody to learn about a plant or a tree at the tip of their fingers,” If any app generating a QR code, which is available for free on the online stores, can be used to avail the information of the trees.



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5.2 Other Useful Suggestions

Some of the very important suggestions are: -

- ✚ Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.
- ✚ Increase recycling education on campus.
- ✚ Increase Awareness of Environmentally Sustainable Development in College campus.
- ✚ Practice Institutional Ecology- Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.
- ✚ Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development.
- ✚ Collaborate for Interdisciplinary Approaches- To develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.
- ✚ Increase reduces, reuse, and recycle education on campus.
- ✚ Develop a butterfly garden that arouses appreciation towards flora and fauna diversity.
- ✚ Name all the trees and plants (Plant DNA barcodes) with its common name and scientific name.
- ✚ Arrange training programmes on environmental management system and nature conservation.
- ✚ Renovation of cooking system in the canteen to save gas by installation solar water heater system with heat pump.
- ✚ Establish a procurement policy that is energy saving and eco-friendly.



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ANNEXURE

Recommendation for Herbal & medicinal plants:

S.No.	Hindi Name	Botanical Name	Family
1	Asopalav	<i>Polyalthia longifolia</i>	Annonaceae
2	Gudhal	<i>Hibiscus-rosa-sinensis</i>	Malvaceae
3	Nandee	<i>Ficus Benjamina</i>	Moraceae
4	Bahera	<i>Terminalia Bellirica</i>	Combretaceae
5	Khirni	<i>Manilkara hexandra</i>	Sapotaceae
6	Kaner	<i>Nerium indicum</i>	Apocynaceae
7	Champa	<i>Plumeria fragrance</i>	Apocynaceae
8	Peepal	<i>Ficus religiosa</i>	Moraceae
9	Jackfruit	<i>Artocarpus heterophyllus</i>	Moraceae
10	Amla	<i>Emblica officinalis</i>	Euphorbiaceae
11	Bael	<i>Aegle marmelos</i>	Rutaceae
12	Amrood	<i>Psidium guajava</i>	Myrtaceae
13	Ghratkumari	<i>Aloe barbadensis</i>	Liliaceae
14	Nimbu	<i>Citrus lemon</i>	Rutaceae
15	Mogra	<i>Jasminum sambac</i>	Oleaceae
16	Parijaat	<i>Nyctanthes arbor-tristis</i>	Oleaceae
17	Aam	<i>Mangifera indica</i>	Anacardiaceae
18	Peela kaner	<i>Thevetia nerifolia</i>	Apocynaceae
19	Jaamun	<i>Syzygium cumini</i>	Myrtaceae
20	Kachnar	<i>Bauhinia variegata</i>	Fabaceae
21	Ratanjot	<i>Jatropha curcas</i>	Euphorbiaceae
22	Shewt ark	<i>Calotropis procera</i>	Asclepiadaceae
23	Drumstick	<i>Moringa oleifera</i>	Moringaceae
24	Neem	<i>Azadirachta indica</i>	Meliaceae
25	Arandi	<i>Ricinus communis</i>	Euphorbiaceae
26	Arjuna	<i>Terminlia arjuna</i>	Combretaceae
27	Putranjiva	<i>Putranjiva roxburghii</i>	Putranjivaceae
28	Anjeer	<i>Ficus carica</i>	Moraceae
29	Shikakai	<i>Acacia concina</i>	Fabaceae
30	Pila amaltas	<i>Cassia glauca</i>	Fabaceae
31	Nirgundi	<i>Vitex negundo</i>	Lemiaceae
32	Sheesham	<i>Dalbergia sissoo</i>	fabaceae
33	Dhawda/ Gumghatti	<i>Anogeissus latifolia</i>	Combrataceae
34	Paras peepal	<i>Thespsia populina</i>	Malvaceae
35	Kanak champa	<i>Pterospermum acerifolium</i>	Malvaceae
36	Maulshree	<i>Mimusops alengi</i>	Sapotaceae
37	Tendu	<i>Diospyros melanoxylon</i>	Ebanaceae