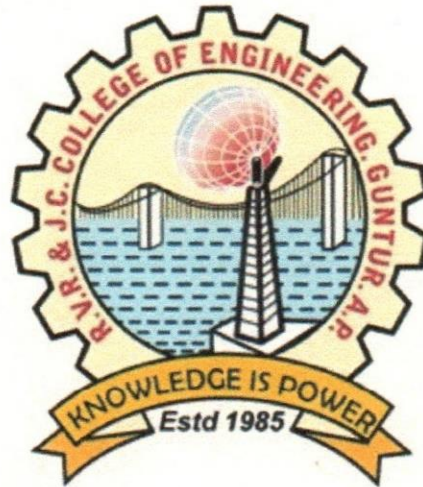


Environment and Green Audit Report

for



R.V.R. & J.C. College of Engineering, Chowdavaram,
Guntur

By



Bhumitra Energy Auditing and Consultancy Pvt. Ltd.

For Bhumitra		For RVR&JC
Prepared By	Reviewed and Approved By	Accepted By

Think for future! Think green! Print this document only, if it is really required. Please do not make multiple hard copies of this document ...



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COMMUNICATION

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I would like to sincerely appreciate and thank the key people, Dr. K. Srinivasu (Principal), Audit Committee members Mr. G Bhaskara Rao, Dr. P. Gouri Sankar, Dr. P. Rohinikumar, Mr. B.V Vasantha Rao, Mr. M. Srikanth Kumar, Mr. Ch. Devaraj, Ms. M. Sudheera who are always available for me in sharing the data. The study would not have come up so well without their help.

The Involvement of Management and Their Commitment to Environment Sustainability is clearly demonstrated in every stage of the audit by the way of full cooperation and total involvement from top to bottom. It is this commitment that helped me deliver an HONEST report without trouble.

This section would be incomplete without mention of support rendered by Dr. NV Srinivas, Registrar and HODs of various departments by guiding their staff in promptly delivering requisite data.

I once again thank each and every one and wish that this association should go a real long way in contributing for a Sustainable Environment.

LIMITATIONS / DISCLAIMER

We have taken maximum care in ensuring the results to be accurate. Bhumitra shall be only responsible to correct any unfortunate discrepancies and compensate any direct advantage if enjoyed by Bhumitra. The reporting format is intellectual property of Bhumitra. Sharing of the document or content shall be judicious to avoid any duplication and misuse and shall be with permission of Bhumitra if it has to be shared externally.

1.0 SUMMARY OF AUDIT

1.1 NOTEWORTHY PRACTICES

- ✔ The college has adopted steel cutlery replacing plastic glasses, plastic cups and disposable plates minimizing single use plastic generated in canteen.
- ✔ 3 Stage cleaning employed in Kitchen minimizes water usage.
- ✔ Segregation of waste and waste management system is good.
- ✔ Rainwater harvesting and check dam, contour for collection of run-off water from hills is worth noting.
- ✔ Significant amount of money being spent annually on Gardening and Greening.

1.2 OPPORTUNITIES FOR IMPROVEMENT

- ✔ It is recommended to discard usage of RO and go for alternative means for drinking water as it generates about 12 kl per day of waste water. Also, Worldwide, RO usage is being discouraged for its bad effects.
- ✔ Centralized sewage treatment plant based on bio-membrane or any environment friendly based technology may be established to reuse all the grey water and become zero discharge campus and avoid usage of fresh water for gardening.
- ✔ Single use plastic like packing material and cooldrink bottles are still in use and may be phased out slowly by adopting feasible methods.
- ✔ Rainwater may be collected and stored and used as drinking water with minimum treatment. Open well may be modified for the purpose.

Note:

All the findings and recommendations are based on available data and assumptions. These are very indicative and detailed study, analysis and proper engineering is required for implementation of any of recommendations.

2.0 INTRODUCTION

2.1 A BRIEF ABOUT RVR AND JC COLLEGE OF ENGINEERING

Rayapati Venkata Ranga Rao and Jagarlamudi Chandramouli (R.V.R. & J.C.) College of Engineering, Chowdavaram, Guntur trains undergraduate and postgraduate students in Engineering and Management for award of degree from Acharya Nagarjuna University. Established by the renowned Nagarjuna Education Society (1967) in the year 1985, the College drew its initial impetus from Peoples Representatives, local doctors, charitable trusts and commercial houses of Guntur District. Today, it enjoys flagship status among the eight constituent institutions, that are governed by Nagarjuna Education Society. The founder-members of Nagarjuna Education Society and their successors have provided abundant inputs to turn a mere 3-course-180-intake College into a 14-course-1200-intake edifice by the Silver Jubilee Year.

The premier status of the institution is made possible by sticking to core-principles of student-focus, Human Resource Development and emphasis on total quality. Training the students beyond the defined borders of the curriculum is a basic emphasis, the college dearly practices. The college periodically tests its own standards and standing among the fraternity of colleges, securing Accreditation from National Board of Accreditation, AICTE in 1998, 2002, 2007, 2012, & 2017. The A.P. State Council of Higher Education (APSCHE) too awarded the second-best rating in 'Academic Audit and Grading' in 2004. The Awards of Best Performing U.G. College in the university examinations, consecutively for three years and a place among the 'Top-100 Engineering Colleges in the country are major achievements. The College practices the modesty of looking for new starting lines than be content with the finishing lines reached. They humbly admit, they have miles and miles to go before they complete their mission.

2.2 ABOUT BHUMITRA

Bhumitra Energy Auditing and Consultancy Pvt. Ltd. (Bhumitra) is an integrated service provider in the areas of energy audit, total energy management solutions, reliability audit, consultancy services for Greenfield and efficiency improvement projects. The company is setup by Mr. ND Raghuram, who is having vast and varied experience of about 20 years in Power, Green Energy, Industrial Automation, CDM and ISO. Bhumitra is setup by him with passion towards Environment and Energy Conservation.

Bhumitra is setup with a primary motto to conserve environment and energy and thereby contribute for a better and greener tomorrow

Vision : Tomorrow Should be Better

Mission : Reduce Damage being caused to Environment by providing Eco Friendly Services and Products.

Values : Honesty, Commitment and Hard Work ... In what We think, We talk and We do...

2.2.1 THE CONSULTANT TEAM

Environment audit of the college was carried out by Bhumitra Energy Auditing & Consultancy pvt Ltd. Analysis is carried out by Amrutharam Enviro Solutions.

1	Mr. Durga Raghuram Nagalla	<i>BEE Certified Energy Auditor (EA-11516) & Chief Consultant</i>
2	Mr. Bhaskar Rao L	Chief Analyst, Amrutharam Enviro Solutions
3	Ms Renuka L	Analyst, Amruthram Enviro Solutions
4	Mr. Rajesh K	Lab Technician, Amruthram Enviro Solutions

2.2.2 LIST OF INSTRUMENTS USED

S.No	Inst.Name	Make	Model
1	Fine Particulate Sampler	Envirotech	APM 550MFC
2	Sound Level Meter	LUTRON	SL-4010
3	BOD Incubator	Vihaan Techno Services	
4	COD Digester	Tulin	
5	Analytical Balance		
6	Muffle Furnace	VTS	

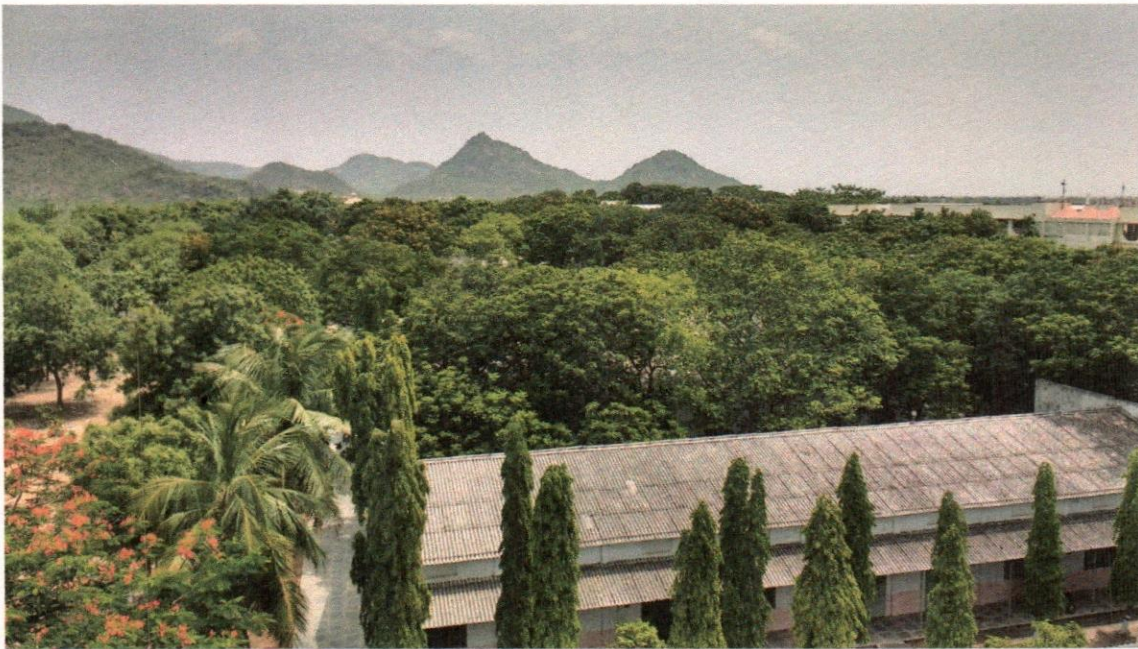
2.3 SCOPE OF AUDIT

The main objective of this Environment and Green Audit is to get a third-party opinion on the quality of various natural elements and to identify any conservation opportunities and implement possible best practices.

It is intended that the auditor's report will include physical analysis results of Air, Water and Soil samples.

2.4 A GREEN CAMPUS

RVR & JC College of Engineering is located at footstep of hills and one falls in love with the college for its well-organized gardens, trees along roads and lawns. This is one of the first-generation engineering colleges in AP which seems to have given equal priority for Environment along with Education.



The college campus is spread in about 37 acres of land and has green cover of about 50%, spreading over 78,100 Smuts which includes road side trees, lawns, mini forest etc. College has got about 50 to 60 various species of plants and few species of fauna.

It offers environment education and organized several seminars on environment education. The college is recognized for its efforts with few green awards.

It is evidenced that the college continuously thrives to be environment friendly by effective utilization of the available resources without depleting them. Regular annual Investments made on developing greenery establishes the commitment of Management for Environment.

Many aspects considered to be environmentally friendly are also being put into practice like encouraging public transport system, design of curriculum to bring in more awareness on the environment, following good practices like acknowledging individual contributions without ignoring institutional responsibility.

College does not deal with any potentially hazardous chemicals except in Laboratories which are in very minute quantities and are disposed safely.

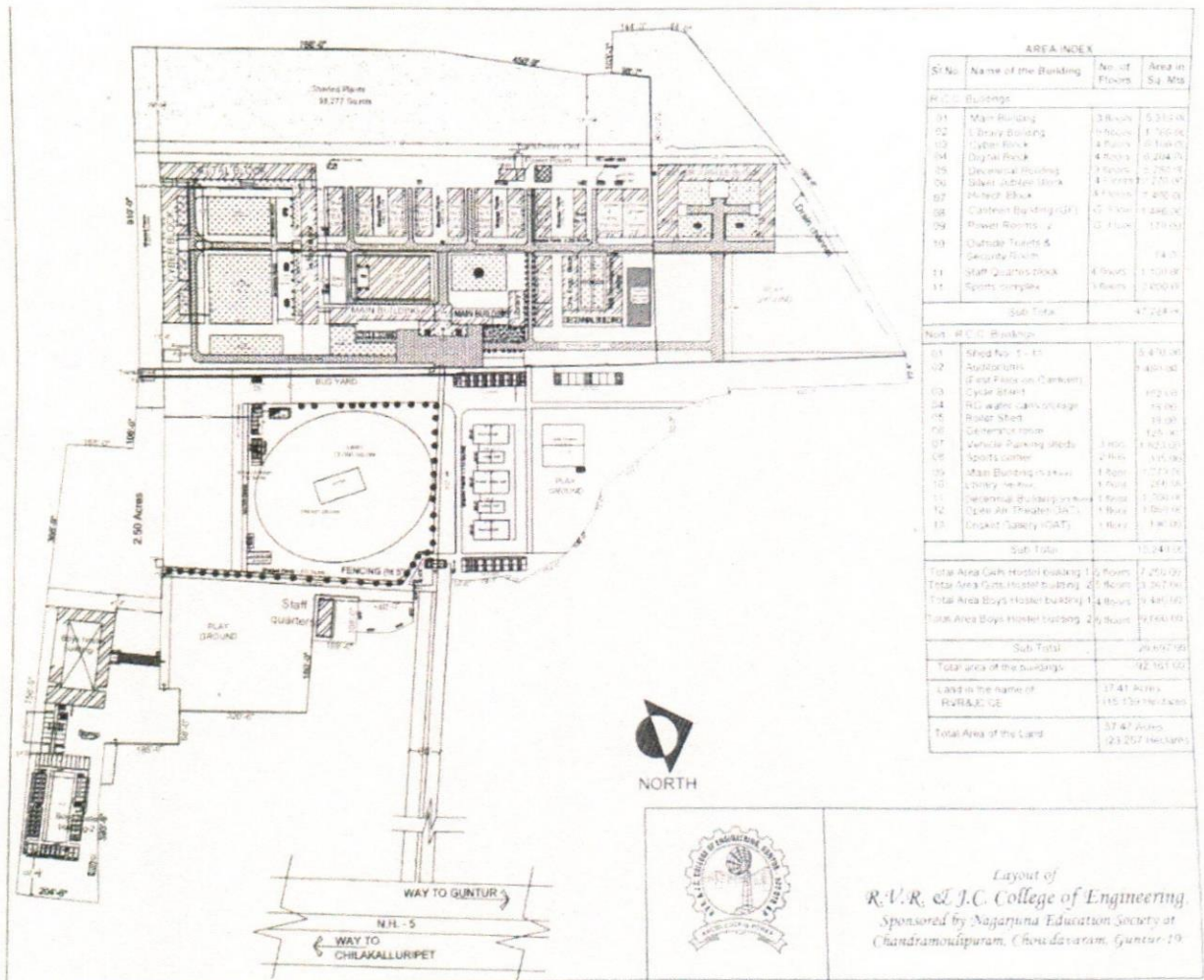


Figure 1 : Layout of RVR & JC College of Engineering, Nargarjuna Education Society

2.5 RAINWATER HARVESTING

A Check dam constructed in the campus on a natural drain passing through the campus this also collects Run off generated in the campus. It is estimated that the pondage developed by the dam can store up to 10000000 liters of water. The stored water percolates into the ground to recharge ground water.

The rain water coming from roof tops and that flowing within the campus are collected in several percolation pits constructed in the campus and recharge ground water. An open well located in the campus is recharged by rain water. The well also receives water from the pondage of check dam through pumping.

A contour bund along one boundary of the college for the percolation of rain water coming from hills.

3.0 ENVIRONMENT FRIENDLY PRACTICES OF COLLEGE

It is observed during audit visit that the college has good environment friendly practices in place with respect to natural resources. The college has also got good waste management system.

3.1 WASTE GENERATION AND MANAGEMENT

It is observed that single use plastic is minimized by adopting green practices in canteen and creating awareness among students. The waste generated is handled properly and systematically. Reuse of water is being practiced. Various wastes generated and their handling as observed are discussed below.

3.2 SOLID WASTE MANAGEMENT

The college has adopted steel cutlery replacing plastic glasses, plastic cups and disposable plates minimizing single use plastic generated in canteen. Single use plastic like packing material and cooldrink bottles are still in use and may be phased out slowly by adopting feasible methods. However, these are being collected separately and disposed.

Food wastes and non-biodegradable waste are collected in separate bins. Biodegradable wastes like food are disposed-off to vendors for feeding purpose and balance is dumped in dumping yards along with leaves for converting to organic manure. Non-Biodegradable waste like metal cans and plastic are disposed to recyclers.

3.3 LIQUID WASTE MANAGEMENT

Liquid wastes that are generated in the institute are ...

- ❶ Septic tank effluents from various sanitary blocks.
- ❷ Water used for washing and cleaning of utensils etc. from canteen and washing of hands.
- ❸ Wastewater from laboratories using chemicals
- ❹ Reject water from RO plant of about 2KL per hour

College has got few open drains to convey this water. Wastewater generated from the toilets is disposed of into septic tanks located at different places in the campus and their effluents combined with canteen wastewater is used for gardening, watering trees etc. The excess wastewater is being directed into natural drain passing near by the college campus.

Wastewater generated from the laboratories is very small in quantity and handled along with septic sewage. RO plant wastewater is also combined with grey water from canteen.

There is provision for collection of waste water and using it for plants. However due to tedious process it seems to be not regularly used. Significant water is being seen to be going away into natural drain.

It is recommended to discard usage of RO and go for alternative means for drinking water as it generates about 12 kl per day of waste water. Also, bio membrane based or any environment friendly based STP may be established to become zero discharge Campus and avoid usage of fresh water for gardening.

In Canteen three stage cleaning of vessels is employed which is very good in conserving water while maintaining hygiene.

3.4 E- WASTE MANAGEMENT

E-wastes mainly include obsolete electronic devices, such as computer systems, servers, monitors, electrical components etc. E-wastes are disposed-off through authorized vendors. It is required to establish the authenticity of vendors.

4.0 PHYSICAL OBSERVATIONS BY SAMPLING

College has adopted the environment monitoring into its curriculum. Every year students perform various experiments which involves monitoring of quality parameters of air and water. This is commendable process as this gives good hands on training to the students. In addition to this internal verification an external agency Amrutharam Enviro Services is hired to perform analysis of Air, Water and Soil samples collected from designated locations. The observations are presented below.

4.1 AIR

Air is one of the essential elements for sustainability of life on this planet. This is often most polluted by humans along with water. It is required monitor its quality frequently to establish its goodness. Physically due to greenery and absence of polluting industries are processes in the vicinity the air quality appears to be very good. In addition, the parking area and bus bay are maintained clean by paving and regular cleaning giving no scope for dust rise. Also, the road sides are all covered with plants and trees aiding for good air quality.

4.1.1 EXTERNAL ANALYSIS REPORTS

Ms Amrutharam Enviro Solutions has installed Air monitoring equipment at main gate near to bus bay and at Admin block and analyzed the air quality. Details are as furnished below and are very much better than the AP Pollution Board norms.

4.1.1.1 AMBIENT AIR

VENDOR REF. NO: AES/Lab/04/

Sample Name : Ambient Air Monitoring
 Sample Collected by : Amrutaram Enviro Solutions
 Sample Collected on : 30.01.2020
 Sample Received on : 30.01.2020
 Report Date : 03.02.2020
 Registration Number : AAQ-02

S.No.	Parameter	Test Method	Location		APPCB Standards
			Near Main gate	Admin. Block	
1	PM10	NEERI	52	38	100
2	PM2.5	NEERI	22	16	80
3	SO2	NEERI	5	3	60
4	NO2	NEERI	2	1	60

4.2 WATER

Water is other essential element for sustainability of life on this planet. This is often most polluted by mixing of sewage waste, trash chemical discharges etc. It is required monitor its quality frequently to establish its goodness. Physically due to absence of polluting industries in vicinity or inside the college the quality of water is good.

4.2.1 EXTERNAL ANALYSIS REPORTS

4.2.1.1 DRINKING WATER

LAB REF. NO: AES/Lab/04/ RO /2020

Sample Name : Drinking Water
 Sample Collected by : Amrutaram Enviro Solutions
 Sample Collected on : 30.01.2020
 Sample Received on : 30.01.2020
 Report Date : 03.02.2020
 Registration Number : W-226
 Sample Quantity : 1 Liter

S.No.	Parameter	Test Method	Test Results	
			W-226	IS Standard
1	Ph	NEERI	7.54	6.5-9.5
2	TDS at 180°C	NEERI	26	100
3	TSS at 105°C	NEERI	BDL	100
4	Total Hardness	NEERI	9	50
5	Chlorides	NEERI	6	30
6	Alkalinity	NEERI	3	10

Note : All results are expressed in mg/L except Ph
 BDL : Below Detectable limit

4.2.1.2 RAW WATER

LAB REF. NO: AES/Lab/05/2020

Sample Name : Raw Water
 Sample Collected by : Amrutaram Enviro Solutions
 Sample Collected on : 30.01.2020
 Sample Received on : 30.01.2020
 Report Date : 03.02.2020
 Registration Number : W-0227
 Sample Quantity : 1 Liter

S.No.	Parameter	Test Method	Test Results
			W-0227
1	pH	NEERI	7.39
2	TDS at 105 ⁰ C	NEERI	287
3	TSS	NEERI	63
4	Total Hardness as CaCO ₃	NEERI	59
5	Alkalinity as CaCO ₃	NEERI	36
6	Chlorides as Cl ⁻	NEERI	29
7	Calcium as Ca	NEERI	2.5
8	Magnesium as Mg	NEERI	1.3
9	Toxic metals	NEERI	BDL

Note : All results are expressed in mg/L except Ph
 BDL : Below Detectable limit

4.2.1.3 SEWAGE WATER

LAB REF. NO: AES/Lab/05/2020

Sample Name : Sewage Water
Sample Collected by : Amrutaram Enviro Solutions
Sample Collected on : 30.01.2020
Sample Received on : 30.01.2020
Report Date : 03.02.2020
Registration Number : W-0226
Sample Quantity : 1 Liter

S.No.	Parameter	Test Method	Test Results	
			W-0226	APPCB Standard
1	Ph	NEERI	7.86	6.5-9.5
2	TDS at 1050C	NEERI	1050	2100
3	TSS	NEERI	114	100
4	COD	NEERI	224	250
5	BOD	NEERI	138	30

Note : All results are expressed in mg/L except Ph
BDL : Below Detectable limit

4.3 SOIL

Source of soil contamination is often because of extensive use of chemicals and discharge of untreated water. Construction activities also contribute but here they are confined.

4.3.1 EXTERNAL ANALYSIS REPORTS

4.3.1.1 SOIL

LAB REF. NO: AES/Lab/03/Soil/2020

Sample Name : Soil
 Sample Collected by : Amrutaram Enviro Solutions
 Sample Collected on : 30.01.2020
 Sample Received on : 30.01.2020
 Report Date : 03.02.2020
 Registration Number : S-03
 Sample Quantity : 2KGS

S.No	Parameter	Test Method	Near Main Gate	Admin. Block
1	pH	NEERI	7.96	7.56
2	Total Hardness as CaCO ₃	NEERI	186	176
3	Chlorides as Cl ⁻	NEERI	187	182
4	Calcium as Ca	NEERI	47	43
5	Magnesium as Mg	NEERI	16.5	16.5

Note : All results are expressed in mg/L except pH

4.4 NOISE LEVEL

The College is very quiet and no noise pollution is seen. The maximum observed noise level is between 55 - 70 dB in most of the places and at times 80 to 85 dB near some of machines in Lab. Noise levels are well within limits.

Note :

As per the Factories Act 1948 Permissible Exposures in cases of continuous Noise is 90 dBA for 8 hours per day. No exposure in excess of 115 dBA is to be permitted.

5.0 SOLAR POWER

A 500 kWp Solar power plant is established to reduce dependency on Grid power which is predominantly fossil fuel based. Green Energy Percentage is about 50%.

College is already using a Solar powered UPS and Solar Street Lights.

