



CERTIFICATE OF EXCELLENCE

THIS IS CERTIFY THAT

KALINGA UNIVERSITY

HAS SUCCESSFULLY

COMPLETED THE

GREEN

AUDIT PROGRAM

CONDUCTED ON

25 FEBRUARY 2023

CERTIFICATE NO. **SMPL/2023/C-0023**

DATE OF ISSUE **01-03-2023**

Samarth Suri

AUTHORISED SIGNATORY

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New Delhi - 110087



GREEN AUDIT REPORT



**KALINGA
UNIVERSITY**
RAIPUR | INDIA

**Kotni, Near Mantralaya, Naya Raipur – 492101, Chhattisgarh,
India.**

Audit Date – 25th February, 2023

Audit Conducted by:

SAMARTH™
GROUP

M/S SAMARTH MANAGEMENT PRIVATE LIMITED

212, BHERA ENCLAVE, PASCHIM VIHAR, DELHI – 110087



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ABOUT KALINGA UNIVERSITY

Kalinga University, Raipur has emerged as a centre of excellence of higher education in Central India. Strategically located in the Smart City of New Raipur, this University has started carving a niche for itself in the education domain and is rising as a shining star on the horizon of quality education.

About Raipur – Raipur is the Capital of Chhattisgarh and New Raipur is the New Capital of Chhattisgarh in the making. New Raipur is the fourth planned city of India with wide roads and miles of greenery and is pollution free. It is the first Integrated and Smart City of the country. A cosmopolitan city which is also the hub of higher education hosts IIM, IIT, IIIT, National Law University, CIPET, NIT and AIIMS. In addition it also hosts most National and International brands of Food and Retail Outlets.

Establishment - Established in 2013, this university has been able to win the confidence of over 7000 students. Meritorious students from all over the country and various foreign countries namely Afghanistan, Bangladesh, Nepal, Nigeria, South Korea and Uganda have chosen this University for their education and career.

Schools of Excellence - A centre for Doctoral research programmes in various fields. Currently the University is serving the student community through various UG and PG programs namely Engineering, Law, Pharmacy, Arts & Humanities, Science, Commerce & Management, Biotechnology, Information Technology, Library Science, Fashion Design & Interior Design.

Academics and Faculty - All schools are headed by senior professors having excellent academic credentials and experience of teaching, publications and research. They are ably supported by the well qualified faculty members who come from top educational institutions and the Industry. Students also get an opportunity to learn from a distinguished panel of experts drawn from various industries, who regularly come for guest lectures.

Infrastructure – Kalinga boasts of World Class Infrastructure and student facilities with student centric approach. Highest attention is paid to hands-on learning approach and students are encouraged to come up with innovative ideas for projects and practical's. The University has more than 75 laboratories and workshops, all well equipped with the latest, state of the art apparatus and tools. Special emphasis is given to the development of communication skills through the language lab. More than 1200 computers are available for the use of the students.

The Library has a collection of over 79,000+ books and also offers Digital content through membership of DELNET, National Digital Library and NPTEL. Various magazines and journals are available for the use of the faculty and students.

Infrastructure consists of Student Hostel facilities, Green Acres, Canteen, Food Mess, Gymnasium, Fully Wi-Fi Campus, ATM, Mini Market, Student hangout Areas, Sports Complex, Re-creation Halls with Indoor Games and Music and recreation activities.

Industry Orientation and Leadership - Industry interaction is an integral part of the curriculum and Industrial visits, internships on live projects and mentoring by the Industry leaders are regular features. The University has developed excellent connections with the top Industries of the region by taking memberships of leading industrial associations like Confederation of Indian Industries, PHD Chamber of Commerce and Industry, Federation of Indian Chamber of Commerce and Industry, Indian Importers Chamber of Commerce and Industry. The University has an active chapter of Young Indians in which students get an opportunity to interact extensively with the Industry leaders and attend various corporate seminars and events.



Life Changing Experience - Kalinga is a Life Changing experience where the stress is on over all development of students. NCC, NSS and Various other clubs and societies offer opportunities to students to showcase their talent and learn under the guidance of experts. Music, dance and martial arts trainers are available for the students. Coaches of different games and sports like Cricket, Football, Basketball, Volleyball and athletics are also available for sharpening the talent of the students.

HIGHLIGHTS OF KALINGA UNIVERSITY

1	Research oriented, student centric university attracting students from all parts of India and over 22 foreign countries.
2	8th Private University in the country approved under Section 12B by UGC.
3	The best Private University in Central India Award by ASSOCHAM in 2020.
4	44th Rank in top Universities in the country as per survey done by outlook-icare in 2019.
5	30th Rank in top universities in the country established after the year 2000 as per survey done by India Today in 2018.
6	Management Department Ranked as 7th Best in the country as per survey by Competition Success Review in 2018.
7	Engineering Department Ranked as 3rd Best in the country as per survey by Competition Success Review in 2019.
8	State of the art Library with over 80,000 books and E access to various journals and databases including DELNET, NPTEL, NDL, J-Gate (Social Science), J-Gate (Science and Technology), INSPEC Database of Elsevier & Web of Science.
9	Free of cost Coaching classes for Competitive exams and IT skills in Collaboration with Bosch, NIIT, and BT for all students.
10	Free of Cost Hobby classes for Self defense and Martial arts , Instrumental and Vocal Music for hostel students.
11	Central Instrumentation Facility with world class Scientific apparatus and research databases.
12	Innovation and Incubation Cell to support startups and entrepreneurship of students.
13	Accredited by NAAC with B+ grade.
14	Listed in Rank Band 101-150 in University category in NIRF Ranking 2022 as well as 2023.
15	"Free of cost" Value Added courses available for all students.
16	Unique policy of acquiring "Extra Credits" for Various Co-curricular & academic activities.
17	Mentoring of all students by dedicated faculty members.
18	Extra classes for slow learners.
19	Regular field visits, guest lectures, case studies, role plays, mock sessions etc.
20	Soft skills classes for all students.
21	Activities, internship & placement opportunities for all students.



ABOUT SAMARTH MANAGEMENT PRIVATE LIMITED

M/s SAMARTH MANAGEMENT PRIVATE LIMITED is a Management and Environmental Consulting Organization working in the Environmental field since 2004. The organization has a team of Environment Experts with wide knowledge in the subject. SMPL is providing services for various sectors such as

- Preparing Environment Impact Assessment (for Building & Construction Projects, Small and big manufacturing units, Hospitals, Educational Institutions, Hotels etc.)
- Samarth Management Private Limited has prepared Green Audit reports for various institutes and organizations.
- Team involved in this auditing and report preparation is given below:

NAME	DESIGNATION
Ms. Palak Ahuja	Auditor
Mr. Sagar Mahour	Auditor



1. INTRODUCTION

The green audit aims to analyze environmental practices within and outside the university campuses, which will have an impact on the eco-friendly atmosphere. Green audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of the university environment. It was initiated with the motive of inspecting the effort within the institutions whose exercises can cause threat to the health of inhabitants and the environment. Through the green audit, a direction as to how to improve the structure of the environment and there are several factors that have determined the growth of carried out the green audit.

1.1. NEED FOR GREEN AUDITING

Green auditing is the process of identifying and determining whether institutions' practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, are becoming habitual for everyone especially, in common areas. Now, it is necessary to check whether our processes are consuming more than required resources? Whether we are handling resources carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it into a green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institutions towards an environment.

1.2. GOALS OF GREEN AUDIT

University has conducted a green audit with specific goals as:

- Identification and documentation of green practices followed by university.
- Identify strength and weakness in green practices.
- Analyze and suggest solutions for problems identified.
- Assess facility of different types of waste management.
- Increase environmental awareness throughout campus
- Identify and assess environmental risk.
- Motivates staff for optimized sustainable use of available resources.
- The long-term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issues before they become a problem.

1.3. OBJECTIVES OF GREEN AUDIT

- To examine the current practices, which can impact on the environment such as resource utilization, waste management etc.



- To identify and analyze significant environmental issues.
- Setup goal, vision, and mission for Green practices on campus.
- Establish and implement Environment Management in various departments.
- Continuous assessment for betterment in performance in green

1.4. BENEFITS OF GREEN AUDIT TO EDUCATIONAL INSTITUTIONS

There are many advantages of green audit to an Educational Institute:

- It would help to protect the environment in and around the campus.
- Recognize the cost saving methods through waste minimization and energy conservation.
- Empower the organization to frame a better environmental performance.
- It portrays a good image of the institution through its clean and green campus.

Finally, it will help to build a positive impression for the upcoming NAAC visit through green initiatives.

2. OBJECTIVE AND SCOPE

The broad aims/benefits of the eco-auditing system would be

- Environmental education through systematic environmental management approach
- Improving environmental standards
- Benchmarking for environmental protection initiatives
- Sustainable use of natural resources in the campus.
- Financial savings through a reduction in resource use
- Curriculum enrichment through practical experience
- Development of ownership, personal and social responsibility for the College campus and its environment
- Enhancement of University profile
- Developing an environmental ethic and value systems in young people

3. EXECUTIVE SUMMARY

A Green audit is a snapshot in time, in which one assesses campus performance in complying with applicable environmental laws and regulations. Though a helpful benchmark, the audit almost immediately becomes outdated unless there is some mechanism in place to continue the effort of monitoring environmental compliance.



This audit report contains observations and recommendations for improvement of sustainability consciousness.

1. Energy use

As part of its focus on energy management, Kalinga University will strive towards ensuring:

- 1.1 Inspection of the campus facilities every semester to identify, maintain and repair faulty or broken equipment on campus, such as ICT equipment, electrical devices, electrical panels, etc.
- 1.2 Appropriate investment on developing renewable sources of energy on campus such as solar cells panel.
- 1.3 Adoption of energy efficient equipment/appliances and fixtures such as LED lights, sensor operated lights, Solar lights in open areas etc. within the campus.

2. Water Management

As part of its focus on water management, Kalinga University will strive towards ensuring:

- Inspection of the campus facilities every semester to identify and repair any faulty installations such as pipes, taps, flushes, etc. which may lead to leaks and wastage of water.
- Adoption of rain water harvesting techniques and proper utilization of the same.
- The exploration of water recycling mechanisms through collaborations with appropriate organizations.
- Installation of sensor operated water taps in washrooms to prevent wastage of water.
- Utilization of STP outlet water for gardening purposes to reduce usage of water.

3. Waste Management

As part of its focus on waste management, Kalinga University will strive towards ensuring:

- Adoption of waste segregation methods such as appropriately placed dustbins for dry and wet-waste.
- Appropriate e-waste management practices for collection, disposal or recycling of such waste.
- Minimal use of paper in the campus in all aspects of administrative and academic functioning by utilizing ERP and emails to the extent possible
- Minimal use of plastic on campus to reduce non-recyclable waste
- Adoption of appropriate practices to reduce/recycle/treat municipal waste within the campus premises such as collaborations with companies/NGOs for recycling
- Minimize hazardous waste and appropriate management of such waste
- Disposal of waste to authorized recyclers to ensure responsible disposal.

4. Landscaping and gardening

- As part of its focus on building a green campus, Kalinga University will strive towards ensuring:
Expansion of green cover in the campus through investments in gardening and landscaping activities.
- Active engagement with the community for increasing green cover in the surrounding areas.



4. KALINGA UNIVERSITY INFRASTRUCTURE

Kalinga boasts of World Class Infrastructure and student facilities with student centric approach. Highest attention is paid to hands on learning approach and students are encouraged to come up with innovative ideas for projects and practical's. The University has more than 75 laboratories and workshops, all well equipped with the latest, state of the art apparatus and tools. Special emphasis is given to the development of communication skills through the language lab. More than 1200 computers are available for the use of the students.

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Table 1: Green Area at Kalinga University Campus

GREEN AREA AT KALINGA UNIVERSITY CAMPUS			
S.NO	PARTICULARS	AREA	
		SQUARE METER	SQUARE FEET
A1+A2	HORSE GARDEN	2461	26476.5
A3	PORCH GARDEN	140	1506
A4	KHO KHO GARDEN	1596	17170
A5	CIRCLE GARDEN	94.98	1021
A6	KABADDI GARDEN	1595	17159
A7	OLD BOYS HOSTEL GARDEN	1015	10919
A8	BOTANICAL GARDEN	1980	21301
A9	MINI CANTEEN GARDEN	352.8	3796
A10	ELEPHANT FOUNTAIN GARDEN	29.4	316.3
A11	MAIN CANTEEN GARDEN	847.3	9115.59
A12	GIRLS HOSTEL	595	6401.24
A13	INTERNATIONAL BOYS HOSTEL	304.7	3278.08
A14	NEW BOYS HOSTEL	3680	8071.28
A15	SPORTS GROUND (16 Acre)	64782.86	696960
GRAND TOTAL AREA		79474.04	855013.511
GRAND TOTAL AREA IN ACRES =18.36 ACRES			
PREPARED BY : DEPARTMENT OF CIVIL ENGINEERING , NAYA RAIPUR C.G.			



Table 2: Details of Trees and Plants in Campus

S.No.	AREA	LOCAL NAME	BOTANICAL NAME	NUMBERS
1	Finger Garden	Paper Flower	Bougainvillea Glabra	480
2		Chhatim Tree	Alstonia Scholaris	5
3		Gulmohar	Delonix Regia	14
4		Badam, Almond	Terminalia Catappa	7
5		Palm	Syagrus Romanzoffiana	15
6		Shami Plant (Sonapatti)	Bauhinia Racemosa	4
7		Cape Honeysuckle	Tecoma Capensis	6
8		Canna	Canna Indica	29
9		Morning Glory	Ipomoea Carnea	3
10	Basketball Area (Inside)	Badam, Almond	Terminalia Catappa	2
11		Gulmohar	Delonix Regia	11
12		Kaner	Nerium Oleander	1
13		Chandni Plant	Tabernaemontana Divaricata	2
14		Paper Flower	Bougainvillea Glabra	9
15	Basketball Area (Outside)	Kadam	Neolamarckia Cadamba	6
16		Palm	Syagrus Romanzoffiana	6
17		Gulmohar	Delonix Regia	5
18		Badam, Almond	Terminalia Catappa	5
19		Yellow Bells	Tecoma Stans	23
20		Yellow Trumpetbush	Tecoma Trumpet Vine	88
21		4 O'clock	Mirabilis Jalapa	16
22		10 O'clock Plant	Portulaca Grandiflora	30
23	Gol Chowk Area	Paper Flower	Bougainvillea Glabra	51
24		Red Leaf Plant	Acalypha	25
25		Cape Honeysuckle	Tecoma Capensis	5
26		Gudhal	Hibiscus Rosa Sinensis	2
27		Morning Glory	Ipomoea Carnea	3

28	Parking Area	Palm	Syagrus Romanzoffiana	6
29		10 O'clock Plant	Portulaca Grandiflora	172
30		Kadam	Neolamarckia Cadamba	3
31		Ashoka Plant	Saraca Asoca	3
32		Gulmohar	Delonix Regia	5
33		Chhatim Tree	Alstonia Scholaris	3
34		Paper Flower	Bougainvillea Glabra	468
35	Mini Market Area	Gulmohar	Delonix Regia	13
36		Kadam	Neolamarckia Cadamba	4
37	Pond Area	Kaner	Cascabela Thevetia	1
38		Babul Plant	Vachellia Nilotica	16
39		Canna	Canna Indica	4
40		Aak	Calotropis Procera	2
41		Peepal Plant	Ficus Religiosa	1
42		Chhatim Tree	Alstonia Scholaris	39
43		Khajur	Date Palm	256
44		Mango	Mangifera Indica	16
45		Kadam	Neolamarckia Cadamba	4
46		Madhavi Latha	Hiptage Benghalensis	5
47		Cape Honeysuckle	Tecoma Capensis	5
48		Gulmohar	Delonix Regia	14
49		Cape Honeysuckle	Tecoma Capensis	5
50		Paper Flower	Bougainvillea Glabra	476
51		Shami Plant (Sonapatti)	Bauhinia Racemosa	3
52	Main Building Area	Gulmohar	Delonix Regia	36
53		Shami Plant (Sonapatti)	Bauhinia Racemosa	1
54		Bamboo	Bambusa Vulgaris	48
55		Badam, Almond	Terminalia Catappa	6
56		Chhatim Tree	Alstonia Scholaris	3
57		Palm	Syagrus Romanzoffiana	26
58		Bamboo Palm	Areca Palm Tree	30



59		Gulmohar	Delonix Regia	39
60		Petunia	Petunia	8
61	Girls Hostel Area	Cape Honeysuckle	Tecoma Capensis	29
62		Gulmohar	Delonix Regia	2
63		Bamboo Palm	Areca Palm Tree	35
64		Palm	Syagrus Romanzoffiana	8
65		10 O'clock Plant	Portulaca Grandiflora	33
66	New Pharmacy Building	Kadam	Neolamarckia Cadamba	28
67		Cape Honeysuckle	Tecoma Capensis	8
68		Petunia	Petunia	8
69	Boy International Hostel	Gulmohar	Delonix Regia	58
70		Palm	Syagrus Romanzoffiana	6
71		Amaltas	Cassia Fistula	12
72		Madhavi Latha	Hiptage Benghalensis	8
73		Bamboo Palm	Areca Palm Tree	34
74	General Boys Hostel	Bamboo Palm	Areca Palm Tree	15
75		Gulmohar	Delonix Regia	79
76		Paper Flower	Bougainvillea Glabra	58
77		10 O'clock Plant	Portulaca Grandiflora	97
78		Palm	Syagrus Romanzoffiana	18
79	Botanical Garden	Gulmohar	Delonix Regia	76 Approx.
80		Adhusa, Vasaka	Adhatoda Vasica	24
81		Ashoka	Saraca Asoca	1
82		Physic Nut, Biodiesel Plant	Jatropha Curcas	2
83		Lipstick Tree	Bixa Orellana	2
84		Cowplant, Periploca Of The Woods, Gurmar	Gymnema Sylvestre	1
85		Basil, Tulsi	Ocimum Sanctum	
86		Madar	Calotropis Procera	
87		Origano	Origanum Vulgare	
88		Frangipani, Champa	Plumeria Alba	



89		Shatavari	Asparagus Racemosus	2
90		Parijat, Night Flowering Jasmine	Nyctanthes Arbor-Tristis	4
91		Water Hyssop, Herb Of Grace	Bacopa Monnieri	3
92		Aloe Vera	Aloe Vera	18
93		Air Plant, Cathedral Bells, Life Plant	Bryophyllum Pinnatum	23
94		Babul	Acacia Nilotica	4
95		Banana, Kela	Musa × Paradisiaca	1
96		Hadjod And Pirandai	Cissus Quadrangularis	4
97		Bottlebrushes	Callistemon	1
98		Chinese Chastetree	Vitex Negundo	3
99		Neem	Azadirachta Indica	2
100		Peepal	Ficus Religiosa	2
101		Curry Tree	Murraya Koenigii	1
102		Sago Palm	Cycas Revoluta	14
103		Guduchi, And Giloya,	Tinospora Cordifolia	3
104		Asian Pigeonwings, Bluebellvine, Blue Pea, Butterfly Pea.	Clitoria Ternatea	2
107		Rhoeo Discolor, Moses-In-The-Cradle	Tradescantia Spathacea	2
108		Lemon	Citrus Limon	1
109		Lemon Grass	Cymbopogon	1
110		Cactus	Mammillaria	1
111		Pudina	Mintha	17
112		Asthma-Plant	Euphorbia Hirta	1
113		Jungle Geranium, Flame Of The Woods Or Jungle Flame	Ixora Coccinea	3
114		Henna Tree, The Mignonette Tree	Lawsonia Inermis	2
115		Queen Palm	Syagrus Romanzoffiana	9



116		Bird Of Paradise Flower	Strelitzia Reginae	2
117		Ti Plant	Cordyline Fruticosa	9
119	Old Boys Hostel	Malabar Madhu Malati	Combretum Malabaricum	12
120		Palm	Syagrus Romanzoffiana	2
121		Gulmohar	Delonix Regia	5
122		Badam, Almond	Terminalia Catappa	5
123	Butterfly Garden	Paper Flower	Bougainvillea Glabra	159 Approx.
124		Gudhal	Hibiscus Rosa Sinensis	1
125		Gulmohar	Delonix Regia	14
126		Shami Plant (Sonapatti)	Bauhinia Racemosa	2
127		Badam, Almond	Terminalia Catappa	5
128		Palm	Syagrus Romanzoffiana	2
129	Horse Garden	Badam, Almond	Terminalia Catappa	9
130		Shami Plant (Sonapatti)	Bauhinia Racemosa	3
131		Palm	Syagrus Romanzoffiana	17
132		Cape Honeysuckle	Tecoma Capensis	6
133		Ticoma	Tecoma Stans	15 Approx.
135	Small Canteen Area	Petunia	Petunia	89 Approx.
136		Ticoma	Tecoma Stans	14 Approx.
137		Gulmohar	Delonix Regia	1
138		Badam, Almond	Terminalia Catappa	1
139		Chhatim Tree	Alstonia Scholaris	3
140		Shami Plant (Sonapatti)	Bauhinia Racemosa	29 Approx.



5. GREENERY IN THE CAMPUS





5.1 FULLY AUTOMATED LIBRARY



The Library at Kalinga University Raipur is more like an integrated Knowledge Resource Centre that is stocked with large numbers of Books, Magazines, Indian & International Journals, Online Journals and other Online Resources supporting all aspects of Studies and Research.

- Kalinga University has 79,000+ books and is also subscribed to various National and International Journals.
- It has a reading room capacity for 400 students that is divided into 2 halls of 200 each.
- The University is also member of several Online/Digital Libraries including National Digital Library (NDL), Developing Library Network (DELNET), NPTEL, Manupatra (For Law Students), J-Gate (Social Science), J-Gate (Engineering and Technology), INSPEC Database by Elsevier and Web of Science. Students are given free access to these e-resources through their ERP login.



5.2 DIGITAL LIBRARY

A. DELNET was started at the India International Centre Library in January 1988 and was registered as a society in 1992. It was initially supported by the National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Government of India. It was subsequently supported by the National Informatics Centre, Department of Information Technology, Ministry of Communications and Information Technology, Government of India and the Ministry of Culture, Government of India.

DELNET has been established with the prime objective of promoting resource sharing among the libraries through the development of a network of libraries. It aims to collect, store, and disseminate information besides offering computerized services to users, to coordinate efforts for suitable collection development and also to reduce unnecessary duplication wherever possible.

It has over 2,50,00,000 E Resources including E Books, E journals, Multimedia Content, dissertations, PhD Thesis and research papers.

B. The National Digital Library of India (NDL) is a project under the Ministry of Human Resource Development, India. The objective is to collect and collate metadata and provide full text indexes from several national and international digital libraries, as well as other relevant sources. It is a digital repository containing textbooks, articles, videos, audio books, lectures, simulations, fiction and all other kinds of learning media. The NDLI provides access to many books in English and various Indian languages.

C. The National Programme on Technology Enhanced Learning (NPTEL) was initiated by seven Indian Institutes of Technology. The main goal of NPTEL Phase II was to build on the engineering and core science courses launched previously in NPTEL Phase I. An additional 600 web and video courses were created in all major branches of engineering, physical sciences at the undergraduate and postgraduate levels and management courses at the postgraduate level. Several improvements such as indexing of all video and web courses and keyword search were implemented.

- Largest online repository in the world of courses in engineering, basic sciences and selected social sciences subjects.
- Online web portal <http://nptel.ac.in> – more than 471 million+ views.
- YouTube channel for NPTEL – most subscribed educational channel, 1.5 million+ channel subscribers, 404 million+ views.
- More than 56000 hours of video content.
- Most accessed library of peer-reviewed educational content in the world.
- 52000+ hours of transcribed content; 51000+ hours of subtitled videos.



6. WASTE MANAGEMENT

Management of the various types of Degradable and Non-Degradable waste at the campus

There are different types of waste that are produce-

- **Biodegradable Waste**
- **Non-Biodegradable Waste.**

Biodegradable materials are those, which degrade or break down in a natural manner. In other words, their decomposition happens with the help of natural agents like sunlight, microorganisms, water, ozone and more which turns it into organic manure.

Non-biodegradable substances are materials which do not degrade easily. As they are synthesized and do not occur naturally, degradation is impossible with these products. Therefore, when they stay in the ecosystem for a long period and do not decompose, they harm our environment.

The Institution adopts several measures for management of the various types of degradable and non-degradable waste at the campus.

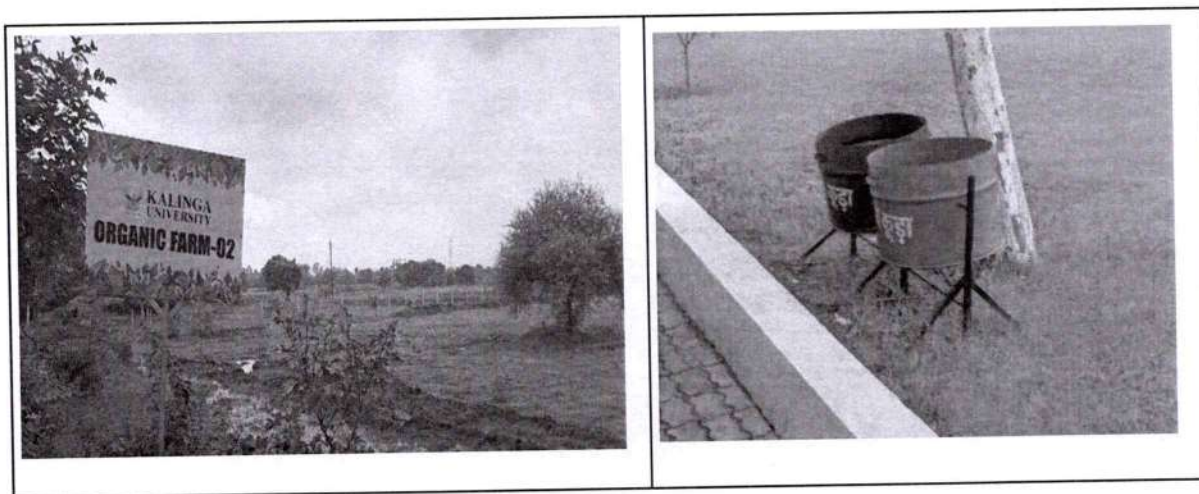
Some of them are -

- i. The Institution provides small dustbins in every class room and faculty rooms and encourages students and faculties to throw their waste specifically in the dustbins.
- ii. Kalinga University has ensured installation of big dustbins near the Canteen area to promote amongst students the habit of disposing waste in bins.
- iii. The Institution also encourages the use of 2 different dustbins i.e., Green Dustbin and Blue Dustbin. The same is done to segregate the waste.
- iv. At each floor of the institute, near the washrooms big dustbins have been kept.
- v. Incinerators are used for waste management.



6.1 USE OF DEGRADABLE WASTE

Due to the canteen in the college premises itself; there is a lot of degradable waste generated. This includes, vegetable peels, leftover food etc. All this waste is collected and used in the compost pit dug in the college itself. This not only helps in proper management of waste but also aids in the growth of other plants as the compost is later used as Organic Compost or Organic Natural Fertilizer.



6.2 SOLID WASTE

The university campus has the capacity to house the following population:

1. Students – 1200 (residents)
2. Teaching staff - 600
3. Non-teaching staff – 400
4. Students – 2800 (day engagement)

The solid waste generated from the campus in 2022-23 has been estimated based on the following (Assuming 0.3 kg/per capita daily solid waste generation):

The solid waste is collected through bins (blue and green). Blue bins are for dry waste, while the green bins are for wet wastes. Fallen leaves, flowers and other organic materials are collected through manual sweeping and transported to vermicomposting plants.

The university also generates plastic wastes depending on the usage. However, considering that around 48,000 TPA of plastic waste is generated in the state with a population of 32,941,966 in 2021. The average plastic waste per capita comes around 1.45 kg per capita annually, which translates to 0.4 gm per capita daily.

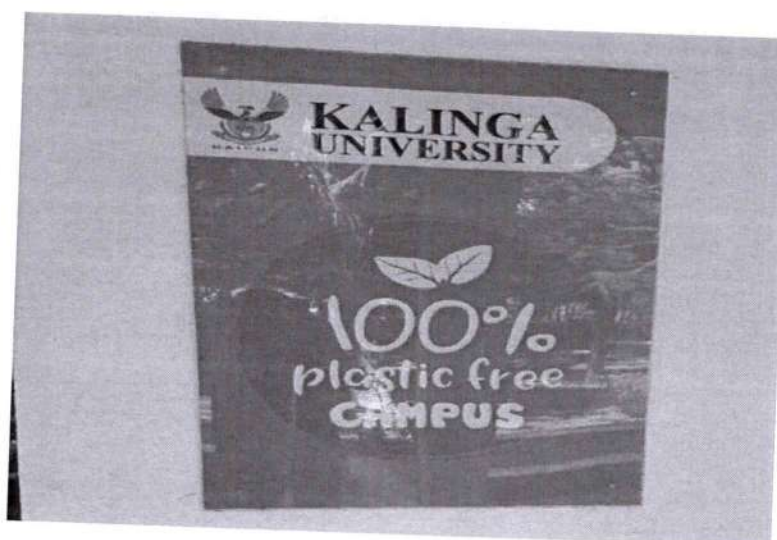
The inert and other solid wastes are collected and stored before being discarded to authorized agencies on a regular basis. The university is steadily moving towards achieving zero plastic thought. The university encourages segregation and has

placed several blue and green bins across the campus site.

The sources of solid wastes are as follows:

1. Hostel Canteen – cut fruits and vegetables, eggshells, peels, skins, meat leftovers, etc.pl
2. General campus – crunchies packet, plastic water bottles, packaging, used and won out fabric and clothes, used paper, cardboards, stationery items, etc.
3. Fallen leaves, flowers, dried stems, road, and kerb side dusts, etc.

There is solid waste generated from laboratories and offices.



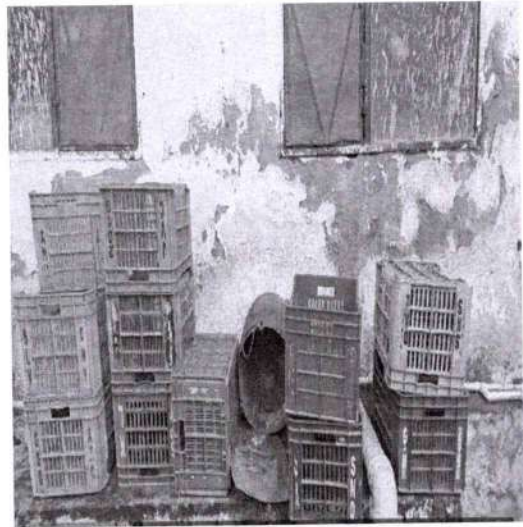
6.3 FOOD WASTE

The food waste is generated from various locations:

1. Hostel canteens
2. Offices
3. Small campus stalls
4. Restaurant

These are collected in boxes and sent for composting. There are also visits by municipal authorities daily for picking up garbage and municipal waste.





6.4 E- WASTE

The university has several sources of e-waste such as from laboratories, hostels, and offices. Some of the equipment which are deemed fit for up scaling and refurbishing are completed in these two aspects and donated for primary school use in nearby villages.

University is committed to practicing sustainable development and the management of E-waste is an important aspect of the sustainability goal. E-waste is collected and segregated in reusable and non-usable items. The life of electronic equipment is extended by appropriate upkeep and minor repairs carried out by University's own technical experts. Flip flops, memory chips, motherboard, compact discs, cartridges etc generated by electronic equipment such as Computers, Radio, TV, Phones, Printers, Fax and Photocopy machines are recycled properly. Instead of buying a new machine, a buyback option is taken for technology upgradation.

The e-waste generated from hardware which cannot be reused or recycled is being disposed of centrally through authorized



vendors. Kalinga University has MoU with Adatte E- Waste Management Private Limited, New Delhi for E-Waste disposal.



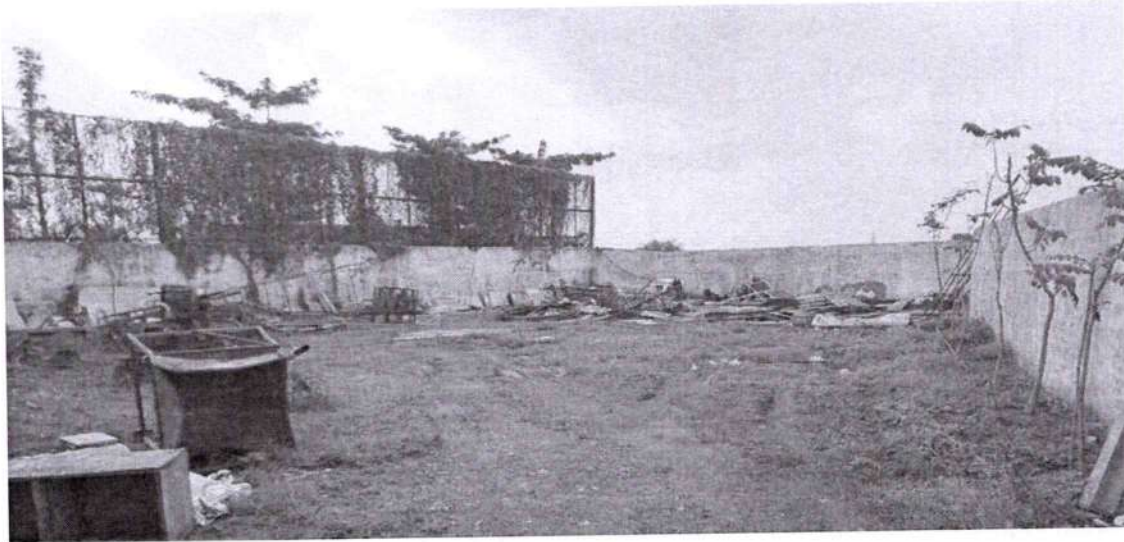
6.5 BIOMEDICAL WASTE

The biomedical wastes are generated from the campus, especially from laboratories and hostels. However, the quantity is small.



6.6 HAZARDOUS WASTE

The university generates hazardous waste from laboratories. A very small proportion of the hazardous waste is also generated from hostels and offices, especially used cells and batteries.



7. WATER

MANAGEMENT

The university has installed groundwater extraction systems inside the campus to meet water demand. The groundwater is pumped to overhead tanks and passed through RO. Filtered water is supplied for drinking purposes. Raw water is utilized for laundry, washing and bathing purposes. Cooking water supplied is of drinking quality.

The tank capacity at various locations is provided in Table 3

Table 3: Water storage quantity in Campus

S. No.	Block	Quantity
1.	Main Building	40,000 ltr
2.	Academic Block	20,000 ltr
3.	Indus Hostel	50,000 ltr
4.	Bhramputra Hostel	40,000 ltr
5.	Everest Hostel	20,000 ltr

The water requirement as per NBC 2016 is provided in Table. This quantity is at a higher estimate. The water consumption is around 75% of the estimated quantity. The staffing pattern for the university is 600, out of which 200 are administrative, 400 teaching and 200 working staff. There are two restaurants with seating capacity of 10 indoors and 30 outdoors. The campus also houses canteens. There are 3500 non-resident students who travel from their place of residence to the campus by bus and personal transport. The annual holiday for students has been estimated to be around 75 days spread over two to three months along with leave with respect to medical and personal reasons.

Table 4: Water demand as per NBC for Kalinga University

S.No	Establishment	Number	Persons	NBC standard	Quantity
1.	Hostels	4	1200	135	1,62,000



2.	Offices	45	200	45	27,000
3.	Restaurant	2	10 (indoors) 30 (outdoors)	70	1,400 4,200
4.	Non-resident students		3500	45	1,57,500
5.	Total requirement				3,52,100
6.	Say				350 KLD

The supply is also obtained from tankers of 4 KL capacity. This water is utilized for drinking purposes. The approximate distribution of water is provided in table 5.

Table 5: Number of tankers utilized by Hostels

S.No	Establishment	Number of tankers
1.	Brahmaputra	210
2.	Girls hostel	18
3.	Gole chowk	18
4.	Tree/Garden	76
5.	Sports Ground	22
6.	Makhana	13
	Total	325

The total tankers received in a month are an average of 640-650 KL. It translates to around 80-90 tankers per day. This would then indicate a volume of 80-90 KLD. This indicates that the tankers cater to 25%-30% of the total water demand.

The main storage inside the campus is at gole chowk of 35 KL. The underground tank at Brahmaputra hostel is of 15 KL capacity.

The wastewater generated is therefore, $350 \text{ KL} \times 80\% = 280 \text{ KL}$

The groundwater sampling reveals the following results.

Sampling was also undertaken from the artificial pond created by the university authorities. The pond is 200 KL capacity.

7.1 RAIN WATER HARVESTING

Conserving and preserving water are a key issue that has been addressed by the University in the form of Rain water harvesting. The campus has been practicing rainwater mechanisms in a site area of 33.98 acres approx. where there are 31 rain water harvesting pits all over campus. This mechanism ensures an increase in the water table index. The details of the



rainwater harvesting system have been designed by a certified architect and have been implemented throughout the campus.

Average yearly rainfall data of Chhattisgarh tabulated below: -

Table 6: Average yearly rainfall data of Chhattisgarh

	Avg. Temperature °C (°F)		Min. Temperature °C (°F)		Max. Temperature °C (°F)		Precipitation / Rainfall mm (in)		Humidity (%)	Rainy days (d)
January	13.5 °C	(56.4) °F	7.6 °C	(45.6) °F	20.1 °C	(68.2) °F	23	0	66%	2
February	17 °C	(62.6) °F	10.5 °C	(50.9) °F	23.8 °C	(74.8) °F	31	-1	59%	3
March	22.8 °C	(73) °F	15.3 °C	(59.6) °F	30.2 °C	(86.3) °F	20	0	45%	2
April	29.4 °C	(85) °F	21.2 °C	(70.1) °F	37 °C	(98.6) °F	13	0	27%	2
May	33.1 °C	(91.6) °F	25.6 °C	(78.1) °F	40 °C	(104) °F	19	0	30%	4
June	33.4 °C	(92.1) °F	28 °C	(82.4) °F	38.7 °C	(101.6) °F	71	-2	45%	7
July	30.2 °C	(86.4) °F	26.9 °C	(80.4) °F	34.1 °C	(93.4) °F	197	-7	69%	14
August	29 °C	(84.2) °F	26 °C	(78.8) °F	32.6 °C	(90.7) °F	180	-7	75%	15
September	28.2 °C	(82.7) °F	24.1 °C	(75.4) °F	32.7 °C	(90.9) °F	90	-3	69%	8
October	25.8 °C	(78.4) °F	19.3 °C	(66.8) °F	32.4 °C	(90.4) °F	14	0	52%	2
November	20.8 °C	(69.4) °F	14.3 °C	(57.7) °F	27.8 °C	(82) °F	5	0	52%	1
December	15.5 °C	(59.9) °F	9.2 °C	(48.6) °F	22.4 °C	(72.3) °F	7	0	60%	1

Dimension of Rain Water Harvesting Pits and Desilting Pits as appended below: -

Water Harvesting Pits

- Depth - 3 Mtr
- Diameter - 3 Mtr
- Volume - $3 \times 3 \times 670$ (average rainfall in mm) $\times 8 = 3216$ Liters/pit $\times 31$ Nos pits
- Total = 99696 Liters

Desilting Pits

- Depth - 03 Mtr
- Area - 3×3 Mtr

7.2 SEWAGE TREATMENT PLANT

The wastewater is generated from campus from the following areas:

1. Canteen
2. Restaurants
3. Hostels
4. Offices
5. Generator room

There are five STPs installed in the campus at various locations.

Table 7: STP and their location with capacity and operational time.

S.No	STP capacity (KL)	Location	Operation status
1	40	Pacific Hostel	Operation hours 8-10 hrs
2	30	Brahmaputra Hostel	Operation hours 8-10 hrs

3	30	Indus Hostel	Operation hours 8-10 hrs
4	40	Canteen	Operation hours 8-10 hrs
5	40	Administrative Block	Operation hours 8-10 hrs

The STPs are maintained by the university staff. These STPs were installed during 2020.

Treatment Capacity:

The wastewater treatment plant is designed to treat 30,000 Liters/Day to 1 Lakh Liters/Day Sewage generated from Unit. The treated effluent will be used for gardening, horticulture, and flush water in toilets.

There are 6 buildings-

1. Admin Building
2. Pharmacy Building
3. Old Boys Hostel
4. Girls Hostel
5. International Boys Hostel
6. New Boys hostel.

Admin Building and Pharmacy Building Sewage treatment plants can be common as there are no distances between them. There will be separate Sewage treatment plants for the other four buildings. As per the people's strength we have designed plants of different capacities for different buildings.

For Admin building and under construction pharmacy building we recommend a plant of 100 KLD.

DESIGN BASIS

Treatment Capacity:

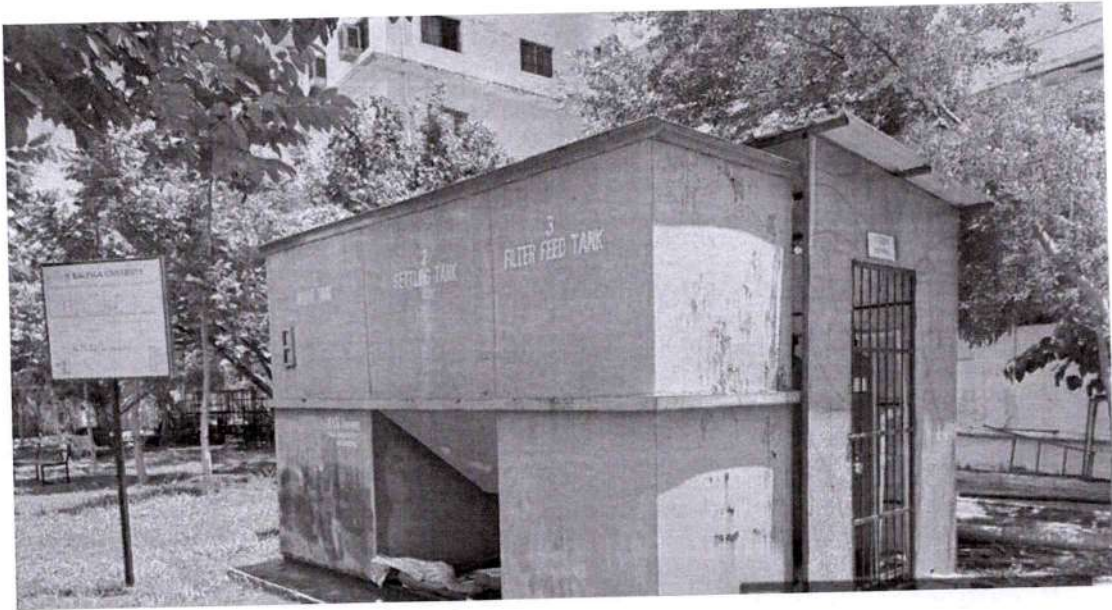
The wastewater treatment plant is designed to treat 30,000 Liters/Day to 1 Lakh Liters/Day Sewage generated from the unit. The treated effluent will be used for gardening, horticulture and flush water in toilets.

As per the site visit, there are 6 buildings-

1. Admin Building
2. Pharmacy Building
3. Old Boys Hostel
4. Girls Hostel
5. International Boys Hostel
6. New Boys hostel.



Admin Building and Pharmacy Building Sewage treatment plants can be common as there are no distances between them. There will be separate Sewage treatment plants for the other four buildings. As per the people's strength we have designed plants of different capacities for different buildings.



8. ENERGY MANAGEMENT

8.1 DIESEL GENERATOR DETAILS

The Kalinga University has installed 2# of Diesel Generator. The following table provides the Diesel generator capacity in the University.

S. No	Equipment Name	Make	Capacity in (kVA)
1	Diesel Generator - 01	Greaves	250 kVA
2	Diesel Generator - 02		250 kVA



8.2 TRANSFORMER DETAIL

The Kalinga University has installed one Transformer of 300 kVA. The following table provides the transformer capacity in the University.

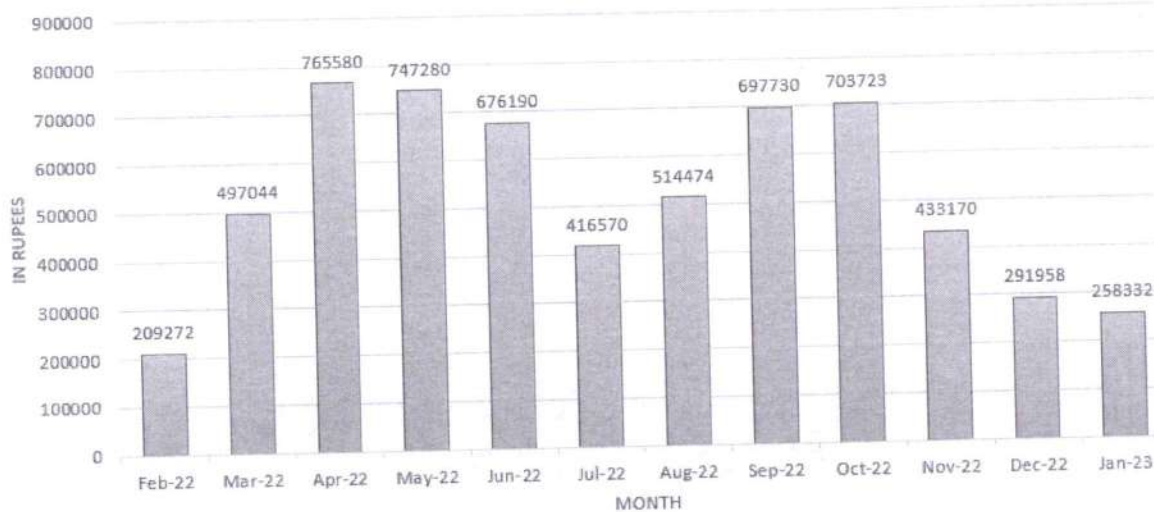
S.NO	Rated Specification	TRI
1	KVA	300
2	HV VOLTAGE	11000
3	LV VOLTAGE	433
4	AMP HV	15.75
5	AMP LV	416.37

6	MAKE	Power Star
7	DATE OF INSTALLATION	2015
8	VECT GROUP	Dyn11

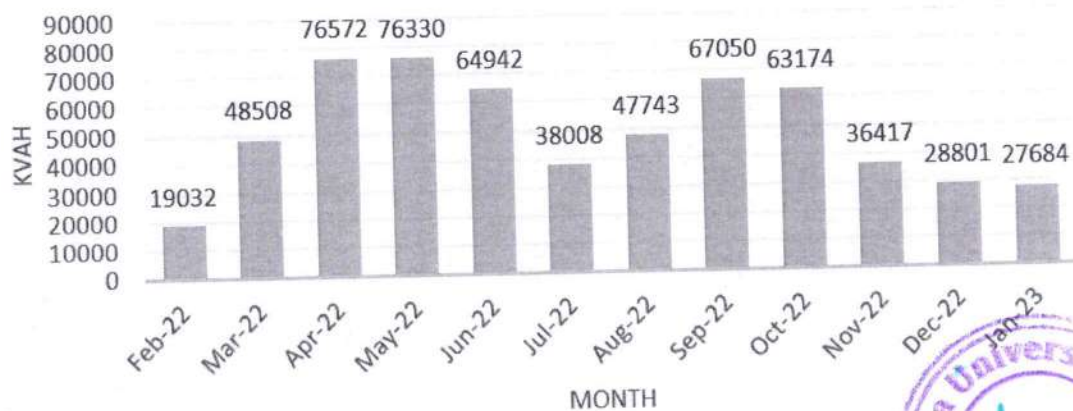
8.3 ELECTRICITY TREND

The below graph represents the total electricity consumption trends for the year 2022-23 of Kalinga University.

Monthly Bills (In Rs.)



Units Consumed, kVAH



8.4 ALTERNATE SOURCES OF ENERGY AND ENERGY CONSERVATION MEASURES AT THE CAMPUS

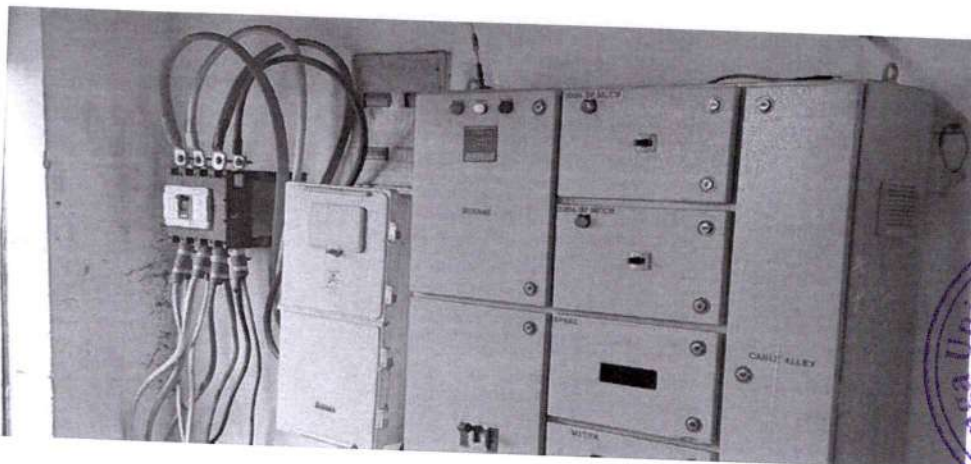
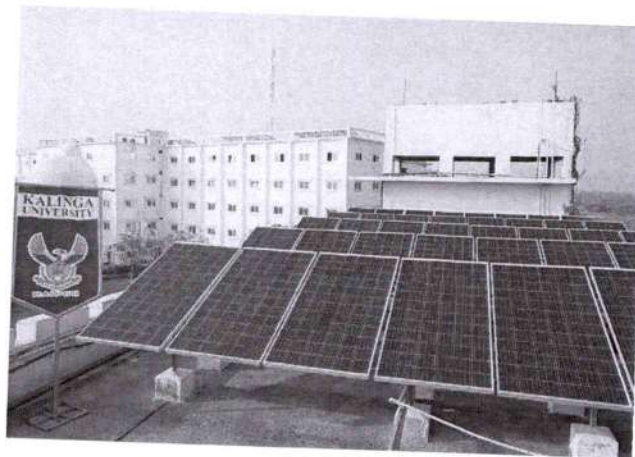
The Institution has facilities for alternate sources of energy and energy conservation measures

1. Solar energy
2. Use of LED bulbs/power efficient equipment
3. Other measures

Solar energy

Institute has taken initiative to install solar lights in the garden and also intends to increase campus wide solar light usage. The 300 KW solar Power Plant is being maintained nicely. This system is further to be provided with battery backup so that solar power can be used at night also.

Kalinga University has set up Solar Panels generating 300 KW (200 KW + 100 KW) of electricity, which is directly linked to the grid. Apart from the above, the university has 24 solar street lights.



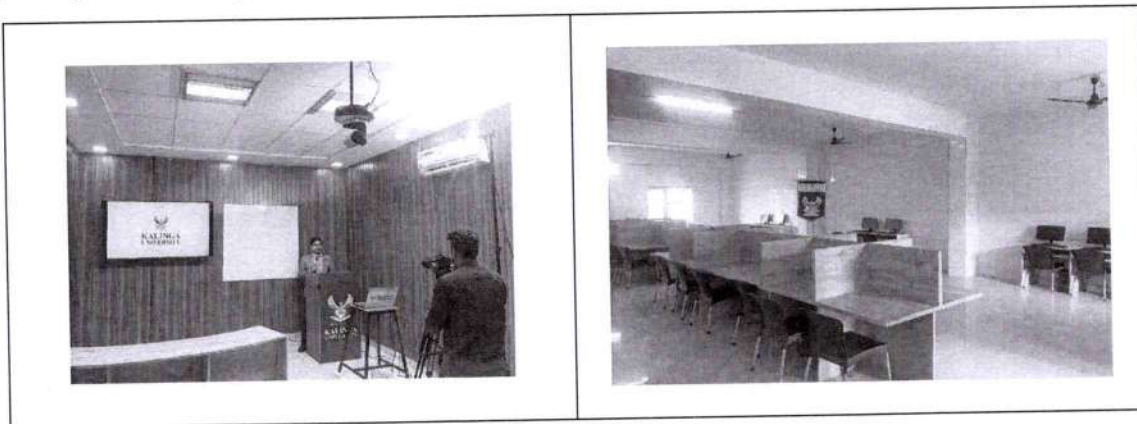
Use of LED bulbs/power efficient equipment

Power crisis is one of the most common problems in India. With the help of LEDs, we can eliminate this shortage by minimizing the wastage of electrical power or saving our generated power. Light-emitting diodes (LED) are one of today's most energy-efficient and rapidly developing lighting technologies. Quality LED light bulbs last longer, are more durable, and offer comparable or better light quality than other types of lighting.

Energy Savings with use of LED is a highly energy efficient lighting technology, and has the potential to fundamentally change the future of lighting.

LED bulbs were used for newly constructed buildings and some of the incandescent and fluorescent tube lights were replaced with LED bulbs. Majority of the class rooms, laboratories, administrative blocks, computer centers, libraries, seminar halls and staff rooms were provided with LED lighting systems which are supposed to be energy efficient. Now, the power consumption through lighting systems is about 20 percent by LED bulbs.

This initiative is very low cost and also power saving. It also minimizes the electric bills of the institute. Moreover, it creates an opportunity for minimizing the load shedding in the campus.



Other Measures

- Energy efficient electronic gadgets are used and maintained regularly to achieve energy conservation.
- Campaigns on awareness on energy conservation are made available in all relevant locations.
- Unwanted usage of power is discouraged in the Institute.
- Institute has conducted various awareness drives in campus to ensure saving water & electricity.
- Star rated refrigeration system
- Invertors
- Use of induction in pantry
- Awareness on how to conserve energy during the day time



8.5 TRANSPORTATION WITHIN CAMPUS

Battery vehicles technology is shaping the future of mobility in many parts of the world. Battery vehicles are around 3-5 times more efficient than internal combustion vehicles in utilizing energy.

A group of final year students of Mechanical Engineering of Kalinga University have created a battery vehicle prototype which is lightweight and with a customized motor controller.

Kalinga University has battery operated carts & bicycles for commuting within the campus.

The university has a vehicle parking system inside the campus. Only very selected vehicles are allowed to ply. Staff, students, and visitors must park their vehicles at designated places.

The university has deployed golf carts and battery-operated rickshaws inside the campus for movement. Moreover, the campus has beautiful pathways for pedestrian movements.



9. GREEN CAMPUS INITIATIVES BY Kalinga University

Plastic Free Campus:

Universities can generate enormous amounts of plastic waste, which is toxic to people and the environment, and never goes away.

- i Kalinga University is a Plastic Free Campus. We aim to measurably reduce plastic waste and pollution in our campus and the world around us. To achieve this we have undertaken following steps:
- ii Kalinga University has banned use of single-use plastics in canteens, cafes, Mini Market complex in the university premises and hostels, etc.
- iii In regular intervals, we carry out awareness drives and sensitisation workshops on the harmful impacts of single-use plastics.
- iv Encourage all students to avoid bringing non-bio-degradable plastic items to the University.
- v We encourage students to sensitize their respective households about the harmful effects of plastics and make their households also 'plastic-free'.
- vi We have installed necessary alternative facilities like water units to avoid the use of plastic water bottles, and encourage the use of alternative solutions like cloth bags, paper bags, etc, instead of plastic bottles, bags, cover, and other goods on campus.



10. SUMMARY

Green Audit is one of the important tools to check the balance of natural resources and its judicious use. Green auditing is the process of identifying and determining whether institutional practices are eco-friendly and sustainable. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area.

Kalinga University has conducted a "Green Audit" in the academic year 2022-2023. The main objective to carry out a green audit is to check the green practices followed by Kalinga University and to conduct a well-defined audit report to understand whether Kalinga University is on the track of sustainable development.



11. CONCLUSION

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

- a. All departments generate paper waste. Especially academic buildings. Using both sides of paper for printing and writing is good practice and use the other side of used paper for rough work.
- b. Rainwater is collected from the rooftop to recharge the groundwater level table.
- c. E- waste is segregated, handled and disposed properly in an eco-friendly manner.
- d. Wear Mask Signages are provided in the facility.
- e. Reducing the use of one-time use plastic bottles, cups, folders, pens, bouquets, decorative items will be useful to solve the problem of plastic pollution to some extent.



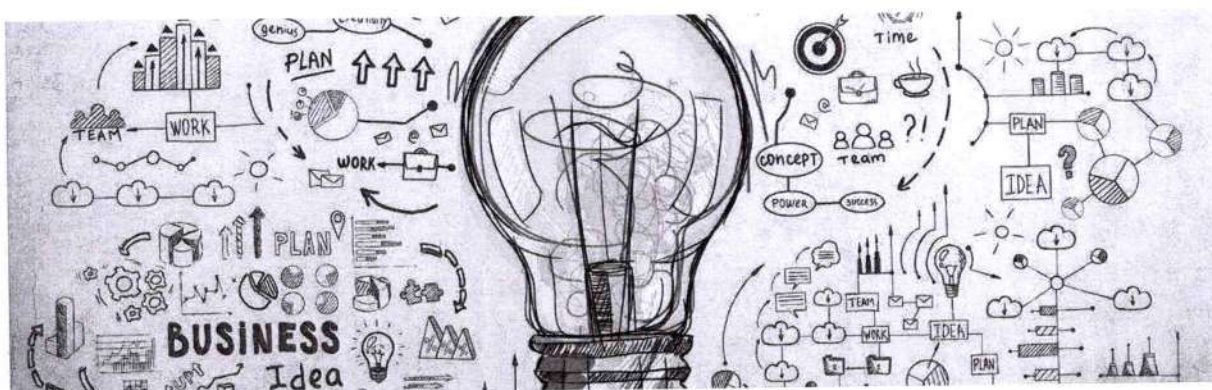
12. RECOMMENDATIONS

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

- i. Install a water meter to record water usage in the college Kalinga University premises.
- ii. The solid waste should be reused or recycled at maximum possible places.
- iii. An environmental policy document has to be prepared with all the recommendations and current practice carried by Kalinga University.
- iv. A frequent visit should be conducted to ensure that the generated waste is measured, monitored and recorded regularly and information should be made available to administration.



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ENERGY AUDIT REPORT



KALINGA UNIVERSITY

KALINGA UNIVERSITY

Address - Village Kotni Near Mantralaya, Naya Raipur,
492101 (CG) India

Audit Date – 23rd and 24th February 2023

Audit Conducted by:

SAMARTH
GROUP

M/S Samarth Management Private Limited

192, Bhera Enclave, Paschim Vihar, New Delhi, Delhi, 110087.



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Executive Summary

Summary of Energy Conservation Measure

S. No	Energy Conservation Measure	Annual Savings Electricity		Investment	Payback
		kWh	Rs. Lakhs	Rs. Lakhs	Month
Payback Time					
1.	Replace 2/3star Air Conditioners with 5-star ACs (9 Nos. initially)	31588.2	2.3	3.2	16.7
2.	Installation of BLDC Fans in place of normal Fans	133120	13.3	62.4	55.2
Total		164708	15.6	65.6	51 Months

Observation

- Air Conditioners and Fans shall be changes in Phased Manner
- Regular (Daily) Monitoring of Power Factor shall be done.
- MDI is increasing in summer months. It shall be monitored to keep it less than contract demand (300KVA) to avoid penalty.
- Power Generation from Solar Plant shall be monitored monthly to evaluate Solar performance for provision of additional Solar PV plant to save energy cost.
- Energy Meter to be installed in DGs to evaluate performance of Diesel Generators.
- Posters related to Energy conservation to be displayed in common areas for awareness of Students and University staff.
- University level events may be organised for exploration of new methods of Energy Conservation.

Introduction

Kalinga University is committed to sustainability and seeks to enhance energy efficiency in its operations. The energy audit, conducted between 23-02-2023 and 24-02-2023, evaluates the current energy consumption patterns and identifies areas for improvement.

About University

Kalinga University, Raipur has emerged as a Center of excellence of higher education in Central India. Strategically located in the Smart City of New Raipur, this University has started carving a niche for itself in the education domain and is rising as a shining star on the horizon of quality education.

Establishment - Established in 2013, this university has been able to win the confidence of over 7000 students. Meritorious students from all over the country and various foreign countries namely Afghanistan, Bangladesh, Nepal, Nigeria, South Korea and Uganda have chosen this University for their education and career.

Infrastructure – Kalinga boasts of World Class Infrastructure and student facilities with student centric approach. Highest attention is paid to hands on learning approach and students are encouraged to come up with innovative ideas for projects and practical. The University has more than 75 laboratories and workshops, all well equipped with the latest, state of the art apparatus and tools. Special emphasis is given to the development of communication skills through the language lab. More than 1200 computers are available for the use of the students.

The library has a collection of over 79,000+ books and offers Digital content through membership of DELNET, National Digital Library and NPTEL. Various magazines and journals are available for the use of the faculty and students.

Infrastructure consists of Student Hostel facilities, Green Acres, Canteen, Food Mess, Gymnasium, Fully Wi-Fi Campus, ATM, Mini Market, Student hangout Areas, Sports Complex, Re-creation Halls with Indoor Games and Music and recreation activities.

Objectives

- Assess and analyse energy usage across campus.
- Identify energy-intensive areas and equipment.
- Propose cost-effective energy-saving measures.
- Promote renewable energy integration.

Auditor Team

1. Mrs. Seema Suri (EA-0048) (Certified Energy Auditor)
2. Mr. Samarth Suri (Audit Manager)
3. Mr. Sagar Mahour (Engineer)
4. Mr. Sanjeev Sharma (Engineer)



Approach & Methodology

A team of 2 Auditor/Engineers were involved in carrying out the study, the general scope of which was as follows:

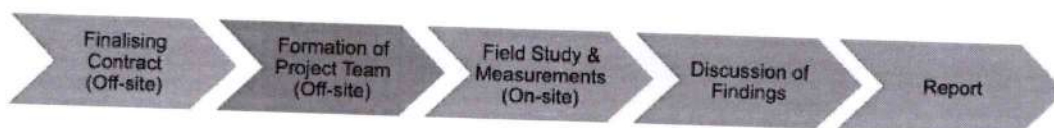
- Identify areas of opportunity for energy saving and recommend an action plan to bring down total energy cost
- Conduct energy performance evaluation and process optimization study
- Conduct efficiency test of equipment and make recommendations for replacement (if required) by more efficient equipment with projected benefits
- Suggest improved operation & maintenance practices
- Provide details of investment for all the proposals for improvement
- Evaluate benefits that accrue through investment and payback period
- Analyse various energy conservation measures and to prioritize based on the maximum energy saving & investment i.e. short, medium and long term.

Prioritization	Payback Period
Short Term Project	Less than 6 months
Medium Term Project	Between 6 to 12 months
Long Term Project	More than 12 months

Discuss with the plant personnel, the individual Energy Saving Projects (ESPs) for agreement for implementation.

Methodology

The general methodology followed is captured in the following figure –



The study was conducted in 3 stages:

- Stage 1: Walk through audit to understand process energy drivers, measurability and formulation of audit plan.
- Stage 2: Detailed Energy audit.
- Stage 3: Off-site work for data analysis and report preparation



Instrument Used

The following portable instruments were used for data measurement:

- 3 – phase Power Analyzer
- Single phase Power Analyzer
- Ultrasonic Water Flow Meter
- Anemometer
- Hygrometer
- Sling Hygrometer
- Digital Thermometer
- Infrared Thermometer
- Pressure gauge
- Thermal Imager
- Flue Gas Analyzer
- Lux Meter



Observation and Analysis

Electricity Supply and Network

Electricity & fuel (Diesel) are major energy sources of the University. Electricity is supplied from CSPDCL (Chhattisgarh State Power Distribution Company Limited)

Total Consumption of Electricity from Grid in the period of was

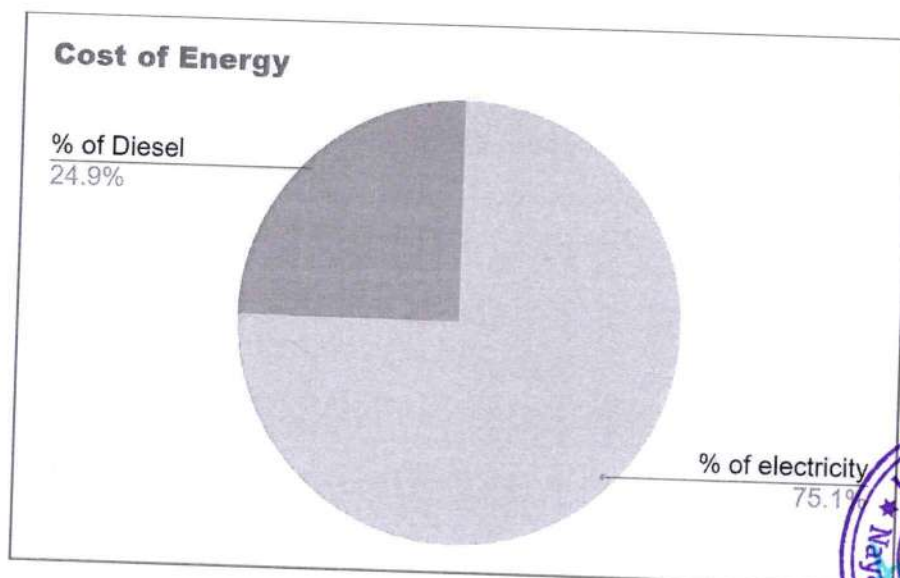
- Total KWH: 584020
- Electricity Charges: Rs. 62,11,323/-

The Diesel as a thermal energy source is used mainly in DG Sets of 2 X 250 KVA

- Total Consumption of Diesel in the Feb-22 to Jan-23 was
- Total Diesel in Liters – 22094
- Cost of Diesel: Rs. 20,58,497/-

Kalinga University has set up Solar Panels generating 300 KV (200 KV + 100 KV) of electricity, which is directly linked to the grid. Apart from the above, the university has 24 solar street lightings.

Electricity (INR)	Diesel (INR)	Total Cost of Energy	% of electricity	% of Diesel
6211323	2058497	8269820	75.10	24.89

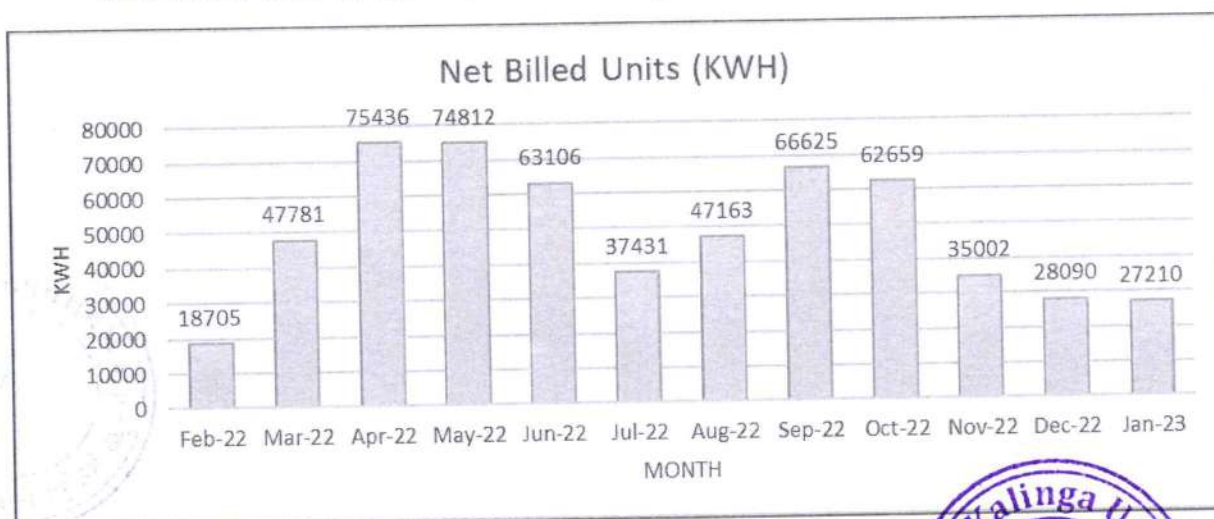


Analysis of Electricity Bills

Kalinga University has two electrical connections with a total contract demand of 300 kVA. Power Supply is received from CSPDCL (Chhattisgarh State Power Distribution Company Limited). Monthly Electricity Billing has been studied for a period of one year. All parameters have been studied & tabulated in Table

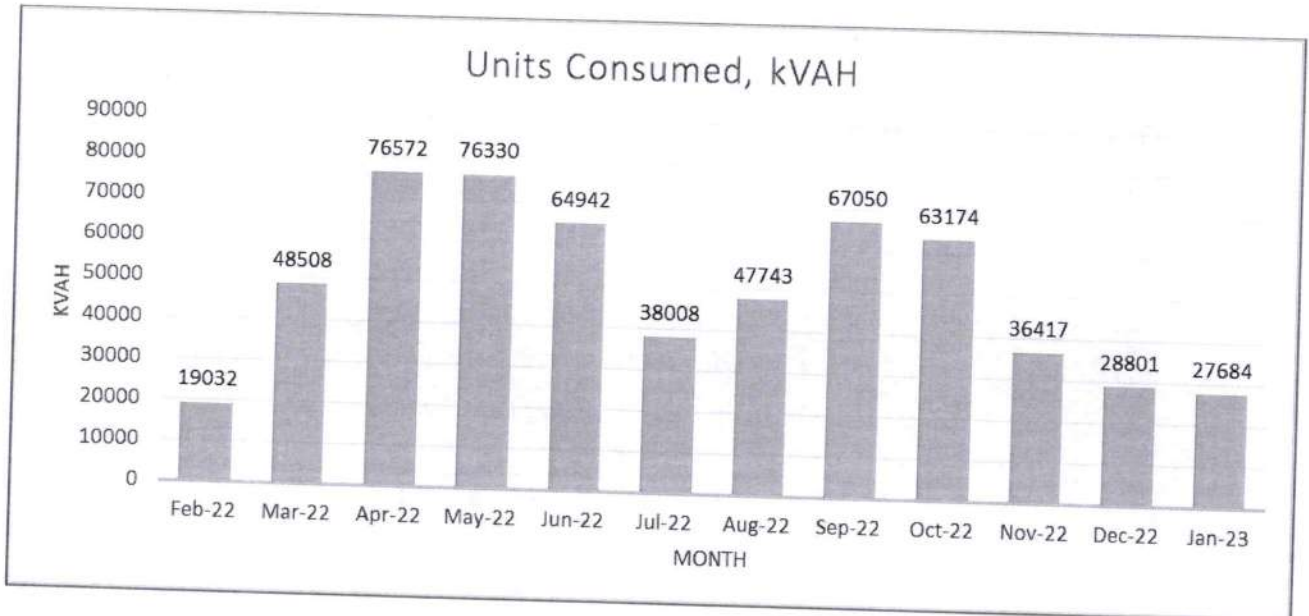
Sr. No.	Billing Month	No. of Days	Working Hours	Sanctioned Load, Kw/CD	Units Consumed, kWh	Units Consumed, kVAH	Solar Generated	Net Billed Units =	MDI	Average P.F.	Total Bill, Rs.
1	Feb-22	28	9	300	18705	19032	0	18705	80	0.98	209272
2	Mar-22	31	9	300	47781	48508	0	47781	203	0.99	497044
3	Apr-22	30	9	300	75436	76572	0	75436	242	0.99	765580
4	May-22	31	9	300	74812	76330	0	74812	263	0.98	747280
5	Jun-22	30	9	300	63106	64942	13.5	63106	273	0.97	676190
6	Jul-22	31	9	300	37431	38008	1099	37431	158	0.98	416570
7	Aug-22	31	9	300	47163	47743	847	47163	215	0.99	514474
8	Sep-22	30	9	300	66625	67050	52.5	66625	242	0.99	697730
9	Oct-22	31	9	300	62659	63174	0	62659	238	0.99	703723
10	Nov-22	30	9	300	35002	36417	2307	35002	154	0.96	433170
11	Dec-22	30	9	300	28090	28801	7263	28090	108	0.98	291958
12	Jan-23	30	9	300	27210	27684	7733	27210	117	0.98	258332
TOTAL					584020	594261	19315	584020	273	0.98	6211323

- Net Billed Unit in the Last 12 Month period

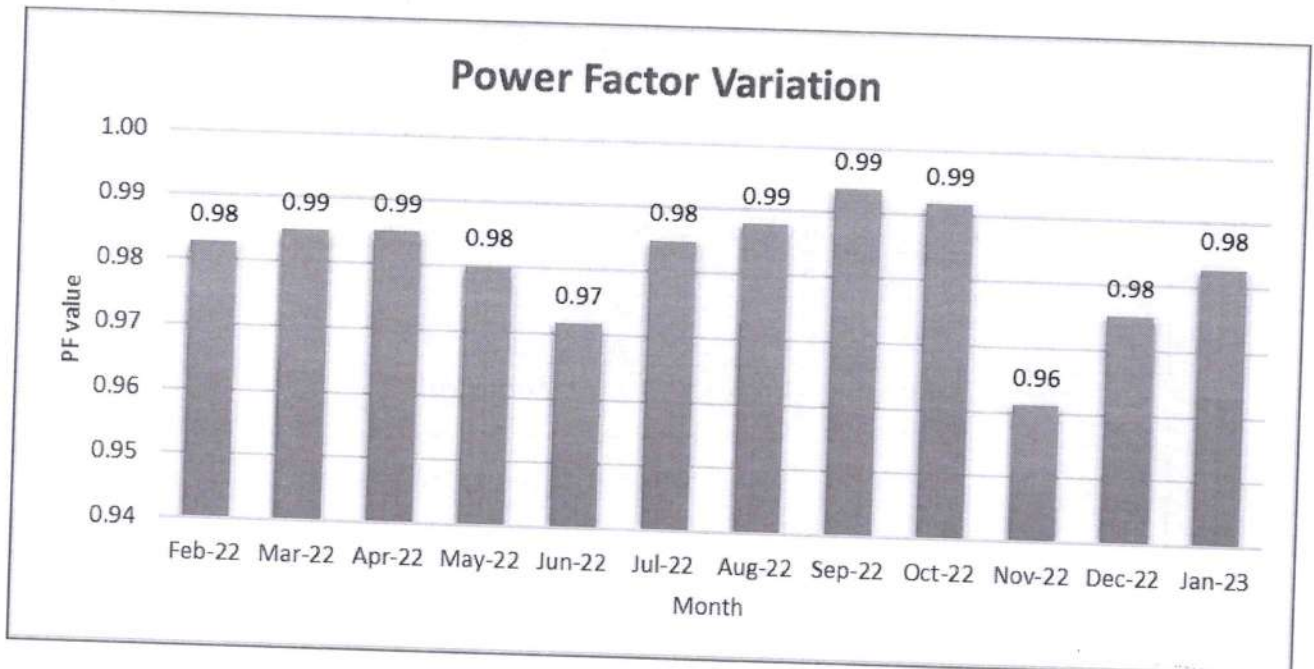


It can be seen from figure, that electricity consumption in the month of Apr-22 is the highest.

- Unit Consumed (KVAH)

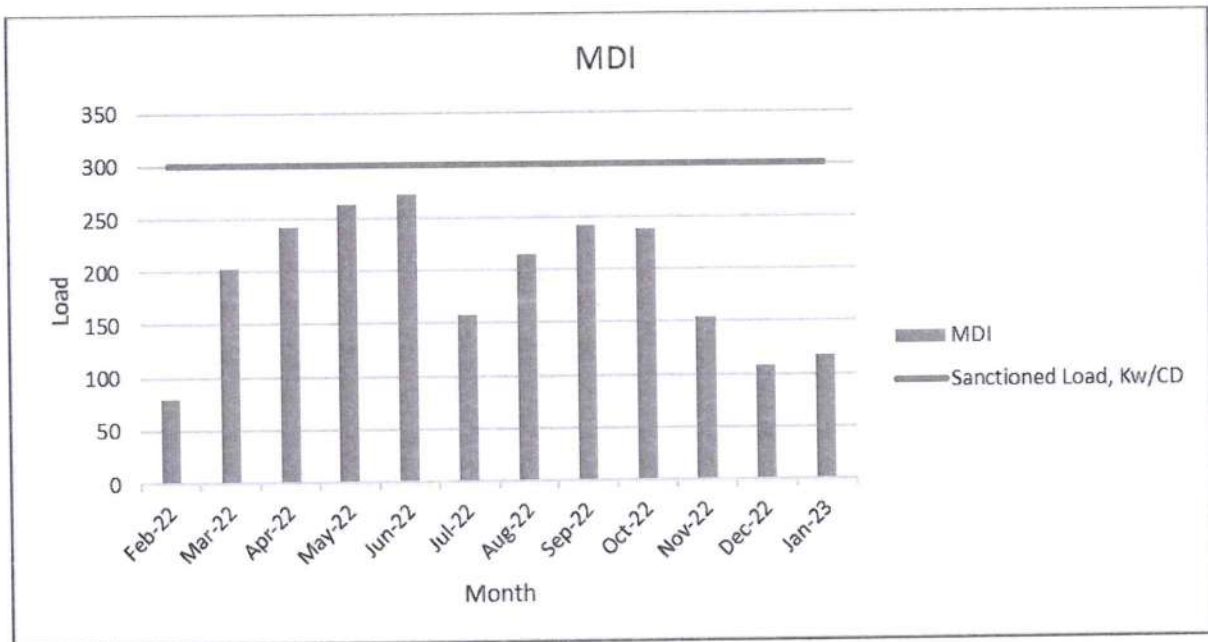


- Power Factor Variation



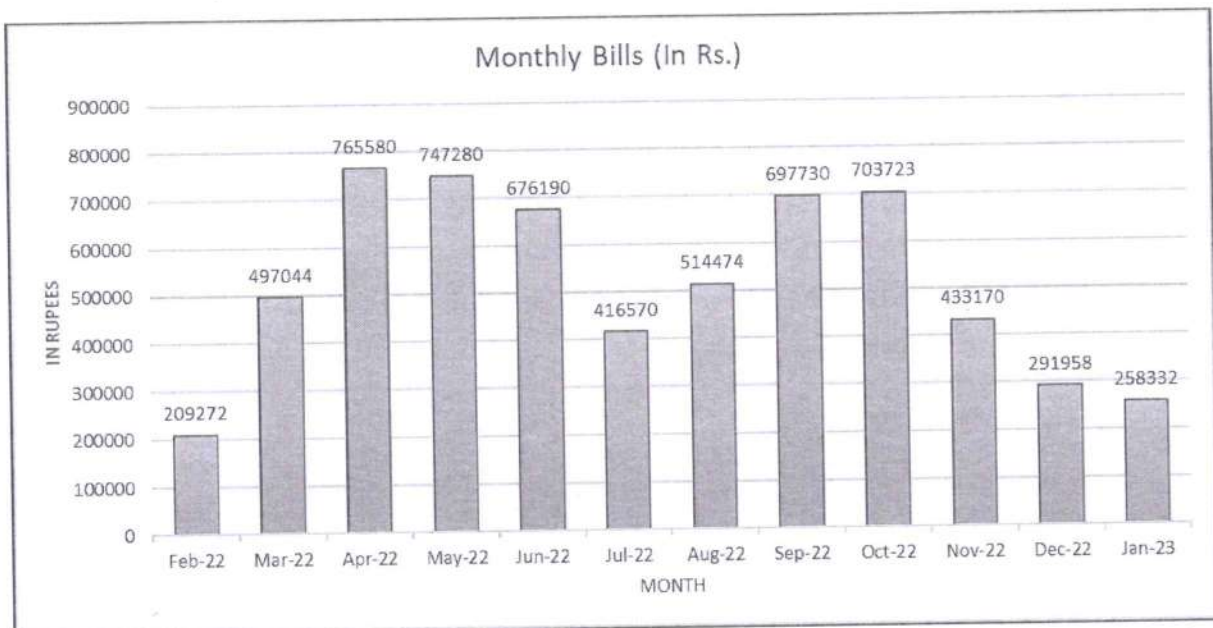
- MDI





Maximum demand load in Jun 22 (273 KVA) is the highest in the last 12-month period.

- Monthly Bill



Maximum Electricity bill was 7,65,580/- in April 22 from Feb 2022 to Jan 2023 period.

Solar Power System

Kalinga University has set up Solar Panels generating 300 KW (200 KW + 100 KW) of electricity, which is directly linked to the grid. Apart from the above, the university has 24 solar street lightings.



- Average Sunshine Data of Raipur

Month	Temperature	Average Sunshine (Hours)
January	28	11.4
February	32	11.6
March	36	11.8
April	40	12.34
May	47	12.97
June	37	12.93
July	31	6.04
August	30	5.9
September	31	10.91
October	31	11.45
November	29	11.21
December	27	11.4

Transformer

Kalinga University has two electrical connections. One HT with a total contract demand of 300 kVA. The other one is LT connection for two hostels. Power Supply is received from CSPDCL (Chhattisgarh State Power Distribution Company Limited) at 11 KV. Subsequently, the voltage is stepped down by one (1) transformer of 300 kVA from 11 kV to 0.433 kV. Transformer rated specifications are shown below.

Transformer Rate Details

Sr. No.	Particulars	TR # 1
1	Make	Power Star
2	KVA	300
3	Volts at HV/LV	11000/433
4	Phases	3
5	Frequency	50

Transformer Load Survey

During the site visit, 24-hour log of Transformer (300 kVA) (23rd February 2023 to (24th February 2023) was made to record the load profile of Transformer,

which includes the variations in the voltage, current, power factor, kW, kVA, Vthd, Ithd etc. Details of the load profile are provided in the below table and figure.

TR-1 300 KVA Load Measurement Data

Main Incomer LT Side		Transformer (300 kVA)
Particulars	Phase	Average Measured Values
Voltage (Volts) (L-L)	Phase "R"	410
	Phase "Y"	417
	Phase "B"	420
Current (Amps)	Phase "R"	63
	Phase "Y"	58
	Phase "B"	55
	Neutral	12
Load (KW)	Phase "R"	43.40
	Phase "Y"	41.05
	Phase "B"	39.61
	Total	123.66
Apparent Power (KVA)	Phase "R"	44.74
	Phase "Y"	41.89
	Phase "B"	40.01
	Total	126.64
Power Factor (P.F.)	Phase "R"	0.97
	Phase "Y"	0.98
	Phase "B"	0.98
Voltage THD %	Phase "R"	4.1
	Phase "Y"	4.9
	Phase "B"	2.5
Current THD %	Phase "R"	8.7
	Phase "Y"	4.1
	Phase "B"	4.1

Transformer Loading

Description	Transformer Capacity	Power factor	Maximum Apparent power	Average Apparent Power	Max Loading	Average Loading
	kVA	PF	kVA	kVA	%	%
TR1	300	0.98	273	126.64	91	42.2

Observation Based on Ranking

- The measurement taken at the transformers includes data logging for every 5 seconds for 24 hours and during the logging period it was found that the average Voltage (L-L) for the transformer is 420V, which is slightly on the higher side. Therefore, it is suggested to maintain the Voltage level at 400 ± 10 by changing the tap position of the transformer.
- The average P.F. is 0.98, which is satisfactory.
- Voltage and Current harmonics are within limits.

Effects of High and Low Voltage

Wide Voltage fluctuation is a common phenomenon all over the country. Generally, the voltage is very low during the daytime and high during night hours. Therefore, Industrial Units running round the clock, face the problem of both Low and High Input Voltage. Also, voltage fluctuation is a seasonal phenomenon and increases in the summer season. Moreover, on holidays, peak hours, rainy days and when the agricultural load is switched off, the voltage rises sharply in the feeder lines. There are few consumers of electricity, during such days, leading to comparatively lower voltage drop in the feeder lines; as a result, consumers suffer from high voltage which is more dangerous.

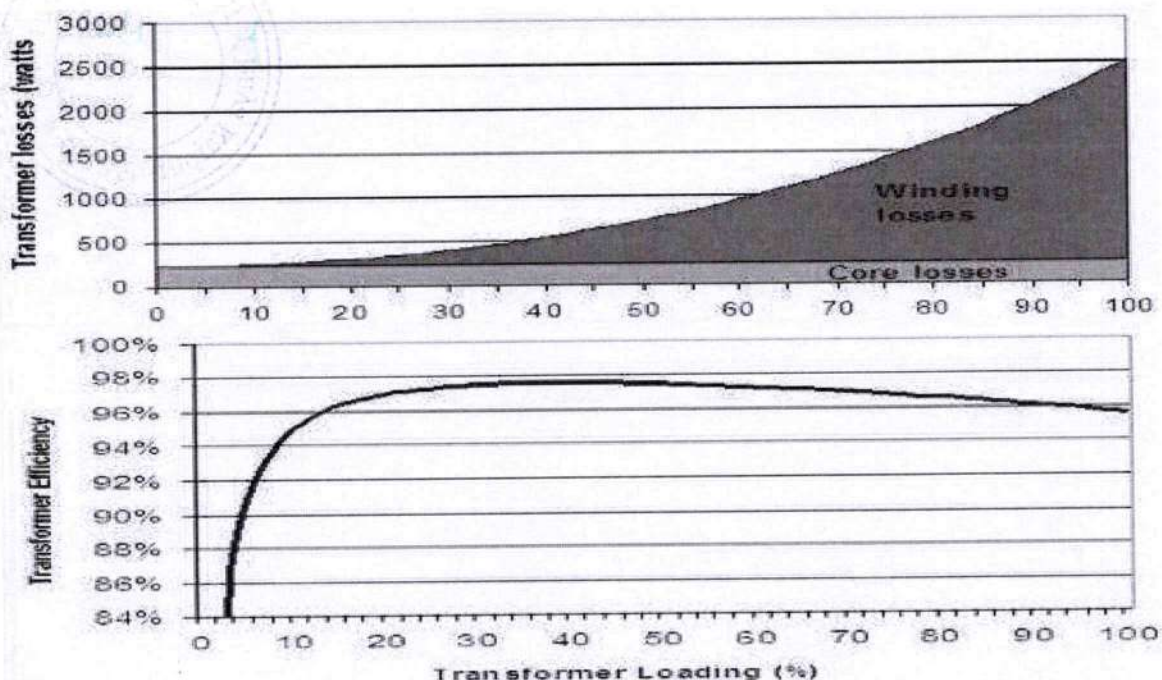
Most electrical equipment is designed for 230 volts (single-phase) or 410 volts (3-phase) and operates with optimum efficiency at its rated voltage. 50% of industrial load consists of motors. Due to continuously varying voltage and especially during peaks, electric motors draw considerably high current at high voltage which increases energy consumption, increases MDI and reduces power factor etc. These excessive power losses of motors generated at higher voltage results in premature failure of electrical equipment.

Similar is the case with single-phase equipment such as bulbs and tubes, when voltage increases above 230 volts. For example, at 270 volts, the power

consumption of 60 W bulb increase by almost 40% and the life of the bulb reduces from normal 1000 Hours to mere 100 Hours only (as per analysis report of ISI marked bulb manufacturers)

Transformer Loading & Efficiency

The efficiency of the transformers not only depends on the design but also, on the effective operating load. The variable losses depend on the effective operating load on the transformer. The maximum efficiency of the transformer occurs at a condition when the constant loss is equal to variable loss. For distribution transformers, the core loss is 15 to 20% of full load copper loss. Hence, the maximum efficiency of the distribution transformers occurs at a loading between 40 – 60%. For power transformers, the core loss is 25 to 30% of full load copper loss. Hence, the maximum efficiency of the power transformers occurs at a loading between 40 – 60%.



All the electrical parameters required evaluating percentage loading & losses of Transformers were recorded for old building transformers.

No load and full load losses of the transformer are obtained from standards to calculate the transformer losses as follows.

Note: Total loss = No load loss at Full load loss*(% Loading/2)

The efficiency of the transformers not only depends on the design but also, on the effective operating load. The variable losses depend on the effective operating load on the transformer.

Maximum Transformer load is 91% noted during power quality analysis. There is possibility of overloading in future. Transformer efficiency decreases as transformer winding losses increases at such >90% loading.

The university must plan to enhance transformer rating by addition of one more transformer.

Maximum demand is less than contract demand, no penalty charges were observed during last one year.



Total Energy Consumption

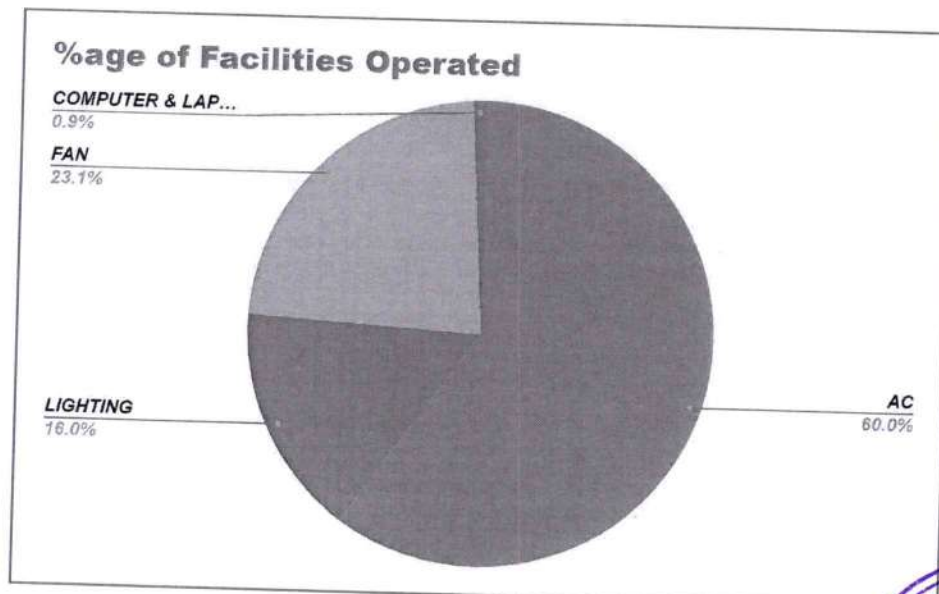
The University has facilities of Air Conditioning, Lighting system, Fans, Lifts and Fire Fighting System in the Block A, Block B, Block C, Block D, Block E, Block F, Block G, Block H, and Hostels of the University.

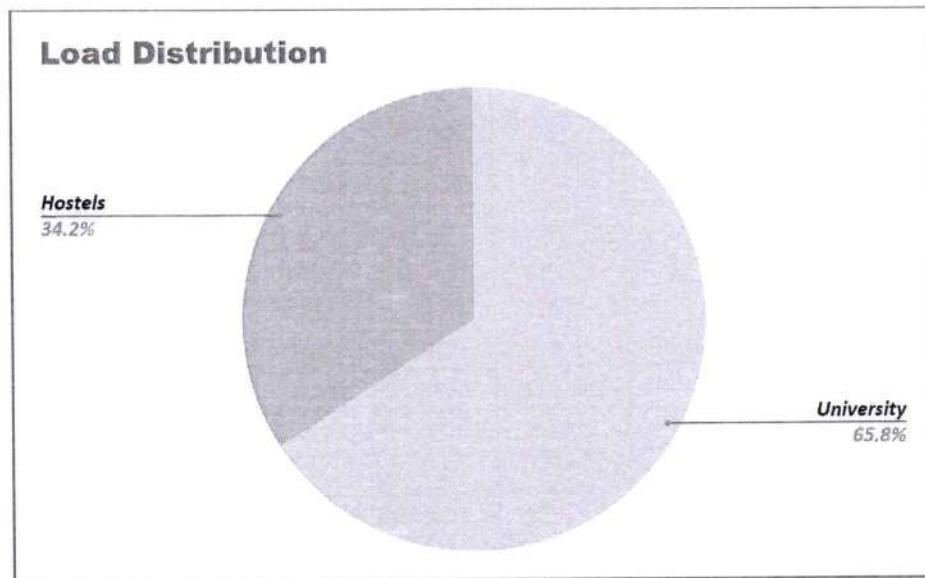
Electrical Equipment List in the University

S. No.	Equipment Name	Power	Qty
1	Ceiling Fan	65W	2080
2	Tube Light	20W	2621
3	2" x2" LED Light	36W	232
4	9" x8" LED Light	9W	560
5	LED Round White	12W	1131
		15W	
		18W	
		20W	
		30W	
6	LED Street Light	20W	41
		36W	
		100W	
7	Air conditioner	1.5T	170
		1.8T	
		2.2T	
		4.0T	
8	UPS	5KVA	8
		10KVA	
		25KVA	
		50KVA	
9	Water Motor Pump Mono block	2HP	5

Distribution of Load in the University

Load (KW) Distribution in the University				
Facility Operated	University	Hostels	Total	%age
AC	272	123.7	395.7	59.95
Lighting	63.9	42	105.9	16.04
Fan	92.7	59.8	152.5	23.10
Computer & Laptop	6	0	6	0.91
Total	434.6	225.5	660.1	100.00
%age	65.84	34.16		





Air Conditioner System

The Institute has installed 170 Nos. Window, Split and Cassette AC for human comfort.

S. No.	Quantity		
	Split	Window	Cassette
1.5 Ton AC	86	-	-
1.8 Ton AC	25	-	-
2.2 Ton AC	52	-	-
4.0 Ton AC	09	-	-
Total ACs	170		

The analysis was done to identify the measures that could be undertaken to reduce the energy consumption. The following parameter has studied in each unit.

- Air flow rate
- Air flow cross section area
- Return dry bulb temperature.
- Return wet bulb temperature.
- Power consumption
- Supply dry bulb temperature.
- Supply wet bulb temperature.



Parameters	Units	Split ACs					
		Classro om	Classro om	Classro om	Classr oom	Classro om	Classro om
Location							
Design Capacity	TR	2.2	2.2	2.2	2.2	2.2	2.2
Total Area	m ²	0.108	0.108	0.108	0.108	0.108	0.108
Measured avg. Velocity	m/s	4.3	4.2	2.9	2.2	2.9	4.6
Calculated Flow	m ³ /hr	1671.8	1633.0	1127.5	855.4	1127.5	1788.5
Supply Air Dry Bulb Temp.	C ⁰	26	26	25	24	25	23
Supply Air Wet Bulb Temp.	C ⁰	20	21	17	16	18	19
Enthalpy supply air	KCal/Kg	13.7	14.5	11.4	10.7	12.1	12.9
Return Air Dry Bulb Temp.	C ⁰	27	29	28	26	28	29
Return Air Wet Bulb Temp.	C ⁰	23	25	22	23	23	23
Enthalpy return air	KCal/Kg	16.27	17.21	15.36	16.27	16.26	15.36
Density of Air	Kg/M ³	1.225	1.225	1.225	1.225	1.225	1.225
Calculated Capacity	TR	1.76	1.79	1.82	1.94	1.90	1.79
Power Consumption	KW	3.02	3.1	3	3.1	3.1	3.2
KW/TR		1.715	1.729	1.646	1.595	1.635	1.788
EER		6.997	6.939	7.290	7.525	7.337	6.711
COP		2.049	2.032	2.135	2.203	2.149	1.965

Observation: AC can be replaced with five-star AC, AC is used for human comfort in Classrooms and office area. AC used in office areas are in two- and three-star rating.

Recommendations Replace old AC with five-star rating AC. Consider first phase to replace 9 AC.

- Cost Benefit Analysis of 3-star AC to 5-star AC

Parameters	Units	Classrooms		
Location		Classrooms	Classrooms	Classrooms
Design Capacity	TR	1.5	1.5	1.5
Total Area	m ²	0.085	0.085	0.085
Measured avg. Velocity	m/s	2	1.9	2.2
Calculated Flow	m ³ /hr	612.0	581.4	673.2
Supply Air Dry Bulb Temp.	C ⁰	26	23	28
Supply Air Wet Bulb Temp.	C ⁰	18	17	19
Enthalpy supply air	KCal/Kg	12.1	11.4	
Return Air Dry Bulb Temp.	C ⁰	29	27	

Return Air Wet Bulb Temp.	C ⁰	24	24	25
Enthalpy return air	KCal/Kg	17.21	17.3	18.18
Density of Air	Kg/M ³	1.225	1.225	1.225
Calculated Capacity	TR	1.27	1.39	1.45
Power Consumption	KW	2.1	2.2	2.25
KW/TR		1.658	1.578	1.548
EER		7.239	7.605	7.752
COP		2.120	2.227	2.270
Proposed				
Design Power of AC	kW	1.5	1.5	1.5
Present power consumption of AC	kW	2.1	2.2	2.25
Expected saving	%	28	28	28
Reduction in power consumption	kW	0.588	0.616	0.63
Running hours of AC fan	Hr/day	18	18	18
Running days of AC fan per annum	Days/Year	250	250	250
Cost of electrical energy	INR/KWh	7.15	7.15	7.15
Energy Saving/yr.	kWh	2646	2772	2835
Monetary saving per year	INR	18918.9	19819.8	20270.3
Investment	INR	35,000	35,000	35,000
Payback period	month	22.20	21.19	20.72



Water Pumps

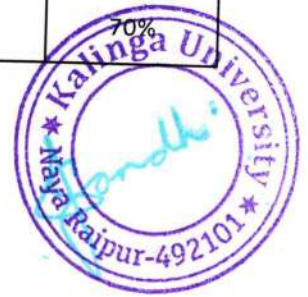
Kalinga University has supply from Municipal water to meet the requirement for usage in University, Hostel and Washrooms. All the pumps are running as per the requirement. The detailed operating parameters of these pumps were measured to analyses the performance and it is given below.

The following parameters have been measured / recorded to assess the performance of pumps:

- Suction pressure
- Discharge pressure
- Power consumption
- Flow rate
- Performance Analysis of Water Pumps

Water Pumps						
Description	UOM	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5
Design						
Make		Crompton	Crompton	Crompton	Crompton	Crompton
Model		B99576751P 119030001	B99576751P 1119030002	B99576751P 1119030010	B99576751P 1119030030	B99576751P 1119030031
Capacity	m ³ /hr	50	50	50	50	50
Head	M	20	20	20	20	20
Power	KW	1.5	1.5	1.5	1.5	1.5
Operating Parameter						
Suction head	m	10	10	10	10	10
Discharge head	m	28	28	28	28	28
Total head	m	18	18	18	18	18
Flow rate	m ³ /hr	46.76	46.76	46.76	46.76	46.76
Power consumption	kW	1.36	1.46	1.60	1.25	1.25
Combined efficiency	%	51%	61%	55%	65%	65%
Pump Efficiency (η Motor=91%)	%	59%	67%	63%	70%	70%

- Pump Performance found Satisfactory



Lighting System

The University has already implemented energy efficient measures in lighting areas at different places. All conventional lamps are replaced by LED Lamps.

Blocks	LED Consumption (Kwh)	%age
Block A	8.22	7.62
Block B	7.22	6.69
Block C	11.89	11.02
Block D	12.97	12.02
Block E	12.93	11.98
Block F	11.30	10.47
Block G	11.40	10.57
Block H	10.90	10.10
Hostel - Boy	8.93	8.28
Hostel - Girl	7.09	6.57
Outer Area	5.04	4.67
Total Consumption (KWH)	107.89	

Observations

- It is recommended to install occupancy sensors ex. restroom, offices, lobby, staircases, panel room etc.
- University has opted for the latest LED technology for lighting.
- Lux was found satisfactory in many places but in some places, it is different from standard. It can be maintained as per university requirement.

Recommended value of illumination given as per National Building Code of India, 2005 clause 4.1.3, 4.1.3.2, 4.3.2 and 4.3.2.1

- Details of measured LUX in University

S.NO.	LOCATION NAME	MIN LUX	MAX LUX	Recommendation
1	Ground Floor	121	126	100-200
3	DG Room	150	170	100-200
4	Classrooms	310	450	300
5	Lecture rooms (including Demonstration areas)	310	450	300
6	Reading rooms	250	450	300-500



7	Laboratories	530	670	500-750
8	Corridors	150	170	150
9	Libraries	210	295	300
10	Moot court	245	450	300-500
11	Stage area	125	325	300
12	Canteen	80	120	100
13	Staff Room	155	185	150

Computer and Other Power Devices

University is using approximately 1200 nos. of computer and other power electronic devices.

An average desktop computer uses between 60 and 300 watts. It is very difficult to know exactly how much computers use on average because there are so many different hardware configurations. We estimate that an average modern desktop PC will use approximately 100 watts of power per day approximately 4-6 hrs. working per day.

Total consumption of electricity for 1200 computers per day = 120 KWH= 2400 KWH per month

Considering 250 days of working power consumption = $250 \times 110 = 30000$ KWH

To save energy, turn off the computer when it is not being used or enable power saving features such as hibernate, standby or sleep mode. Power saving modes will allow you to turn on a computer quickly when you need to use it. Sleep mode typically uses only 1-5 watts of power and can be set to turn on automatically after a set time of inactivity.



DG Performance

Two DG installed of ratings – 2 X 250 KVA, DGs were running for power cuts. No major power cuts were observed. Total diesel consumed = 22094 Liters.

Observation -

- Logbooks for DG were not maintained by the University. It is recommended to maintain a proper logbook for DG sets. This will help them to evaluate the specific power generation i.e kWH/litre of DG sets on a periodic basis. Sample Log Sheet for DG performance monitoring is shown in below table

Date	Time Start	Time Stop	Running Hours	Power Generated (Kwh)	Fuel Tank			Specific Power Consumption
					Initial Dip (mm)	Final Dip (mm)	Diesel Consumed (Ltr)	(Kwh/ltr)



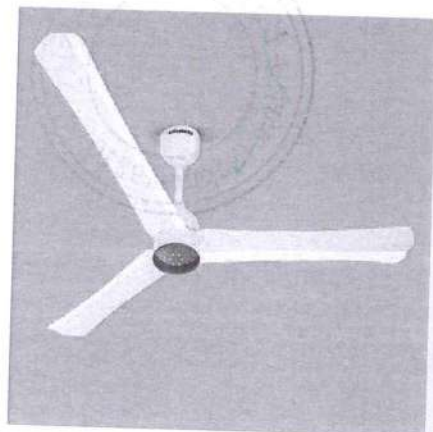
Fans

KALINGA UNIVERSITY has installed many fans for the comfort of the employees and students. The fans are regular fans consuming 70 watts each. The auditors recommend the use of Energy efficient BLDC Fans which consume less power.

The fans are regular fans consuming 70 watts each. The auditors recommend the use of Energy efficient BLDC Fans which consume less power.

- Saving Calculation of Ceiling Fans

Parameter	Unit of Measurement	Existing	Proposed
Ceiling Fan Type		Induction Motor	Brushless DC Motor
No of Fans	Nos	2080	2080
Power Consumption	Watts	65	25
Hours of Operation per year	Hours	1600	1600
Energy Consumed Annually	kWh/Fan	104	40
Saving in Energy	kWh/Fan		64
For 2080 fans	kWh		133120
Saving in Rs	Rs		13,31,200/-
Investment	Rs		6240000
Payback	Years		4.6



Product Features

- Small yet powerful BLDC motor for high air delivery
- Metallic finish Blades
- Wide blades for high air delivery
- Enjoy unmatched convenience with smart and elegant remote control
- Easy Speed Control Using Smart Remote
- Consistent Performance Even At Low Voltage and Power Fluctuations
- 3-Years Of On-site Warranty
- Save Up to ₹ 1,500 per year



General Tips for Energy Conservation in Different Utilities



- Minimize maximum demand by tripping loads through a demand controller.
- Use standby electric generation equipment for on-peak high load periods.
- Correct power factor to at least 0.99 under rated load conditions.
- Provide proper ventilation
- For every 10°C increase in motor operating temperature over recommended peak, the motor life is estimated to be halved.
- Check for under-voltage and overvoltage conditions.
- Use smooth, well-rounded air inlet cones for fan air intakes.
- Avoid poor flow distribution at the fan inlet.
- Minimize fan inlet and outlet obstructions.
- Clean screens, filters, and fan blades regularly.
- Clean screens and filters regularly.

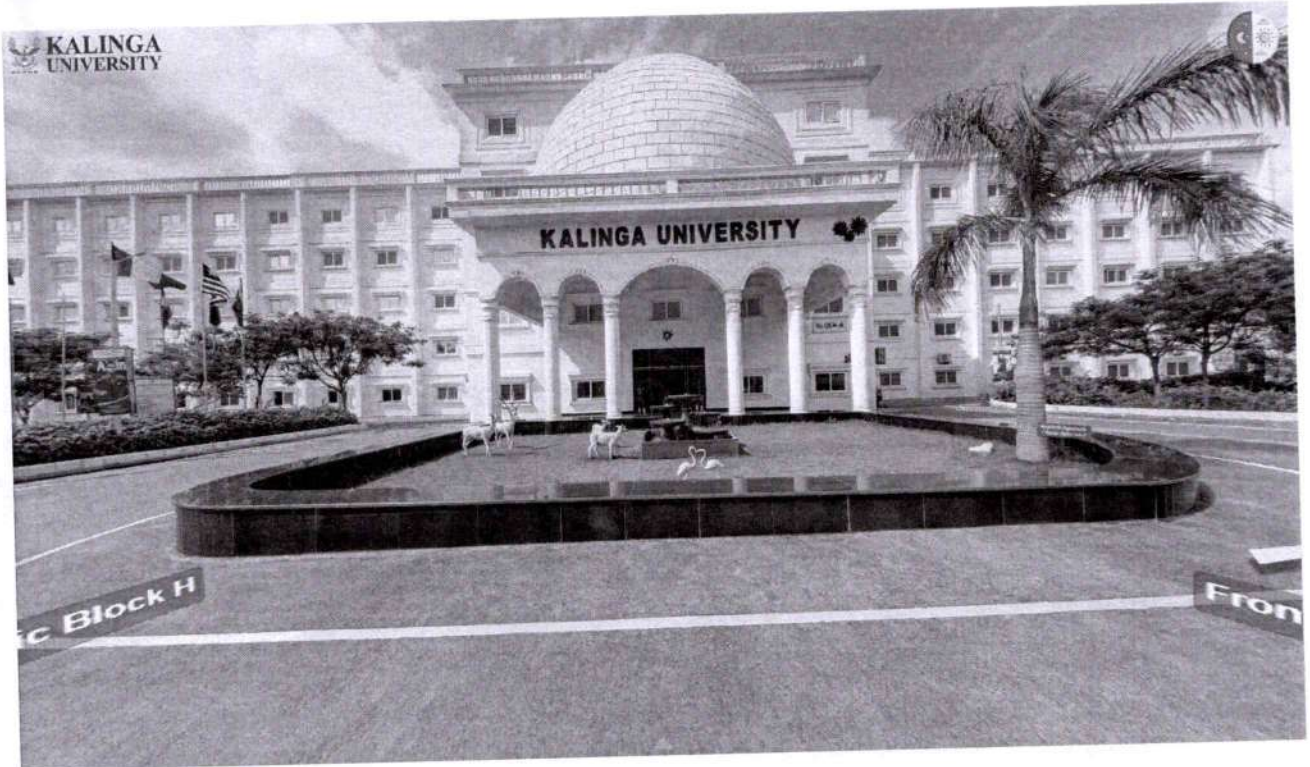


- Minimize blower speed.
- Use low-slip or no-slip belts.
- Operate pumping near the best efficiency point.
- Modify pumping to minimize throttling.
- Adapt to wide load variation with variable speed drives or sequenced control of smaller units.
- Increase the chilled water temperature set point if possible.
- Use the lowest temperature condenser water available that the chiller can handle.
- Reducing condensing temperature by 5.5°C, results in a 20 - 25% decrease in compressor power consumption.
- Tune up the HVAC control system.
- Consider installing a Plant automation system (BAS) or energy management system (EMS) or restoring an out-of-service one.
- Balance the system to minimize flows and reduce blower/fan/pump power requirements.
- Reduce excessive illumination levels to standard levels using switching, de-lamping, etc. (Know the electrical effects before doing de-lamping.)
- Aggressively control lighting with clock timers, delay timers, photocells, and/or occupancy sensors.
- Consider painting the walls a lighter colour and using less lighting fixtures or lower wattages.
- Use task lighting and reduce background illumination.
- Use waste heat to generate steam/hot water/power an absorption chiller or preheat process or utility feeds.
- Use jacket and head cooling water for process needs
- Clean air filters regularly
- Seal exterior cracks/openings/gaps with caulk, gasketing, weather stripping, etc.
- Consider new thermal doors, thermal windows, roofing insulation, etc.
- Install windbreaks near exterior doors.



SAMARTHTM
GROUP

KALINGA UNIVERSITY



Kotni, Near Mantralaya, Naya Raipur - 492101
(Chhattisgarh) India.

Audit Date – 22nd February, 2023

Audit Conducted by:

SAMARTHTM
GROUP

M/S SAMARTH MANAGEMENT PRIVATE LIMITED

212, BHERA ENCLAVE, PASCHIM VIHAR, DELHI – 11008



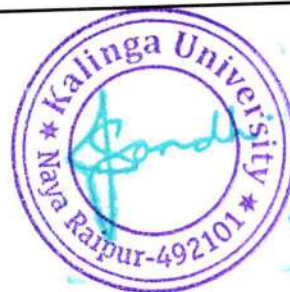
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LIST OF ABBREVIATIONS

1.	NAAC	National Assessment and Accreditation Council
2.	SMPL	Samarth Management Private Limited
3.	BMW	Biomedical Waste
4.	CTE	Consent to Establish
5.	CTO	Consent to Operate
6.	LOR	List of Requirements
7.	NABET	National Accreditation Board for Education and Training
8.	RWH	Rain water Harvesting
9.	STP	Sewage Treatment Plant
10.	L	Liters
11.	KLD	Kiloliter per Day
12.	Kg	Kilogram
13.	LED	Light-emitting diode
14.	PVC	Photovoltaic cell



CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Environmental audit is systematic and objective assessments of the environmental status and performance of facilities, processes, and/or operations. It is a valuable management tool which can be used to identify and assess environmental problems, and initiate corrective actions which ensure legal compliance and internal management policies and practices. Environmental audits can also be used to assess the quality of the existing environmental management systems, and to foster additional initiatives to improve the environmental performance. International Chambers of Commerce (ICC) has defined Environmental Auditing as

"A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of safeguarding the environment and natural resources in its operations/projects."

This Environment Audit aims to assess all the attributes of the environmental paradigm & natural resources which are likely to be impacted from different activities of the University. Samarth Management Private Limited (*hereafter termed as SMPL*) have been appointed by the Kalinga University to ensure the University's environmental performances are in-alliance with enviro-legal compliance set up by the Government.

This audit is prepared based on the legal compliances applicable to the University and environmental mitigation measures that have been undertaken by the University to reduce the environmental impacts. The detailed approach and methodology of this report is explained in Chapter 2 while this Chapter (1), provides the overview of the University along with the Audit objectives and scope.

1.2 OVERVIEW OF UNIVERSITY

Kalinga University, Raipur has emerged as a centre of excellence of higher education in Central India. Strategically located in the Smart City of New Raipur, this University has started carving a niche for itself in the education domain and is rising as a shining star on the horizon of quality education.

About Raipur – Raipur is the Capital of Chhattisgarh and New Raipur is the New Capital of Chhattisgarh in the making. New Raipur is the fourth planned city of India with wide roads and miles of greenery and is pollution free. It is the first Integrated and Smart City of the country. A cosmopolitan city which is also the hub of higher education hosts IIM, IIT, IIIT, National Law University, CIPET, NIT and AIIMS. In addition it also hosts most National and International brands of Food and Retail Outlets.



Establishment - Established in 2013, this university has been able to win the confidence of over 7000 students. Meritorious students from all over the country and various foreign countries namely Afghanistan, Bangladesh, Nepal, Nigeria, South Korea and Uganda have chosen this University for their education and career.

Schools of Excellence - A centre for Doctoral research programmes in various fields. Currently the University is serving the student community through various UG and PG programs namely Engineering, Law, Pharmacy, Arts & Humanities, Science, Commerce & Management, Biotechnology, Information Technology, Library Science, Fashion Design & Interior Design.

Academics and Faculty - All schools are headed by senior professors having excellent academic credentials and experience of teaching, publications and research. They are ably supported by the well qualified faculty members who come from top educational institutions and the Industry. Students also get an opportunity to learn from a distinguished panel of experts drawn from various industries, who regularly come for guest lectures.

Infrastructure – Kalinga boasts of World Class Infrastructure and student facilities with student centric approach. Highest attention is paid to hands on learning approach and students are encouraged to come up with innovative ideas for projects and practical's. The University has more than 75 laboratories and workshops, all well equipped with the latest, state of the art apparatus and tools. Special emphasis is given to the development of communication skills through the language lab. More than 1200 computers are available for the use of the students.

The Library has a collection of over 79,000+ books and also offers Digital content through membership of DELNET, National Digital Library and NPTEL. Various magazines and journals are available for the use of the faculty and students.

Infrastructure consists of Student Hostel facilities, Green Acres, Canteen, Food Mess, Gymnasium, Fully Wi-Fi Campus, ATM, Mini Market, Student hangout Areas, Sports Complex, Re-creation Halls with Indoor Games and Music and recreation activities.

Industry Orientation and Leadership - Industry interaction is an integral part of the curriculum and Industrial visits, internships on live projects and mentoring by the Industry leaders are regular features. The University has developed excellent connections with the top Industries of the region by taking memberships of leading industrial associations like Confederation of Indian Industries, PHD Chamber of Commerce and Industry, Federation of Indian Chamber of Commerce and Industry, Indian Importers Chamber of Commerce and Industry. The University has an active chapter of Young Indians in which students get an opportunity to interact extensively with the Industry leaders and attend various corporate seminars and events.



Life Changing Experience - Kalinga is a Life Changing experience where the stress is on over all development of students. NCC, NSS and Various other clubs and societies offer opportunities to students to showcase their talent and learn under the guidance of experts. Music, dance and martial arts trainers are available for the students. Coaches of different games and sports like Cricket, Football, Basketball, Volleyball and athletics are also available for sharpening the talent of the students.

1.3 CHRONOLOGY OF ENVIRONMENTAL PERMISSION

This section explains the historical background of the university in terms of the clearances that it has obtained from different authorities as per the national norms, related with environment clearance, consent to establish (CTE), and consent to operate (CTO). The series of the clearances obtained by the University at different times as presented below in **Table 1:**

Table 1: Brief History

S. No.	DESCRIPTION
1.	Research oriented, student centric university attracting students from all parts of India and over 22 foreign countries.
2.	8th Private University in the country approved under Section 12B by UGC.
3.	The best Private University in Central India Award by ASSOCHAM in 2020.
4.	44th Rank in top Universities in the country as per survey done by outlook-icare in 2019.
5.	30th Rank in top universities in the country established after the year 2000 as per survey done by India Today in 2018.
6.	Management Department Ranked as 7th Best in the country as per survey by Competition Success Review in 2018.



7.	Engineering Department Ranked as 3rd Best in the country as per survey by Competition Success Review in 2019.
8.	State of the art Library with over 80,000 books and E access to various journals and databases including DELNET, NPTEL, NDL, J-Gate (Social Science), J-Gate (Science and Technology), INSPEC Database of Elsevier & Web of Science.
9.	Free of cost Coaching classes for Competitive exams and IT skills in Collaboration with Bosch, NIIT, and BT for all students.
10.	Free of Cost Hobby classes for Self defense and Martial arts , Instrumental and Vocal Music for hostel students.
11.	Central Instrumentation Facility with world class Scientific apparatus and research databases.
12.	Innovation and Incubation Cell to support startups and entrepreneurship of students.
13.	Accredited by NAAC with B+ grade.
14	Listed in Rank Band 101-150 in University category in NIRF Ranking 2022 as well as 2023.
15.	"Free of cost" Value Added courses available for all students.
16.	Unique policy of acquiring "Extra Credits" for Various Co-curricular & academic activities.

17.	Mentoring of all students by dedicated faculty members.
18.	Extra classes for slow learners.
19.	Regular field visits, guest lectures, case studies, role plays, mock sessions etc.
20.	Soft skills classes for all students.
21.	Activities, internship & placement opportunities for all students.

1.4 AUDIT OBJECTIVES

This audit focuses on the effective management of environment, health and safety within the University premises both during construction and operation phases along with legal compliances associated with the university. The objectives of this auditing are as follows:

- To assess the performance of implementation of environmental safeguards,
- To identify shortfalls and intimate the proponent regarding action required for improved & effective obedience of environmental conditions as stipulated in Environmental Clearance, Consent to Establish Certificate and statutory approvals / permissions.

1.5 ABOUT THE AUDITORS

M/s SAMARTH MANAGEMENT PRIVATE LIMITED (SMPL) is an Environmental Consulting Organization working in the Environmental field since 2004. The organization is having a team of Environment Experts with wide knowledge in the subject. SMPL is providing services for various sectors such as

- Preparing Environment Impact Assessment (for Building & Construction Projects, Small and big manufacturing units, Hospitals, Educational Institutions, Hotels etc.)
- Samarth Management Private Limited has prepared Environmental Audit reports for various institutes and organizations.

- Team involved in this auditing and report preparation is given below

Name

Designation



Ms. Palak Ahuja
Mr. Sagar Mahour

Auditor
Auditor

1.6 REPORT STRUCTURE

This audit report has been divided in to the following chapters:

Chapter 1: Introduction briefs on project background, project status, audit objectives.

Chapter 2: Approach & Methodology briefs the methodology and approach followed to conduct Environment Audit

Chapter 3: Data Collection and Analysis explains the norms applicable to the University and management measures undertaken by it.

Chapter 4 Conclusion elucidates the findings of the audit report and area for improvements

1.7 DISCLAIMER

SMPL Environment Audit Team has prepared this report based on input data submitted by the representatives of the University and the best judgment capacity of the expert team. It is further informed that the conclusions are arrived at following best estimates based on the provided information, and onsite observations to the extent possible.



CHAPTER 2: APPROACH AND METHODOLOGY**2.1 APPROACH & METHODOLOGY**

The audit has been carried out in two stages. In the first stage, it includes the review of documents while involving the site inspection and report preparation. The general approach followed to prepare the audit report.

This report has been prepared based on the documents provided by the Kalinga University, and site inspection carried out by the SMPL team. Based on detailed scrutiny of documents and field observations on complied/partially complied /not complied/not assessed particulars, this report has been prepared.

SMPL team reviewed the previous reports, documents, and listed out the required information / documents to prepare this audit report. The checklist was prepared and was shared with the client to collect them during the site inspections. The audit was carried out as per compliance obligation applicable to the University. There are certain rules and notification that the university shall comply with either in the construction or in operation phases as explained below in Table 2.

Table 2: Applicable Rules and Notifications to University

S. No.	Act/Rule Notification	Related NOC/Clearance/Annual Returns	Concerned Department
1.	Environment Protection Rule 1986,	Submission of Environmental Statement (Form-5).	State Pollution Control Board
2.	Water prevention and Control of pollution act 1974.	1. Consent to Establish 2. Consent to Operate	State Pollution Control Board
3.	Air prevention and control of pollution act 1981		
4.	Hazardous & Other Wastes (Management and Tran-boundary Movement) Rules, 2016.	1. Hazardous Waste Authorization 2. Hazardous Waste Return (Form 4) 3. Manifest- Form 10.	State Pollution Control Board
		3. Maintain a record of hazardous	



		and other wastes in Form 3.	
5.	E-Waste (Management) Rules, 2016.	1. Form 3 (Annual returns) and 2. Form 6 (Manifest)	State Pollution Control Board
		3. Form-2: Maintain records of E- waste generated	
6.	Biomedical Waste Management Rules 2016.	1. BMW Authorization 2. Annual Return (Form 4)	State Pollution Control Board
7.	Municipal Solid Waste Management Rules 2018		Municipal Corporation



CHAPTER 3: DATA COLLECTION AND ANALYSIS

This audit has been carried out based on norms/rules/ laws applicable to the University and the actions undertaken by the University to combat the impacts on environmental components. The activities undertaken by the University along with the aspects and impacts are given below:

Table 3: Environment Impact/Aspects

S. No	Activities	Aspects	Impacts
1.	Water usage-domestic use, drinking purposes, etc.	Water consumption: almost 350KLD which is fulfilled by the Municipal.	Depletion of water sources.
2.	Use of diesel generator (DG) sets.	• Air Emission • Waste generation: spent oil • Noise nuisances • Leakages	• Increase the pollutant into the air. • Spent oil is a hazardous waste. • Increase in noise level. • Adverse impacts on the soil.
3.	Canteen Operation-produces the solid wastes.	Production of solid wastes;	• Soil contamination • Groundwater contamination • Health issues
4.	Use of medicine and first aid services-Medical waste	Biomedical waste generation	Health issues from the waste if not disposed of properly.
5.	Use of electronic equipments and E waste (TVs, computer monitors, printers, fan, scanners, keyboards, mouse, cables, circuit boards, lamps, clocks, flashlight, calculators, phones, answering	E-waste generation	Depletion of the resources



	<i>machines)-</i>		
6.	Planting around the premises of University.	Generation of green waste.	• Safety issues • Increase in greenery
7.	Electricity Usage: Lightening/appliances/ office electrical equipment.	Energy consumption in the University:	• Depletion of resources. • Increase the pollution level.
8.	Vehicular Movement & Access	Traffic and transportation in the University	• Release of dust from un-surfaced roads. • Increase in noise level. • Increased localized traffic movements and congestion in the parking area.
9.	Printed material: flyers, newspapers, posters, others	• Paper use • Printing - o Internally – electricity use - o Externally: transportation - Energy usage	• Raw materials (paper) – unsustainable forestry, habitat loss, biodiversity, air pollution. • Contribution to climate change: air pollution. • Contribution to climate change: land degradation.

3.1 DATA COLLECTION

In order to audit the legal compliances, all the required documents as per the norms and standards applicable for construction/expansion of the University are listed and collected. Similarly, the existing environmental conditions were examined through the site observations.



3.2 DATA ANALYSIS

3.2.1 Document Analysis

- As per the Environment Protection Rule 1986, the University is supposed to submit the Environmental Statement in the prescribed Form V. The University is regularly submitting the Statement to the State Pollution Control Board.
- The University has the CTE for site area 33.98 acres and it is validated. CTO was granted after completion of the construction.
- The University is having Hazardous Waste Authorization and maintaining the records of Manifest (Form 10). Also, the University is filing annual returns of hazardous waste. The records show that the University provides its hazardous waste to the vendor within 90 days of the generation of waste. Sub Rule (5) under Rule 6 of **Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016** mentions that every occupier authorized under these rules, shall maintain a record of hazardous and other wastes managed by him. The University is maintaining the records of the same.
- As per **Bio-Medical Waste (Management and Handling) Rules, 2016**, The University shall maintain and update on day to day basis the bio-medical waste management register in terms of category and color coding as specified in Schedule I. It is observed that the University is maintaining the record of day to day basis the bio-medical waste management registers.
- The University is submitting a compliance report to NAAC as mentioned in the EIA notification 2006.
- In terms of Fire NOC, the University is having fire NOC for the buildings, a fire frightening plan has been prepared by the University.

3.2.2 Monitoring Report

The University is conducting quarterly monitoring of STP outlets, stack emission, and DG noise from ISO certified laboratories.

- For STP outlets, the parameters such as pH, total suspended solid, chemical oxygen demand (COD), biological oxygen demand (BOD), oil and grease are tested. The recent monitoring carried out, shows that the parameters are within the limit as per CPCB norms.
- The University is regularly monitoring the DG stack emission and noise. The monitoring results show that the emission from the DG sets are within the limit and so the noise.



3.3 MANAGEMENT MEASURE

In the above **Table 3**, the aspect and impact matrix of the University is given. The University is following different management measures to reduce the possible impacts. The overview of the same is given in Figure 3 while the detailed measures taken for each component are explained in Table 4.

Table 4: Management Measures

S. No	Aspects	Impacts	Management Measures
1.	Water consumption	Depletion of water sources.	• Water Recycling: The University is having the STP of capacity 3 X 40 KLD, 2 X 30 KLD = 180 KLD The treated water is used for flushing, landscape irrigation, and dust suppression. The treated water is tested each time before its use internally while quarterly monitoring is carried out from accredited laboratories. • Use of a low flow tap. • Rain water Harvesting Pits are available in the University.



2.	DG sets Operations • Air Emission • Waste generation: spent oil • Noise nuisances • Leakages	• Increase the pollutant into the air. • Spent oil is a hazardous waste. • Increase in noise level. • Adverse impacts on the soil.	• Almost 18.36 acres is under the landscaping and the University is planning to plant almost 1000 trees (as of today). This landscaping acts as a carbon sink. • The DG sets are provided with stack height as per the government notification for the DG sets i.e. 35 meters. Also, DG set is within the enclosure to reduce the noise nuisances. • The DG set is used only during emergencies. • The spent oil generated from the DG sets is given to the waste management authorities. • Regular monitoring of DG sets. • Use of low Sulphur content diesel (BS6).
3.	Production of biodegradable solid wastes	• Soil contamination • Groundwater contamination • Health issues	The University is having the Organic Waste Converter and biodegradable wastes are converted into the compost which is further used as manure in the landscape area.
4.	Biomedical waste generation	Health issues from the waste if not disposed of properly.	Management as per Bio-medical Waste Management Rule 2016.
5.	E-waste generation	Depletion of the resources	The University has an agreement with Adatte E- Waste Management Private Limited, New Delhi for E-Waste disposal.
6.	Energy consumption in the University:	• Depletion of resources. • Increase the pollution level.	Adoption of Energy efficient measures. Such as LED light, light sensor lights.



7.	• Paper use • Printing - o Internally – electricity use - o Externally: transportation - Energy usage	• Raw materials (paper) – unsustainable forestry, habitat loss, Biodiversity, and air pollution. • Contribution to climate change: air pollution. • Contribution to climate change: land Degradation.	• The University is having a paperless office policy and has discarded the use of paper cups.

3.4 SEWAGE TREATMENT PLANT

The wastewater is generated from campus from the following areas:

1. Canteen
2. Restaurants
3. Hostels
4. Offices
5. Generator room

There are five STPs installed in the campus at various locations. The details are provided in table 5

Table 4: STP and their location with capacity and operational time.

S.No	STP capacity (KL)	Location	Operation status
1	40	Pacific Hostel	Operation hours 8-10 hrs
2	30	Brahmaputra Hostel	Operation hours 8-10 hrs
3	30	Indus Hostel	Operation hours 8-10 hrs
4	40	Canteen	Operation hours 8-10 hrs
5	40	Administrative Block	Operation hours 8-10 hrs

The STPs are maintained by the university staff. These STPs were installed during 2020.

Treatment Capacity:

The wastewater treatment plant is designed to treat 30,000 Liters/Day to 1 Lakh Liters/Day Sewage generated from the University..

The treated effluent is used for gardening, horticulture, and flush water in toilets.

As per the site visit, we found that there are 6 buildings-

1. Admin Building



2. Pharmacy Building
3. Old Boys Hostel
4. Girls Hostel
5. International Boys Hostel
6. New Boys hostel.

Admin Building and Pharmacy Building Sewage treatment plants can be common as there are no distances between them. There will be separate Sewage treatment plants for the other four buildings. As per the people's strength we have designed plants of different capacities for different buildings.

For Admin building and under construction pharmacy building we recommend a plant of 100 KLD.

DESIGN BASIS

Treatment Capacity:

The wastewater treatment plant is designed to treat 30,000 Liters/Day to 1 Lakh Liters/Day Sewage generated from the unit.

The treated effluent will be used for gardening, horticulture and flush water in toilets.

As per the site visit, there are 6 buildings-

1. Admin Building
2. Pharmacy Building
3. Old Boys Hostel
4. Girls Hostel
5. International Boys Hostel
6. New Boys hostel.

Admin Building and Pharmacy Building Sewage treatment plants can be common as there are no distances between them. There will be separate Sewage treatment plants for the other four buildings. As per the people's strength we have designed plants of different capacities for different buildings.





3.5 DETAILS OF TREES AND PLANTS IN CAMPUS

S.No.	AREA	LOCAL NAME	BOTANICAL NAME	NUMBERS
1	Finger Garden	Paper Flower	Bougainvillea Glabra	480
2		Chhatim Tree	Alstonia Scholaris	5
3		Gulmohar	Delonix Regia	14
4		Badam, Almond	Terminalia Catappa	7
5		Palm	Syagrus Romanzoffiana	15
6		Shami Plant (Sonapatti)	Bauhinia Racemosa	4
7		Cape Honeysuckle	Tecoma Capensis	6
8		Canna	Canna Indica	29

9		Morning Glory	Ipomoea Carnea	3
10	Basketball Area (Inside)	Badam, Almond	Terminalia Catappa	2
11		Gulmohar	Delonix Regia	11
12		Kaner	Nerium Oleander	1
13		Chandni Plant	Tabernaemontana Divaricata	2
14		Paper Flower	Bougainvillea Glabra	9
15	Basketball Area (Outside)	Kadam	Neolamarckia Cadamba	6
16		Palm	Syagrus Romanzoffiana	6
17		Gulmohar	Delonix Regia	5
18		Badam, Almond	Terminalia Catappa	5
19		Yellow Bells	Tecoma Stans	23
20		Yellow Trumpetbush	Tecoma Trumpet Vine	88
21		4 O'clock	Mirabilis Jalapa	16
22		10 O'clock Plant	Portulaca Grandiflora	30
23	Gol Chowk Area	Paper Flower	Bougainvillea Glabra	51
24		Red Leaf Plant	Acalypha	25
25		Cape Honeysuckle	Tecoma Capensis	5
26		Gudhal	Hibiscus Rosa	2



			Sinensis	
27		Morning Glory	Ipomoea Carnea	3
28		Palm	Syagrus Romanzoffiana	6
29		10 O'clock Plant	Portulaca Grandiflora	172
30	Parking Area	Kadam	Neolamarckia Cadamba	3
31		Ashoka Plant	Saraca Asoca	3
32		Gulmohar	Delonix Regia	5
33		Chhatim Tree	Alstonia Scholaris	3
34		Paper Flower	Bougainvillea Glabra	468
35	Mini Market Area	Gulmohar	Delonix Regia	13
36		Kadam	Neolamarckia Cadamba	4
37	Pond Area	Kaner	Cascabela Thevetia	1
38		Babul Plant	Vachellia Nilotica	16
39		Canna	Canna Indica	4
40		Aak	Calotropis Procera	2
41		Peepal Plant	Ficus Religiosa	1
42		Chhatim Tree	Alstonia Scholaris	39
43		Khajur	Date Palm	256
44		Mango	Mangifera Indica	16
45		Kadam	Neolamarckia	4



			Cadamba	
46		Madhavi Latha	Hiptage Benghalensis	5
47		Cape Honeysuckle	Tecoma Capensis	5
48		Gulmohar	Delonix Regia	14
49		Cape Honeysuckle	Tecoma Capensis	5
50		Paper Flower	Bougainvillea Glabra	476
51		Shami Plant (Sonapatti)	Bauhinia Racemosa	3
52	Main Building Area	Gulmohar	Delonix Regia	36
53		Shami Plant (Sonapatti)	Bauhinia Racemosa	1
54		Bamboo	Bambusa Vulgaris	48
55		Badam, Almond	Terminalia Catappa	6
56		Chhatim Tree	Alstonia Scholaris	3
57		Palm	Syagrus Romanzoffiana	26
58		Bamboo Palm	Areca Palm Tree	30
59		Gulmohar	Delonix Regia	39
60		Petunia	Petunia	8
61	Girls Hostel Area	Cape Honeysuckle	Tecoma Capensis	29
62		Gulmohar	Delonix Regia	



63		Bamboo Palm	Areca Palm Tree	35
64		Palm	Syagrus Romanzoffiana	8
65		10 O'clock Plant	Portulaca Grandiflora	33
66	New Pharmacy Building	Kadam	Neolamarckia Cadamba	28
67		Cape Honeysuckle	Tecoma Capensis	8
68		Petunia	Petunia	8
69	Boy International Hostel	Gulmohar	Delonix Regia	58
70		Palm	Syagrus Romanzoffiana	6
71		Amaltas	Cassia Fistula	12
72		Madhavi Latha	Hiptage Benghalensis	8
73		Bamboo Palm	Areca Palm Tree	34
74	General Boys Hostel	Bamboo Palm	Areca Palm Tree	15
75		Gulmohar	Delonix Regia	79
76		Paper Flower	Bougainvillea Glabra	58
77		10 O'clock Plant	Portulaca Grandiflora	97
78		Palm	Syagrus Romanzoffiana	18
79	Botanical Garden	Gulmohar	Delonix Regia	76 Approx.

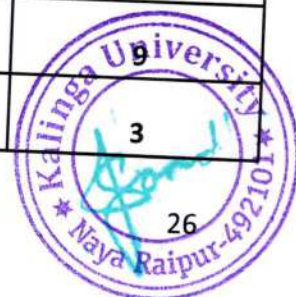


80		Adhusa, Vasaka	Adhatoda Vasica	24
81		Ashoka	Saraca Asoca	1
82		Physic Nut, Biodiesel Plant	Jatropha Curcas	2
83		Lipstick Tree	Bixa Orellana	2
84		Cowplant, Periploca Of The Woods, Gurmar	Gymnema Sylvestre	1
85		Basil, Tulsi	Ocimum Sanctum	10
86		Madar	Calotropis Procera	1
87		Origano	Origanum Vulgare	1
88		Frangipani, Champa	Plumeria Alba	4
89		Shatavari	Asparagus Racemosus	2
90		Parijat, Night Flowering Jasmine	Nyctanthes Arbor-Tristis	4
91		Water Hyssop, Herb Of Grace	Bacopa Monnieri	3
92		Aloe Vera	Aloe Vera	18
93		Air Plant, Cathedral Bells, Life Plant	Bryophyllum Pinnatum	23
94		Babul	Acacia Nilotica	4
95		Banana, Kela	Musa × Paradisiaca	1



96		Hadjod And Pirandai	Cissus Quadrangularis	4
97		Bottlebrushes	Callistemon	1
98		Chinese Chastetree	Vitex Negundo	3
99		Neem	Azadirachta Indica	2
100		Peepal	Ficus Religiosa	2
101		Curry Tree	Murraya Koenigii	1
102		Sago Palm	Cycas Revoluta	14
103		Guduchi, And Giloya,	Tinospora Cordifolia	3
104		Asian Pigeonwings, Bluebellvine, Blue Pea, Butterfly Pea.	Clitoria Ternatea	2
107		Rhoeo Discolor, Moses-In-The-Cradle	Tradescantia Spathacea	2
108		Lemon	Citrus Limon	1
109		Lemon Grass	Cymbopogon	1
110		Cactus	Mammillaria	1
111		Pudina	Mintha	17
112		Asthma-Plant	Euphorbia Hirta	1
113		Jungle Geranium, Flame Of The Woods Or	Ixora Coccinea	3

		Jungle Flame		
114		Henna Tree, The Mignonette Tree	Lawsonia Inermis	2
115		Queen Palm	Syagrus Romanzoffiana	9
116		Bird Of Paradise Flower	Strelitzia Reginae	2
117		Ti Plant	Cordyline Fruticosa	9
119	Old Boys Hostel	Malabar Madhu Malati	Combretum Malabaricum	12
120		Palm	Syagrus Romanzoffiana	2
121		Gulmohar	Delonix Regia	5
122		Badam, Almond	Terminalia Catappa	5
123	Butterfly Garden	Paper Flower	Bougainvillea Glabra	159 Approx.
124		Gudhal	Hibiscus Rosa Sinensis	1
125		Gulmohar	Delonix Regia	14
126		Shami Plant (Sonapatti)	Bauhinia Racemosa	2
127		Badam, Almond	Terminalia Catappa	5
128		Palm	Syagrus Romanzoffiana	2
129	Horse Garden	Badam, Almond	Terminalia Catappa	9
130		Shami Plant	Bauhinia Racemosa	3



		(Sonapatti)		
131		Palm	Syagrus Romanzoffiana	17
132		Cape Honeysuckle	Tecoma Capensis	6
133		Ticoma	Tecoma Stans	15 Approx.
135	Small Canteen Area	Petunia	Petunia	89 Approx.
136		Ticoma	Tecoma Stans	14 Approx.
137		Gulmohar	Delonix Regia	1
138		Badam, Almond	Terminalia Catappa	1
139		Chhatim Tree	Alstonia Scholaris	3
140		Shami Plant (Sonapatti)	Bauhinia Racemosa	29 Approx.

3.6 RAINWATER HARVESTING

Conserving and preserving water is a key issue that has been addressed by the University in the form of Rain water harvesting. The campus has been practicing rainwater mechanism in a site area of 33.98 acres approx. where there are 31 rain water harvesting pits all over campus. This mechanism ensures an increase in the water table index. The details of the rainwater harvesting system have been designed by a certified architect and have been implemented throughout the campus.

Table 5: Average yearly rainfall data of Chhattisgarh

	Avg. Temperature °C (°F)		Min. Temperature °C (°F)		Max. Temperature °C (°F)		Precipitation / Rainfall mm (in)		Humidity (%)	Rainy days (d)
January	13.5 °C	(56.4) °F	7.6 °C	(45.6) °F	20.1 °C	(68.2) °F	23	0	66%	3
February	17 °C	(62.6) °F	10.5 °C	(50.9) °F	23.8 °C	(74.8) °F	31	-1	59%	1
March	22.8 °C	(73) °F	15.3 °C	(59.6) °F	30.2 °C	(86.3) °F	20	0	45%	2
April	29.4 °C	(85) °F	21.2 °C	(70.1) °F	37 °C	(98.6) °F	13	0	27%	1
May	33.1 °C	(91.6) °F	25.6 °C	(78.1) °F	40 °C	(104) °F	19	0	30%	5
June	33.4 °C	(92.1) °F	28 °C	(82.4) °F	38.7 °C	(101.6) °F	71	2	45%	8
July	30.2 °C	(86.4) °F	26.9 °C	(80.4) °F	34.1 °C	(93.4) °F	197	-7	69%	12

August	29 °C	(84.2) °F	26 °C	(78.8) °F	32.6 °C	(90.7) °F	180	-7	75%	13
September	28.2 °C	(82.7) °F	24.1 °C	(75.4) °F	32.7 °C	(90.9) °F	90	-3	69%	7
October	25.8 °C	(78.4) °F	19.3 °C	(66.8) °F	32.4 °C	(90.4) °F	14	0	52%	1
November	20.8 °C	(69.4) °F	14.3 °C	(57.7) °F	27.8 °C	(82) °F	5	0	52%	1
December	15.5 °C	(59.9) °F	9.2 °C	(48.6) °F	22.4 °C	(72.3) °F	7	0	60%	0

Dimension of Rain Water Harvesting Pits and Desilting Pits as appended below: -

Water Harvesting Pits

- a. Depth - 3 Mtr
- a. Diameter - 3 Mtr
- b. Volume - $3 \times 3 \times 670$ (average rainfall in mm) $\times 8 = 3216$ Liters/pit $\times 31$ Nos pits
Total=99696 Liters

Desilting Pits

- a. Depth - 03 Mtr.
- a. Area - 3×3 Mtr



3.7 WATER MANAGEMENT

The university has installed groundwater extraction systems inside the campus to meet water demand. The groundwater is pumped to overhead tanks and passed through RO. Filtered water is supplied for drinking purposes. Raw water is utilized for laundry, washing and bathing purposes. Cooking water supplied is of drinking quality.

The tank capacity at various locations is provided in Table 1

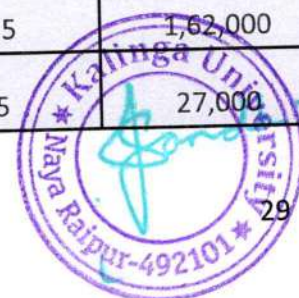
Table 6: Water storage quantity in Campus

S. No.	Block	Quantity
1.	Main Building	40,000 ltr
2.	Academic Block	20,000 ltr
3.	Indus Hostel	50,000 ltr
4.	Bhramputra Hostel	40,000 ltr
5.	Everest Hostel	20,000 ltr

The water requirement as per NBC 2016 is provided in Table. This quantity is at a higher estimate. The water consumption is around 75% of the estimated quantity. The staffing pattern for the university is 600, out of which 200 are administrative, 400 teaching and 200 working staff. There are two restaurants with seating capacity of 10 indoors and 30 outdoors. The campus also houses canteens. There are 3500 non-resident students who travel from their place of residence to the campus by bus and personal transport. The annual holiday for students has been estimated to be around 75 days spread over two to three months along with leave with respect to medical and personal reasons.

Table 7: Water demand as per NBC for Kalinga University

S.No	Establishment	Number	Persons	NBC standard	Quantity
1.	Hostels	4	1200	135	1,62,000
2.	Offices	45	200	45	27,000



3.	Restaurant	2	10 (indoors) 30 (outdoors)	70	1,400 4,200
4.	Non-resident students		3500	45	1,57,500
5.	Total requirement				3,52,100
6.	Say				350 KLD

The supply is also obtained from tankers of 4 KL capacity. This water is utilized for drinking purposes. The approximate distribution of water is provided in table 8

Table 8: Number of tankers utilized by Hostels

S.No	Establishment	Number of tankers
1.	Brahmaputra	210
2.	Girls hostel	18
3.	Gole chowk	18
4.	Tree/Garden	76
5.	Sports Ground	22
6.	Makhana	13
	Total	325

The total tankers received in a month are an average of 640-650 KL. It translates to around 80-90 tankers per day. This would then indicate a volume of 80-90 KLD. This indicates that the tankers cater to 25%-30% of the total water demand.

The main storage inside the campus is at gole chowk of 35 KL. The underground tank at Brahmaputra hostel is of 15 KL capacity.



The wastewater generated is therefore, $350 \text{ KL} \times 80\% = 280 \text{ KL}$

The groundwater sampling reveals the following results.

Sampling was also undertaken from the artificial pond created by the university authorities. The pond has a 200 KL capacity.

The following type of waste is being generated in the university campus and quantity is calculated based on average of certain items received and the waste material sold out to vendors during last years: -

Solid

The university campus has the capacity to house the following population:

1. Students – 1200 (residents)
2. Teaching staff - 600
3. Non-teaching staff – 400
4. Students – 2800 (day engagement)

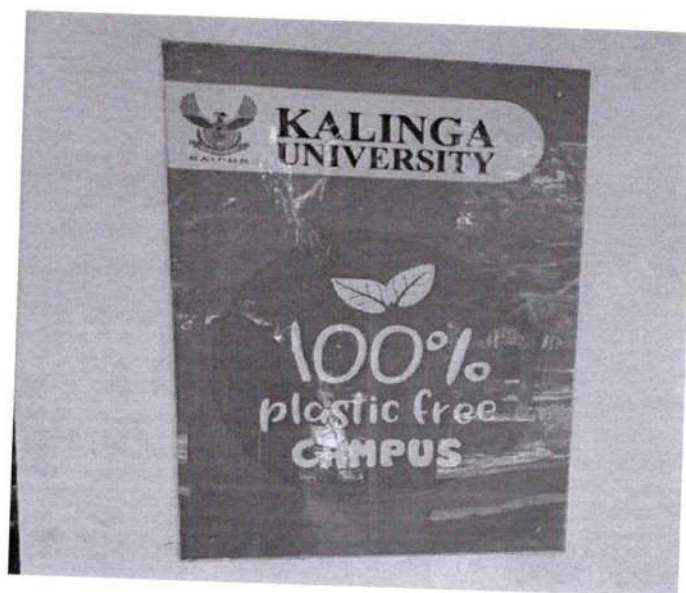
The solid waste generated from the campus in 2022-23 has been estimated based on the following (Assuming 0.3 kg/per capita daily solid waste generation):

The solid waste is collected through bins (blue and green). Blue bins are for dry waste, while the green bins are for wet wastes.

Fallen leaves, flowers and other organic materials are collected through manual sweeping and transported to vermicomposting plants.

The university also generates plastic wastes depending on the usage. However, considering that around 48,000 TPA of plastic waste is generated in the state with a population of 32,941,966 in 2021. The average plastic waste per capita comes around 1.45 kg per capita annually, which translates to 0.4 gm per capita daily.





The inert and other solid wastes are collected and stored before being discarded to authorized agencies on a regular basis.

The university is steadily moving towards achieving zero plastic thought. The university encourages segregation and has placed several blue and green bins across the campus site.

The sources of solid wastes are as follows:

1. Hostel Canteen – cut fruits and vegetables, eggshells, peels, skins, meat leftovers, etc.
2. General campus – crunchies packet, plastic water bottles, packaging, used and worn out fabric and clothes, used paper, cardboards, stationery items, etc.
3. Fallen leaves, flowers, dried stems, road, and kerb side dusts, etc.

There is solid waste generated from laboratories and offices.



CHAPTER 4: CONCLUSION

It has been observed that the University is following the applicable norms/laws and undertaking the management measures to reduce emission to the air, waste generation, water consumptions, and measures to conserve energy, and water. Following conclusions are made based on the documents received from the University and site observations.

- The University is submitting environment Statement, and compliance reports as per the applicable norms. It is having an agreement with authorized vendors for the waste management and maintaining the records of the waste.
- The University has installed various measures for the environmental conservation such as STP, RWH pits, low flow taps, organic waste converter etc. Almost 18.36 acres of the area is under the green cover of the University. The green coverage is well maintained and the compost from the OWC is used in it.
- The regular monitoring of STP water, DG stack and DG noise is carried out by the University.
- The safety, precautionary sign boards are placed at the different locations to alert the students and staff.

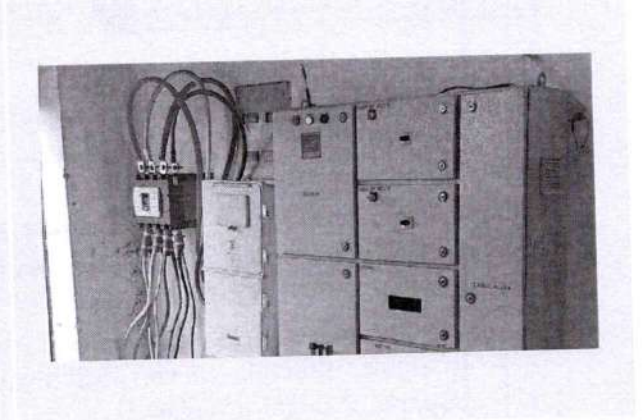
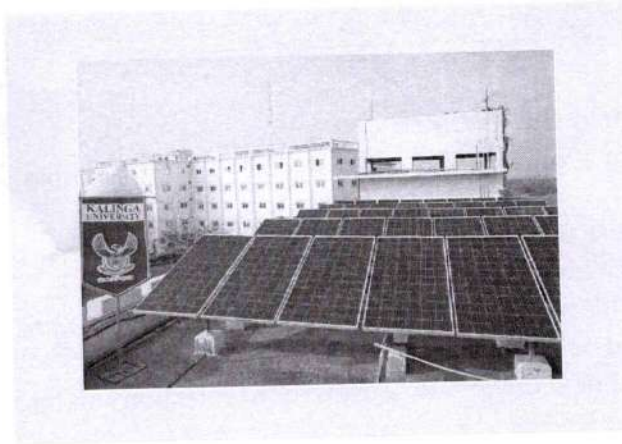
4.1 AREA OF IMPROVEMENTS

- Specific Environment Management Plan to be prepared by the University and shall establish the environment Management Cell with the proper responsibilities.
- It is suggested to the University to maintain the records of waste generated by them in the Forms as prescribed in the waste management rule.
- The University is having a provision for the solar PVC, however, it is recommended to increase the solar power plan. Also, installation and maintenance of water meters at the suitable places to measure the quantity of water used in various processes is also recommended.
- The University shall conduct the water audit annually. Water auditing is a systematic & scientific examination of water accounts of the University. It is a tool to overcome shortage, leakage and losses of water in the University.
- The used paper (if any) can be sent to an external unit for recycling. The recycled paper can be used in the University in the form of calendar, diaries, files/folders etc.



PHOTOGRAPHS





INITIATIVES TAKEN BY THE KALINGA UNIVERSITY TO SAVE ENVIRONMENT

Plastic Free Campus

Universities can generate enormous amounts of plastic waste, which is toxic to people and the environment, and never goes away.

Kalinga University is a Plastic Free Campus. We aim to measurably reduce plastic waste and pollution in our campus and the world around us. To achieve this we have undertaken following steps:

- Kalinga University has banned use of single-use plastics in canteens, cafes, Mini Market complex in the university premises and hostels, etc.
- In regular intervals, we carry out awareness drives and sensitisation workshops on the harmful impacts of single-use plastics.
- Encourage all students to avoid bringing non-bio-degradable plastic items to the University.
- We encourage students to sensitize their respective households about the harmful effects of plastics and make their households also 'plastic-free'.
- We have installed necessary alternative facilities like water units to avoid the use of plastic water bottles, and encourage the use of alternative solutions like cloth bags, paper bags, etc, instead of plastic bottles, bags, cover, and other goods on campus.



ENVIRONMENTAL PARAMETERS QUALITY MONITORING ANALYSIS

The ambient air samples were collected from two locations inside the campus. These were analyzed as per NAAQS parameters. The university also ensures that there is no open burning of solid waste.

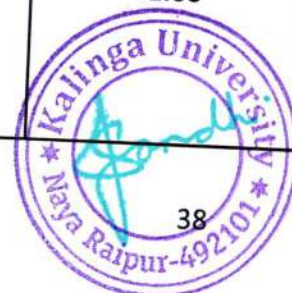
TEST REPORT

AMBIENT AIR QUALITY REPORT		
Name & Address of the Customer To, M/s Kalinga University Address: Raipur, Chhattisgarh	Test Report No.: CES/LAB/22-23/ Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Method of test : IS: 5182	Sampling Details	
Test required: As per work order	Sample Monitored	: Ambient Air Quality
Sample Collected By:- CES Representative	Date of Sampling	: 01.04.2022 to 02.04.2022
Instrument used: Eco Tech FDS	Date of Receipt	: 02.04.2022
Atmospheric condition : Clear	Period of testing	: 02.04.2022 to 08.04.2022
Page : 1 of 1	Duration of sampling	: 24 hrs



AMBIENT AIR QUALITY RESULTS

S. No.	Parameters	NAAQ Standards (industrial area)	Pollutant Concentration	
			Near Main Gate	Near Girls Hostel
1	Wind direction		SE	SE
2	Wind speed Km/h		13	13
3	Relative Humidity %		31	31
4	Ambient Temp. (°C)		39	39
	Parameters		Pollutant Concentration	
1	Particulate matter (size less than 10µm) or PM ₁₀ (µg/m ³)—Part-23-2006	100	57.22	61.30
2	Particulate matter (size less than 2.5µm) or PM _{2.5} (µg/m ³)—Part-24	60	30.16	30.44
3	Sulphur Di-Oxide (SO ₂) (µg/m ³) — Part-2	80	9.20	12.35
4	Oxide of Nitrogen (NO ₂) (µg/m ³)— Part-6	80	15.30	19.24
5	Carbon monoxide (CO) mg/m ³ Part-10 By Indicator tube method	04	<1.00	<1.00



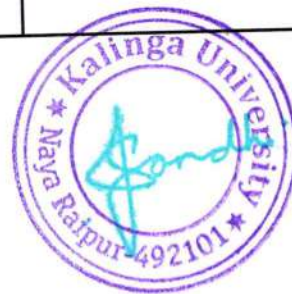
NAAQ- National Ambient Air Quality Standards CPCB Notification 18th Nov. 2009

The Results relate only to the sample tested/Sampled

Note:-The report will not be valid for legal cases, if Prior permission is not taken from CES.

TEST REPORT

Name & Address of the Customer To, M/s Kalinga University Address: Raipur, Chhattisgarh	Test Report No.: CES/LAB/22-23/ Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Qty : 1 No. x 1 litre	Date of Collection	: 02.04.2022
Method of test : APHA 23rd edition	Date of Receipt	: 02.04.2022
Packing :- Plastic bottle	Period of testing	: 02.04.2022 to 08.04.2022
Sample Condition at receipt: packed	Method of sampling	: IS:3025
Sample Discipline: Chemical Testing Sub Group: Surface Water	Sample tested as received	: OK
Sample Collected By:- CES Representative	Page no.	: 1 of 1



S. No	Test Parameters	Unit	Method No.	Result Obtained Pond Water
1	pH	-	4500 H+B	7.41
2	Conductivity	μmhos/cm	2510 B	1272.00
3	Turbidity	NTU	2130 B	0.70
4	Total Solid	mg/lit	2540 B	743.00
5	Total Dissolved Solid	mg/lit	2540 C	683.00
6	Total suspended solid	mg/lit	2540 D	60.00
7	Total Alkalinity	mg/lit	2320 B	144.00
8	Total Hardness as CaCO ₃	mg/lit	2340 C	258.00
9	Calcium as Ca	mg/lit	3500 B	57.72
10	Magnesium as Mg	mg/lit	3500 B	27.70
11	Sulphates as SO ₄	mg/lit	4500- SO ₄ E	48.93



12	Chlorides as Cl	mg/lit	4500-Cl ⁻ B	61.98
13	Iron as Fe	mg/lit	3500- Fe B	<0.05
14	Nitrate as NO ₃	mg/lit	4500-NO ₃ B	20.83
15	Sodium as Na	mg/lit	3500- Na B	1.50
16	Potassium as K	mg/lit	3500- K B	<1.00
17	Fluoride as F	mg/lit	4500- F D	<0.10
18	Acidity	mg/lit	2310 B	18.00

The Results relate only to the sample tested/Sampled

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TEST REPORT

Name & Address of the Customer To, M/s Kalinga University Address: Raipur, Chhattisgarh	Test Report No.: CES/LAB/22-23/ Issue Date: 08.04.2022 Client Ref: Nil Date : Nil
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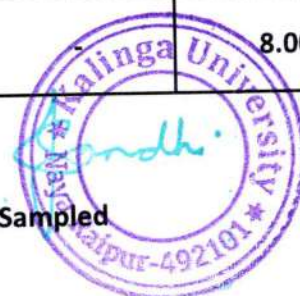
Qty : 1 No. x 1 litre	Date of Collection	: 02.04.2022
Method of test : APHA 23 rd edition	Date of Receipt	: 02.04.2022
Packing :- Plastic bottle	Period of testing	: 02.04.2022 to 08.04.2022
Sample Condition at receipt: packed	Method of sampling	: IS:3025
Sample Discipline: Chemical Testing Sub Group: Ground Water	Sample tested as received	: OK
Sample Collected By:- CES Representative	Page no.	: 1 of 1

S. No	Test Parameters	Unit	Method No.	Requirement as per IS-10500-2012		Result Obtained Handpump within University Campus
				Desirable Limit	Permissible limit	
1	pH	-	4500 H+B	6.5-8.5	No relaxation	7.27
2	Conductivity	µmhos/cm	2510 B	-	-	910.40
3	Turbidity	NTU	2130 B	1	5	0.80
4	Total Solid	mg/lit	2540 B	-	-	498.00
5	Total Dissolved Solid	mg/lit	2540 C	500	2000	456.00



6	Total suspended solid	mg/lit	2540 D	-	-	42.00
7	Total Alkalinity	mg/lit	2320 B	200	600	132.00
8	Total Hardness as CaCO ₃	mg/lit	2340 C	200	600	168.00
9	Calcium as Ca	mg/lit	3500 B	75	200	56.11
10	Magnesium as Mg	mg/lit	3500 B	30	100	6.80
11	Sulphates as SO ₄	mg/lit	4500- SO ₄ E	200	400	31.91
12	Chlorides as Cl	mg/lit	4500-Cl ⁻ B	250	1000	29.99
13	Iron as Fe	mg/lit	3500- Fe B	0.30	1	<0.05
14	Nitrate as NO ₃	mg/lit	4500-NO ₃ B	45	No relaxation	14.00
15	Sodium as Na	mg/lit	3500- Na B	-	-	12.33
16	Potassium as K	mg/lit	3500- K B	-	-	<1.00
17	Fluoride as F	mg/lit	4500- F D	1.0	1.5	<0.10
18	Acidity	mg/lit	2310 B	-	-	8.00

The Results relate only to the sample tested/Sampled



Note:-The report will not be valid for legal cases, if Prior permission is not taken from CES.

TEST REPORT

Name & Address of the Customer To, M/s Kalinga University Address: Raipur, Chhattisgarh	Test Report No.: CES/LAB/22-23/ Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Qty : 1 No. x 2 litre	Date of Collection	: 02.04.2022
Method of test : APHA 23rd edition	Date of Receipt	: 02.04.2022
Packing :- Plastic bottle	Period of testing	: 02.04.2022 to 08.04.2022
Sample Condition at receipt: Packed	Method of sampling	: IS:3025
Sample Discipline: Chemical Testing Sub Group: Waste Water	Sample tested as received	: OK
Sample Collected By:- CES Representative	Page no.	: 1 of 1

S. No.	Test Parameters	Unit	Method No.	Permissible limit	Result Obtained STP Outlet
1	pH	-	4500 H+B	6.5-9.0	7.36
2	Total Solid	mg/lit	2540 B	2200	788.00



3	Total Dissolved Solid	mg/lit	2540 C	2100	724.00
4	Total Suspended Solid	mg/lit	2540 D	100	64.00
5	COD	mg/lit	5220 B	250	90.00
6	BOD (3 day 27 degree)	mg/lit	IS/3025/P-44	30	8.00
7	Oil & Grease	mg/lit	5520 B	10	3.00

The Results relate only to the sample tested/Sampled

Note:-The report will not be valid for legal cases, if Prior permission is not taken from CES.



TEST REPORT

Name & Address of the Customer To, M/s Kalinga University Address: Raipur, Chhattisgarh	Test Report No.: CES/LAB/22-23/ Issue Date: 08.04.2022 Client Ref: Nil Date : Nil	
Qty : 1 No. x 2 litre	Date of Collection	: 02.04.2022
Method of test : APHA 23rd edition	Date of Receipt	: 02.04.2022
Packing :- Plastic bottle	Period of testing	: 02.04.2022 to 08.04.2022
Sample Condition at receipt: Packed	Method of sampling	: IS:3025
Sample Discipline: Chemical Testing Sub Group: Waste Water	Sample tested as received	: OK
Sample Collected By:- CES Representative	Page no.	: 1 of 1

S. No.	Test Parameters	Unit	Method No.	Result Obtained STP Inlet
1	pH	-	4500 H+B	7.75
2	Total Solid	mg/lit	2540 B	850.00
3	Total Dissolved Solid	mg/lit	2540 C	670.00



4	Total Suspended Solid	mg/lit	2540 D	80.00
5	COD	mg/lit	5220 B	130.00
6	BOD (3 day 27 degree)	mg/lit	IS/3025/P-44	14.00
7	Oil & Grease	mg/lit	5520 B	5.00

The Results relate only to the sample tested/Sampled

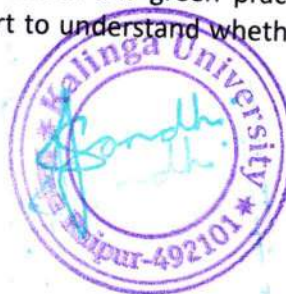
Note: -The report will not be valid for legal cases, if Prior permission is not taken from CES.



SUMMARY

Environment Audit is one of the important tools to check the balance of natural resources and its judicious use. Environment auditing is the process of identifying and determining whether institutional practices are eco-friendly and sustainable. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area.

Kalinga University has conducted a "Environment Audit" in the academic year 2022-2023. The main objective to carry out an Environment audit is to check the green practices followed by Kalinga University and to conduct a well-defined audit report to understand whether Kalinga University is on the track of sustainable development.



CONCLUSION

From the environment audit following are the conclusions, which can be taken for improvement in the campus.

All departments generate paper waste. Especially academic buildings. Using both sides of paper for printing and writing is good practice and use the other side of used paper for rough work.
Rainwater is collected from the rooftop to recharge the groundwater level table.

E- waste is segregated, handled and disposed properly in an eco-friendly manner.
Wear Mask Signages are provided in the facility.

Reducing the use of one-time use plastic bottles, cups, folders, pens, bouquets, decorative items will be useful to solve the problem of plastic pollution to some extent.



RECOMMENDATIONS

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

- Install a water meter to record water usage in the University premises.
- The solid waste should be reused or recycled at maximum possible places.
- An environmental policy document has to be prepared with all the recommendations and current practice carried by Kalinga University.
- Waste management agreements with authorized recyclers shall be regularly renewed.
- Seminars shall be arranged to spread awareness for Environment Safety amongst students
- A frequent visit should be conducted to ensure that the generated waste is measured, monitored and recorded regularly and information should be made available to administration.

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