AMET

ACADEMY OF MARITIME EDUCATION AND TRAINING

DEEMED TO BE UNIVERSITY

(Under Section 3 of UGC Act 1956)

Environmental/Green Audit

For AMET Deemed to be University, Chennai.

EXECUTIVE SUMMARY

A Nation's growth starts from its educational institutions, where the ecology is taught as a prime factor of development associated with environment. A clean and healthy environment aids effective learning and provides a conductive learning environment. Educational institutions now a day are becoming more sensitive to environmental factors and more concepts are being introduced to make them eco-friendly. To preserve the environment within the campus, various viewpoints are applied by the several educational institutes to solve their environmental problems such as promotion of the energy savings, recycle of waste, water reduction, water harvesting etc...

The activities pursued by colleges can also create a variety of adverse environmental impacts. Environmental auditing is a process whereby an organization's environmental performance is tested against its environmental policies and objectives. Environmental Green audit is defined as an examination of the effects a college has on the environment. As a part of such practice, internal Environmental audit (Green Audit) is conducted to evaluate the actual scenario at the campus.

Environmental Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. Green auditing and the implementation of mitigation measures is a win-win situation for all the college, the learners and the planet. It can also create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. Environmental Green auditing promote financial savings through reduction of resource use. It gives an opportunity for the development of ownership, personal and social responsibility for the students and teachers. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental

sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

In AMET Deemed to be University, the audit process involved initial interviews with management to clarify policies, activities, records and the co-operation of staff and students in the implementation of mitigation measures. This was followed by staff and student interviews, collection of data through the questionnaire, review of records, observation of practices and observable outcomes. In addition, the approach ensured that the management and staff are active participants in the green auditing process in the college.

The baseline data prepared for the AMET Deemed to be University will be a useful tool for campus greening, resource management, planning of future projects, and a document for implementation of sustainable development of the college. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects. We expect that the management will be committed to implement the green audit recommendations.

We are happy to submit this Environmental green audit report to the AMET Deemed to be University.

WASMANPRO ENVIRONMENTAL SOLUTIONS LLP Chennai

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Chairman

WASMANPRO ENVIRONMENTAL SOLUTIONS LLP

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List of Abbreviations:

QMS	-	Quality Management System
NAAC	-	National Assessment and Accreditation Council
KLD	-	Kilo Liters per Day
OHT	-	Over Head Tank
LTR	-	Liter
STP	-	Sewage Treatment Plant
TNPCB	-	Tamil Nadu Pollution Control Board

1 CHAPTER

1.1 Introduction

India's first Maritime Deemed to be University for maritime-related education, training and research.

Overlooking the deep blue sea cradled by the Bay of Bengal and tucked in the scenic drive way of east coast road is AMET. The one and only University from India to be a member of the International Association of Maritime Universities. With quality, commitment, knowledge and excellence as its corner stones, AMET had a humble beginning in the year 1993 with just 14 cadets molded for a career in merchant navy through a Higher National Diploma programme in marine engineering. AMET's uncompromising strides of excellence in the field of maritime education and training laced with its capacity to feed the global shipping industry with an unrivalled maritime human resource secured it the status of becoming the first Deemed to be University in India for maritime education, training, research and development activities on the 21st August 2007.

AMET had the privilege and unprecedented status of getting unveiled as a Maritime Deemed to be University from the hands of the secretary general of the International Maritime Organization, Mr.Efithimios E Mitrapoulos.

AMET serves as an ocean of knowledge for over 3700 students pursuing Programmes ranging from diploma to Doctoral programs through 4 schools and 2 intensive research and training centers for marine and marine related activities. Equipped with an excellent infrastructure for research and development, co curricular and extracurricular activities AMET secured its compliance certificate for ISO 9001:2015 QMS standards from the prestigious and globally renowned DET NORSKE VERITAS, Norway.

The National Assessment and Accreditation Council (NAAC) an autonomous institution of the University Grants Commission has assessed AMET and accredited with B Grade during November 2015. The accreditation is an indication of standards of quality as set by the NAAC and valid for a period of five years from 16-11-2015.


AMET
AMET


AMET
Training Ship
JEWEL OF AMET
CHENNAI

Forged with a vision to secure a position of prominence among the world's maritime universities and with a mission to be the fountainhead for nurturing finest intellectual capital base for the maritime sector – worldwide, education at AMET caters to the comprehensive development of all its students so as to make them better educated, more articulate and demanding. To that end is enabled and inculcated by modern teaching aids, well equipped workshops for practical training, marine workshop for hands on training on marine auxiliaries, Ship in Campus, well furnished hostel, canteen facilities, indoor and outdoor games, swimming pool, medical facilities backed by an overall conducive learning environment.

For over two decades AMET is remaining as the favourite destination for campus interviews by many shipping giants such as AP MOLLER MAERSK, GOODWOOD, NYK, SONANGOL, VSHIPS, WALLEMS, SHELL, CHEVRON, STENA and so goes a list of over 100 companies. Besides positions onboard, AMET Business school graduates have secured lucrative jobs in commercial shipping sectors such as chartering and ship broking. Never the less, Naval architecture, petroleum engineering, harbour engineering, marine electrical and electronics engineering graduates have successfully walked away from AMET with jobs offering sumptuous packages along with an opportunity to grow and glow in their career swiftly. Needless to say about the entrepreneurship development activities nurtured into AMET'ians has been found rewarding by students who are chief executive officers of their own organization.

AMET works closely and cohesively with the global shipping industry and aligns its objectives regularly to suit the demands of the evolution in technology. Such alignment keeps the students updated and industry-ready. With a consistent placement record AMET has been recognized as a premier institution for marine and marine related jobs and has earned a position as a trustworthy consultants for research and development projects wherein the investment are worth to the tune of several crores of rupees. Adducing to this achievements are the awards and accolades garnered by AMET for a range of activities in pursuit of excellence over the last two decades in maritime education, training, research and development.

AMET commitment to cater for the maritime capacity building has no bounds. AMET's strong hold as an institution for quality, discipline and rigor has drawn the attention of several growing maritime nations. To name a few are Republic of Nigeria, Angola and Djibouti that has signed a

long term memorandum of understanding with AMET for developing their nation's maritime human resource in particular and maritime infrastructure in general. Nigerian Maritime safety authority (NIMASA) which is the supreme authority for maritime administration in Nigeria, has got over 500 cadets trained through AMET over the last five years. AMET is a host to over 400 international students hailing from more than 10 countries across the world, thus providing and proving itself as a culturally diverse destination with a pledge to "Respect Diversity" and to promote cross cultural understanding which is the most essential quality for working in global environment.

AMET has a very ambitious vision 2025 plan wherein it aims to be a one stop solution for all marine related activities happening around the world and has clearly charted out an action plan to gauge its growth towards its 2025 milestone. The dogged perseverance of AMET's unmatched faculty gears up the student to meet the challenges of their life and career with tenacity of mind, endeavour to face them and emerge victorious. With a synergistic attitude prevailing among management, staff and student, AMET is all set to achieve and sustain a status par excellence.

1.2 Vision

To sustain our identity as a leader in maritime education through progressive innovation in training, research and development that will render a brilliant future for our students and a trans formative impact on the global society.

1.3 Mission

To deliver technical knowledge and ethical values with uncompromising strides of excellence that will make our students employable, our faculty advance their knowledge, our staff achieve excellence and our alumni become global leaders.

1.4 Quality Policy

Academy of Maritime Education and Training (AMET) is committed to provide highest quality in education and be the most preferred institution for pursuing marine and marine related Programmes.

This will be achieved by consistent focus on:

1. Providing a conducive, vibrant, progressive and enriching learning environment.
2. Teaching Excellence and Research output
3. Global outlook and engaging with the world through learning, teaching and research
4. Attracting the best and the brightest students.
5. Providing competitive advantage in gaining employment or further academic opportunities.
6. Maintaining excellent links with commerce and industry both nationally and internationally.
7. Complying with all applicable requirements and continually improving the effectiveness of the Quality Management system.

1.5 Recognition and Accreditation

Table 1 List of Recognition and Accreditation Details

DIRECTORATE GENERAL OF SHIPPING MUMBAI	AMET has been recognized by Directorate General of Shipping (DG Shipping) for conducting Marine Engineering and Nautical Science Courses. Det Norske Veritas- Germanischer Lloyds (DNV-GL) world renowned Classification society bestowed the highest Grade A1 (Outstanding) to AMET continuously four years i.e. 2014 - 15, 2015 – 16, 2016 – 17 and 2017-18 after intensive inspection for the Comprehensive Inspection Programme (CIP) conducted under the authority of Directorate General of Shipping, Government of India.
ज्ञान-विज्ञान विमुक्तये	AMET has been conferred with Deemed University Status under De Novo category on August 2007 by University Grants Commission as per Sec.3 of UGC Act, 1956.
QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001:2015	AMET is certified to ISO 9001:2015 QMS Standard by Det Norske Veritas for Design, Development and Conducting Maritime Training Courses, Programmes, Examinations and Assessments.

The Royal Institution of Naval Architects	AMET has been accredited by **The Royal Institution of Naval Architects**, United Kingdom.
	AMET Deemed to be University is the only member institution of **International Association of Maritime Universities**, from India among 64 maritime institutions of 39 countries in the world.

1.6 Acknowledgements

WasmanPro Environmental Solution gratefully acknowledges the co-operation received from the management of AMET Deemed to be University during the study. WasmanPro in particular would like to thank, Dr.T. Sasilatha and Dr. V. Karthikeyan for the excellent support and co-ordination provided for the electrical safety audit by providing all the manpower assistance and making available the required documents.

1.7 Disclaimer

The advice rendered by WasmanPro Environmental Solution is in the nature of guidelines based on good engineering practices and generally accepted safety procedures and WasmanPro Environmental Solutions does not accept any liability for the same. The priorities of suggestions shown in the report are advisory in nature and not binding on the parties involved viz. WasmanPro Environmental Solutions and AMET Deemed to be University.

1.8 Objectives of Green Audit

- Secure the environment and reduce the potential threats to human health
- To ensure the rules and regulations are followed as per requirement/ university guidelines.
- To avoid the interruptions in environment that are more difficult to handle and their correction requires high cost
- To create and maintain best practices for sustainable development.
- To promote eco-friendly initiatives.
- To comply the provisions of Environment Protection Act,1986 that every establishment shall have the environmental audit

1.9 About WasmanPro Environmental Solutions LLP

WasmanPro has in-depth understanding and practical experience with Environmental Green Audit, Green Practices, Environmental policies, regulatory programs, and remediation strategies. Our team of environmental experts has provided Environmental compliance and remediation services for a wide variety of Commercial and Industrial Facilities. We offer comprehensive regulatory consent and compliance support that address a full spectrum of air, water, wastewater and hazardous waste issues, regulations, and policies. Drawing upon the collective experience of our team we have developed technically sound and cost-effective strategies to achieve environmental compliance. The development and implementation of these strategies have led to:

- Faster Consent Management Services
- Reducing waste streams
- Improving mechanisms to track consent conditions
- Executing effective monitoring programs
- Implementing phased compliance and clean-up strategies

1.10 Core Environmental Compliance & Remediation Services

WasmanPro helps our clients advance environmental sustainability, maintain environmental compliance, and reduce environmental risk and cleanup sites by providing a diverse set of core services including:

• Environmental Compliance
• Air Emission Inventories and Reporting
• Air Quality and Clean Air Act Compliance
• Environmental Due Diligence
• Environmental Impact Assessment
• Site Investigation and Feasibility Studies
• EHS Audits & Training
• Environmental Management System and Compliance Auditing
• Environmental Monitoring
• Groundwater and Subsurface Investigations
• Green Audit
• Soil Management Plans
• Hazardous and Solid Waste Management Plans
• Remedial Design and Monitoring
• Brownfield Cleanup
• Pollution Prevention Plans
• Environmental, Health and Safety Plans
• Hydro geological studies

2 CHAPTER

2.1 Pre-Audit Stage

A pre-audit meeting provided an opportunity to reinforce the scope and objectives of the audit and discussions were held on the practicalities associated with the audit. This meeting is an important prerequisite for the green audit because it is the first opportunity to meet the expert and deal with any concerns. It was held at AMET Deemed to be University, Chennai. The meeting was an opportunity to gather information that the WasmanPro team can study before arriving on the site. The audit protocol and audit plan was handed over at this meeting and discussed in advance of the audit itself.

In AMET Deemed to be University pre-audit meeting was conducted successfully and necessary documents were collected directly from the college before the initiation of the audit processes. Actual planning of audit processes was discussed in the pre-audit meeting. WasmanPro Team was also selected in this meeting with the help of staff and the college management. The audit protocol and audit plan were handed over at this meeting and discussed in advance of the audit itself. The WasmanPro team worked together, under the leadership of the lead auditor, to ensure completion within the brief and scope of the audit.

2.2 Scope and Goals of Green Auditing

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues. Green Audit is the most efficient and ecological way to manage environmental problems. It is a kind of professional care which is the responsibility of each individual who are the part of economic, financial, social, environmental factor. It is necessary to conduct green audit in college campus because students become aware of the green audit, its advantages to save the planet and they become good citizen of our country. Thus Green audit becomes necessary at the college level.

A very simple indigenized system has been devised to monitor the environmental performance of AMET Deemed to be University. It comes with a series of questions to be answered on a regular basis. This innovative scheme is user friendly and totally voluntary. The aim of this is to help the

institution to set environmental examples for the community, and to educate the young learners.

2.3 Benefits of the Green Auditing

- ✓ More efficient resource management
- ✓ To provide basis for improved sustainability
- ✓ To create a green campus
- ✓ To educate sustainable goals
- ✓ To enable waste management through reduction of waste generation, E-Waste management, solid- waste and water recycling
- ✓ To create plastic free campus and evolve health consciousness among the stakeholders
- ✓ Recognize the cost saving methods through waste minimizing and managing
- ✓ Point out the prevailing and forthcoming complications
- ✓ Authenticate conformity with the implemented laws
- ✓ Empower the organizations to frame a better environmental performance
- ✓ Enhance the alertness for environmental guidelines and duties
- ✓ Impart environmental education through systematic environmental management approach and Improving environmental standards
- ✓ Benchmarking for environmental protection initiatives
- ✓ Financial savings through a reduction in resource use
- ✓ Development of ownership, personal and social responsibility for the College and its environment
- ✓ Enhancement of college profile
- ✓ Developing an environmental ethic and value systems in youngsters.
- ✓ Green auditing should become a valuable tool in the management and monitoring of environmental and sustainable development programs of the college.

2.4 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on

the efficient use of energy and water; Minimize waste generation or pollution and also economic efficiency. All these indicators are assessed in process of "Green Auditing of educational institute". Eco-campus focuses on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourages and enhances energy use conservation, promotes personal action, reduce the institute's energy and water consumption, reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint

2.5 Auditing for Water Management

Water is a natural resource; all living matters depend on water. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. We need to use water wisely to ensure that drinkable water is available for all, now and in the future. A small drip from a leaky tap can waste more than 180 liters of water to a day; that is a lot of water to waste - enough to flush the toilet eight times! Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water. It is therefore essential that any environmentally responsible institution examine its water use practices.

2.6 Auditing for Waste Management

Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities which can cause health problems. Plastic bags and discarded ropes and strings can be very dangerous to birds and other animals. This indicator addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Solid waste can be divided into two categories: general waste and hazardous waste. General wastes include what is usually thrown away in homes and schools such as garbage, paper, tins and glass bottles. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals and petrol. Unscientific landfills may contain harmful contaminants that leach into soil and water

supplies, and produce greenhouse gases contributing to global climates change.

Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Thus the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems. It is therefore essential that any environmentally responsible institution examine its waste processing practices.

2.7 Auditing for Green Campus Management

Unfortunately, biodiversity is facing serious threats from habitat loss, pollution, over consumption and invasive species. Species are disappearing at an alarming rate and each loss affects nature's delicate balance and our quality of life. Without this variability in the living world, ecological systems and functions would break down, with detrimental consequences for all forms of life, including human beings. Newly planted and existing trees decrease the amount of carbon dioxide in the atmosphere. Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen that a single tree produces is enough to provide one day's supply of oxygen for people. So while you are busy studying and working on earning those good grades, all the trees on campus are also working hard to make the air cleaner for us. Trees on our campus impact our mental health as well; studies have shown that trees greatly reduce stress, which a huge deal is considering many students are under some amount of stress.

2.8 Auditing for Carbon Footprint

Commutation of stakeholders has an impact on the environment through the emission of greenhouse gases into the atmosphere consequent to burning of fossil fuels (such as petrol). The most common greenhouse gases are carbon dioxide, water vapor, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the earth's atmosphere through human activities is commonly known as carbon missions.

An important aspect of doing an audit is to be able to measure your impact so that we can determine better ways to manage the impact. In addition to the water, waste, energy and biodiversity audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created. One aspect is to consider the distance and method traveled between home and college every day. It undertakes the measure of bulk of carbon dioxide equivalents exhaled by the organization through which the carbon accounting is done. It is necessary to know how much the organization is contributing towards sustainable development. It is therefore essential that any environmentally responsible institution examine its carbon footprint.

2.9 Methodology of Green Auditing

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution. The criteria, methods and recommendations used in the audit were based on the identified risks. The methodology includes: preparation and filling up of questionnaire, physical inspection of the campus, observation and review of the document, interviewing responsible persons and data analysis, measurements and recommendations. The methodology adopted for this audit was a three step process comprising of:

1. Data Collection – In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements. Following steps were taken for data collection:

The team went to each department, centers, Library, canteen etc.

Data about the general information was collected by observation and interview.

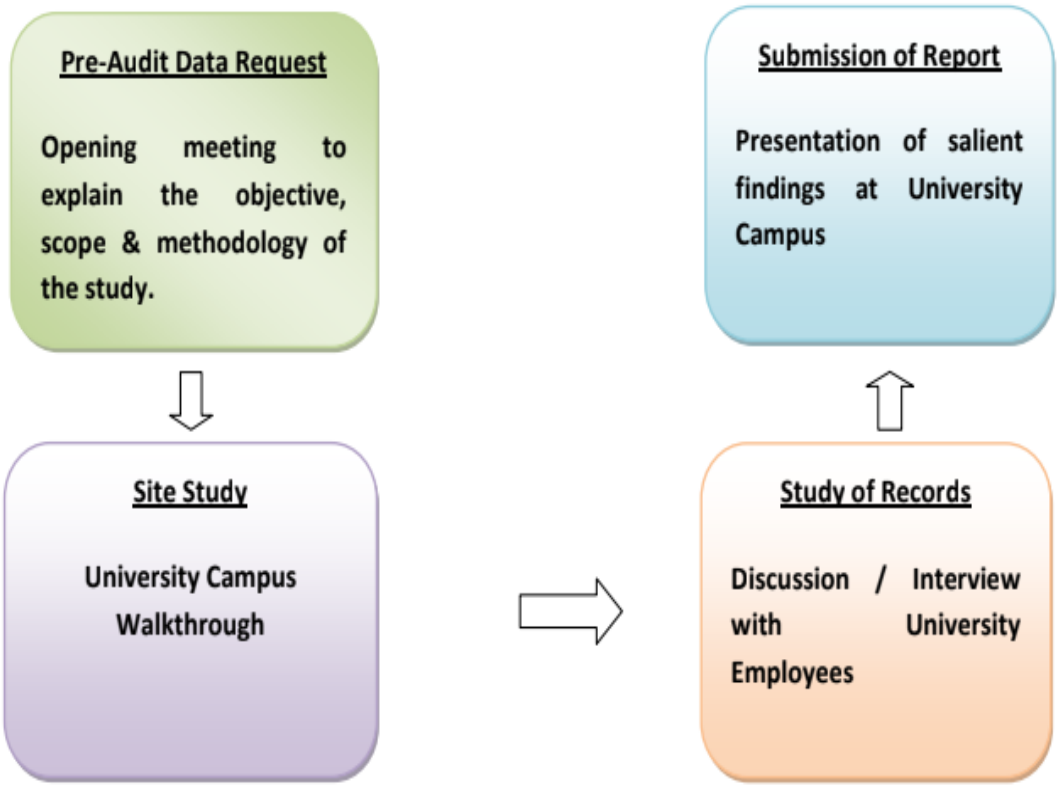
The power consumption of appliances was recorded by taking an average value in some cases.

2. Data Analysis - Detailed analysis of data collected include: calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the Tamil Nadu State Electricity Board (TNEB). Data related to water usages were also analyzed using appropriate methodology.

3. Recommendation/Suggestions– On the basis of results of data analysis and observations, some steps for reducing power and water consumption were recommended. Proper treatments for

waste were also suggested. Use of fossil fuels has to be reduced for the sake of community health.

The above target areas particular to the college was evaluated through questionnaire circulated among the students for data collection. Five categories of questionnaires were distributed. The formats of these are given below.



AUDIT FLOW CHART

3 CHAPTER

Survey Forms

3.1 Auditing for Water Management

1) List uses of water in your college.
2) What are the sources of water in your college?
3) How many wells are there in your college?
4) No. of motors used for pumping water from each well?
5) What is the total horse power of each motor?
6) What is the depth of each well?
7) What is the present depth of water in each well?
8) How does your college store water?
9) Quantity of water stored in your overhead water tank? (in liters)
10) Quantity of water pumped every day? (in liters)
11) If there is water wastage, specify why.
12) How can the wastage be prevented /stopped?
13) Locate the point of entry of water and point of exit of waste water in your college.
14) Where does waste water come from?
15) Where does the waste water go?
16) What are the uses of waste water in your college?
17) What happens to the water used in your labs? Whether it gets mixed with groundwater?
18) Is there any treatment for the lab water?
19) Whether green chemistry methods are practiced in your labs?
20) Write down four ways that could reduce the amount of water used in your college.
21) Record water use from the college water meter for six months.
22) Bimonthly water charges paid to water connections if any,
23) No. of water coolers. Amount of water used per day? (in liters)
24) No. of water taps. Amount of water used per day?

25) No. of bath rooms in staff rooms, common, hostels amount of water used per day?
26) No. of toilet, urinals. Amount of water used per day?
27) No. of water taps in the canteen. Amount of water used per day?
28) Amount of water used per day for garden use.
29) No. of water taps in laboratories. Amount of water used per day in each lab?
30) Total use of water in each hostel?
31) At the end of the period, compile a table to show how many liters of water have been used in the college for each purpose
32) Is there any water used for agricultural purposes?
33) Does your college harvest rainwater?
34) If yes, how many rain water harvesting units are there? (Approx. amount)
35) How many of the taps are leaky? Amount of water lost per day?
36) Are there signs reminding people to turn off the water? Yes /No
37) Is there any water less toilets?
38) How many water fountains are there?
39) How many water fountains are leaky?
40) Is drip irrigation used to water plants outside? YES/NO
41) How often is the garden watered?
42) Quantity of water used to watering the ground?
43) Quantity of water used for bus cleaning? (liters per day)
44) Amount of water for other uses? (items not mentioned above)
45) Area of the college land without tree/building canopy.
46) Is there any water management plan in the college?
47) Are there any water saving techniques followed in your college? What are they?
48) Please share some idea for how your college could save more water.

3.2 Auditing for Waste Management

1) What is the total strength of students, teachers and Non teaching staff in your college?
2) Does your college generate any waste?
3) If so, what are they? How much quantity? Number or weight
    - E-waste
    - Solid waste
    - Dry leaves
    - Canteen waste
    - Liquid waste
    - Glass
    - Unused equipment
    - Medical waste if any Napkins

    Others (Specify)
4) Is there any waste treatment system in the college?
5) Is there any treatment for toilet/urinal/sanitary napkin waste?
6) What is the approximate quantity of waste generated per day? (In Kilograms)
7) Why waste is a problem?
8) Whether waste is polluting ground/surface water? How?
9) Whether waste is polluting the air of the college? How?
10) How is the waste generated in the college managed? Methods
    - Composting
    - Recycling
    - Reusing
    - Others (specify)
11) How many separate boxes do you think you would need to put into a classroom to start a waste segregation and recycling campaign?
12) What should be the use for each box? (Develop a color code with reasons)

13) Do you use recycled paper in College?

14) Is there any waste wealth program practiced in the college?

15) How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.

16) Can you achieve zero garbage in your college? (Reduce ,Recycle, Reuse, Refuse) If yes, how?

3.3 Auditing For Green Campus Management

1) Is there a garden in your college? Area?
2) Do students spend time in the garden?
3) List the plants in the garden, with approx. numbers of each species.
4) Suggest plants for your campus. (Trees, vegetables, herbs, etc.)
5) List the species planted by the students, with numbers.
6) Whether you have displayed scientific names of the trees in the campus?
7) Is there any plantation in your campus? If yes specify area and type of plantation.
8) Is there any vegetable garden in your college? If yes how much area?
9) Is there any medicinal garden in your college? If yes how much area?
10) What are the vegetables cultivated in your vegetable garden? (Mention the quantity of harvest in each season)
11) How much water is used in the vegetable garden and other gardens? (Mention the source and quantity of water used).
12) Who is in charge of gardens in your college?
13) Are you using any type of recycled water in your garden?
14) List the name and quantity of pesticides and fertilizers used in your gardens?
15) Whether you are doing organic farming in your college? How?
16) Do you have any composting pit in your college? If yes what are you doing with the compost generated?
17) What are you doing with the vegetables harvested? Do you have any student market?
18) Is there any botanical garden in your campus? If yes give the details of campus Lora.

19) Give the number and names of the medicinal plants in your college campus.
20) Any threatened plant species planted/conserved?
21) Is there a nature club in your college? If yes what are their activities?
22) Is there any arboretum in your college? If yes details of the trees planted.
23) Is there any fruit yielding plant in your college? If yes details of the trees planted.
24) Is there any grove in your college? If yes details of the trees planted.
25) Is there any irrigation system in your college?
26) What is the type of vegetation in the surrounding area of the college?
27) What are the nature awareness programs conducted in the campus?
28) What is the involvement of students in the green cover maintenance?
29) What is the total area of the campus under tree cover? Or under tree canopy?
30) Share your IDEAS for further improvement of green cover.

3.4 Auditing for Carbon Footprint

1) What is the total strength of students and teachers in your College?

   No. of Students No. of Teachers No. of Non-teaching staffs Staffs

2) Total Number of vehicles used by the stakeholders of the college. (per day)
3) No. of cycles used?
4) No. of two wheelers used (average distance travelled and quantity of fuel and amount used per day)
5) No. of cars used (average distance travelled and quantity of fuel and amount used per day)
6) No. persons using common (public) transportation (average distance travelled and quantity of fuel and amount used per day)
7) No. of persons using college conveyance by the students, non-teaching staff and teachers (average distance travelled and quantity of fuel and amount used per day)
8) Number of parent-teacher meetings in an year? Parents turned up (approx.)
9) Number of visitors with vehicles per day?
10) Number of generators used per day (hours). Give the amount of fuel used per day.
11) Number of LPG cylinders used in the canteen (Give the amount of fuel used per day and amount spent).

12) Quantity of kerosene used in the canteen/labs (Give the amount of fuel used per day and amount spent).

13) Amount of taxi/auto charges paid and the amount of fuel used per month for the transportation of vegetables and other materials to canteen.

14) Amount of taxi/auto charges paid per month for the transportation of office goods to the college.

15) Average amount of taxi/auto charges paid per month by the stakeholders of the college.

16) Use of any other fossil fuels in the college (Give the amount of fuel used per day and amount spent).

17) Suggest the methods to reduce the quantity of use of fuel used by the stakeholders/students/teachers/non-teaching staff of the college.

4 CHAPTER

4.1 Audit Stage

In AMET Deemed to be University, Chennai green auditing was done with the help of WasmanPro Environmental Solutions LLP involving different student groups, teaching and non-teaching staff. The green audit began with the teams walking through all the different facilities at the college, determining the different types of appliances and utilities (lights, taps, toilets, fridges, etc.) as well as measuring the usage per item (Watts indicated on the appliance or measuring water from a tap) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain appliances. Data collection was done in the sectors such as, Waste, Greening, Carbon footprint and Water use. College records and documents were verified several times to clarify the data received through survey and discussions

- **Involvement of Student Clubs and Forums**
- **Site inspection**
- **Interviews**
- **Review of Policies**
- **Review of Documents and Records**

5 CHAPTER

OBSERVATIONS AND RECOMMENDATIONS

5.1 Water Management

A water audit is a systematic review of a site that identifies the quantities and characteristics of all water uses. The overall objective of conducting a water audit is to identify opportunities to preserve and save water more efficiently. Water audit for water utility refers to tracking, assessing and validating all components of flow from the site of withdrawal or treatment through the water distribution system and into the consumer's properties. The principles of circular economy defined to have better water usage, treatment, Recycling and Conservation. The institutional awareness on establishing water quality and effluent standards, as well as monitoring waste water quality, prosecuting offenders. Data related the water audit is collected by circulating questionnaires, to the management. It includes Bathroom, Toilet, Laboratory, Kitchen, Garden, Shower, Drinking, Washing, etc. sites in college campus and water consumption on these sites were studied.

1. Break up Areas of premises

Open space 3 acres

Built up Area 7 acres

2. Present Source of Water from

Bore wells & their drawl

3. Number of Bore wells; open wells functioning

13 no's (12 no's in working & 1 no stand by)

4. Treated Water used for - Gardening and flush

5. Rain Water now like Collects in a pond/sump/well.

Figure 1: Water Cooler Slogan

5.1.1 Water source Bore-well details

Table 2: Bore-well details

Sl. No	Location	No's	Routed
1	Main Gate to Main Canteen	13	Main Sump for Purification

5.1.2 Water Main Storage- Sump details

Table 3: Storage-Sump details

Sl. No	Water Storage	Capacity in KLD
1	Fire Water Storage Tank	40
2	Raw Water Tank	200
3	Treated Water Tank	20

5.1.3 OHT/SUMP Details

Table 4: OHT/SUMP Details

Sl. NO	BLOCK	CAPACITY in LTR
1	Main Sump	200000
2		20000 R.0
3	Mahatma Gandhi	20,000
4	Rabindranath Tagore	5000
5		5000 R0
6		5000 R0
7	Jawaharlal Nehru	20,000
8		20,000
9	Bharathiyar	20,000
10		20,000
11	V O C	5,000
12		2000 R.0
13	Ganga - Hostel	20,000
14		20,000
15		5000 STP
16	Yamuna - Hostel	80000
17		40000
18		5000 R.0
19		5000 R.0
20	Anna poorna Mess	5,000
21		3000 R.O
22		1,000
23		500
24	Akshaya Mess	5,000
25		2000 R.O
26	Swimming Pool	5,000

5.1.4 Water cooler

Table 5: Number of Water Cooler Details

SL.NO	Location	No's
1	Mahatma Gandhi	6
2	Rabindranath Tagore Block	5
3	Jawaharlal Nehru Block	5
4	Bharathiyar Block	4
5	V.O. Chidambaram	5
6	Ganga Hostel	7
7	Yamuna Hostel	7
8	Work shop 3 & 4	2
9	Library	1
10	Ladies Hostel	1
11	SIC	3
12	Canteen	10
	Grand Total	56

5.1.5 Restrooms, Urinals, Bath rooms, Wash basin

Academic Block

Table 6: List of Restrooms, Urinals, Bath Rooms and Wash Basin

SL. No	BLOCK	GENTS	LADIES	WASH BASIN	URINALS
1	Mahatma Gandhi	6	2	33	
2		6	1		
3		6	1		
4		6	2		
5	Rabindranath Tagore	3		17	4
6		2	1		7
7		1	1		6
8		2	1		6
9		2	1		5
10	Jawaharlal Nehru	8		15	
11		5	1		5
12		5			5

SL. No	BLOCK	GENTS	LADIES	WASH BASIN	URINALS
13		5			5
14		2			1
15	Bharathiyar	5		29	5
16		5	1		5
17		3	2		5
18		1			1
19	Vivekananda	2	1	5	2
20		2			
21	V.O. Chidambaram	5	4	33	
22		3	3		
23		5	1		
24		5	1		
25		5	1		
26	SIC	2	1	6	8
	Total	**102**	**26**	**138**	**70**

Ganga Hostel -1

Floor	Bathroom	Rest Room	Urinal	Washbasin
Ground	18	18	6	10
1St Floor	18	18	6	10
2nd Floor	18	18	6	10
3rd Floor	18	18	0	8
4th Floor	8	14		3
5th Floor	8	15		
6th Floor	2	2		2
Total	**90**	**103**	**18**	**46**

Yamuna Hostel- II

Floor	Bathroom	Rest Room	Urinal	Washbasin
Ground	18	18	3	16
1St Floor	18	18	3	16
2nd Floor	18	18	3	16
3rd Floor	18	18	3	16
4th Floor	18	18	3	16
5th Floor	18	18	3	16
6th Floor	18	18	3	16
Total	126	126	21	112

5.1.6 Sewage treatment plant

Sewage treatment plant has a total design capacity of 530 KLD flow rate per day, which is approximately 3 times of the maximum expected daily output. The treated water is used for gardening and flushing of toilets in hostel blocks. The plant is maintained through Annual Maintenance Contract. The quality of treated water is certified by NABL accredited labs. The campus is facilitated by continuous water supply. The STP treated water test report of analysis from the NABL accredited laboratory is attached in the annexure. The Treated water results are under the Tolerance limit as per TNPCB (Tamil Nadu Pollution Control Board).

Figure 2: Sewage Treatment Plant

Treated Water Test Result

Table 7: Treated Water Test Result

SL.NO	Parameters	Results	TNPCB Limits
1	pH	7.44	5.5-9
2	TSS	10	30
3	TDS	1380	2100
4	COD	64	250
5	BOD	7	20
6	Chlorides	358	1000
7	Sulphates	118	1000
8	Oil and Grease	<1.0	10

5.1.7 Rain water Harvesting

Table 8: Rain Water Harvesting

Rain water Harvesting Areas		
SL. NO	WORK DESCRIPTION	LOCATION
1	Rain Water Harvesting	MahatmaGandhi Block- North wing
2		MahatmaGandhi Block- South wing
3		Rabindranath Tagore Block - East wing
4		Rabindranath Tagore Block - North wing
5		Yamuna Hostels - East Wing
6		Yamuna Hostels - North Wing
7		Yamuna Hostel - south wing
8		Yamuna Hostel - Indoor badminton court
9		Bharathiyar Block

5.1.8 Recommendations

- The Sewage treatment plant has to be recommended to upgrade for better sludge management.
- The effective sludge management may enhance the yield of bio fertilizer which helps for gardening.
- Need of monitoring, controlling overflow from the storm water drains to the public sewer is to be avoided. It is recommended that maximum retention of water shall be within the campus and excess water shall be let to the public sewer.
- Ensure that all cleaning products used by college staff have a minimal detrimental impact on the environment.
- The STP is to be upgraded for the best utilization of the water for bathing by incorporating UF-Ultra Filtration.

5.2 Waste Audit

- E-wastes- computers, electrical and electronic parts – Disposal by selling/Exchange (Vendors)
- Plastic waste –Disposal by selling (milk covers, Plastic covers – Source segregation)
- Solid wastes – Disposal to Pig farm (Canteen and Mess waste) – as per the Solid Waste Management Hierarchy.
- Paper Waste- Recycling
- Chemical wastes – Laboratory waste – STP
- Waste water – STP
- Glass waste – Recycling

At present wastes are generated from the Garden, Mess, College, Hostel, Sweeping areas and Stores sections .The source Segregation of the waste from the entry level at each stage was done. The Food waste generated at the Mess was given to the pig farms in the daily basis. The garden waste was collected by the sweepers in the daily basis and disposed. Bottles, plastic covers & Plastic materials, cans, broken glass wares, tins etc., may be recycled or sold out. For both the boys and girls hostel provided with the bin. In the campus verandah, all blocks, Parking etc.., are located for the collection of waste. Large trolleys are operated by management for the collection of waste from their source. This waste production and disposal of different wastes like paper, food, plastic, biodegradable, construction, glass, dust etc and recycling. Solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Solid waste generation and management is a need of the hour issue. Unscientific handling of solid waste can create threats to everyone. The survey focused on volume, type and current management practice of solid waste generated in the campus. The different solid wastes collected as mentioned above. Letter of Appreciation from ITC on recycling of Paper is attached in the annexure.

The total solid waste generated is estimated to be 1250 Kg per day. Out of which the quantity of food waste is 40% of total waste i.e 500 Kg per day. From this food waste is offered as a donation to Pig farm. The main dry waste is Paper waste, glass, cardboards, etc. Others are E-waste, tree

droppings and lawn management. The waste is segregated at source by providing separate dustbins for Biodegradable and Plastic waste. Segregation of chemical waste generated from the laboratories is spent chemicals, chemicals that are out of date of expiry which were sent to the supplier back. Single sided used papers reused for writing and printing in all departments. Important and confidential reports/ papers are sent for pulping and recycling after completion of their preservation period. Very less plastic waste (0.1Kg/day) is generated by some departments, office, garden etc., but it is neither categorized at point source nor sent for recycling. Metal waste and wooden waste is stored and given to authorized scrap agents for further processing. Few glass bottles are reused in the laboratories.

Figure 3: Dustbin for different kinds of waste

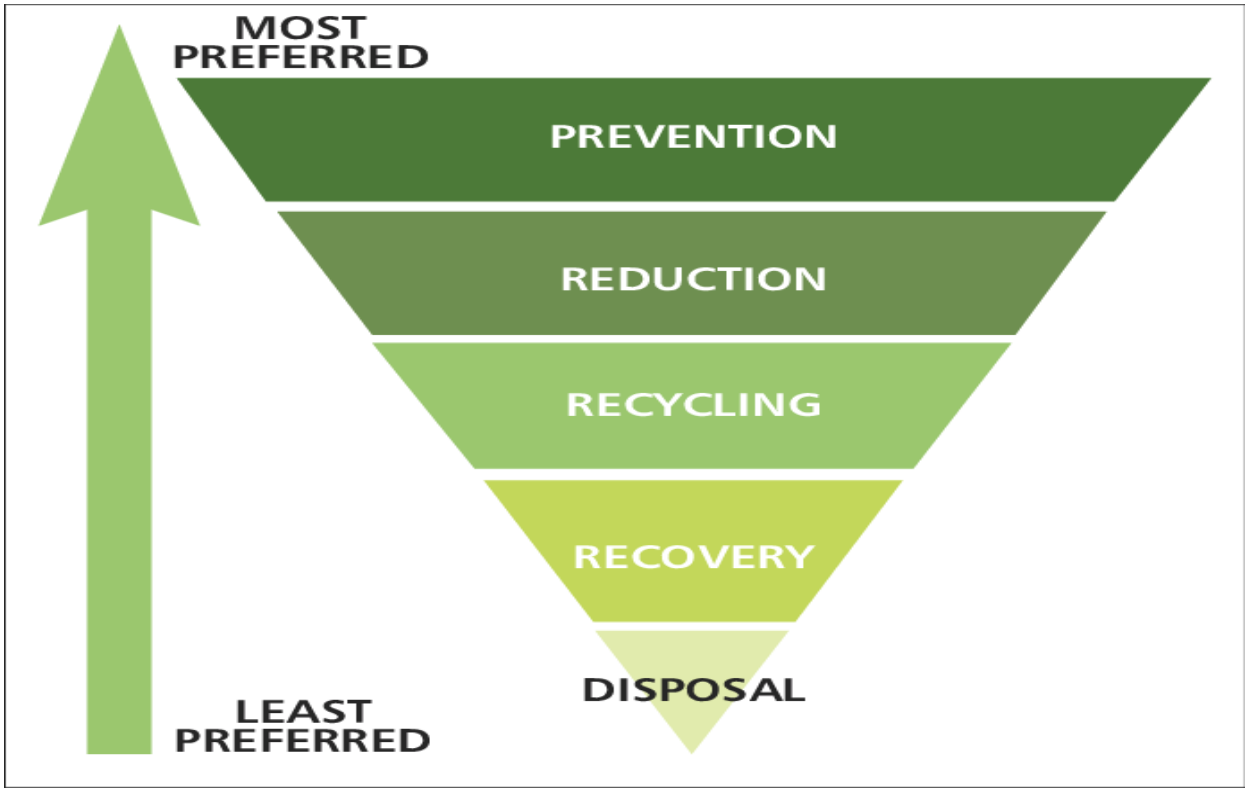


Figure 4: The Solid Waste Management Hierarchy

5.2.1 Paper Waste management

Paper Waste Management Was carried out by signing an MOU with WOW (Wellbeing out of Waste) an ITC initiative. Paper waste generated by the institution was source segregated throughout the campus and handed over to the WOW program. During the financial year 2019-2020 AMET has contributed for recycling 12336 Kg of dry recyclable waste through WOW program and obtained a certificate of Appreciation from ITC.

5.2.2 Compost unit

Organic Waste such as kitchen waste and dry yard waste are collected and sorted at source of generation throughout the institution. The segregated kitchen and Yard waste are collected and transported to the composting pit. There are three composting pit each of 50 kg capacity, the waste dumped in the compost pit are turned at a frequency of three days to keep the compost

aerated after the period of maturation and curing the compost is used as manure for the development of green belt.

Figure 5: Compost pit with kitchen waste and yard waste

5.2.3 Bio Gas Plant

Collection of Food Waste:

The food waste generated throughout the institution mainly from the hostels and from the canteen is transfer through proper¬ conveyance. The samples are physically assessed and to consist of the following mixture: Cooked¬ Rice waste in major portion, Vegetable Peelings and Greens/Spinach, etc. All samples along with kitchen waste were analysed for pH, COD, C/N ratio, total¬ solids (TS) and volatile solids (VS) contents according to the standard methods of American Public Health Association (APHA).

Preparation of Feedstock:

After receiving the waste to the treatment plant through conveyance, the presence of any other non-biodegradable wastes are present that will be remove by using sized meshes. After Screening for non biodegradables the biodegradable wastes were shredded and grinded well; using a mixer and it is made into a homogenous mixture in a container. The feedstock included homogenization in a blender, diluting with water and feeding inside the digester tank. The food wastes were grinded and mixed thoroughly with inoculum. The mixture is then thoroughly mix with water and this will be used as a feedstock

Feeding of the Digester:

The digester is filled with two third of its capacity with food waste and inoculum in definite proportion. The digester was operated in batch mode where the feeding was done in batch mode.

Limiting Factors:

Anaerobic bacteria ferment biodegradable matter into methane (40-70%), carbon dioxide (30-60%), hydrogen (0-1%) and hydrogen Sulphide (0-3%). The ideal process temperature for the fermentation process is at about 35°C, which might require additional heat or insulation of the digester in regions with daily or seasonal temperature fluctuations.

Biogas production depends on the availability of sufficient biomass feedstock, water and space for the digester. As the biogas cannot be transported over long distances, the digester has to be placed close to the user, which requires sufficient space.

The biogas accumulates at the top of the tank where it is collected and taken by pipe to the user. The slurry has to be removed regularly from the tank. It can be used further, e.g. as agricultural fertilizer.

The complex fermentation process in the biogas plant needs a continuous supply of suitable feedstock. It requires a continuous supply of water all year round, which can be a limiting factor. Once gas formation starts, to feed the food waste to the digester is important at regularly. But the big question is how much waste can feed? Here, the capacity of digester is 1000 litres. So the feed about nearly 50 L of homogenised waste in this plant daily.

Figure 6: Biogas Plant of capacity 5m3 per day

AREA REQUIRED FOR SETTING UP THE BIOGAS PLANT 5.0 M3

8.0 Ft (Length) x 7.0 Ft (Breadth) x 7.0 Ft Height

(b) DETAILED LIST OF EQUIPMENTS PER PLANT [5.0M3 / DAY]

S.No	Name of the Equipment	Technical Specification	Quantity
1.	5.0 M^3/Day Biogas Plant-Digester & Biogas holder (2.2M Dia X 2.1M Height)	4.5M^3Digester thickness 5.0 mm 3.5M^3 Gas Holding thickness 4.0 mm	1 No
2.	Biogas Canteen Burner	Single Stove	2 No's
3.	Gas Pipeline	Nylon threaded gas hose pipeline & Ball valve connection	Up to 5 Meters Max.
4.	Installation and commissioning	As required	Lot

5.	Water line and cow dung feeding to biogas plant	Cow Dung + Water Content (1:1 Ratio)	Lot
6.	Earth Excavation	As required	Lot
7.	Initial cow dung feeding to biogas plant for First gas generation	2000 Kg to 2300 Kg	Lot

(C) TECHNICAL SPECIFICATION FOR 5.0M^3 / DAY OF BIOGAS PLANT

Biogas Plant Model	**Specifications**
Biogas Plant Type	Biogas plant- Water seal model
Feed stock	50KG/Day Food Waste
Bio-Digester Output	
Biogas production (M^3 / day)	~ 5
Average Gas Calorific Value (Kcal/NM^3)	~ 4,700
Organic Manure Generated (Lit/Day)	~ 60 to 80
Biogas Equivalent to LPG	
5.0M^{3}Biogas equivalent to LPG (kg/day)	~ 2.0 to 2.25
5.0M^{3}Biogas equivalent to LPG(kg/Month)	~ 60 to 67.5

RETURN ON INVESTMENT (R O I):

Biogas Plant

- ✓ 5.0M^3 X 30 days = 150M^3/Month
- ✓ 150M^3 = 67.5KG of LPG
- ✓ Domestic Cylinder Weight 14.5Kg,
- ✓ So, 67.5Kg/14.5Kg= 4.6 Cylinder Saving per Month

- ✓ Domestic Cylinder cost (Rs) = 1000
- ✓ 4.6 X Rs.1000 = Rs.4600 savings per month
- ✓ Total Savings per year [Rs.4600/- X 12) = Rs.55,200

5.2.4 E-waste

Generation of E-waste is apparent at every college. In academic colleges there are several equipment's and instruments running in administrative as well as in various departments used for educational activities. Computers, Printers, Scanners, Xerox machines are mostly used for administrative work. At time of teaching, learning and evaluation in academic college we deal with electric material, electric equipment's/ instruments ,measuring instruments, different electric circuits, wires, ICs, Microprocessors, PCBs, electronic components(like resistors, diodes, transistors, transformers, inductances, relays, etc.),damages instruments, hardware's and peripherals of computer system, lighting equipment's (like Bulbs, tube, fans) all these include in E-wastes. The E-Waste generated from the college premises from the above said items is disposed through government authorized E-waste unit- *LEELA TRADERS*. Maximum amount of E-Waste is not generated; all the products are bought by Buy-Back Process.

5.2.5 Recommendations

- The waste should be reused or recycled at maximum possible places.
- Glass waste should be disposed properly and sent for recycle.
- Provide sufficient, accessible and well-publicized collection points for recyclable waste, with responsibility for recycling clearly allocated.
- Segregation of waste at the source is to be implemented. Source segregation prevents the maximum accumulation of mixed wastes.
- The E-Waste is disposed through government authorized E-waste unit- *LEELA TRADERS.*

5.3 Green Campus

This includes the plants, greenery and sustainability of the campus to ensure that the buildings conform to green standards This also helps in ensuring that the Environmental Policy is enacted,

enforced and reviewed using various environmental awareness programs.

The campus has 80 species of trees. At least 50 different types of trees can be planted in the campus every year. Area demarcated for the establishment of a gardens of medicinal plants, paddy field and vegetable garden, the extent of which may be increased. Various tree plantation programs are being organized during the month of July and August at college campus and surrounding villages through ECO Club. This program helps in encouraging eco-friendly environment which provides clean air within the institute and awareness among students. The plantation program includes various types of indigenous species of ornamental and medicinal wild plant species planted in Herbal garden and maintained by ECO Club & Department of Bio-technology. Through the efforts from the Eco club totally, 2.5 Acers of land was maintained as green belt within the campus.

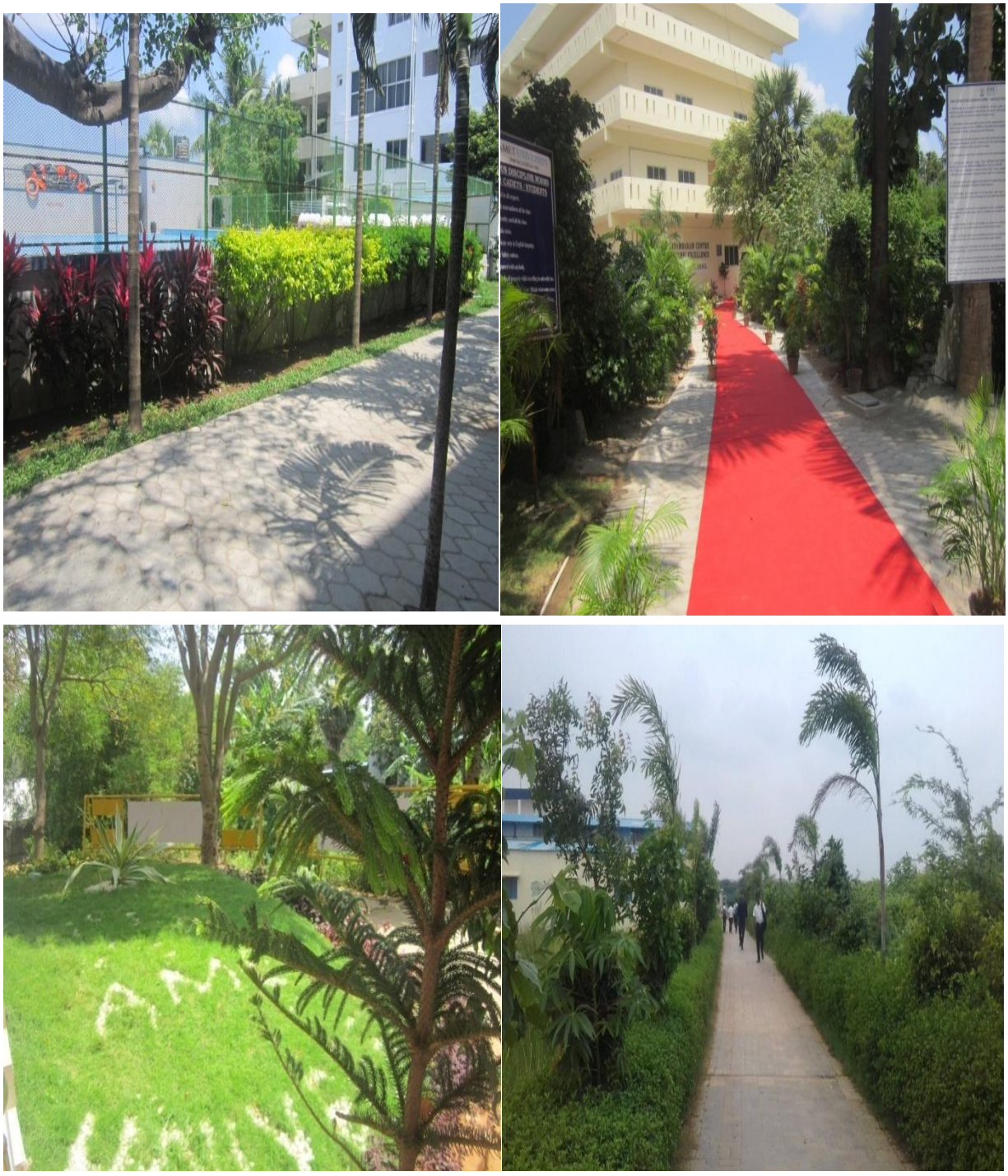


Figure 7: Green Campus

5.3.1 Herbal Garden- Initiative by Eco Club

Figure 8: Herbal Garden

5.3.2 Indoor Gardening Details

Indoor plants are commonly used for their aesthetics benefits but they also have vital role reducing airborne pollution. The right choice of plants can be an excellent way of improving indoor air quality and general health. Local landscape contractor can be contacted for supply and rotation of these plants.

Suggestions:

Table 9: List of Recommended Plants

Plants	VOC it removes	Indoor source of VOC's	Plant care
 **Aloe Vera**	Formaldehyde, Trichloroethylene and Benzene	Chemical based cleaners and paints	Easy to grow with enough sunlight
 **Bamboo Plant**	Formaldehyde, Trichloroethylene and Benzene	Paints, Plastics, Wood products etc.	Thrives under low light conditions as well as easy to maintain

Plants	VOC it removes	Indoor source of VOC's	Plant care
 **Chinese Evergreen**	Benzene	Paints	Low maintenance plant that prefers low light conditions.
 **English Ivy**	Formaldehyde, Benzene, Air borne fecal matter particles	Wood, Paper products, Air borne fecal – matter particles from pests	Easy to maintain

5.3.3 Eco club

Eco club formed under the supervision of Department of biotechnology and involved in various eco friendly activities such as planting trees inside the college campus and villages around the college campus. Cleaning up of Coastal areas nearer to the college encouraging eco-friendly environment which provides clean air within the institute and awareness among students

Figure 9: Cleaning up of the Coastal Area around the College Campus by Eco club Members

5.3.4 Recommendations

- Plant Indoor Gardening plants like Aloe Vera, Bamboo and listed above to address indoor

air pollution.

- Plant variety of species in Herbal garden to promote eco diversity.
- Utilization of sprinklers can be increased inside the campus.
- Promote environmental awareness as a part of course work in various curricular areas, independent research projects, and community service.
- Create awareness of environmental sustainability and takes actions to ensure environmental sustainability.
- Ensure that an audit is conducted annually and action is taken on the basis of audit report, recommendation and findings.
- Reviews periodically the list of trees planted in the garden, allot numbers to the trees and Keep records.

5.4 Carbon Footprint

Feasible emission inventories are to be selected to analyze the Carbon footprint of the campus. The inventory survey is to be done for one academic year. The selected inventories are Human Factor, Transportation, Electricity, Solid Waste, Production and Consumption of Food, LPG, Natural Gas, Buildings.

Data keepers are identified and the primary details are collected. Parameter wise and zone wise details are collected. The received data are assembled and the missing gaps are recognized. Zone division is pictorially depicted.

5.4.1 Human Factor

Carbon dioxide emitted by a person per day is not negligible. It is equivalent to the emission of a car in a 5km stretch. Humans emit 26 giga tons of carbon dioxide per year while CO2 in the atmosphere is rising by only 15 giga tones per year. Just for breathing, humans emit per person each day 1140 grams of CO2, assuming that they eat normally and follow a mean diet of 2800kcal.

The population details of each zone include the total number of teaching faculty, non-teaching

staff and students. The carbon dioxide emissions will be larger in the Zone having highest population.

Figure 10: Zebra Crossing

5.4.2 Transportation

Fossil fuels are used for transportation. The carbon dioxide emitted by different fuels is in different amounts. The engine of the vehicle burns fuel and creates a certain amount of CO2, depending upon its fuel type, fuel consumption and the driving distances. One liter of petrol and diesel emits 2.3kg and 2.7kg of carbon dioxide, respectively. Travelling by car for 1000km can produce about 200-230kg of carbon dioxide into the atmosphere. If a person travels by a bus for 1000km, it can add 1075kg of CO2 to his/her Carbon footprint. Worldwide, the fossil fuels used for transportation contribute over 13% of GHG emissions.

The transportation details for the college campus include the type of vehicle, No. of vehicles and the fuel used. The details give us the idea that the vehicles' using petrol or diesel as the fuel is more in the college premises. The carbon dioxide emitted from petrol is less compared to that of diesel. The Carbon footprint by the emission inventory transportation will be quite high. Zone-wise details of transportation are to be surveyed.

5.4.3 Conventional Transport system within the campus

The institution has arranged for conventional transport system facility to be used by the teaching and non teaching staff within the campus. This facility includes 30 numbers of Bi-Cycles and one battery operated vehicle of six feet length with 6 seater capacity.

5.4.4 No vehicle Day

AMET Deemed to be university observing no vehicle day yearly once to develop awareness among the student and the staff about the carbon foot print and green house gas emissions from the vehicles. On this day the management instructed the student and staff to use the common transport arranged by the Institution and also they can use only cycles as private mode of transport on the particular day. This has gained a mass momentum from the students eagerly participating the program with the bicycles.

5.4.5 Solid Waste

Generally, 1kg of solid waste is generated per capita per day. For high income countries, the solid waste generation is 1.1-5kg per capita per day. For middle income countries, it is 0.52-1kg and

for low income countries the value is 0.45-0.89kg/capita/day. One kilogram of solid waste can emit about 0.125kg of carbon. The details regarding the solid waste generated in each zone is collected including the waste produced in canteen and hostels.

The solid waste generated in the canteen and hostel which is taken out of the campus comes under other indirect emissions. Solid Waste emits less amount of carbon dioxide compared to other emission inventories considered.

5.4.6 Food Production and Consumption

Food is one of the consumption categories which cause the highest environmental impact on the climate. According to the study conducted by the European commission (2006), the food and drink category causes 20-30% of the various environmental impacts of total consumption. Worldwide, agriculture contributes to nearly 14% of total GHG emissions.

The Carbon footprint of an average diet is 0.75 tons CO2-eq, without accounting for food transportation. The amount of GHGs produced by the production of food differs much from one food type to other. Meat products have a larger Carbon footprint than fruits, vegetables and grains. The Carbon footprint of an average meat eater is about 1.5 tons CO2-eq larger than that of a vegetarian. Consumption details of different zones are collected for the carbon foot print analysis.

5.4.7 LPG and Natural Gas

The consumption of one liter of LPG can release 1.5kg of carbon dioxide to the atmosphere. Also burning of wood (250kg) can add 33kg of carbon dioxide to the Carbon footprint. The consumption details of LPG and Natural Gas in canteen and hostels are surveyed.

5.4.8 Carbon Footprint Analysis

Carbon footprint analysis can be done by suitably combining data collected with respective emission factor of the selected emission inventories. Table represents emission factors of the selected inventories.

Human Factor- 3690(Students) +729(staffs) +150(Visitors Approx) = 4569

Diesel & Petrol – 2853.9 L/d (Approx)

Solid waste -1300 -1500 kg/d (Approx)

LPG - 19.5 * (15- 17) no's = 292.5kg/d

Table 10: Emission Inventory and Co_2 Emitted

Sl. No	Emission Inventory	CO_2 Emitted
1	Human Factor	1.14kg per person per day
2	Petrol	2.3 kg per liter
3	Diesel	2.7kg per liter
4	Electricity	0.68956kg per kwh
5	Solar based Electricity	0.05kg per kwh
6	Solid Waste	0.125kg per kg
7	LPG	1.5kg per kg
8	Natural Gas	0.775kg per kg

The total carbon footprint of campus is determined, zone-wise and on the whole. Values are tabulated below as shown in Table. Total CO_2 emission from a college Campus.

Table 11: Co_2 Emission from College Campus

Sl. No	Emission Inventory	TOTAL (metric tons)
1	Human Factor	5.2
2	Transportation	2.8
4	Solid waste	0.112
5	Food	0.06
6	LPG	0.438
	Total	**8.61**

Note: The entry of the values will be based on the emission inventories of various zones and the emission factor of each inventory.

5.4.9 Carbon Offsetting

The following effective measures can be suggested to reduce the present carbon footprint value in

the next academic year.

5.4.10 Human Factor

Avoid rampant consumerism.

5.4.11 Transportation

- Use energy efficient fuels for transportation, especially in the case of college & school buses.
- Use vehicles adhering to emission norms.
- Purchase vehicles with competitive mileage & fuel efficiency.
- Parking of college bus, staff vehicle, student vehicle is inside the campus. Movement of vehicle during morning and evening inside the campus is high and so is the pollution.
- Encourage use of public transport facilities.
- Car pooling can be encouraged.
- Ensure proper inflation of vehicle tyres.
- Use of Bicycles can be encouraged.
- Encourage walking when it comes to short distances.
- Remove unnecessary weight from vehicles.
- Use unleaded petrol in vehicles..

5.4.12 Solid Waste

- Avoid wasting paper.
- Avoid burning of paper waste.
- Recycle waste if possible.
- Reuse resources whenever possible.
- Adopt proper waste management techniques

5.4.13 Production & Consumption of Food

- Do not waste food items.
- Avoid wastage in kitchen.
- Use local and seasonal fruits & vegetables.
- Reduce use of non-vegetarian food.
- Encourage use of organic food

5.4.14 LPG

- Use LPG efficiently.

5.4.15 Natural Gas

- Use of Biogas made from waste can be encouraged.
- Use Natural Gas efficiently.

5.4.16 Conclusion

Analysis of the Carbon footprint is basically a fair evaluation of the Carbon dioxide potency in the region under study. This gave us an idea as to how contaminated our environment is. It also provided us with the details regarding the amount up to which the inventories affect emission levels, helping us to know how and up to what extent each of our actions effect changes in the environment. This study is a sure shot that would help us realize and look back at each of our activities, and how exactly it have changed the very world we inhabit. The scope of such a study is very much relevant in the current scenario of rising CO_2 levels in our very own ecosystem.

The Carbon footprint is to be treated seriously as a quantitative yield of the quality of our very own surroundings. Necessary activity monitoring can be followed to contribute to the wellness of the planet in our own little ways. Awareness and Commitment can go a long way in keeping our environment clean. This study was undertaken with the sole motive to identify those factors that contribute to the excessive CO_2 emission, and to suggest measures that are to be put into practice for a cleaner, greener tomorrow.

5.5 Preparation of Action Plan

Policies referring to college's management and approaches towards the use of resources need to be considered. The college should have a green policy/environmental policy for its sustainable development. The environmental policy formulated by the management of the college should be implemented meticulously. The college should have a policy on awareness rising or training programs and college also should have a procurement policy.

5.6 Follow Up Action and Plans

Green Audits are exercises which generate considerable quantities of valuable management information. The time and effort and cost involved in this exercise is often considerable and in order to be able to justify this expenditure, it is important to ensure that the findings and recommendations of the audit are considered at the correct level within the organization and that action plans and implementation programs result from the findings.

Audit follow up is part of the wider process of continuous improvement. Without follow-up, the audit becomes an isolated event which soon becomes forgotten in the pressures of organizational priorities and the passing of time.

5.7 Environmental Education

The following environmental education program may be implemented in the college before the next green auditing:-

- Training programs in solid waste management, liquid waste management, setting up of medicinal plant nursery, water management, tree planting, energy management, landscape management, pollution monitoring methods, and rain water harvesting methods.
- Increase the number of display boards on environmental awareness such as – save water, save electricity, no wastage of food/water, no smoking, switch off light and fan after use, plastic free campus etc.
- Activate the environmental clubs
- Set up model rainwater harvesting system, rainwater pits, vegetable garden, medicinal plant garden etc. for providing proper training to the students.
- Conduct exhibition of recyclable waste products.

6 CHAPTER

6.1 Audit Conclusion

The green audit for AMET Deemed to be University, ECR, Chennai-603 112, brings out the commitment on Environment with a greater notification by the management and teaching professionals and student community. The audit has show a significance in micro water management with proper water usage and key areas of the hostels, classrooms and laboratory and the waste water treatment and reuse has shown the way for the institution for its environmental and social responsibility to the greater extend. The green campus motivation with different plant species with a large and micro level of tress helps to reduce the impact of carbon and other pollutant specific absorption through the plantation is significant initiatives. The carbon foot print also balanced from the green plantation to absorb CO_2 and reduction through bicycle usage within the campus.

I would like to appreciate the team effort and the commitment by the management for such a great campus activity.

Table 12: Transportation Details

S. No	Vehicle No	Make	Facility	Seating Capacity	Purpose
1	TN 10M 5225	Eicher	Non A/C	62 Seater	Staff & Student/Pick up
2	TN 36H 5757	Leyland	Non A/C	58	Staff & Student/Pick up
3	TN 22AU 8590	Leyland	Non A/C	50	Student Pick up/Hostel
4	TN 22AU 4231	Leyland	Non A/C	50	Staff & Student/Pick up
5	TN 19J 8338	Leyland	Non A/C	50	Staff & Student/Pick up
6	TN 19J 8392	Leyland	Non A/C	50	Staff & Student/Pick up
7	TN 19J 8700	Leyland	Non A/C	48	University Purpose
8	TN 19J 8636	Leyland	Non A/C	48	Staff & Student/Pick up
9	TN 10AA 3328	Swaraj Mazda	Non A/C	41	Student Pick up/Hostel
10	TN 19F 7584	Eicher	Non A/C	41	Staff & Student/Pick up
11	TN 19H 4176	Eicher	Non A/C	41	Staff & Student/Pick up
12	TN 19K 9492	Eicher	Non A/C	41	Staff & Student/Pick up
13	TN 10T 4997	Eicher	Non A/C	32	Student Pick up/Hostel
14	TN 10X 7371	Eicher	Non A/C	25	Student Pick up/Hostel
15	TN 19A 7149	Tempo Traveller	A/C	13	H.O.D/Pickup
16	TN 19E 1543	Tempo Traveller	A/C	13	H.O.D/Pickup
17	TN 19H 5367	Tempo Traveller	A/C	13	H.O.D/Pickup
18	TN 22DB 3120	Tempo Traveller	A/C	13+1	University Purpose
19	TN 02UB 2030	Innova	A/C	7+1	University Purpose
20	TN 19AB 2310	Ecco Ambulance	A/C	2+1	Ambulance

S. No	Vehicle No	Make	Facility	Seating Capacity	Purpose
21	TN 10BD 3290	Innova Crysta	A/C	4+1	Vice chancellor
22	TN 10AE 2939	Innova	A/C	6+1	University Purpose
23	TN 10BB 1422	Dzire	A/C	4+1	University Purpose
24	TN 10BB 1463	Swift	A/C	4+1	University Purpose
25	TN 10BB 1494	Ertiga	A/C	4+1	University Purpose
26	TN 10BB 1480	Ertiga	A/C	4+1	University Purpose
27	TN 10AK 0576	Corolla Altis	A/C	4+1	Joint Registrar
28	TN 10AZ 1570	Fortunar	A/C	6+1	Trustee
29	TN 10AX 1166	Innova Crysta	A/C	4+1	University Purpose
30	TN 10BD 3335	Innova Crysta	A/C	4+1	Managing Trustee
31	TN 10AQ 6575	Benz ML 250	A/C	4+1	President
32	TN 10AZ 3335	Land Rover	A/C	4+1	Trustee
33	TN 19AK 0456	Mahindra Thar	A/C	4+1	University Purpose
34	TN 02BQ 4356	Mahindra Bolero	A/C	7+1	University Purpose
35	TN 02BQ 5076	Ertiga Bs-5	A/C	7+1	University Purpose
36	TN 11AL 4387	Traveller	A/C	9+1	University Purpose
37	TN 02BR 1896	Innova Crysta	A/C	4+1	Pro VC
38	TN 02BR 3335	Honda CRV	A/C	7+1	Vice President
39	TN 10X 4608	Eicher Truck	Non A/C	Goods Vehicle	University Purpose
40	TN 10H 6998	Trax Load Zeep	Non A/C	Goods Vehicle	University Purpose

Table 13: Built-Up Environment Management

S. No	Department / Block	A	B	C	D	E	F	G	H	I	J
		Building Type	Area in Square Feet	Eco-Friendliness	Fire Prevention Provisions	Aesthetic Appeal	Serenity of Class Rooms	Ladies Restroom	Recreation Room	Provision for Disabled	Toilets- Men, Women, Differently-abled
1.	**V.O.C Block**										
	AMET Business School	C	8608	G	√	G	G	√	√	√	√
	HND Marine Engineering	C	9511	G	√	G	G	√	√	√	√
	Petroleum Engineering	C	10000	G	√	G	G	√	√	√	√
	Placement	C	450	G	√	G	G	√	√	√	√
	Day care Centre	C	2000	G	√	G	G	√	√	√	√
2.	**Rabindranath Tagore Block**										
	Chairman Office	C	6821	G	√	G	G	√	√	√	√
	Research Centre	C	6821	G	√	G	G	√	√	√	√
	Admission Cell	C	7133	G	√	G	G	√	√	√	√
	Workshops	C	8833	G	√	G	G	√	√	√	√
3.	**Mahatma Gandhi Block**										
	Marine Engineering	C		G	√	G	G	√	√	√	√
	Electrical and Electronic Engineering	C	14246	G	√	G	G	√	√	√	√

S. No	Department / Block	A	B	C	D	E	F	G	H	I	J
		Building Type	Area in Square Feet	Eco-Friendliness	Fire Prevention Provisions	Aesthetic Appeal	Serenity of Class Rooms	Ladies Restroom	Recreation Room	Provision for Disabled	Toilets- Men, Women, Differently-abled
	Naval Architecture & offshore Engineering	C	14700	G	√	G	G	√	√	√	√
	HND Nautical Science	C		G	√	G	G	√	√	√	√
	Marine Biotechnology	C	14300	G	√	G	G	√	√	√	√
	GMDSS	C	14246	G	√	G	G	√	√	√	√
	Marine Information Technology	C	14300	G	√	G	G	√	√	√	√
	Mathematics	C	2500	G	√	G	G	√	√	√	√
	Physics	C	4000	G	√	G	G	√	√	√	√
	Chemistry	C	4500	G	√	G	G	√	√	√	√
4.	**Jawaharlal Nehru Block**		5986								
	Harbor & Ocean Engineering	C	5907	G	√	G	G	√	√	√	√
	Health Centre	C	5400	G	√	G	G	√	√	√	√
	Canteen	C	5300	G	√	G	G	√	√	√	√
	Gymnasium	C	5800	G	√	G	G	√	√	√	√
5.	**Barathiyar Block**										
	Nautical Science	C	22100	G	√	G	G	√	√	√	√
	Canteen	C	5900	G	√	G	G	√	√	√	√
6.	**Vivekanandar Block**										

S. No	Department / Block	A	B	C	D	E	F	G	H	I	J
		Building Type	Area in Square Feet	Eco-Friendliness	Fire Prevention Provisions	Aesthetic Appeal	Serenity of Class Rooms	Ladies Restroom	Recreation Room	Provision for Disabled	Toilets- Men, Women, Differently-abled
	AMET Centre for IELTS	C	1900	G	√	G	G	√	√	√	√
	English	C	1800	G	√	G	G	√	√	√	√
	Cafeteria	C	1900	G	√	G	G	√	√	√	√
7.	**Ship in Campus**	C	22302	G	√	G	G	√	√	√	√
8.	**Library**	C	21300	G	√	G	G	√	√	√	√
9.	**Yamuna Hostel Block**	C	74600	G	√	G	G	√	√	√	√
10.	**Ganga Hostel Block**	C	47150	G	√	G	G	√	√	√	√
11.	**Akshaya Mess Block**	C	10100	G	√	G	G	√	√	√	√
12.	**PowerHouse**	C	450	G	√	G	G	√	√	√	√
13.	**Security**	C	200	G	√	G	G	√	√	√	√
14.	**Swimming Pool**	C	8300	G	√	G	G	√	√	√	√
Where G-Good, A-Average, P-Poor & C-CONCRETE TYPE BUILDING.											

Figure 11: Letter of Appreciation from ITC on recycling of Paper

LEELA TRADERS
(E-Waste Division)
Govt. Authorised E-Waste Unit
Plot No. C15/1, CMDA Industrial Complex, Maraimalai Nagar, Chengalpattu Taluk, Kancheepuram District - 603 209
Regd. Office : No.21/44, 1st Floor, Wallers Road, Chintadripet, Chennai - 600 002 Phone : 044-2842 0404

Sl.No. 0919010

Certificate of E-waste Destruction

This is to certify that the e-waste received from

ACADEMY OF MARITIME EDUCATION AND TRAINING (AMET) CHENNAI

vide MATERIAL GATE PASS dated 16/08/2019

has been disposed off in scientific and eco-friendly manner.

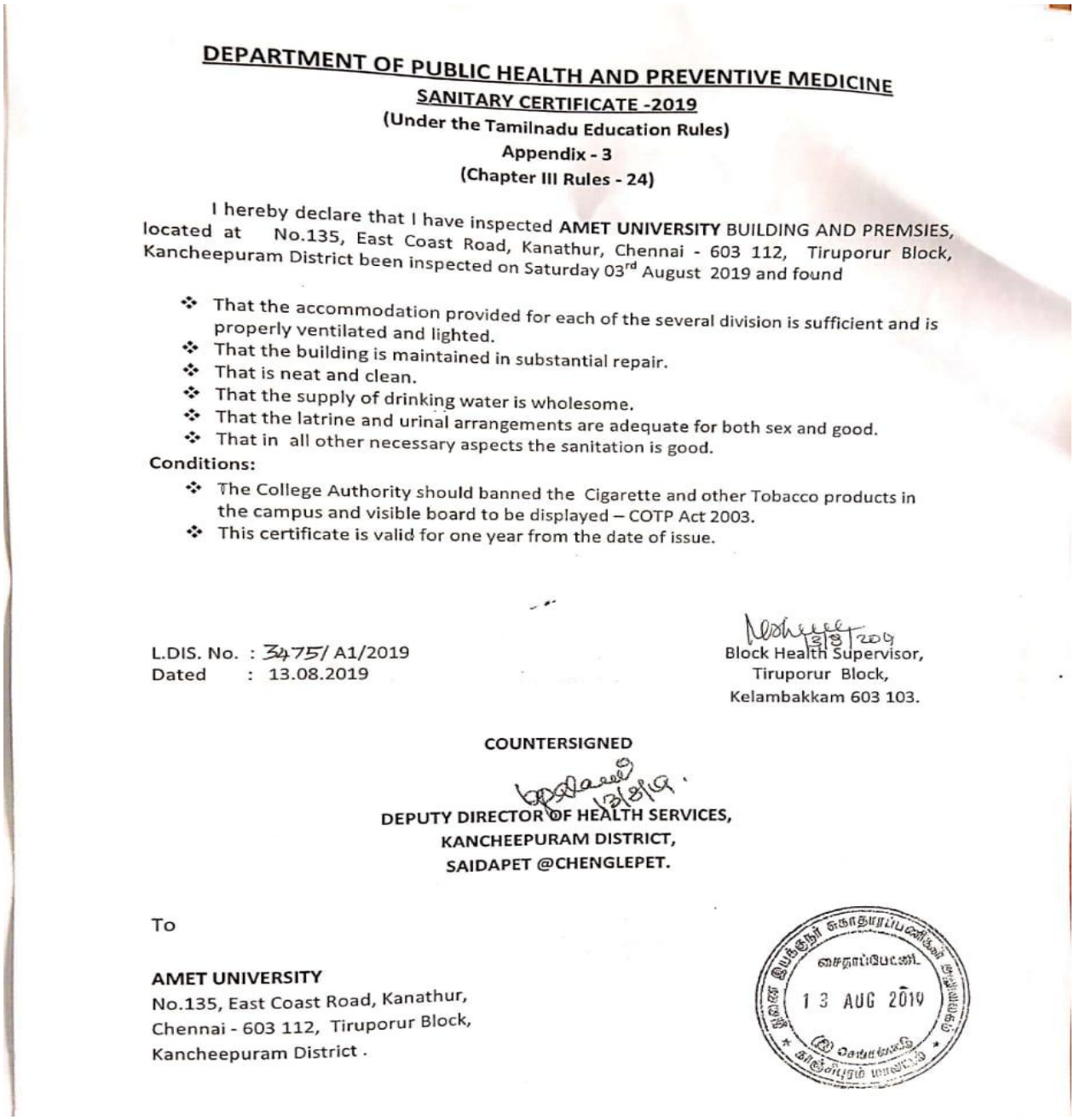
our Sincere thanks for your support in Green & Healthy environment

For LEELA TRADERS

Issuing Authority

Date : 30/09/19

Figure 12: Certificate of E-Waste Destruction



DEPARTMENT OF PUBLIC HEALTH AND PREVENTIVE MEDICINE

SANITARY CERTIFICATE -2019

(Under the Tamilnadu Education Rules)

Appendix - 3

(Chapter III Rules - 24)

I hereby declare that I have inspected **AMET UNIVERSITY** BUILDING AND PREMSIES, located at No.135, East Coast Road, Kanathur, Chennai - 603 112, Tiruporur Block, Kancheepuram District been inspected on Saturday 03rd August 2019 and found

- That the accommodation provided for each of the several division is sufficient and is properly ventilated and lighted.
- That the building is maintained in substantial repair.
- That is neat and clean.
- That the supply of drinking water is wholesome.
- That the latrine and urinal arrangements are adequate for both sex and good.
- That in all other necessary aspects the sanitation is good.

Conditions:

- The College Authority should banned the Cigarette and other Tobacco products in the campus and visible board to be displayed – COTP Act 2003.
- This certificate is valid for one year from the date of issue.

L.DIS. No. : 3475/ A1/2019
Dated : 13.08.2019

Block Health Supervisor,
Tiruporur Block,
Kelambakkam 603 103.

COUNTERSIGNED

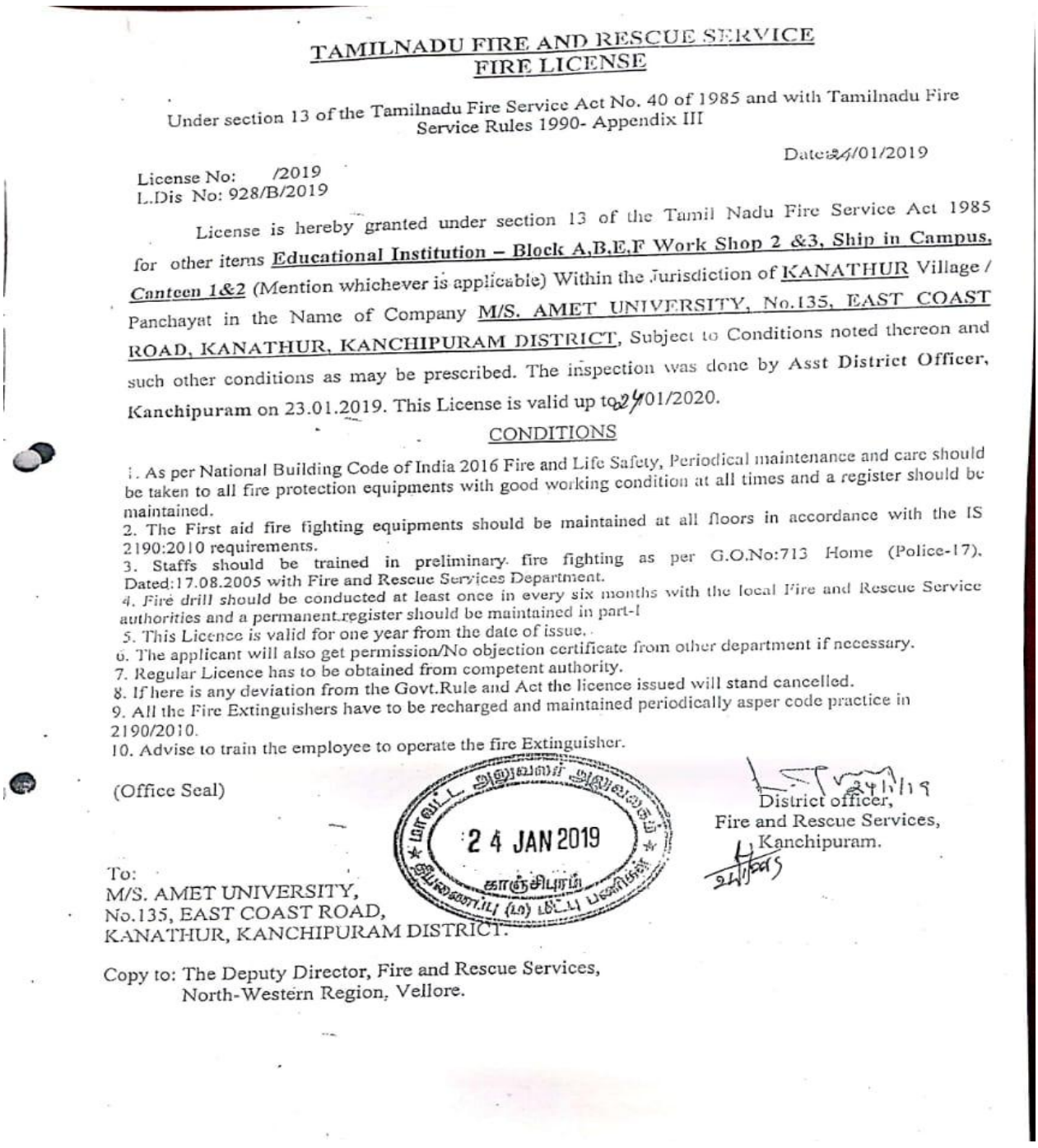
DEPUTY DIRECTOR OF HEALTH SERVICES,
KANCHEEPURAM DISTRICT,
SAIDAPET @CHENGLEPET.

To

AMET UNIVERSITY
No.135, East Coast Road, Kanathur,
Chennai - 603 112, Tiruporur Block,
Kancheepuram District .

13 AUG 2019

Figure 13: Sanitary Certificate issued by Department of Public health and Preventive Medicine



TAMILNADU FIRE AND RESCUE SERVICE
FIRE LICENSE

Under section 13 of the Tamilnadu Fire Service Act No. 40 of 1985 and with Tamilnadu Fire Service Rules 1990- Appendix III

Date:24/01/2019

License No: /2019
L.Dis No: 928/B/2019

License is hereby granted under section 13 of the Tamil Nadu Fire Service Act 1985 for other items Educational Institution – Block A,B,E,F Work Shop 2 &3, Ship in Campus, Canteen 1&2 (Mention whichever is applicable) Within the Jurisdiction of KANATHUR Village / Panchayat in the Name of Company M/S. AMET UNIVERSITY, No.135, EAST COAST ROAD, KANATHUR, KANCHIPURAM DISTRICT, Subject to Conditions noted thereon and such other conditions as may be prescribed. The inspection was done by Asst District Officer, Kanchipuram on 23.01.2019. This License is valid up to 24/01/2020.

CONDITIONS

1. As per National Building Code of India 2016 Fire and Life Safety, Periodical maintenance and care should be taken to all fire protection equipments with good working condition at all times and a register should be maintained.
2. The First aid fire fighting equipments should be maintained at all floors in accordance with the IS 2190:2010 requirements.
3. Staffs should be trained in preliminary fire fighting as per G.O.No:713 Home (Police-17), Dated:17.08.2005 with Fire and Rescue Services Department.
4. Fire drill should be conducted at least once in every six months with the local Fire and Rescue Service authorities and a permanent register should be maintained in part-I
5. This Licence is valid for one year from the date of issue.
6. The applicant will also get permission/No objection certificate from other department if necessary.
7. Regular Licence has to be obtained from competent authority.
8. If here is any deviation from the Govt.Rule and Act the licence issued will stand cancelled.
9. All the Fire Extinguishers have to be recharged and maintained periodically asper code practice in 2190/2010.
10. Advise to train the employee to operate the fire Extinguisher.

(Office Seal)

24 JAN 2019

District officer,
Fire and Rescue Services,
Kanchipuram.

To:
M/S. AMET UNIVERSITY,
No.135, EAST COAST ROAD,
KANATHUR, KANCHIPURAM DISTRICT.

Copy to: The Deputy Director, Fire and Rescue Services,
North-Western Region, Vellore.

Figure 14: Fire Licence certificate issued by Tamilnadu Fire and Rescue Service

Santhome Enviro services

NABL (ISO / IEC 17025:2005) Accredited &
(A CONSTITUENT BOARD OF QUALITY COUNCIL OF INDIA)
ISO 9001:2015 Certified Laboratory
L4/2, East Avenue Road, (Near SBI)Korattur, Chennai-600 080
Ph : 044 - 26871331 / Mob: 9791530069
Email ID: santhomeenviro@gmail.com | Website : www.santhomeenvirolab.in

NABL Cert No.TC-7144

BMQR

TEST REPORT

Sample Ref No. : SAS/W/249/09
Customer Name : M/s. AMET University

Report No. : 057/09
Report Date : 28.09.19
Page: 1 of 1

Sample Description : Sewage Water
Sample Drawn By/ Date : Customer /23.09.19
stomer's Reference : Eyar Water Tech (P) Ltd
ample Mark : STP Treated Water

Received On : 23.09.19
Commenced On : 23.09.19
Completed On : 28.09.19

Sl. No	PARAMETERS	UNITS	RESULTS	Tolerance limits for Treated Outlet as per TNPCB	TEST METHOD
1	pH value at 25°C	-	7.44	5.5 to 9.0	APHA 23rd Edn :2017 4500 H^+ B
2	Total Suspended Solids	mg/l	10.0	30	IS:3025: P.17:1984:R.2012
3	Total Dissolved Solids	mg/l	1380	2100	IS 3025:P.16:1984:R.2012
4	COD	mg/l	64.0	250	APHA 23rd Edn :2017 5220 B
5	BOD at 27°C for 3 days	mg/l	7.0	20	IS: 3025 P. 44 1993 R. 2009
6	Chlorides as Cl	mg/l	358	1000	APHA 23rd Edn :2017 4500 Cl B
7	Sulphates as SO_4	mg/l	118	1000	APHA 23rd Edn :2017 4500 SO_4^{2-} E
8	Oil & Grease	mg/l	<1.0	10	IS 3025 P.39 1991 R.2009

End of Report

Report Opinion: The above submitted water sample meets the TNPCB Standards.

For SANTHOME ENVIRO SERVICES

SANTHOME ENVIRO SERVICES Chennai 600 080

Verified & Authorized By
M.Maria Frank Omer – Quality Manager

NOTE: 1. Test results shown in this test report relate only to the items tested.
2. This test report shall not be reproduce anywhere except in full and in same format without the Approval of the laboratory
3. Unless informed by the customer the test items will not be retained for more than 10 days from The date of issue of test report (exceptional for Microbiology and wastewater for which retaining time 7 days.)

Figure 15: Report of analysis of Sewage

Santhome Enviro services

NABL (ISO / IEC 17025:2005) Accredited &
(A CONSTITUENT BOARD OF QUALITY COUNCIL OF INDIA)
ISO 9001:2015 Certified Laboratory
L4/2, East Avenue Road, (Near SBI)Korattur, Chennai-600 080
Ph : 044 - 26271331 / Mob. 9791530069
Email ID: santhomeenvi@gmail.com | Website : www.santhomeenvirolab.in

NABL Cert No.TC-7144

TEST REPORT

Sample Ref No. :SAS/W/ 440/06	Report No. :
Customer Name : M/s.AMET University	Report Date : 15.03719
Sample Description : Water Sample Drawn By/ Date : SAS/08.07.19 Customer's Reference : Letter Dated on 08.07.19 Sample Mark : Main RO	Received On : 08.07.19 Commenced On : 08.07.19 Completed On : 15.07.19

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
	Physical Properties					
1	*Appearance: When Analyzed After Filtration	-	 Clear Clear	 - -	 - -	-
2	pH value at 25°C	-	6.73	6.5 – 8.5	6.5 – 8.5	APHA 23rd Edn :2017 4500 H+ B
3	*Color	Hazen Unit	<1.0	5	15	APHA 23rd Edn :2017 2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	<1.0	1	5	APHA 23rd Edn :2017 2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	72.0	-	-	APHA 23rd Edn :2017 2510 B
	Chemical Properties					
7	Total Suspended Solids	mg/l	<1.0	-	-	IS:3025:P.17:1984:R.2012
8	Total Dissolved Solids	mg/l	36.0	500	2000	IS 3025:P.16:1984:R.2012

End of Page 1

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M Maria Evans Omer - Quality Manager

SANTHOME ENVIRO SERVICES Chennai-80

NOTE: 1. Test results shown in this test report relate only to the items tested,
2. This test report shall not be reproduce anywhere except in full and in same format without the Approval of the laboratory
3. Unless informed by the customer the test items will not be retained for more than 10 days from The date of issue of test report (exceptional for Microbiology and wastewater for which retaining time 7 days.)
4. "The parameter marked with an * are not accredited by NABL "

TEST REPORT – ADDITIONAL SHEET

Sample Ref No. : SAS/W/440/06

Report No. :
Report Date :15.07.19
Page: 2 of 2

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as $CaCO_3$	mg/l	4.75	200	600	APHA 23rd Edn :2017 2340 C
10	Calcium Hardness as $CaCO_3$	mg/l	4.82	-	-	APHA 23rd Edn :2017 3500 - Ca B
11	Magnesium Hardness as $CaCO_3$	mg/l	BDL (DL=1.0)	-	-	APHA 23rd Edn :2017 3500 – Mg B
12	Calcium as Ca	mg/l	1.64	75	200	APHA 23rd Edn :2017 3500 - Ca B
13	Magnesium as Mg	mg/l	BDL (DL=0.24)	30	100	APHA 23rd Edn :2017 2340 C
14	Phenolphthelein Alkalinity as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2320 B
15	Total Alkalinity as $CaCO_3$	mg/l	12.0	200	600	APHA 23rd Edn :2017 2320 B
16	Chlorides as Cl	mg/l	11.0	250	1000	APHA 23rd Edn :2017 4500 Cl B
17	Sulfates as SO_4	mg/l	BDL (DL=0.1)	200	400	APHA 23rd Edn :2017 4500 SO_4^{2-} E
18	Total Iron as Fe	mg/l	BDL (DL=0.04)	0.3	0.3	APHA 23rd Edn :2017 3500 Fe- B
19	Silica (Reactive) as SiO_2	mg/l	BDL (DL=0.04)	-	-	APHA 23rd Edn :2017 4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$	mg/l	5.37	-	-	APHA 23rd Edn :2017 2340 A
21	Non-Carbonate Hardness as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2340 A
22	Free Residual Chlorine	mg/l	<0.2	0.2	**1	APHA 23rd Edn :2017 4500 Cl B

BDL= Below Detectable Limit; DL= Detection Limit

End of Report

** To be applicable only when water is chlorinated.

Report Opinion: The above submitted water sample complies with drinking water specification as per IS 10500:2012 with respect to the above tests.

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
Manager Chemical Officer / Quality Manager

SANTHOME ENVIRO SERVICE Chennai-80

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Figure 16: Lab result for Main RO Water

Santhome Enviro services
NABL (ISO / IEC 17025:2005) Accredited &
(A CONSTITUENT BOARD OF QUALITY COUNCIL OF INDIA)
ISO 9001:2015 Certified Laboratory
L4/2, East Avenue Road, (Near SBI)Korattur, Chennai-600 080
Ph : 044 - 26871331 / Mob: 9791530969
Email ID: santhomeenviro@gmail.com | Website : www.santhomeenvirolab.in

NABL Cert No.TC-7344

TEST REPORT

Sample Ref No. :SAS/W/ 442/06	Report No. :
Customer Name : M/s.AMET University	Report Date : 15.07.19
Sample Description : Water Sample Drawn By/ Date : SAS/08.07.19 Customer's Reference : Letter Dated on 08.07.19 Sample Mark : Swimming Pool Water	Received On : 08.07.19 Commenced On : 08.07.19 Completed On : 15.07.19

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
	Physical Properties					
1	*Appearance: When Analyzed After Filtration	-	 Clear Clear	 - -	 - -	-
2	pH value at 25°C	-	8.40	6.5 – 8.5	6.5 – 8.5	APHA 23rd Edn :2017 4500 H+ B
3	*Color	Hazen Unit	<1.0	5	15	APHA 23rd Edn :2017 2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	<1.0	1	5	APHA 23rd Edn :2017 2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	3090	-	-	APHA 23rd Edn :2017 2510 B
	Chemical Properties					
7	Total Suspended Solids	mg/l	<1.0	-	-	IS:3025:P.17:1984:R.2012
8	Total Dissolved Solids	mg/l	2000	500	2000	IS 3025:P.16:1984:R.2012

End of Page 1

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Mary Ezhil Omar, Quality Manager

SANTHOME ENVIRO SERVICES Chennai-80

NOTE: 1. Test results shown in this test report relate only to the items tested.
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3. Unless informed by the customer the test items will not be retained for more than 10 days from The date of issue of test report (exceptional for Microbiology and wastewater for which retaining time 7 day
4. "The parameter marked with an * are not accredited by NABL "

TEST REPORT – ADDITIONAL SHEET

Sample Ref No. : SAS/W/442/06

Report No. :
Report Date :15.07.19
Page: 2 of 2

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as $CaCO_3$	mg/l	242	200	600	APHA 23rd Edn :2017 2340 C
10	Calcium Hardness as $CaCO_3$	mg/l	134	-	-	APHA 23rd Edn :2017 3500 - Ca B
11	Magnesium Hardness as $CaCO_3$	mg/l	108	-	-	APHA 23rd Edn :2017 3500 – Mg^{2+} B
12	Calcium as Ca	mg/l	54.0	75	200	APHA 23rd Edn :2017 3500 - Ca B
13	Magnesium as Mg	mg/l	26.0	30	100	APHA 23rd Edn :2017 2340 C
14	Phenolphthalein Alkalinity as $CaCO_3$	mg/l	45.0	-	-	APHA 23rd Edn :2017 2320 B
15	Total Alkalinity as $CaCO_3$	mg/l	240	200	600	APHA 23rd Edn :2017 2320 B
16	Chlorides as Cl	mg/l	653	250	1000	APHA 23rd Edn :2017 4500 Cl^- B
17	Sulfates as SO_4	mg/l	135	200	400	APHA 23rd Edn :2017 4500 SO_4^{2-} E
18	Total Iron as Fe	mg/l	BDL (DL=0.01)	0.3	0.3	APHA 23rd Edn :2017 3500 Fe- B
19	Silica (Reactive) as SiO_2	mg/l	14.0	-	-	APHA 23rd Edn :2017 4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$	mg/l	240	-	-	APHA 23rd Edn :2017 2340 A
21	Non-Carbonate Hardness as $CaCO_3$	mg/l	2.0	-	-	APHA 23rd Edn :2017 2340 A
22	Free Residual Chlorine	mg/l	<0.2	0.2	**1	APHA 23rd Edn :2017 4500 Cl B

BDL= Below Detectable Limit; DL= Detection Limit

End of Report

** To be applicable only when water is chlorinated.

Report Opinion: The above submitted water sample does not comply with drinking water specification as per IS 10500:2012 with respect to TDS.

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Maria Frank Omer, Quality Manager

SANTHOME ENVIRO SERVICES Chennai-80

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Figure 17: Lab result for Swimming pool water

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L4/2, East Avenue Road, (Near SBI)Korattur, Chennai-600 080
PH : 044 - 26571331 / Mob: 9791530069
Email ID: santhomeenviro@gmail.com | Website : www.santhomeenvirolab.in
NABL Cert No.TC-7144

TEST REPORT

Sample Ref No. :SAS/W/ 443/06	Report No. :
Customer Name : M/s.AMET University	Report Date : 15.07.19
Sample Description : Water Sample Drawn By/ Date : SAS/08.07.19 Customer's Reference : Letter Dated on 08.07.19 Sample Mark : RO Horizon	Received On : 08.07.19 Commenced On : 08.07.19 Completed On : 15.07.19

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
	Physical Properties					
1	*Appearance: When Analyzed After Filtration	-	 Clear Clear	 - -	 - -	-
2	pH value at 25°C	-	7.20	6.5 – 8.5	6.5 – 8.5	APHA 23rd Edn :2017 4500 H+ B
3	*Color	Hazen Unit	<1.0	5	15	APHA 23rd Edn :2017 2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	<1.0	1	5	APHA 23rd Edn :2017 2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	69.0	-	-	APHA 23rd Edn :2017 2510 B
	Chemical Properties					
7	Total Suspended Solids	mg/l	<1.0	-	-	IS:3025:P.17:1984:R.2012
8	Total Dissolved Solids	mg/l	35.0	500	2000	IS 3025:P.16:1984:R.2012

End of Page 1

For SANTHOME ENVIRO SERVICES

Verified & Authorized By
M Mona Frank Omar , Quality Manager

SANTHOME ENVIRO SERVICES Chennai-80

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TEST REPORT – ADDITIONAL SHEET

Sample Ref No. : SAS/W/443/06

Report No. :
Report Date :15.07.19
Page: 2 of 2

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as $CaCO_3$	mg/l	18.0	200	600	APHA 23rd Edn :2017 2340 C
10	Calcium Hardness as $CaCO_3$	mg/l	11.0	-	-	APHA 23rd Edn :2017 3500 - Ca B
11	Magnesium Hardness as $CaCO_3$	mg/l	7.0	-	-	APHA 23rd Edn :2017 3500 – Mg^{2+} B
12	Calcium as Ca	mg/l	4.40	75	200	APHA 23rd Edn :2017 3500 - Ca B
13	Magnesium as Mg	mg/l	1.68	30	100	APHA 23rd Edn :2017 2340 C
14	Phenolphthalein Alkalinity as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2320 B
15	Total Alkalinity as $CaCO_3$	mg/l	33.0	200	600	APHA 23rd Edn :2017 2320 B
16	Chlorides as Cl	mg/l	8.0	250	1000	APHA 23rd Edn :2017 4500 Cl^- B
17	Sulfates as SO_4	mg/l	BDL (DL=0.1)	200	400	APHA 23rd Edn :2017 4500 SO_4^{2-} E
18	Total Iron as Fe	mg/l	BDL (DL=0.01)	0.3	0.3	APHA 23rd Edn :2017 3500 Fe- B
19	Silica (Reactive) as SiO_2	mg/l	0.58	-	-	APHA 23rd Edn :2017 4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$	mg/l	18.0	-	-	APHA 23rd Edn :2017 2340 A
21	Non-Carbonate Hardness as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2340 A
22	Free Residual Chlorine	mg/l	<0.2	0.2	**1	APHA 23rd Edn :2017 4500 Cl B

BDL= Below Detectable Limit; DL= Detection Limit

End of Report

** To be applicable only when water is chlorinated.

Report Opinion: The above submitted water sample complies with drinking water specification as per IS 10500:2012 with respect to the above tests.

For SANTHOME ENVIRO SERVICES

Verified & Authorised By
M. Maria Frank Dhas - Quality Manager

SANTHOME ENVIRO SERVICES Chennai-80

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Figure 18: Lab result for RO Harizon

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L4/2, East Avenue Road, (Near SBI)Korattur, Chennai-600 080
Ph : 044 - 26871331 / Mob: 9791530069
Email ID: santhomeenviro@gmail.com | Website : www.santhomeenvirolab.in
NABL Cert No.TC-7144
BMQR

TEST REPORT

Sample Ref No. :SAS/W/444/06	Report No. :
Customer Name : M/s.AMET University	Report Date : 15.07.19
Sample Description : Water Sample Drawn By/ Date : SAS/08.07.19 Customer's Reference : Letter Dated on 08.07.19 Sample Mark : Yamuna	Received On : 08.07.19 Commenced On : 08.07.19 Completed On : 15.07.19

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
	Physical Properties					
1	*Appearance: When Analyzed After Filtration	-	 Clear Clear	 - -	 - -	-
2	pH value at 25°C	-	6.97	6.5 – 8.5	6.5 – 8.5	APHA 23rd Edn :2017 4500 H+ B
3	*Color	Hazen Unit	<1.0	5	15	APHA 23rd Edn :2017 2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	<1.0	1	5	APHA 23rd Edn :2017 2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	49.0	-	-	APHA 23rd Edn :2017 2510 B
	Chemical Properties					
7	Total Suspended Solids	mg/l	<1.0	-	-	IS:3025:P.17:1984:R.2012
8	Total Dissolved Solids	mg/l	25.0	500	2000	IS 3025:P.16:1984:R.2012

End of Page 1

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Manu Frank Singh, Quality Manager

SANTHOME ENVIRO SERVICES Chennai-80

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TEST REPORT – ADDITIONAL SHEET

Sample Ref No. : SAS/W/444/06

Report No. :
Report Date :15.07.19
Page: 2 of 2

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as $CaCO_3$	mg/l	3.58	200	600	APHA 23rd Edn :2017 2340 C
10	Calcium Hardness as $CaCO_3$	mg/l	BDL (DL=1.0)	-	-	APHA 23rd Edn :2017 3500 - Ca B
11	Magnesium Hardness as $CaCO_3$	mg/l	3.58	-	-	APHA 23rd Edn :2017 3500 – Mg^{+} B
12	Calcium as Ca	mg/l	BDL (DL=0.40)	75	200	APHA 23rd Edn :2017 3500 - Ca B
13	Magnesium as Mg	mg/l	0.86	30	100	APHA 23rd Edn :2017 2340 C
14	Phenolphthalein Alkalinity as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2320 B
15	Total Alkalinity as $CaCO_3$	mg/l	16.0	200	600	APHA 23rd Edn :2017 2320 B
16	Chlorides as Cl	mg/l	7.46	250	1000	APHA 23rd Edn :2017 4500 Cl^{-} B
17	Sulfates as SO_4	mg/l	BDL (DL=0.1)	200	400	APHA 23rd Edn :2017 4500 SO_4^{2-} E
18	Total Iron as Fe	mg/l	BDL (DL=0.01)	0.3	0.3	APHA 23rd Edn :2017 3500 Fe- B
19	Silica (Reactive) as SiO_2	mg/l	BDL (DL=0.04)	-	-	APHA 23rd Edn :2017 4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$	mg/l	3.58	-	-	APHA 23rd Edn :2017 2340 A
21	Non-Carbonate Hardness as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2340 A
22	Free Residual Chlorine	mg/l	<0.2	0.2	**1	APHA 23rd Edn :2017 4500 Cl B

BDL= Below Detectable Limit; DL= Detection Limit

End of Report

** To be applicable only when water is chlorinated.

Report Opinion: The above submitted water sample complies with drinking water specification as per IS 10500:2012 with respect to the above tests.

for SANTHOME ENVIRO SERVICES

Verified & Authorised By
M Maria Frank Omer - Quality Manager

SANTHOME ENVIRO SERVICES Chennai-80

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4. "The parameter marked with an * are not accredited by NABL "

Figure 19: Lab result of Yamuna Hostel Water

TEST REPORT

Sample Ref No : SAS/W/244/09
Customer Name : M/s. AMET University

Report No. :
Report Date : 23.09.19
Page: 1 of 2

Sample Description : Water
Sample Drawn By/ Date : Customer/23.09.19
Customer's Reference : Eyar Water Tech (P) Ltd
Sample Mark : Raw Water

Received On : 23.09.19
Commenced On : 23.09.19
Completed On : 23.09.19

Sl. No.	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
	Physical Properties					
1	*Appearance: When Analyzed After Filtration	-	Slightly Turbid Clear	- -	- -	-
2	pH value at 25°C	-	7.40	6.5 – 8.5	6.5 – 8.5	APHA 23rd Edn :2017 4500 H^+ B
3	*Color	Hazen Unit	15.0	5	15	2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	6.0	1	5	APHA 23rd Edn :2017 2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	1917	-	-	APHA 23rd Edn :2017 2510 B
	Chemical Properties					
7	Total Suspended Solids	mg/l	10.0	-	-	IS:3025:P.17:1984:R.2012
8	Total Dissolved Solids	mg/l	1150	500	2000	IS 3025:P.16:1984:R.2012

End of Page 1

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
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4. "The parameter marked with an * are not accredited by NABL "

TEST REPORT – ADDITIONAL SHEET

Sample Ref No. : SAS/W/244/09

Report No. :
Report Date : 23.09.19
Page: 2 of 2

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as $CaCO_3$	mg/l	457	200	600	APHA 23rd Edn :2017 2340 C
10	Calcium Hardness as $CaCO_3$	mg/l	330	-	-	APHA 23rd Edn :2017 3500 - Ca B
11	Magnesium Hardness as $CaCO_3$	mg/l	127	-	-	APHA 23rd Edn :2017 3500 – Mg^{2+} B
12	Calcium as Ca	mg/l	132	75	200	APHA 23rd Edn :2017 3500 - Ca B
13	Magnesium as Mg	mg/l	30.0	30	100	APHA 23rd Edn :2017 2340 C
14	Phenolphthalein Alkalinity as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2320 B
15	Total Alkalinity as $CaCO_3$	mg/l	364	200	600	APHA 23rd Edn :2017 2320 B
16	Chlorides as Cl	mg/l	251	250	1000	APHA 23rd Edn :2017 4500 Cl^- B
17	Sulfates as SO_4	mg/l	130	200	400	APHA 23rd Edn :2017 4500 SO_4^{2-} E
18	Total Iron as Fe	mg/l	0.45	0.3	0.3	APHA 23rd Edn :2017 3500 Fe- B
19	Silica (Reactive) as SiO_2	mg/l	18.0	-	-	APHA 23rd Edn :2017 4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$	mg/l	364	-	-	APHA 23rd Edn :2017 2340 A
21	Non-Carbonate Hardness as $CaCO_3$	mg/l	93.0	-	-	APHA 23rd Edn :2017 2340 A
22	Free Residual Chlorine	mg/l	<0.2	0.2	**1	APHA 23rd Edn :2017 4500 Cl B

End of Report

** Is applicable only when water is chlorinated.

Report Opinion: The above submitted water sample does not comply with drinking water specification as per IS 10500:2012 with respect to Turbidity & Iron.

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Maria Frank Omer - Quality Manager

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4. "The parameter marked with an * are not accredited by NABL "

Figure 20: Lab result of Raw water

TEST REPORT

Sample Ref No : SAS/W/245/09
Customer Name : M/s. AMET university

Report No. :
Report Date : 23.09.19
Page: 1 of 2

Sample Description : Water
Sample Drawn By/ Date : Customer/23.09.19
Customer's Reference : Eyar Water Tech (P) Ltd
Sample Mark : RO-1- Main RO Plant-2000 LPH RO Plant

Received On : 23.09.19
Commenced On : 23.09.19
Completed On : 23.09.19

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
	Physical Properties					
1	*Appearance: When Analyzed After Filtration	-	 Clear Clear	 - -	 - -	-
2	pH value at 25°C	-	6.36	6.5 – 8.5	6.5 – 8.5	APHA 23rd Edn :201 4500 H^+ B
3	*Color	Hazen Unit	<1.0	5	15	2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2(
5	Turbidity	NTU	<1.0	1	5	APHA 23rd Edn :201 2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	180	-	-	APHA 23rd Edn :201 2510 B
	Chemical Properties					
7	Total Suspended Solids	mg/l	<1.0	-	-	IS:3025:P.17:1984:R.2(
8	Total Dissolved Solids	mg/l	100	500	2000	IS 3025:P.16:1984:R.2(

End of Page 1

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4. "The parameter marked with an * are not accredited by NABL "

TEST REPORT – ADDITIONAL SHEET

Sample Ref No. : SAS/W/245/09

Report No. :
Report Date : 23.09.19
Page: 2 of 2

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as $CaCO_3$	mg/l	21.0	200	600	APHA 23rd Edn :2017 2340 C
10	Calcium Hardness as $CaCO_3$	mg/l	15.0	-	-	APHA 23rd Edn :2017 3500 - Ca B
11	Magnesium Hardness as $CaCO_3$	mg/l	6.0	-	-	APHA 23rd Edn :2017 3500 – Mg^{2+} B
12	Calcium as Ca	mg/l	6.0	75	200	APHA 23rd Edn :2017 3500 - Ca B
13	Magnesium as Mg	mg/l	1.44	30	100	APHA 23rd Edn :2017 2340 C
14	Phenolphthalein Alkalinity as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2320 B
15	Total Alkalinity as $CaCO_3$	mg/l	31.0	200	600	APHA 23rd Edn :2017 2320 B
16	Chlorides as Cl	mg/l	25.0	250	1000	APHA 23rd Edn :2017 4500 Cl^- B
17	Sulfates as SO_4	mg/l	11.0	200	400	APHA 23rd Edn :2017 4500 SO_4^{2-} E
18	Total Iron as Fe	mg/l	BDL (DL=0.01)	0.3	0.3	APHA 23rd Edn :2017 3500 Fe- B
19	Silica (Reactive) as SiO_2	mg/l	0.90	-	-	APHA 23rd Edn :2017 4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$	mg/l	21.0	-	-	APHA 23rd Edn :2017 2340 A
21	Non-Carbonate Hardness as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2340 A
22	Free Residual Chlorine	mg/l	<0.2	0.2	**1	APHA 23rd Edn :2017 4500 Cl B

BDL= Below Detectable Limit; DL= Detection Limit

End of Report

** To be applicable only when water is chlorinated.

Report Opinion: The above submitted water sample does not comply with drinking water specification as per IS 10500:2012 with respect to pH value .

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Maria Frank Omer - Quality Manager

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4. "The parameter marked with an * are not accredited by NABL "

Figure 21: Lab result of RO-1 Main RO Plant 2000 LPH

TEST REPORT

Sample Ref No : SAS/W/246/09
Customer Name : M/s. AMET university

Report No. :
Report Date : 23.09.19
Page: 1 of 2

Sample Description : Water
Sample Drawn By/ Date : Customer/23.09.19
Customer's Reference : Eyar Water Tech (P) Ltd
Sample Mark : RO-2- Yamuna Hostel-500 LPH RO Plant

Received On : 23.09.19
Commenced On : 23.09.19
Completed On : 23.09.19

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
	Physical Properties					
1	*Appearance: When Analyzed / After Filtration	-	Clear / Clear	- / -	- / -	-
2	pH value at 25°C	-	5.04	6.5 – 8.5	6.5 – 8.5	APHA 23rd Edn :2017 4500 H^+ B
3	*Color	Hazen Unit	<1.0	5	15	2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	<1.0	1	5	APHA 23rd Edn :2017 2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	36.0	-	-	APHA 23rd Edn :2017 2510 B
	Chemical Properties					
7	Total Suspended Solids	mg/l	<1.0	-	-	IS:3025:P.17:1984:R.2012
8	Total Dissolved Solids	mg/l	18.0	500	2000	IS 3025:P.16:1984:R.2012

End of Page 1

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Verified & Authorized By
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4. "The parameter marked with an * are not accredited by NABL "

TEST REPORT – ADDITIONAL SHEET

Sample Ref No. : SAS/W/246/09

Report No. :
Report Date : 23.09.19
Page: 2 of 2

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as $CaCO_3$	mg/l	BDL (DL=1.0)	200	600	APHA 23rd Edn :2017 2340 C
10	Calcium Hardness as $CaCO_3$	mg/l	BDL (DL=1.0)	-	-	APHA 23rd Edn :2017 3500 - Ca B
11	Magnesium Hardness as $CaCO_3$	mg/l	BDL (DL=1.0)	-	-	APHA 23rd Edn :2017 3500 – Mg^{+} B
12	Calcium as Ca	mg/l	BDL (DL=0.40)	75	200	APHA 23rd Edn :2017 3500 - Ca B
13	Magnesium as Mg	mg/l	BDL (DL=0.24)	30	100	APHA 23rd Edn :2017 2340 C
14	Phenolphthalein Alkalinity as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2320 B
15	Total Alkalinity as $CaCO_3$	mg/l	13.0	200	600	APHA 23rd Edn :2017 2320 B
16	Chlorides as Cl	mg/l	6.22	250	1000	APHA 23rd Edn :2017 4500 Cl^{-} B
17	Sulfates as SO_4	mg/l	3.0	200	400	APHA 23rd Edn :2017 4500 SO_4^{2-} E
18	Total Iron as Fe	mg/l	BDL (DL=0.01)	0.3	0.3	APHA 23rd Edn :2017 3500 Fe- B
19	Silica (Reactive) as SiO_2	mg/l	BDL (DL=0.04)	-	-	APHA 23rd Edn :2017 4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2340 A
21	Non-Carbonate Hardness as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :2017 2340 A
22	Free Residual Chlorine	mg/l	<0.2	0.2	**1	APHA 23rd Edn :2017 4500 Cl B

BDL= Below Detectable Limit; DL= Detection Limit

End of Report

** To be applicable only when water is chlorinated.

Report Opinion: The above submitted water sample does not comply with drinking water specification as per IS 10500:2012 with respect to pH value.

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Maria Frank Omer - Quality Manager

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4. "The parameter marked with an * are not accredited by NABL "

Figure 22: Lab result of RO-2 Yamuna hostel

TEST REPORT

Sample Ref No : SAS/W/247/09
Customer Name : M/s. AMET university

Report No. :
Report Date : 23.09.19
Page: 1 of 2

Sample Description : Water
Sample Drawn By/ Date : Customer/23.09.19
Customer's Reference : Eyar Water Tech (P) Ltd
Sample Mark : RO-3- Horizon Hostel-500 LPH RO Plant

Received On : 23.09.19
Commenced On : 23.09.19
Completed On : 23.09.19

Sl. No.	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
	Physical Properties					
1	*Appearance: When Analyzed	-	Clear	-	-	-
	After Filtration		Clear	-	-	
2	pH value at 25°C	-	6.30	6.5 – 8.5	6.5 – 8.5	APHA 23rd Edn :2017 4500 H+ B
3	*Color	Hazen Unit	<1.0	5	15	2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	<1.0	1	5	APHA 23rd Edn :2017 2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	77.0	-	-	APHA 23rd Edn :2017 2510 B
	Chemical Properties					
7	Total Suspended Solids	mg/l	<1.0	-	-	IS:3025:P.17:1984:R.2012
8	Total Dissolved Solids	mg/l	40.0	500	2000	IS 3025:P.16:1984:R.2012

End of Page 1

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Maria Frank Omer - Quality Manager

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TEST REPORT – ADDITIONAL SHEET

Sample Ref No. : SAS/W/247/09

Report No. :
Report Date : 23.09.19
Page: 2 of 2

Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		TEST METHOD
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as $CaCO_3$	mg/l	12.0	200	600	APHA 23rd Edn :201 2340 C
10	Calcium Hardness as $CaCO_3$	mg/l	8.16	-	-	APHA 23rd Edn :201 3500 - Ca B
11	Magnesium Hardness as $CaCO_3$	mg/l	3.84	-	-	APHA 23rd Edn :201 3500 – Mg B
12	Calcium as Ca	mg/l	3.26	75	200	APHA 23rd Edn :201 3500 - Ca B
13	Magnesium as Mg	mg/l	0.92	30	100	APHA 23rd Edn :201 2340 C
14	Phenolphthalein Alkalinity as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :201 2320 B
15	Total Alkalinity as $CaCO_3$	mg/l	14.0	200	600	APHA 23rd Edn :201 2320 B
16	Chlorides as Cl	mg/l	15.0	250	1000	APHA 23rd Edn :201 4500 Cl B
17	Sulfates as SO_4	mg/l	3.50	200	400	APHA 23rd Edn :201 4500 SO_4^{2-} E
18	Total Iron as Fe	mg/l	BDL (DL=0.01)	0.3	0.3	APHA 23rd Edn :201 3500 Fe- B
19	Silica (Reactive) as SiO_2	mg/l	0.50	-	-	APHA 23rd Edn :201 4500 SiO_2 C
20	Carbonate Hardness as $CaCO_3$	mg/l	12.0	-	-	APHA 23rd Edn :201 2340 A
21	Non-Carbonate Hardness as $CaCO_3$	mg/l	Nil	-	-	APHA 23rd Edn :201 2340 A
22	Free Residual Chlorine	mg/l	<0.2	0.2	**1	APHA 23rd Edn :201 4500 Cl B

BDL = Below Detectable Limit; DL= Detection Limit

End of Report

** To be applicable only when water is chlorinated.

Report Opinion: The above submitted water sample does not comply with drinking water specification as per IS 10500:2012 wit respect to pH value.

for SANTHOME ENVIRO SERVICES

Verified & Authorized By
M.Maria Frank Omer - Quality Manager

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Figure 23: Lab result of RO -3 harizon hostel water