Confidential

GREEN AUDIT REPORT

Kanoria PG Mahila Mahavidyalaya

Jawahar Lal Nehru Marg, Jaipur, Rajasthan-302015

By

Usha Management Consultants, Jaipur
(Accredited Energy Auditor of BEE)
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Acknowledgment

Usha Management Consultant, Jaipur with reference to the a aforementioned subject of green audit would like to thank the whole team of Kanoria College, for supporting and supplying us with the necessary data for conducting Green Analysis. As we sneak into the building performance, we are assured that the building will behave more responsibly towards energy and environment.

We would also like to thank *Dr. Rashmi Chaturvedi, Director,* Kanoria PG Mahila Vidyalaya, Jaipur for her continuous support and guidance, without which the completion of the project will not be possible.

Last but not the least, we would like to thank *Mr V .K. Bhatia , Secretary ,* Kanoria PG Mahila Vidyalaya ,Jaipur for giving us an opportunity to evaluate the environmental performance of the campus. We express our sincere gratitude to them and particularly to the following:

Shri V.K. Bhatia – Secretary
Dr. Rashmi Chaturvedi – Director
Dr. Seema Agarwal – Principal
Dr. Ratna Saxena – Vice Principal
Dr. Ranjula Jain - Dean – College Development
Dr. Ritu Jain –Assistant Professor (Botany) – Committee Member
Mr. Vijay Sharma – Administrative Officer
Mr. Ritesh Saini – Civil Engineer
Sh. Sanjay Mathur – Office Superintendent

Order No. -KMH2021-22/0119 Dated 26-6-21

Thank You,

(V.K.Luhadiya)

CEO Usha Management Consultants, Jaipur
(Accredited Energy Auditor of BEE)
Dated: 20th July, 2021

THE AUDIT TEAM

1. Mr. Vinod K. Luhadiya, CEO of Usha Management Consultants, Jaipur
2. Mr. Rajesh Goyal – Energy Auditor
3. Mr. Prasoon Godika – Energy Auditor
4. Mr. Anshul Goel – Engineer
5. Mr. Ajay Nunia – STP Expert
6. Mr. N Sai Balaji - Engineer

Executive Summary

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. Hence, it becomes essential to adopt the system of the Green Campus for the institute which will lead for sustainable development. Kanoria PG Mahila vidyala Jaipur, is deeply concerned and unconditionally believes that there is an urgent need to address these fundamental problems and reverse the trends. The purpose of the audit is to ensure that the practices followed in the campus are in accordance with the Green Policy adopted central govt ,UGC and by the Government of Rajasthan (Rajasthan State Pollution Control Board) for solid and liquid waste disposal, clean air, water harvesting, water recycling ,water use and energy audit The methodology included: preparation and collecting data., physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. It works on the several facets of 'Green Campus' including Water Conservation, Green cover and Tree Plantation, Waste Management, Paperless Work, Alternative Energy and Mapping of Biodiversity. With this in mind, the specific objectives of the analysis were to evaluate the adequacy of the management control frame work of environment sustainability as well as the degree to which the Departments are in compliance with the applicable regulations, policies and standards. It can make a tremendous impact on student health and operational costs and the environment. The criteria, methods and recommendations used in the analysis are based on the identified risks. This report can be utilized for NAAC accreditation. (criteria 7) of NAAC procedure by various certifying agencies like LEED, Green star, WELL,GRIHA and ASSOCHEM Green etc.

We will provide all support once agency is finalized by management.

The present waste water is to be recycled after treating in the proposed STP (constructed wetland process HUB of NEERI PHYTROID TECHNOLOGY). The composting machine is drying the green waste and kitchen waste and become manure. The cleaning of water harvesting tanks are to be done regularly so that all

the water goes to the underground fully. The plantation drive is regular feature of institute by NSS and as CSR activities. Use of plastic is fully banned and stopped .

About the College

This is Private College affiliated to University of Rajasthan. The college is situated in Bapu Nagar on the crossing of JLN Marg, the educational hub of Jaipur in 8.67 acres(34900 square meter) sprawling, lush green campus. State–of–the–art building area of college with independent academic & administration block, hostels, laboratories, sports ground, swimming pool etc. provide scholarly ambience for learning & liberty. It creates a warm and protective environment with a professional atmosphere to bring out best women citizens.

The foundation stone of College was done in 1965. The main college building is on 3500 sq meter area. The built-up area is 7091 SqMtr. The air conditioned area of main campus and hostel is 650 sq. Mtr.(9.1%)

About 6500 students enrol every year (about 350 hostellers and 6150 are day scholars) in 24 subjects in Science, Arts and Commerce streams for Bachelor's programme and 15 Master's programme. Maintaining a lead in premier educational location, the college has clocked an enviable growth keeping abreast with the needs and aspirations of times. About 350 girl students reside in the hostels. The facilities for hostellers are – Furnished rooms, Swimming pool, gym, spacious playground, Water-cooler/Water-purifier, solar water heaters, Tata sky Television with LCD, Newspapers, Sanitary Napkin Vending machine and 4 seater AC rooms (15).

There is a large swimming pool with an automatic filtration plant(not in use due to Law college building construction going on above it)An air-conditioned auditorium with the capacity of about 500 seats is the venue of almost all important events of the college. **The law college building (under construction) is with A.C. lecture halls** and there is also provision of lift to go to law college office and lecture halls and proposed library.

College Library is the member of N-LIST Project entitled "National Library and Information Services Infrastructure for Scholarly Content", being jointly executed by the UGC-INFONET Digital Library Consortium, INFLIBNET Centre and the INDEST-AICTE Consortium, IIT-Delhi. This Project provides access to E-Resource (6000+ E-Journals and 31,35,000+ E-books) to students, researchers and faculty members from college through servers installed at the INFLIBNET Centre. The library has internet facility also. Students can borrow books from the book-bank on yearly basis till the annual examinations.

Two Well equipped computer laboratories with 60 computers are there in the campus. Computers are installed in both the labs, all networked to facilitate teaching in batches, with adequate faculty attention. Cyber café is there to provide internet facility.

The college has Bio- tech, Botany, Chemistry, Drawing and Painting, Geography, Home science, Physics, Psychology and Zoology labs. All the laboratories are well-equipped aided by a staff to ensure adherence to practical methodology in the relevant subjects. The college has an Art-room to facilitate the department of Drawing and Painting and a Music room for Music department .English language lab is also there.

College has a cafeteria where students can take variety of healthy snacks, mini-meals. Vending machine for tea and coffee is also there in the cafeteria. Sanitary-pad vending machine is also installed.

The college compound is embellished with sprawling gardens which boast of rare trees and herbs. The college has fully computerised and air-conditioned office.

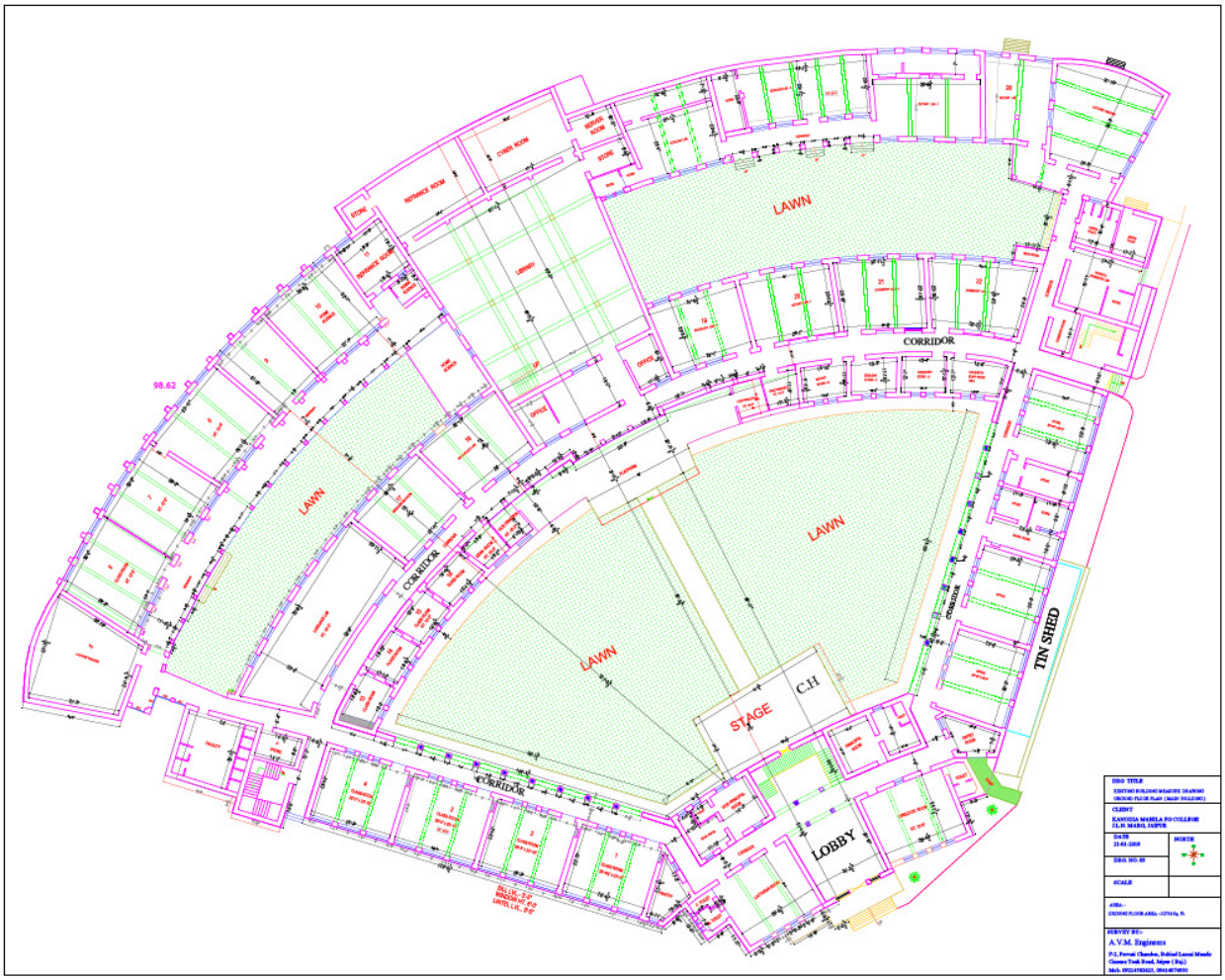
There are two hostel buildings to accommodate 350 students. There are well ventilated rooms, furnished with tables, chairs, beds and wardrobes. And also has 15 nos 4 seater AC rooms.

The college campus has two separate parking areas, the space near to the Nandlal Kanoria complex is exclusively for the staff members and the other one near the

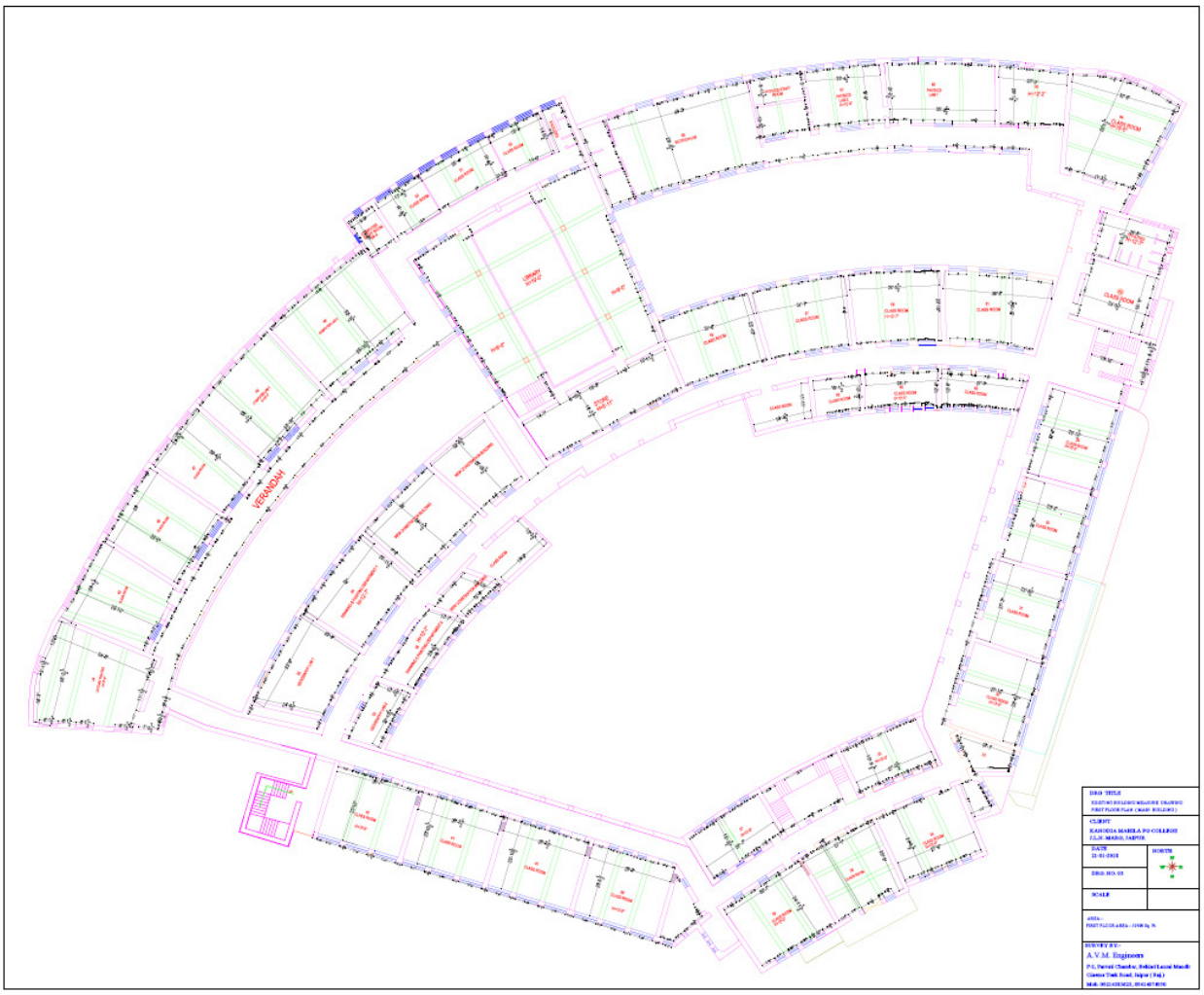
cafeteria is for the students, where they can park two wheeler. The college has basket-ball court, volley ball and hand ball court, badminton court, hockey and football ground and the cricket pitch. **Staff-room is** a place where the meeting of mind takes place and the preparation of future course of action is designed and is in the centre of the campus.

Plan of Kanoria- Showing Greenry

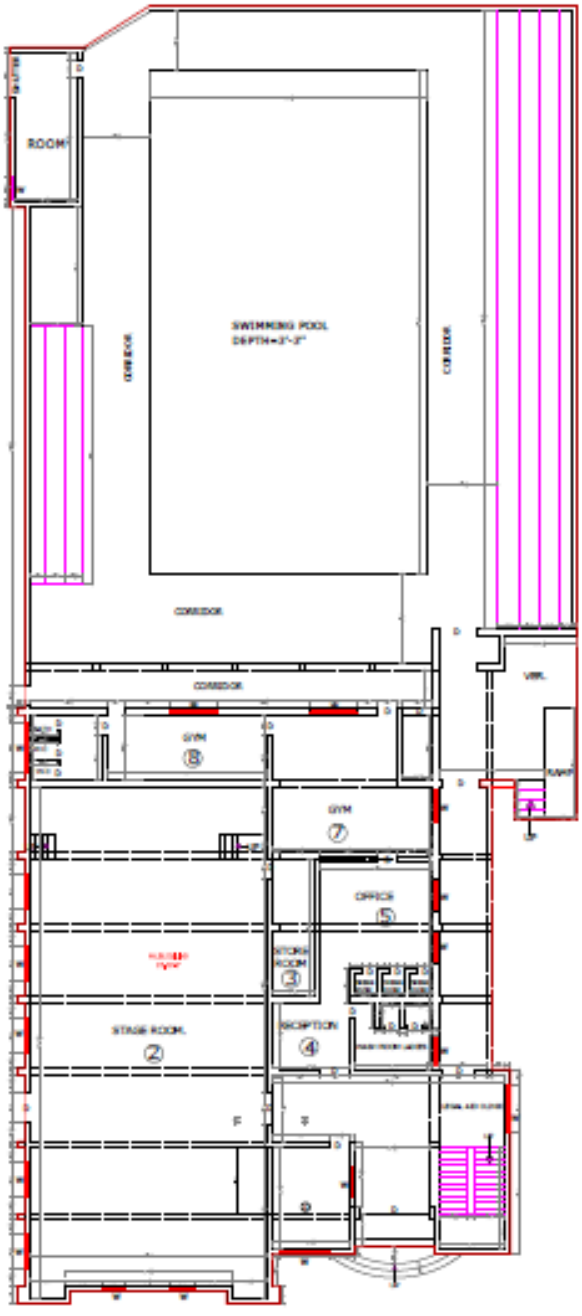
Main building Ground Floor



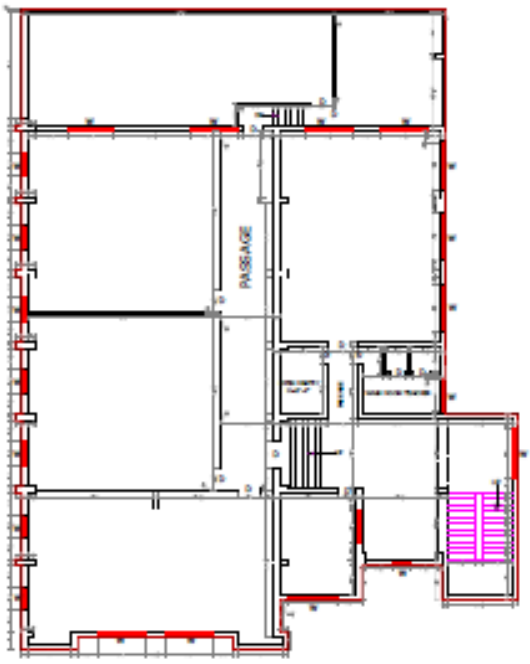
Main building First Floor



Law College

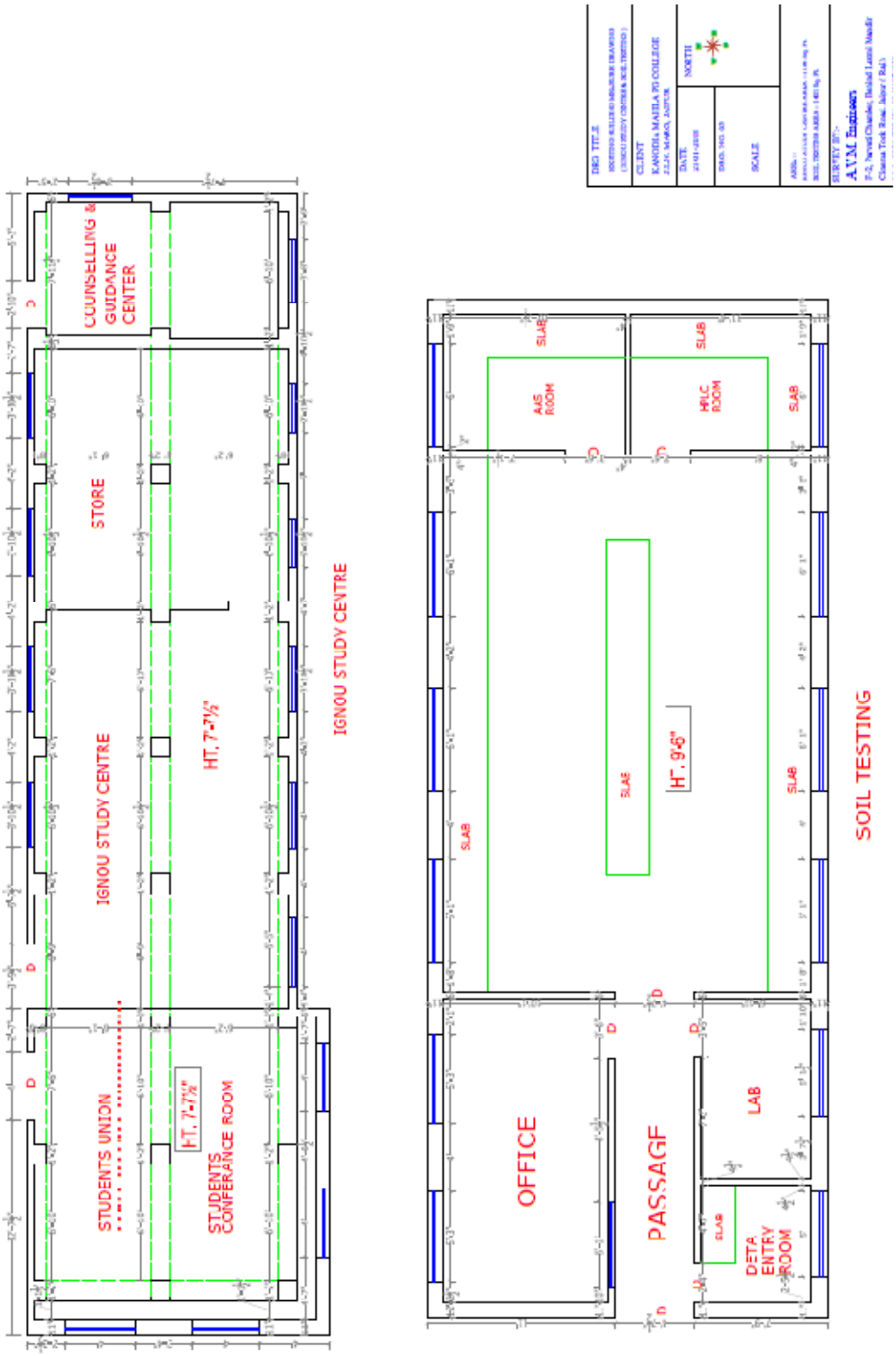


GROUND FLOOR PLAN

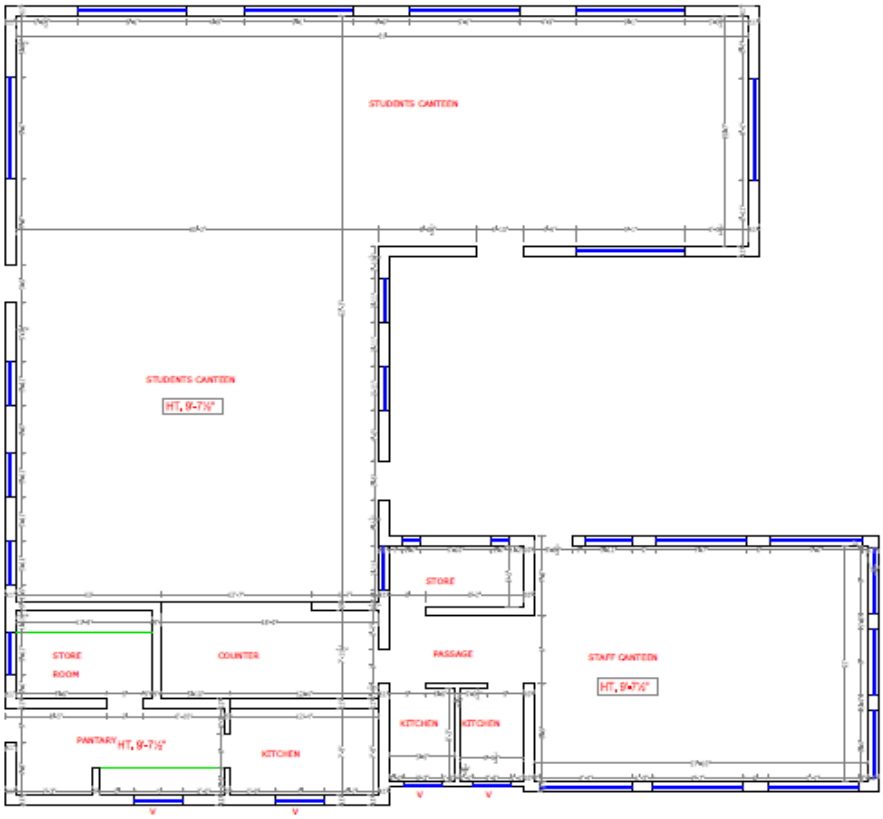


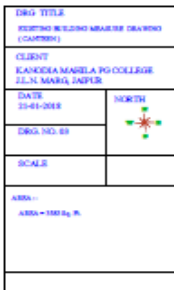
FIRST FLOOR PLAN

IGNOU AREA


COUNSELLING & GUIDANCE CENTER
STORE
IGNOU STUDY CENTRE
HT. 7'-7½"
IGNOU STUDY CENTRE
STUDENTS UNION
HT. 7'-7½"
STUDENTS CONFERANCE ROOM
AAS ROOM
HPLC ROOM
SLAB
SLAB
SLAB
SLAB
SLAB
HT. 9'-6"
SOIL TESTING
OFFICE
PASSAGE
LAB
DETA ENTRY ROOM
SLAB
NORTH
SCALE
CLIENT
KANORIA MAHILA PG COLLEGE
SURVEY BY:
ATM Engineers

Canteen


STUDENTS CANTEEN
STUDENTS CANTEEN
HT, 9'-7½"
STORE
ROOM
COUNTER
STORE
PASSAGE
STAFF CANTEEN
HT, 9'-7½"
PANTARY HT, 9'-7½"
KITCHEN
KITCHEN
KITCHEN


DRG. TITLE
CLIENT
KANODIA MAHILA PG COLLEGE
J.L.N. MARG, JAIPUR
DATE
NORTH
DRG. NO. 03
SCALE

New Hostel

Old Hostel

1. Introduction

Green audit is defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. The Green Audit supports to the Criteria 7 – GREEN AUDIT of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India which declares the institutions as Grade A, B or C according to the scores assigned during the accreditation.

2. Objectives of the Study

The main objective of the green audit is to promote the Environment Management and Conservation in the College Campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of Environment Sustainability incompliance with the applicable regulations, policies and standards. The main objectives are:

I. To introduce and aware students to serious concerns of environment and its sustainability.
II. To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use of the campus.
III. To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requiring high cost.
IV. To bring out a status report on environmental compliance.

3. Audit Inclusions

I. Water Audit and Conservation
II. Waste Audit and Remediation
III. Certification for Energy and Water (Any certifying agency like LEED, IGBC, WELL)- to be got done once college decides

I. Water Audit and Conservation:

Definition:

Water auditing is a method of quantifying water flows and quality in simple or complex systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. It provides the deviation existing in the actual water supply to the minimum required water in the respective premises. Norms for water consumption as per national building code 2018 are 45 liters/day for day scholars and 135 liters/day for hostellers in an educational institution. Water auditing is a mechanism for conserving water, which will grow in significance in the future as demand for water increases.

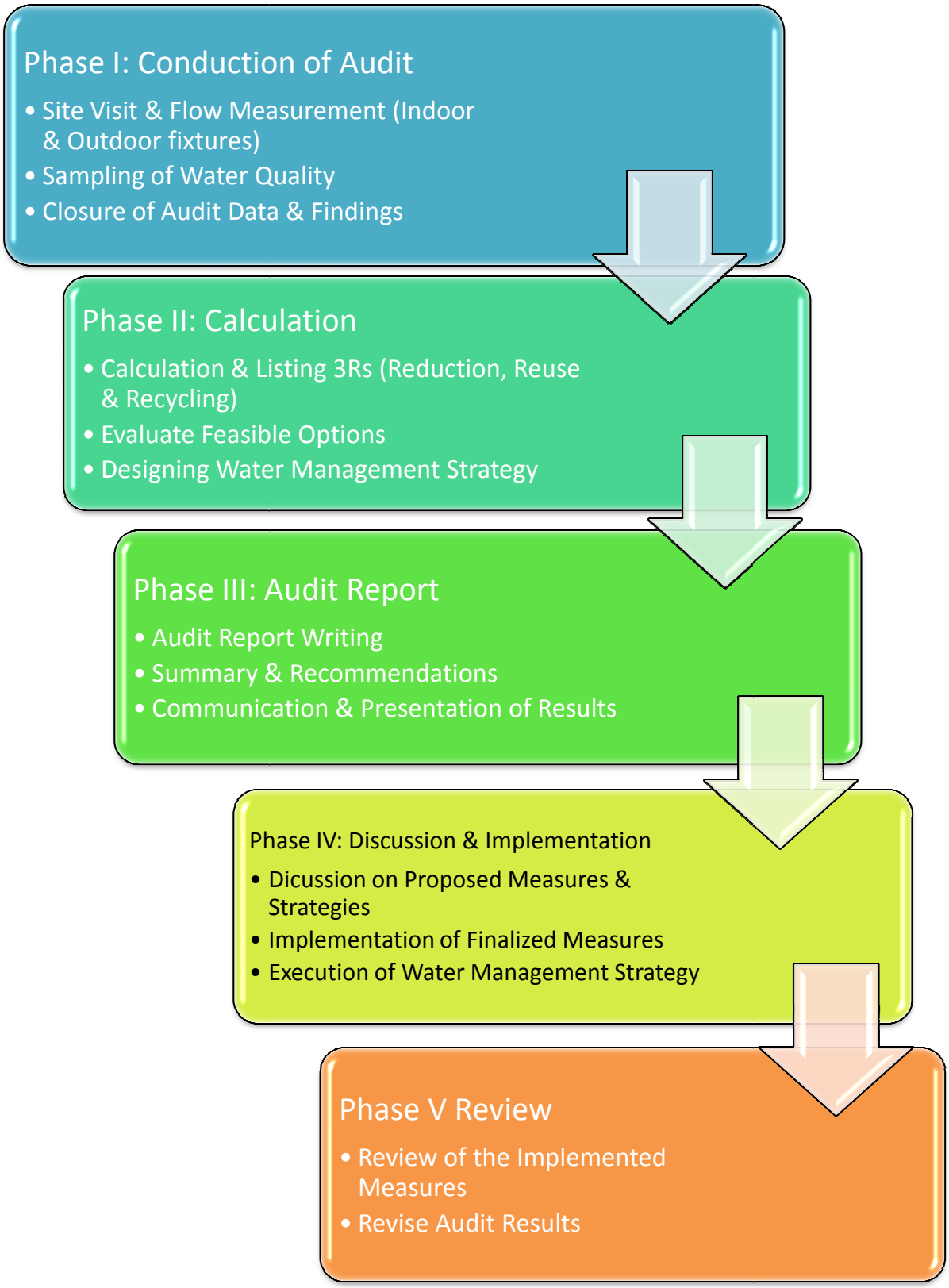
Objective of the Audit:

- The objective of water audit is to assess the following:
- Water Required (in accordance with National and/or State Bye Laws)
- Water Used (as per the Existing Fixtures & Equipment)
- Physical & Non-physical Losses
- To identify and priorities areas which need immediate attention for control

Procedure:

The different stages of the water audit has been depicted in form of flow chart in Figure 1. The whole procedure is divided into five phase starting from the site inspection to review of the implemented measures.

Figure 1 Audit Procedure



Phase I: Conduction of Audit

At the beginning of water audit, it is must to observe the supply, storing & consuming facilities are provided on the site. The water audit team commits to:

1. Conduct site visit to locate the water points & Map them
2. Locate the water usage areas
3. Take samples at various location to define water quality
4. Mark storage tanks
5. Compile the findings during visit
6. Notice conditions of fixtures (dirty, stuck, leaking etc.)

Phase II: Calculation

After completion of site visit, the audit team performed calculation to analyze the acquired data with reference to local bye laws (in India: NBC 2018) as base line. This enables to determine whether the premise is consuming surplus water or not. The results will helps to calculate the amount of water wasted or misused. Following goals are kept in mind during the calculation;

a) Estimating water use from different areas and activities of a building.
b) Estimate rate of flow of water from different outlets and inlets.
c) Determine the rate of flow of water for faucets and shower head.
d) Estimating shortage or surplus with reference to NBC 2018.

Based on the calculation, the water management strategies have to be defined and implement in the respective premises.

Phase III: Audit Report

The team prepares detailed report based on procedure mentioned above. The audit report consists:

- Observations done during audit
- All the measurements, calculations
- Overview of the current working of water supply system
- Summary and conclusions based on the calculations

Phase IV: Discussion & Implementation

After formation of audit report, the audit team will hold meeting with the respective project team to discuss the current and future scenario towards the water management. The key discussion points are:

a) Possible water conservation measures & their implementation.
b) Areas where water can be conserved & wastage of water can be minimized.

Later, the project team will implement the measure that are finalized in accordance to the discussion and meetings held with audit team.

Phase V: Review

After the implementation of measures, the review and maintenance of the same is much needed. Because, the continuous monitoring of the measures can only justify and revise the water savings occurring in the premises.

The formation of "Sustainable Cell" in the premises will help in proper & continuous execution of the measures. This cell is also responsible to educate the occupants regarding effects of water management along with the finding and installing any new techniques at the project site.

Water- Use

This addresses water consumption, water sources, irrigation, storm water, appliances and fixtures. A water analysis is an on-site survey and assessment to determine the water use and hence improving the efficiency of its use.

Observations

The study observed that the Water is taken out from underground from Tube wells through submersible pumps installed at three locations in the campus. The pumps are of 7.5HP kirloskar pumps with 7 stage. One of the pump is under breakdown. The second pump is being run for construction work of Law College and it runs for about 2 hours every day. The third pump runs for 4 hours per day and present water consumption is 8500 liters only due to Covid-19. The pump was run for 1.5 hr only

on 11th of July as no water was used for gardening due to rains. Hence the present water consumption by staff for drinking and toilet purpose is only 3000 liters. This matches with the water consumption of 45liters/day for day for staff present in the campus. (This is matching with the standard of National Building Code.)

Water is used for drinking purpose, toilets and gardening. The waste water from the RO water purifier is not being used now and can be put into a well or can be pumped to proposed STP . The recycled water of STP could be used for gardening purposes. The fresh water which is being used for gardening will be stopped/reduced. The STP PLANT expert and supplier had a lecture in college on dated 26-07-2021 and everyone (total around 50 staff) discussed the technology with benefits to use horizontal constructed wetland process for recycling of the water available from all sources. Refer **Annexure – 5** (Phytorid Technology for treatment of sewage – advantage for Kanoria). The water will be collected from various places and will be pumped in the main unit for treatment. The various other decentralized wastewater treatment technologies - comparison is attached at **Annexure-6**, to understand why the wetland process which has minimum capital and operating cost and why it has been recommended for Kanoria.

The Name and Address of the Supplier is: Sh. Ajay K. Nunia, Director M: +91-9829055096, VARAD PRYAVARAN PVT LDT, F-7, 1st Floor, Brindaban Complex, Central Spine, Vidhyadhar Nagar, Jaipur 302039. This firm has supplied many such plants in colleges and institutes in Rajasthan and all are working good. This process has also been approved by Rajasthan State Pollution Board.

1. Vedanta medical college, Udaipur
2. Modi College of Engineering, Laxmangarh, Sikar
3. Balaji Engg.college at sikar road ,jaipur has decided to put the plant

During the Audit, no loss of water was observed, neither by any leakages nor by over flow of water from overhead tanks.

Details of Overhead Tanks:- Total 41 nos. of tanks are there and out of which only 35 are working (Six are under breakdown).

Sr.No.	Tank Capacity	No. of Tanks	Place
1.	1000 liter	17	Rooftop of College building & NandLal Kanoria Complex(11), Old and new hostel(6)
2.	500 liter	18	Rooftop of College building &NandLalKanoria Complex(06), Old hostel(6), Canteen/IGNOU Study Center(4), Bathroom in parking(2)
3.	2000 liter	6	Rooftop of College building &NandLalKanoria Complex(02), New Hostel(04)

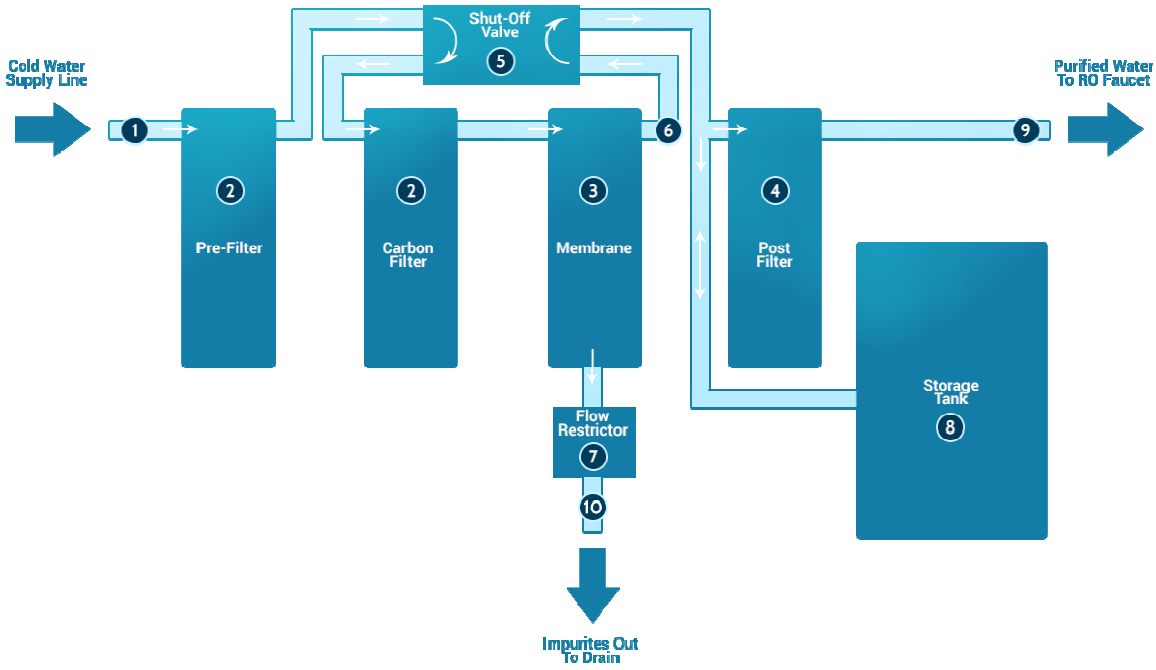
The total capacity of water storage is 38000 liters which is sufficient for 2 days when the college is operating in full. (Now only limited staffs are coming to college due to Covid-19)On an average the college consumes 19,000 Liters of Water per day.

The campus has three rain water recharge pits equivalent to a capacity of 5000 Cu.ft. Length x width x height) each., STP is not there but under planning in this year. On 11th July, 2021 when there was rain all the pits were overflowing as these pits were not cleaned and was having lot of debris and leaves which was stopping the water going into the underground. Later on these were cleaned and it was rechecked on 13th July, 2021 and was found OK.

Rainwater Recharge Pit

Proposed STP Plant Design

Reverse Osmosis Plant - Reverse osmosis (RO) is a membrane separation process, driven by a pressure gradient, in which the membrane separates the solvent (generally water) from other components of a solution. The membrane configuration is of cross-flow.



The water quality of tubewell is good and no RO is needed. However, if in future an RO plant is required due to bad quality of water. (Hardness and TDS). We should buy only RO having maximum waste water of 20% (May be little costlier but water is precious)

Water Purifiers: Various Makes of 14 water purifiers are installed in various places (9 in main building and 5 in hostel). These are all working good. **(See Annexure 1)**

Water Cooler: There are 15 water coolers to make water cold and these are all form to be working good. We have measured their current value and these are all working good. The temperature setting of all these coolers were found to be 25^{o}C to 30^{o}C and are good. **(See Annexure 2)**

II. Solid Waste Management:

There are two types of solid waste which are being generated in campus: *1. Kitchen waste and 2. Organic waste*

A composter machine of capacity of 50kg/day has been installed. The machine was not being used since its installation in March-2020 due to Covid-19. It takes about 24 hrs for kitchen waste and 48 hrs for other organic waste to make manure. But due to very bad smell during trial, it was used with difficulty It is suggested to put wood chips and spray molasses water inside to control smell . Basically this is only a dryer with a heater to dry out moisture from the waste Also the quality of manure produced has not been tested till now.

Details of Composting Machine is given in Annexure 3.

The green waste is being dumped in a pit and are covered and in one week this converts in manure for gardening. This practice is good. Use of plastic has completely stopped in the college canteen and hostel.

Close Circuit TV Cameras: 70 CCTV Cameras are installed in 40 places for safety and are working usefully.

Summary – Water Audit:

The water audit was conducted by a team of experts and recommendations have been shared in the report above. The report is an analysis of the water in flows and out flows, and presents opportunities to save water across the facility. Incorporation of the measures suggested in this report shall bring up the water efficiency in the campus and would be a step further in rendering the education campus among the leading institutions in water efficiency. A summary of the identified water conservation measures are given below:

Possible Water Conservation Measures-General

WCM	Description	Remarks
1	Water Metering	Directly affect the daily usage by representing the daily water usage and monitoring consumption
2	Use of Aerators in Hostel, School & University Premises	38 % of total consumption of building occupant water usage
3	Use of Low Flow fixtures in Kitchen space	46 % savings
4	Install pre-rinse spray valves	66 % savings
5	Use of Dishwasher	60 % reduction in water usage for dishwashing
6	Use of Grease & Oil Interceptor in kitchen	Prevent the blockage of kitchen drain pipe & Increase operating life cycle of STP
7	Use of regulator in Washing Machine	10% savings of water usage in laundry
8	Use of Irrigation System (Drip and sprinkler)	40 % savings in landscaping water usage
9	Installation of RO Plant	100 % savings of purchased drinking water
10	Prevention of leakages in building taps	100 % Savings in leakages

Green Audit - Questionnaire

Which of the following are available in your institute?

1	Garden area	Available
2	Playground	Available
3	Kitchen	Available
4	Toilets	Available
5	Garbage Or Waste Store Yard	Available
6	Laboratory	Available
7	Canteen	Available
8	Hostel Facility	Yes
9	Guest House	Available

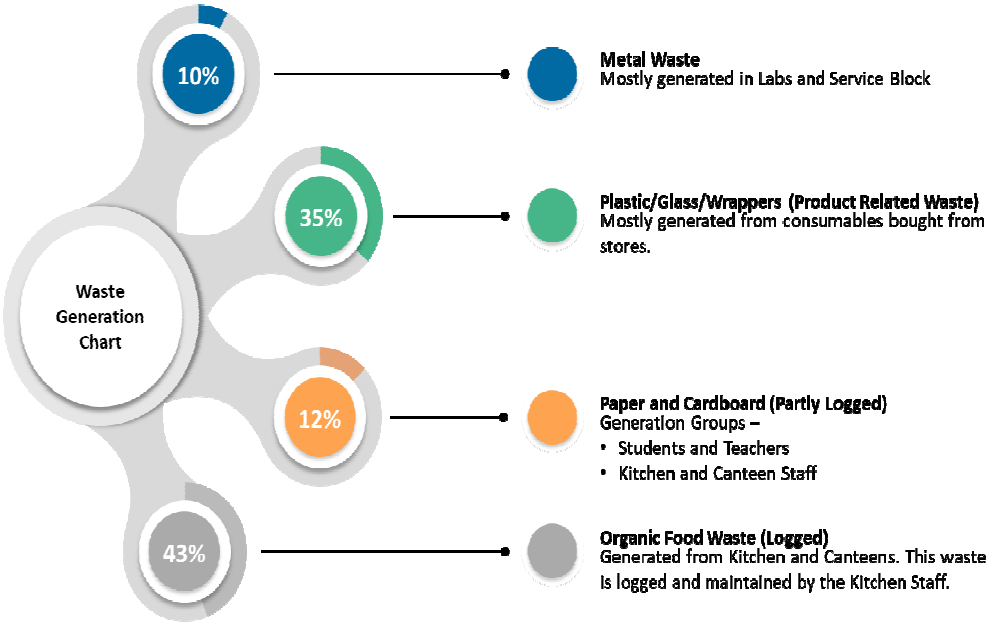
Which of the following are found near your institute?

1	Municipal dump yard	Not in vicinity of institute
2	Garbage heap	No Garbage heaps
3	Public convenience	NO
4	Sewer line	College have internal sewer line which is finally connected to JDA line.
5	Stagnant water	No stagnant water
6	Open drainage	No
7	Industry – (Mention the type)	No
8	Bus / Railway station	Local Bus Station is outside of Campus and Railway Station is far away.
9	Market / Shopping complex / Public halls	No

Waste Minimization and Recycling

1.	**Does the institute generate any waste? If so, what are they?**	**Yes, Solid waste of Canteen .mess. kitchen waste, paper, plastic, Horticulture Waste etc**			
2.	What is the approximate amount of waste generated per day? (in Kilograms/month) (approx.)	Bio Degradable	Non-Biodegradable	Hazardous	others
		500 kg	10kg	Yes	<1kg
3.	How is the waste generated in the institute managed? By 1 Composting(yes) 2 Recycling 3 Reusing 4 Others(specify)	Compositing is being done. Reuse of one side printed Paper for internal communication. Sewage water is discharged to public Sewer. Domestic Waste is given to Municipal Corporation. Two types of Waste bins are provided at campus for biodegradable and non biodegradable waste. Horticulture waste used.			
4.	Do you use recycled paper in institute?	Yes			
5.	Do you use reused paper in institute?	Yes			
6.	How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.	Not done. We train our students and staff to recycle and reuse.			
7.	Can you achieve zero garbage in your institute? If yes, how?	Not yet achieved. Possible through waste management plan and will do soon.			

Waste Categories



Waste Remediation Methods:

01

BIOGAS Plant

Cost (1000 Kg) : INR 30,00,000/-*
LPG Generation: 70 kg/ day
Energy Consumption : 40 kWh/day

☑ Producing biogas gives many advantages for the environment, companies and people involved. The advantages are: Biogas is a green energy source in form of electricity and heat for the local grid. Considerable environmental advantages - less emission of the greenhouse gasses methane, CO2 and nitrous oxide

02

Plastic Waste Convertor

Cost – INR 4,95,600 /-

☑ **ZELENO- reverse vending machine** allows you to easily dispose of your plastic PET bottles and Aluminum/steel cans of different sizes. The machine automatically accepts the trash and crushes them to be recycled later.

☑ **ZELENO-RVM** generates an instant reward for the trash disposed and creates a receipt, which can be redeemed at the chosen outlets.

* Might vary based on actual requirement

03

Association with Recycling/ Feed the Need Organizations

☑ Formed to facilitate recycling of all kinds of packaging waste and thus contribute towards cleaner and greener environment. We specialize in collection and aggregation of all packaging waste in a professional and organized manner backed by technology and we offer Pan India services.

04

Waste Segregation

☑ **Waste segregation** is included because it is much easier to recycle. Effective segregation of wastes means that less waste goes to landfill which makes it cheaper and better for people and the environment. It is also important to segregate for public health.

05

Composting

☑ Organic waste converter which helps convert your segregated organic waste to good quality compost. It can be smart, compact, efficient and aesthetically appealing. Its robust, functional and user-friendly design.

06

Placement of additional bins (10 DB)

Cost (INR) : 1000-1500/ DB

☑ This will reduce the waste spilling which was observed in Football ground, landscapes and near canteen areas.

Greening the Campus:

1.	**Is there a garden in your institute?**	**Yes, about 70% of Campus area is developed and maintained as green spaces.**	
2.	Do students spend time in the garden?	2-4 Hours during winters	
3.	Total number of Plants in Campus	Plant type	Approx. number
		Plants/Trees/shrubs/ Bushes	5000
4.	Suggest plants for your campus. (Trees, vegetables, herbs, etc.)	List added at the end of the report	
5.	Is the college campus have any Horticulture Department	No but two mali and Gardener	
6.	Number of Tree Plantation Drives organized by College per annum.(If Any)	Yes, Two Tree Plantation Drives are Organized Annually. 200 trees and 50shrubs planted.)Photo Attached	
7.	Number of Trees Planted in Last FY.	200	
	Survival Rate	50%	
8.	Plant Distribution Program for Students and Community	Yes, Saplings are distributed to Students and visitors at various Occasions. Besides this landscape of some area in city are developed by Institute. *(photographs attached)*	
9.	Plant Ownership Program	Various Trees are Planted and owned by Visitors as well as students. The Name plates of plants are displayed.	

Clean Air:

1.	**Are the Rooms in Campus are Well Ventilated?**	**Yes**			
2.	Window Floor ratio of the Rooms	**Very Good**			
		Operator-owned vehicles			
		PUC done of all incoming vehicles			
4.	Provide details of college -owned motorized Vehicles?	NIL			
	PUC done	Not Applicable			
5.	Specify the type of fuel used by College		Cars	Two wheeler	Other
	Diesel		Y	--	--
	Petrol	--	Y	Y	--
	CNG	--	--	--	--
	LPG	--	--	--	Y (Hostel & Lab)
	Electric	--	--	--	--
6.	Air Quality Monitoring Program (If Any)	Presently not being done and not required.			
7.	Students suffer from Respiratory ailments? (If Any)	No			
8.	GENSET pollution prevention	Yes			

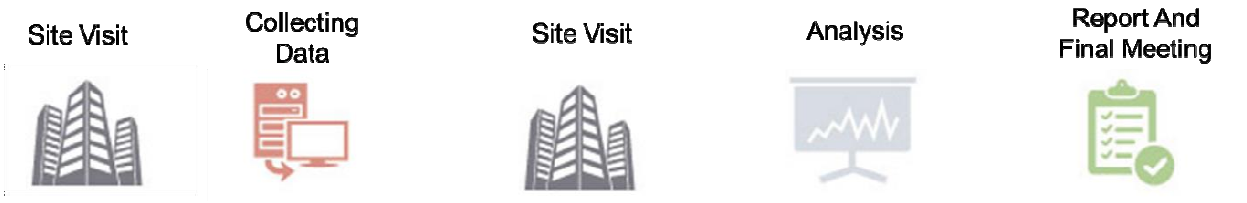
Animal Welfare:

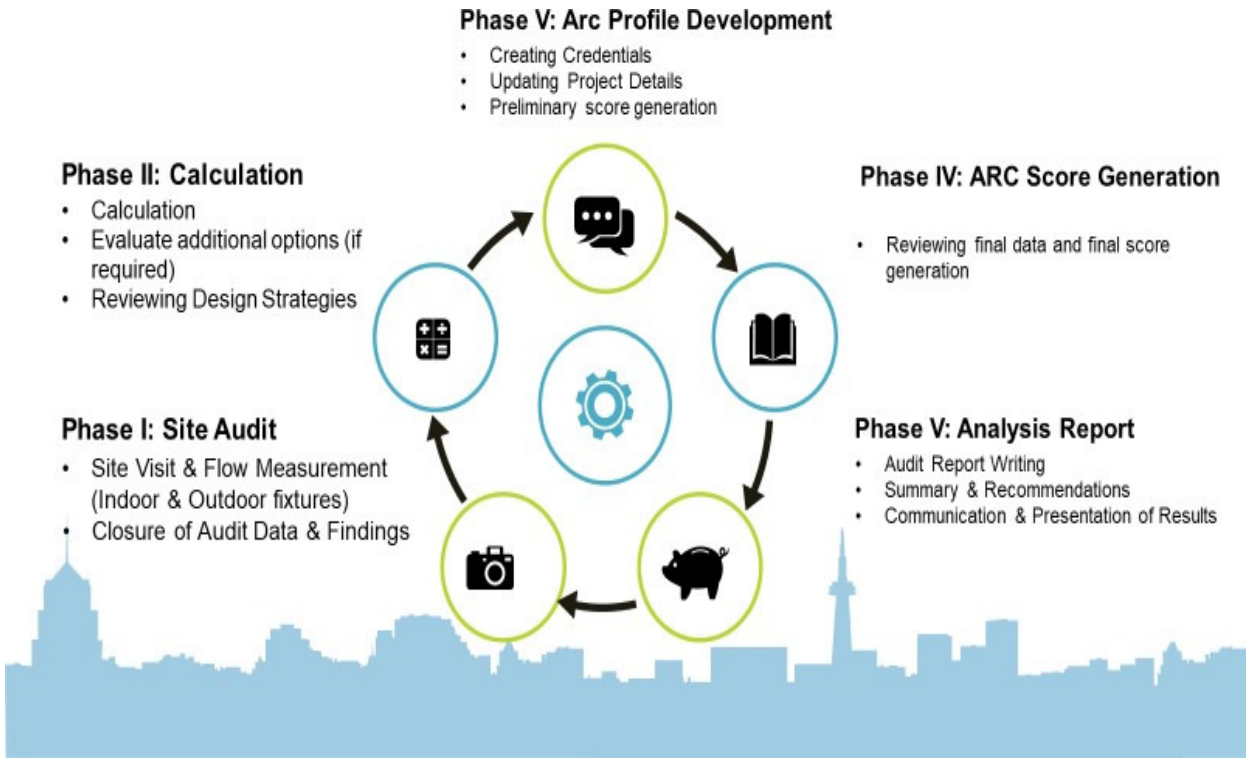
1.	List the animals (wild and domestic) found on the campus (dogs, cats, squirrels, birds, insects, etc.)	Birds and Squirrels are commonly found in campus. A variety of birds species and other flora and fauna available but these are not harmful to human so institute doing their bid for its conservation.
2.	How many dogs in your area have undergone Animal Birth Control - Anti Rabies (ABC - AR)?	Not required
3.	Does your institute have a Biodiversity Programme?	Yes

III. Methodology for Getting Accreditation from Agency:

In order to perform green analysis, the methodology included different tools such as physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. The study covered the following areas to summarize the present status of environment management in the campus:

- Water management
- Energy Conservation





4. Observations and Recommendations

Energy Use and Conservation:

This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliance, natural gas and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. Separate Energy Audit report has been got done by the college form us.

Observations:

Energy source utilized by the campus is electricity only. One DG set is there for emergency use . The entire campus including common facility centers are equipped mostly with LED lamps and LED tube lights. Besides this, photovoltaic cells of 80 kWp are also installed in the campus as an alternate renewable source of energy. The Solar power generated is used first in campus and excess is exported to RVVNL through net meter. 120 kWP solar PV plant is also being installed on the new Law college building roof. In this way, all efforts are being done to make college independent of power from grid (Net Zero Building).

Solar water heaters of 2000 liter capacity are installed in hostel buildings as to promote renewable energy but due to poor maintenance are running with standby electrical heater. These should be got maintained from the supplier through repair and AMC.

It is also noted that all the exterior lighting fixtures are timer based, which is an appreciable input for reducing energy consumption.

All the 72 ACs are star rated from BEE and are in good condition and consuming minimum energy with good temperature control. The setting of ACs is 26^{o}C. The ACs for the new building of Law college are of being planned of VRF which consumes minimum energy. The notice inviting tender is enclosed in annexure 4.

Photovoltaic Cell Panels

Recommendations:

1. In campus premises electricity should be shutdown from main building supply after occupancy time, to prevent power loss due to eddy current.
2. Support renewable and carbon-neutral electricity options on any energy purchasing consortium, with the aim of supplying all college properties with electricity that can be attributed to renewable and carbon-neutral sources. 120 KWp solar PV plant has been planned and should be started soon
3. Installation of LED lamps instead of CFL and replacing the old tube lights with the new LED tubes.
4. 5–star rated Air Conditioners (inverter type) and DC Fans should be used.
5. Cleaning of tube-lights/bulbs to be done periodically, to remove dust over it.
6. Building level energy metering is suggested along with integration over an energy management system, this streamlines the monitoring and data accessibility.
7. A bio-medical waste disposal machine for pads should be installed in the hostel.
8. Paper napkin use should be stopped as these are produced by cutting trees .This has been implemented . Paper recycling machine should be put to make hand made paper.
9. Recycled and locally sourced material and environmental friendly paints (Gobar paint) should be used in future .

5. Conclusions

Considering the fact that the institution is predominantly a college, here significant environmental research are done both by faculty and students. The environmental awareness initiatives are substantial. Plastic is not being used .The installation of solar panels and rain water harvesting system are noteworthy. Besides, environmental awareness programs initiated by the administration shows how the campus is going green. Few recommendations are added to curb the menace of waste management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus & thus sustainable environment and community development.

The STP plant should be installed urgently to recycle the water.

NSS and CSR activities are being done regularly to create awareness in society by the college. Students training on Green is being done to make them a good future citizen. Some photographs of plantation are:

List of Plants

S. No.	Botanical Name	Local Name
1.	ACALYPHA WILKESIANA	कॉपर लीफ
2.	ADENIUM OBESUM	डेजर्ट रोज
3.	ADHATODA VASICA	अडूसा
4.	AEGLE MARMELOS	बिल्व
5.	AILANTHUS EXCELSA	महानिंब
6.	ALBIZZIA LEBBECK	सिरस
7.	ALLAMANDA BLANCHETII	पर्पल वाइन
8.	ALLAMANDA CATHARTICA	गोल्डन ट्रम्पटवाइन
9.	ALOE VERA	घृतकुमारी
10.	ALSTONIA SCHOLARIS	सप्तपर्णी
11.	ALTHEA ROSEA	हॉलीहोक
12.	ALYSSUM MARITIMA	स्वीट अलाइसम
13.	ANNONA SQUAMOSA	सीताफल
14.	ANTIGONON LEPTOPUS	कोरल वाइन
15.	ANTIRRHINUM MAJUS	डॉगफ्लावर
16.	ARGYERIA NERVOSA	सुपुष्पी
17.	ARISTOLOCHIA LITTORALIS	बतख बेल
18.	ARTOCARPUS HETEROPHYLLUS	कटहल
19.	ASPARAGUS RACEMOSUS	शतावरी
20.	ASTER INDICA	एस्टर
21.	AZADIRECHTA INDICA	नीम
22.	BAMBUSA BAMBOS	बाँस
23.	BARLERIA PRIONITIS	वज्रदंती
24.	BAUHINIA VARIEGATA	कचनार
25.	BOMBAX CEIBA	सेमल
26.	BOUGAINVILLEA GLABRA	बॉगनवेलिया

27.	BREYNIA RETUSA	बहुपुष्प
28.	BRYOPHYLLUM PINNATUM	पत्थरचट्टा
29.	CAESALPINIA PULCHERRIMA	गुलेतूरा
30.	CALENDULA OFFICINALIS	पॉट मेरीगोल्ड
31.	CALLIANDRA HAEMATOCEPHALA	पाउडर पफ
32.	CALLISIA REPENS	कछुआ बेल
33.	CALLISTEMON VIMINALIS	बॉटल ब्रश
34.	CAMPSIS GRANDIFLORA	ट्रम्पेट वाइन
35.	CANNA INDICA	केली
36.	CANNABIS SATIVA	भांग
37.	CARICA PAPAYA	पपीता
38.	CARISSA CARANDAS	करौंदा
39.	CASCABELA THEVETIA	पीली कनेर
40.	CASSIA FISTULA	अमलतास
41.	CASSIA JAVANICA	जावा केशिया
42.	CASSIA SIAMEA	कसौंद
43.	CASUARINA EQUISETIFOLIA	कैज्यूराइना
44.	CATESBAEA SPINOSA	लिली थॉर्न
45.	CATHARANTHUS ROSEUS	सदाबहार
46.	CEIBA PENTANDRA	सफेद सेमल
47.	CELOSIA CRISTATA	लाल मुर्गा
48.	CESTRUM NOCTURNUM	रात की रानी
49.	CHRYSANTHEMUM INDICUM	गुलदाउदी
50.	CITRUS AURANTIFOLIA	नींबू
51.	CITRUS LIMETTA	मौसमी
52.	CODIAEUM VARIEGATUM	क्रोटन
53.	COLEUS TRICOLOR	कोलियस
54.	COMBRETUM COCCINEUM	फलेम वाइन
55.	COMBRETUM INDICUM	मधुमालती
56.	COMMIPHORA WIGHTII	गुग्गल
57.	CORDIA DICOTOMA	लसोड़ा
58.	CORDYLINE FRUTICOSA	गुडलक प्लांट
59.	COSMOS COUDATUS	अलम

60.	CRASULA OVATA	जेड प्लांट
61.	CRINUM ASIATICUM	सुदर्शन
62.	CUPHEA HYSSOPIFOLIA	कुफिया
63.	CYATHULA PROSTRATA	लाल चिरचिटा
64.	CYCAS REVOLUTA	सागोपाम
65.	CYPERUS ALTERNIFOLIUS	छाता पाम
66.	DAHLIA TUBEROSA	डेहलिया
67.	DATURA METEL	धतूरा
68.	DELBERGIA SISSOO	शीशम
69.	DELONIX REGIA	गुलमोहर
70.	DELPHINIUM MALBARICUM	लार्कस्पर
71.	DIANTHUS BARBATUS	डायन्थस
72.	DIMORPHOTHECA PLUVIALIS	रेन डेजी
73.	DOMBEYA SPECTABILIS	डॉम्बिया
74.	DRACAENA REFLEXA	ड्रेसिना
75.	DURANTA ERECTA	नीलकांता
76.	EPHEDRA FOLIATA	इफीड्रा
77.	EPIPREMNUM AUREUM	मनीप्लांट
78.	ERYTHRINA VARIEGATA	पगार
79.	EUPHORBIA MILII	क्राउन ऑफ थॉर्न
80.	EUPHORBIA PULCHERRIMA	लालपत्ता
81.	FICUS BENGHALENSIS	बरगद
82.	FICUS ELASTICA	रबर प्लांट
83.	FICUS GLOMERATA	गूलर
84.	FICUS PANDA	पुकर
85.	FICUS RELIGIOSA	पीपल
86.	GAILLARDIA PULCHELLA	नवरंगा
87.	GAZANIA RIGENS	गजानिया
88.	GERBERA AMBIGUA	गरबेरा डेजी
89.	GOMPHRENA GLOBOSA	गुलेमरनमल
90.	GREVILLEA ROBUSTA	सिल्वर ओक
91.	HAMELIA PATENS	फायर बुश
92.	HAPLOPHRAGMA ADENOPHYLLUM	मरोड़ फली

93.	HELIANTHUS ANNUUS	सूरजमुखी
94.	HELICONIA ROSTRATA	लॉबस्टर क्लॉ
95.	HIBISCUS ROSA-SINENSIS	गुड़हल
96.	HIPPEASTRUM REGINAE	लिली
97.	HIPTAGE BENGHALENSIS	माधवीलता
98.	HOLOPTELEA INTEGRIFOLIA	पपड़ी
99.	HYDRILLA VERTICILLATA	कुरेली
100.	HYMENOCALLIS LITTORALIS	स्पाइडर लिली
101.	IBERIS AMARA	कैन्डीटफ्ट
102.	IPOMOEA PURPUREA	आइपोमिया
103.	IXORA COCCINEA	रुमिनी
104.	JACCARANDA MIMOSIFOLIA	नीली गुलमोहर
105.	JACQUEMONTIA VIOLACEA	जैक्यूमोन्शिया
106.	JASMINUM AURICULATA	जूही
107.	JASMINUM GRANDIFLORUM	चमेली
108.	JASMINUM SAMBAC	मोगरा
109.	JATROPHA INTEGERRIMA	जट्रोफा
110.	JATROPHA PODAGRICA	बुद्धा बैली प्लांट
111.	KIGELIA AFRICANA	बलमखीरा
112.	LAGERSTROEMIA SPECIOSA	जरुल
113.	LAWSONIA INERMIS	मेहन्दी
114.	MANGIFERA INDICA	आम
115.	MARSILEA QUADRIFOLIA	जलतिपतिया
116.	MIMUSOPUS ELENGI	मौलश्री
117.	MONSOA ALLIACEA	लहसुन बेल
118.	MONSTERA DELICIOSA	स्पिलिट लीफ
119.	MORINGA OLEIFERA	सहजन
120.	MORUS ALBA	शहतूत
121.	MURRAYA KOENIGII	करीपत्ता
122.	MUSA PARADISICA	केला
123.	NASTARTIUM MAJUS	नस्टरशियम
124.	NEOLAMARCKIA CADAMBA	कदम्ब
125.	NERIUM OLEANDER	कनेर

126.	NYCTANTHUS ARBOR-TRISTIS	हरसिंगार
127.	NYMPHAEA PUBESCENS	कुमुद
128.	OCIMUM SANCTUM	तुलसी
129.	OPUNTIA ELATIOR	नागफणी
130.	PANDANUS ODORIFER	केवड़ा
131.	PAPAVER RHOEAS	लाल पोस्त
132.	PASSIFLORA INCARNATA	राखी बेल
133.	PEDILANTHUS TITHYMALOIDES	जापानी पोइनसेटि
134.	PENTAS LANCEOLATA	स्टार फ्लावर
135.	PETREA VOLUBILIS	नीलमणि लता
136.	PETUNIA GRANDIFLORA	पिटूनिया
137.	PHLOX DRUMMONDII	फ्लाक्स
138.	PHOENIX SYLVESTRIS	खजूर
139.	PLUMERIA ALBA	चम्पा
140.	PLUMERIA PUDICA	नागचम्पा
141.	POLYALTHIA LONGIFOLIA	अशोक
142.	POLYSCIAS SCUTELLARIA	अरेलिया
143.	PONGAMIA PINNATA	करंज
144.	PORTULACA GRANDIFLORA	मॉस रोज
145.	PSEUDERANTHEMUM CARRUTHERSII	पर्पल इरेन्थेमम
146.	PSIDIUM GUAJAVA	अमरूद
147.	PUNICA GRANATUM	अनार
148.	PUTRANJIVA ROXBURGHII	पुतिजिया
149.	PYROSTEGIA VENUSTA	बिग्नोनिया
150.	RAVENIA SPECTABILIS	लिमोनिया
151.	RHOEO DISCOLOR	रोहियो
152.	RICINUS COMMUNIS	अरंडी
153.	RONDELETIA ODORATA	पनामा रोज
154.	ROSA INDICA	गुलाब
155.	ROTHECA MICROPHYLLA	म्यूजिकल नोट
156.	RUELLIA TUBEROSA	चटपटी
157.	SALVIA SPLENDENS	सालिनिया

158.	SANSEVIERIA CYLINDRICA	स्पीयर प्लांट
159.	SANSEVIERIA ZEYLANICA	स्नेक प्लांट
160.	SARACA ASOCA	सीता अशोक
161.	SPATHODEA CAMPANULATA	रगतूरा
162.	SPHAGNETICOLA TRILOBATA	विडेलिया
163.	SYNGONIUM PODOPHYLLUM	ऐरो प्लांट
164.	SYZYGIUM CUMINI	जामुन
165.	TAGETES ERECTA	गेंदा
166.	TAGETES PATULA	फ्रेंच मैरीगोल्ड
167.	TAMARINDUS INDICA	इमली
168.	TECOMA CAPENSIS	टिकोमा
169.	TECOMA STANS	पीलिया
170.	TERMINALIA ARJUNA	अर्जुन
171.	TERMINALIA NEOTALIALA	मेडागास्कर ट्री
172.	THUJA ORIENTALIS	मोरपंखी
173.	TINOSPORA CORDIFOLIA	गिलोय
174.	TRADESCANTIA PALLIDA	पर्पल क्वीन
175.	TYLOPHORA INDICA	यमाबेल
176.	TYPHA ANGUISTIFOLIA	पटेर
177.	VOLKAMERIA INERMIS	सकुरंगी
178.	WITHANIA SOMNIFERA	अश्वगंधा
179.	ZAMIA FURFURACEA	कार्डबोर्ड प्लांट
180.	ZINNIA ELEGANS	जीनिया

180 Varieties of Plants are in campus.

Ranjula J

6. Annexures

6.1 List of Water Purifiers.

6.2 List of Water Coolers.

6.3 Details of Composting Machine

6.4 Notice inviting tender for ACs of Law College.

6.5 Phytorid Technology for treatment of sewage – advantage for Kanoria.

6.6 Various other decentralized wastewater treatment technologies - comparison.

Annexure: 1

Kanoria PG Mahila Mahavidyalaya, Jaipur

List of RO/ Water Purifiers Installed in the College Campus

Session 2020-21

College (KMM)

R.O. Water Purifier

S. No.	Company/ Manufacturer	Qty.	Place	Floor	Old/ New
1	Kent Mineral RO	1	Pantry Room	Ground Floor	Old

Water Purifier

S. No.	Company/ Manufacturer	Qty.	Place	Floor	Old/ New
1	Aquaguard	1	Pantry Room	Ground Floor	Old
2	Kent	1	Inside Canteen	Ground Floor	Old
3	Aquafresh	1	Near Canteen	Ground Floor	New
4	Eureka Forbes	1	Near Room No. 42	First Floor	Old
5	Aquafresh	1	Near Plant Nursery	Ground Floor	New
6	Aquafresh	1	Near Room No. 67	First Floor	New
7	Kent	1	Near Science Gate	Ground Floor	Old
8	Aquafresh	1	Near Canteen Side Channel Gate (Building Entry)	Ground Floor	New
9	Aquaguard	1	Auditorium (Nand Lal Kanoria Complex)	-	New

Hostel

Water Purifier

S. No.	Company/ Manufacturer	Qty.	Place	Floor	Old/ New
1	Aquafresh	1	Old Hostel Building Near New Rooms	First Floor	New
2	Aquaguard	1	New Hostel Building	Ground Floor	Old
3	Aquafresh	1	Old Hostel Building Near Mess	Ground Floor	New
4	Kent	1	Old Hostel Building	First Floor	Old
5	Aquaguard	1	New Hostel Building	First Floor	Old

R.O. Water - LPM
- Waste water - LPM (%)

Annexure: 2

कानोड़िया पीजी महिला महाविद्यालय, जयपुर

वॉटर कूलर्स का विवरण

सत्र 2020–21

कमांक	स्थान	कम्पनी	टिप्पणी
1	नंद लाल कानोड़िया कॉम्प्लेक्स (प्रथम तल)	Voltas	
2	नर्सरी के पास (भू–तल)	Blue Star	
3	पेन्ट्री रूम (भू–तल)	Voltas	
4	कैन्टीन साईड गेट के पास (भू–तल)	Voltas	
5	भूगोल लैब की तरफ सीढ़ीयों के पास (प्रथम तल)	Voltas	
6	कमरा नं. 67 के सामने (प्रथम तल)	Blue Star	
7	साइंस गेट के पास (भूतल)	Voltas	
8	कैन्टीन के पास (भूतल)	Blue Star	
9	ओल्ड हॉस्टल मैस के पास	Blue Star	
10	ओल्ड हॉस्टल	Blue Star	
11	ओल्ड हॉस्टल कमरा नं. 12ए	Voltas	
12	न्यू हॉस्टल में प्रथम तल पर	Voltas	
13	न्यू हॉस्टल में भूतल पर	Blue Star	

1. Current –
2. Capacity –
3. Set point

1, 4, 8, 12

Annexure: 3

Kanoria
PG Mahila
Mahavidyalaya
Jaipur

(18)

Ref. No. KMM/2019-21/389

Date 18-2-2020

M/s R.N. Enterprises
140, Shree Shyam Apartment, Ganesh Nagar Main
Niwaru Road, Jhotwara,
Jaipur-302012 (Raj.)

Subject: Order for supply and installation of Composting Machine.

Dear Sir,

With reference to your quotation dated 21-01-2020 and meeting dated 31-01-2020 regarding negotiation, this is to inform you that your rates for **Composting Machine** have been accepted by the college. As per payment terms, a cheque of Rs. 72,800/- (Rs. Seventy-Two Thousand Eight Hundred only) is enclosed as advance.

Therefore, you are requested to supply the Composting Machine as per following at your earliest and submit the bill in duplicate for payment in the college office:

S. No.	Product/ Service	Unit	Qty.	Amount (Rs.)
1	Composting Machine Capacity: 50 KG Per Day	Per Unit	01	1,45,600/- (Including GST and Installation)

Terms:

1. Training of 21 days will be provided to the concerned staff of the college to operate this machine
2. Two year free bacteria facility/ service
3. Balance 50% amount will be paid after installation
4. Two years' warranty
5. Delivery F.O.R.
6. Other terms and conditions as per quotation and discussion with college officials

Thanking you.

Yours Truly,

Secretary

Copy to:

1. Principal, KMM, Jaipur
2. Dean, College Development, KMM, Jaipur
3. Office Superintendent, KMM, Jaipur
4. Accountant, KMM, Jaipur
5. Store Keeper/ Caretaker, KMM, Jaipur
6. Guard File

Secretary

Ashish
18-2-2020

Annexure: 4

Kanoria PG Mahila Mahavidyalaya, Jaipur

NOTICE INVITING TENDER

Sealed tenders are invited for under noted each works from the contractor having sufficient experience in Installation of Solar PV System works. The tender document shall be issued only to that contractor who satisfies the minimum qualifications given below:

1. The document evidence of having completed at least one Non VRF Ductable Air Conditioner project worth Rs. 50 lakhs (Ninety lakhs) in one year during the last 3 years.
2. Company profile showing man power and equipment's.

Name of Work	**Supply & Installation of Non-VRF Ductable Air Conditioner**
Estimated Cost	45.00 Lakhs
Earnest Money	90000/-
Tender Cost	500/-
Date of Sale of Tender	13/07/2021 to 20/07/2021
Date of Receipt of Tender	22/07/2021 up to 2.00 p.m.
Date of Opening of Tender	22/07/2021 at 3.00 p.m
Completion period	30 days
Name of Firm	.....
	.....
Detail of Bank Draft	DD No. ..... Date .....
	Bank Name .....

3. The tender document can be had and the site can be seen at the office of the Kanoria PG Mahila Mahavidyalaya, Jaipur on payment of tender fee in cash Rs. 500/- during working hours on working days. The tender fee is non refundable.
4. Tenderer may be present at the time of tender opening. The Kanoria PG Mahila Mahavidyalaya, Jaipur reserves the right to reject one/all tenders without assigning any reason whatsoever.
5. The college is not bound to accept the lowest tender, may reject any tender or part of tender without assigning any reason.
6. The tenderer will have to submit GST Number along with the tender.
7. Payment will be made on running bills after deducting security money @5%, income tax, Labour cess etc. amount as per provision after verification of the Architect/Engineer.
8. If any vendor does not want to deduct security deposit,then they will have to give a bank guarantee of the work order amount.
9. Tenders must be accompanied with and earnest money of Rs. 90,000/-(Ninty Thousand) in the form a demand draft favour of Principal, Kanoria PG Mahila Mahavidyalaya, Jaipur from a scheduled bank which shall be returned to the unsuccessful bidders after the decision of the authorities.
10. Tender received after prescribed time and date will be rejected.
11. For any delay in completion of works as per the notify in the work order from the date of received of work order, the contractor shall be liable to pay an amount upto a maximum of 5% (five percent) of the total cost to be paid, at a rate of 1% (one percent) per week of the total installation cost liquidated damaged. One extra day shall be treated as one week.
12. If the vendor will use the Electricity & Water of the College during the work, then an amount of 1% will be deducted from the total billing cost.
13. After completion the installation work ,the vendor will have to provide free of cost annual maintenance for next five years. In this regards vendor has to be submit an Agreement with College.

Annexure-5

Phytorid Technology for Treatment of Sewage

CSIR-National Environmental Engineering Research Institute, Nagpur 440020

A huge quantity of sewage is generated in rural and urban areas. With limited installed capacity of treatment in centralised manner, a large portion of this sewage remains untreated and left as it is to water bodies. Currently there is a growing awareness of the impact of sewage contamination on rivers and lakes. In order to rejuvenate the rivers and lakes it is extremely necessary to stop the flow of untreated waste from river basin to the rivers. A large portion of the wastewater is domestic sewage.

In order to make the method feasible selection of technology for sewage treatment should be on criteria such as plant which works without electricity, require minimum maintenance and most importantly, the technology should be self-sustainable. In order to use the technology in rural areas these criteria become more important due to lack of skilled manpower and challenges on electrical supply. This necessitates use of natural methods, which are highly efficient and structured. Using this concept, natural wetland functioning has been used to design a technology wherein wetlands plants and combined working of their root system have been integrated to get a designer ecosystem. National Environmental Engineering Research Institute (NEERI) has developed a novel technology based on natural method of treatment of sewage using constructed wetlands. The technology is named as PHYTORID and is well patented nationally and internationally.

What is PHYTORID system

Engineered wetland system can be used for treatment of wastewater and particularly for treatment of sewage. This is a stand-alone technology and is very effective alternative to conventional activated sludge treatment plants. PHYTORID is a subsurface flow constructed wetland system (SSFCW) with successful demonstration in the field for more than 6 years of continuous operation as a stand alone sewage treatment system.

Capacity dependent Cost of PHYTORID

Phytorid system is a cost effective option for treatment of sewage from domestic sources. The installation cost of the complete system depends on the capacity of the plant. A variation in the cost of installation, maintenance cost of sewage treatment and space required is shown in the following table;

Population (with LPCD of 70)	Capacities, m^3/day	Civil costs# (for typical design)	Solar pumps*, pipes, etc	Bio-media Culture costs	Plantation costs	Annual Maintenance charges	NEERI's charges	Total Cost (Rs.)	Land Requirement (Sqm)
500	25	1141334	50000	58800	11116	72000	50000	13,83,250	30
600	35	1335135	50000	70560	13339	100800	50000	16,19,834	42
700	40	1506895	50000	82320	15562	115200	50000	18,19,977	48
800	45	1700740	50000	94080	17786	129600	50000	20,42,206	54
900	50	1872250	50000	105840	20009	144000	50000	22,42,099	60
1000	55	2066050	50000	117600	22232	158400	50000	24,64,282	66
1200	65	2437993	50000	141120	26678	187200	50000	28,92,991	78
1400	75	2798758	50000	164640	31125	216000	50000	33,10,523	90
1600	90	3164069	50000	188160	35571	259200	50000	37,47,000	108
1800	100	3536056	50000	211680	40018	288000	50000	41,75,754	120
2000	112	3901367	50000	235200	44464	322560	50000	46,03,591	134

Operation & Maintenance Schedule for Phytorid plant

Although no elaborate maintenance is required as compared to mechanised plants following operation and maintenance is required.

Periods in Months	1	2	3	4	5	6	7	8	9	10	11	12
O & M item												
Replantation (partial if needed)			O									O
Water Quality analysis	O	O	O		O		O		O			O
Cleaning of Screening Chamber [this could be every week, in case load of floating matter is high]	O	O	O	O	O	O	O	O	O	O	O	O
Harvesting of overgrown plants and roots			O			O			O			O
Hydraulics/ water level Checks						O						O
Cleaning of Settling chamber												O
Gravel checks and reshuffle						O						O
Pump maintenance (if pump is installed)			O			O			O			O
Biomedia augmentation (10% of the first time addition)												O

Applications of PHYTORID

The PHYTORID technology is best applicable to following;

- Domestic municipal sewage treatment
- Nallah water treatment
- Improving the lake water quality
- Industrial waste water particularly textile, dairy, food etc.

Space Requirement

As seen from the above photographs phytorid can be integrated into the landscape and therefore no dedicated space is required. However, the total area required for Phytorid treatment plant for a capacity of 100 m^3/day is approximately 150 m^2. The area does not include amenities, approach and other needs for maintenance, which could be an additional 10-20%. Based on the land availability and shape of the land, design can also be changed. If one or two pumps are used then tanks can be built in multiple levels and space can be saved.

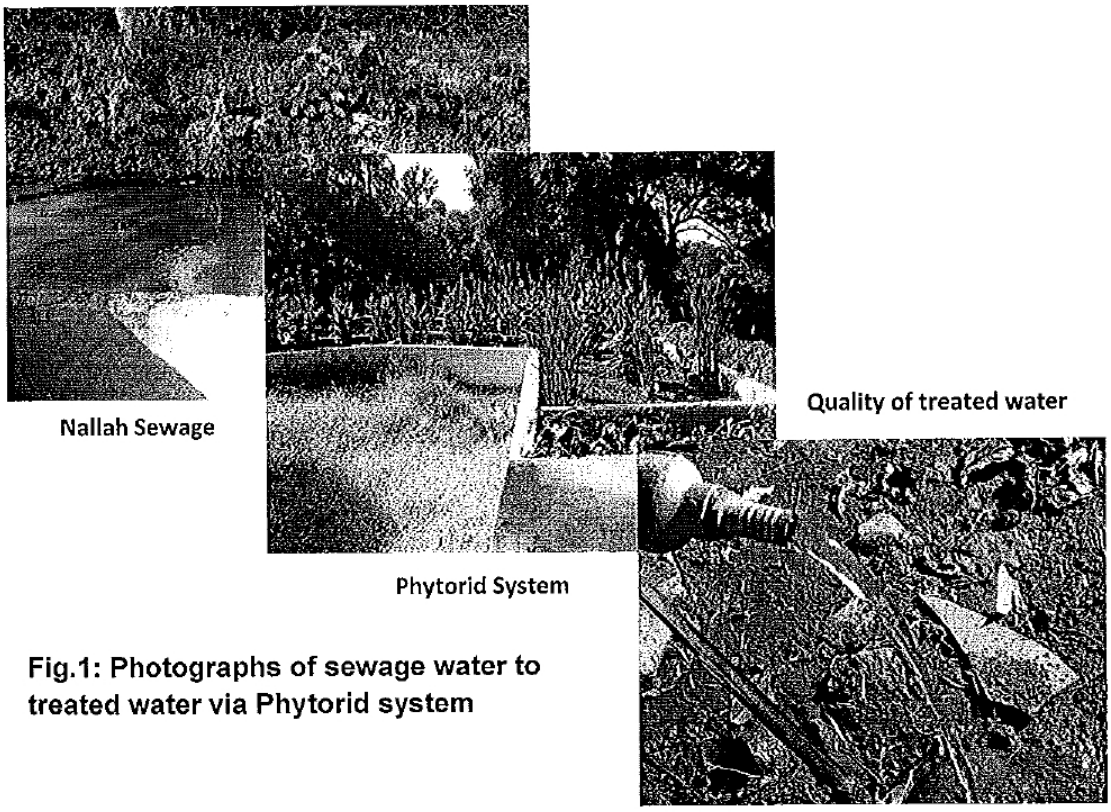


Fig.1: Photographs of sewage water to treated water via Phytorid system

Table 1: Select list of Phytorid Systems installed.

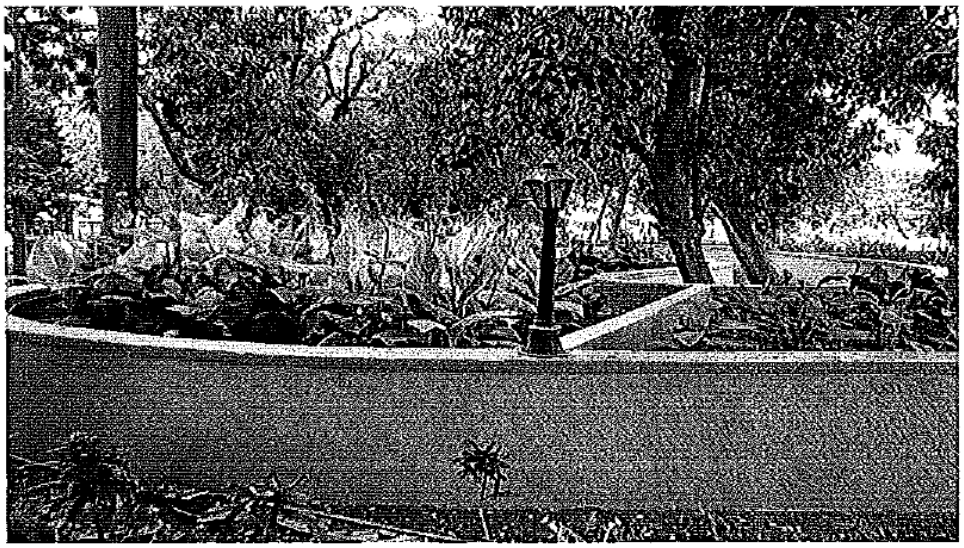
Sr. No.	Place	Capacity (m^3/day)
1.	Primer Auto Ltd, Pune	150
2.	Siemens Ltd Kalwa	500
3.	Bharat Forge, Baramati	100
4.	MJP, Nabi Lake Lonar, Maharashtra	500
5.	Mahindra Vehicle Manufactures, Chakan	750
6.	Swapnalok Builders, Pune (under construction)	250
7.	Clover, Vascon Builder, Pune (under construction)	550
8.	Municipal Council, Chandur Railway	100
9.	Municipal Council, Dhamangao	100
10.	Municipal Council, Daryapur	100
11.	Dr. Panjab Rao Deshmukh Krishi Vidyapeeth, Nagpur	100

Performance of PHYTORID

Table 2: Typical Performance of PHYTORID system on inlet and outlet parameters

Parameter	Inlet (Sewage)	Outlet (treated Water) after Phytorid bed	Outlet after Solar based Ozonation step	Standards as per Environment Protection Rules, 1986	
				Disposal to Inland Surface Water	Disposal on Land for irrigation
BOD (mg/L)	80 to 300	<30	<10	30	100
COD (mg/L)	200 to 600	< 100	<50	250	Not Specified
Total Suspended Solids (ppm)	100 to 500	< 100	<30	100	200
Ammonia as NH3 (ppm)	5 to 20	< 5.0	<5.0	5.0	Not Specified
Phosphate	10 to 50	< 5.0	< 5.0	5.0	Not Specified
pH	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5-9.0	5.5-9.0
Colour	Black/dark	Colourless	Colourless	Colourless	Colourless
Fecal Coli Farm (MNP/100ml)	10^6 to 10^7	<500	Nil	<500	<500

- They provide habitat for many wetland organisms
- This is also more desirable in areas with high water table to avoid any contamination of ground water through soak pit
- It can be applied preservation of natural watercourses such as lakes, rivers and marine ecosystem
- It can be easily integrated into the natural topography



Photograph of a PHYTORID based sewage treatment system emphasising aesthetic view of the plant

PHYTORID working in the field

There are about more than 35 PHYTORID systems with varying capacities from 2000 L/day to 1 MLD are working in the filed successfully for treatment of sewage. The first ever plant was installed at Mumbai University, Kalina campus in 2006.

The PHYTORID technology owing to its several advantage on technological features and economical basis has a large potential for decentralised treatment of sewage in urban and rural areas of the country with concomitant advantage of water resource conservation.

The porous media also supports the root structure of emergent vegetation. The design of the Phytorid system assumes that the water level in the cells will remain below the top of the filter media. The vegetation to be utilized for the said Phytorid system is very important. Various species of aquatic plants have been utilized to attain maximum efficiency in the treatment of domestic wastes. These include species like Phramites australis, Phalaris arundinacea, Glyceria maxima, Typha spp., Scirpus spp., other common grasses etc.

Advantages of PHYTORID System

The PHYTORID systems have distinct advantages over conventional treatment plants. The technology is recommended for decentralized plants with varying capacities of 5000 L/day to 8-10 MLD. The best feature of the PHYTORID technology is that are no mechanical or electrical machineries such are aerators are involved. This gives an advantage for sustainable operation of PHYTORID.

Several advantages of PHYTORID are as follows;

- **No mechanical or electrical machineries** such as aerators/pumps are involved therefore **very low maintenance** (about 10% of Activated Sludge treatment plant or even less as compared to Membrane technology).
- **Space saving** technology as compared to other no-electricity (passive) systems such as Wastewater Stabilization Ponds (WSP). One day residence time for Phytorid as compared to 10-18 days for WSP
- **Scalable** from individual household to community to village/township level
- Decentralized system thereby **saving cost on sewage pipelines** and avoids loss by leakages
- Treated water quality **meets discharge and irrigation standards** specified by CPCB. If ozonation (based on solar power) is added then it meets all reuse standards.
- Aesthetic improvements as **Phytorid resembles garden** (Photo shown below)
- Due to subsurface flow design, **no mosquitoes and odor nuisance** as compared to some other surface flow technologies
- Systems are able to tolerate fluctuations in flow
- They facilitate water reuse and recycling

Annexure-6

Various other decentralized wastewater treatment technologies which are in use:

Name	Treatment Method	Treatment capacity	Reuse of treated water	Capital cost (`/KLD)	O&M cost (`/KLD/ year)	Features
DEWATS	Sedimentation, anaerobic treatment, plant root zone treatment, oxidation process	Should be more than 1 KLD, but plants bigger than 1 MLD are also not feasible as would need extensive land	Horticulture, mopping floors, cooling towers and flushing	35,000 – 70,000	1,000– 2,000	• Consist of several modules like settler, anaerobic baffle reactor, planted filter bed and a pond. • There's no need to have all the modules at each site, selection of modules depend on the quality of the water required after treatment • Settler helps in trapping the settlable solids whereas ABR helps in reducing BOD by 80-90%, while PFB helps in trapping the nutrients. Pond takes care of the odour • Minimal running cost, as no electro-mechanical equipment used

Fixed Film Biofilter Technology (FFBT)	Settling and flow equalisation followed by enhanced natural degradation (biochemical process)	0.5 KLD to tens of MLD	Horticulture Car Washing	25,000 – 35,000	1000 – 2000	• Biofilter used may be stones, gravels, sand or PVC filter material whichever provides maximum surface area and is easily available. • Enhanced degradation of contaminants takes place in minimum area, since suitable micro-culture is added to the Biofilter cell
Constructed Wet Land	Settling followed by plant root zone treatment in specially engineered baffled treatment cells whch provides both aerobic and anaerobic treatment	5 KLD – tens of MLD	Horticulture	14,000 – 35,000	1,000 – 2,000	• Use of chosen wetland plants that are locally available • Retention time is between 5 – 7days • BOD and TSS removal average • between 70-90% while faecal coliform is about 85-97% in treatment cells • Average nitrogen and phosphorus removal are in the range of 69-90%

FLUDISED AEROBIC BED BIOREACTOR (FAB)

Advanced technology of Fixed Film biological process having large surface area for biomass to grow has been used in the past to reduce both the reactor volumes as well as retention times. Further developments in this field have led to development of fluid bed technology in which the media are made of small plastic materials which are freely moving and non clogging type. Positive results have been obtained for a number of sewage wastes. Difference in reactor volumes and retention times and the plants could be installed in a fraction of the space required for conventional plants employing Activated Sludge Process.

The basic idea behind the fluidized bed reactor development is to have a continuous operating non clogging bio film reactor, which requires:

1. No back washing
2. Has low head loss and
3. High specific bio film surface area.

This was achieved by having the biomass to grow on small carrier elements that move along with the water in the reactor. The movement within the reactor is generated by aeration in the aerobic reactor. These bio film carriers are made of special grade plastic having density close to that of water. Different shapes have been tried and it is recommended that for each effluent one should carry out pilot plant studies to determine specific organic loading rates, so that for proper reactor sizing can be achieved.

Apart from making the plant compact, the fluid bed reactor employing fixed film principle of the attached growth process makes the plant more user friendly because it dose not require sludge recycle i.e. synonymous with conventional ASP. The absence of sludge recycle free the operator from the

enormous task of measurement and monitoring MLSS level in the tank and adjusting recycle ratios continuously, due to fluctuating COD loads.

These plants can accept shock loads much better than those employed for suspended growth process. Fluid bed reactors are generally tall there by reducing cross sectional area further.

One more attraction of this technology is that it produces much smaller quantity of sludge and what is more, this sludge requires no further treatment such as digestion, due to the fact that it produces digested sludge which does not smell like that in conventional plant.

It is possible to calibrate the plant by changing the media volumes to take care of actual load. One can operate the plant with media filling of 10-50%. Thus it gives tremendous flexibility in term of capacity. We also have enormous control during commissioning, as it is possible to alter the media quantum to obtain the desired results. The flexibility is totally absent in all other types of designs.

PROCESS DESCRIPTION

The treatment scheme proposed to treat the raw sewage is split into three distinct parts:

1. Pre Treatment, which compromises of screening and grit removal.
2. Biological Treatment, compromising of fluidized aerobic bioreactors, followed by clarification, and 3. Tertiary Treatment comprising of addition of chlorine to remove the E-coli.

Detailed description of each step of treatment is given below;

PRE TREATMENT

The raw sewage is collected through a coarse screen in the receiving Sump &

then pumped to the STP, into the bar screen chamber for removal of floating matter. Removal of such floating / coarse matter is essential because it can otherwise choke pipelines / pumps etc, and hinder the normal operation of the treatment plant. The screens are made of steel bars, placed at equal intervals. The sewage is made to pass through the screen wherein the floating matter, any large particles are trapped in the bars. The inclination of bars is kept such that manual raking becomes easy. The screened sewage is now made to pass through the grit chamber.

The grit present in raw sewage represents sand / dirt collect in sewerage system. This must be removed, in order to keep the channels / pipe clean. Grit has high settling velocity, and can be easily removed in the grit chamber. The grit removal provided here is a gravity type grit removal system. As the sewage is made to pass through this system the grit settle on the floor. This grit is then manually raked. The screening and grit from sewage is conveyed manually up to the suitable loading point from where it can be transported by using truck.

BIOLOGICAL TREATMENT

The main pollutants in the raw sewage are represents in the form of Bio-chemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). The ammonia cal nitrogen, nitrate nitrogen and phosphorus present also represent as polluting substances. The bacterial ability to synthesize the organic matter to harmless end products like carbon dioxide and water molecules is utilized to treat the raw sewage.

The bio-reactions are carried out in controlled environment in the bio-reactor. The bio-reactor comprises of a tank, fitted with aeration grid. The bacterial activity needs dissolved oxygen, to synthesize the organic matter. This supplied by passing air in for of small bubbles. The air is passed at the bottom of the tank, so that complete volume of tank utilized. The bacterial population is present in the reactor system. The media is made of small

plastic elements. Million of such pieces are present in the reactor. A very large area surface available for the bacterial population to grow.

The bacteria grow on the plastic media, by using the organic content in the raw sewage, and the dissolved oxygen available. Due to constant aeration, the media set in whirling motion, so that continuous mixing takes place.

The bacterial layer growth on the media surface increases to a certain extent and then gets sloughed off after a specific period. This phenomenon is called sloughing. This creates new surface for further bacterial growth.

Sloughing takes place only after complete growth and subsequent dyeing off of the bacterial layer and hence the sloughed off material is completely digested. Ammonical nitrogen is completely converted into nitrate nitrogen, in the bacterial synthesis. About 50-60% of the phosphates are also assimilated in the organic synthesis. Nitrogen and phosphorous are utilized as micro nutrients in the bacterial activity. The bacterial reaction is carried out in two stages, for maximizing the BOD removal efficiency. Hence, two such reactors are provided in series. Within reactors, arrangements are made to retain the plastic media in place.

Air supply is done through perforated stainless steel pipes. Use of stainless steel pipes ensures that no maintenance is required.

The sloughed biomass must be removed before the treated sewage can be disposed off. Hence a secondary clarifier is provided. The secondary clarifier is equipment in which the Bio-mass removed & suspended solids are settled.

TERTIARY TREATMENT.

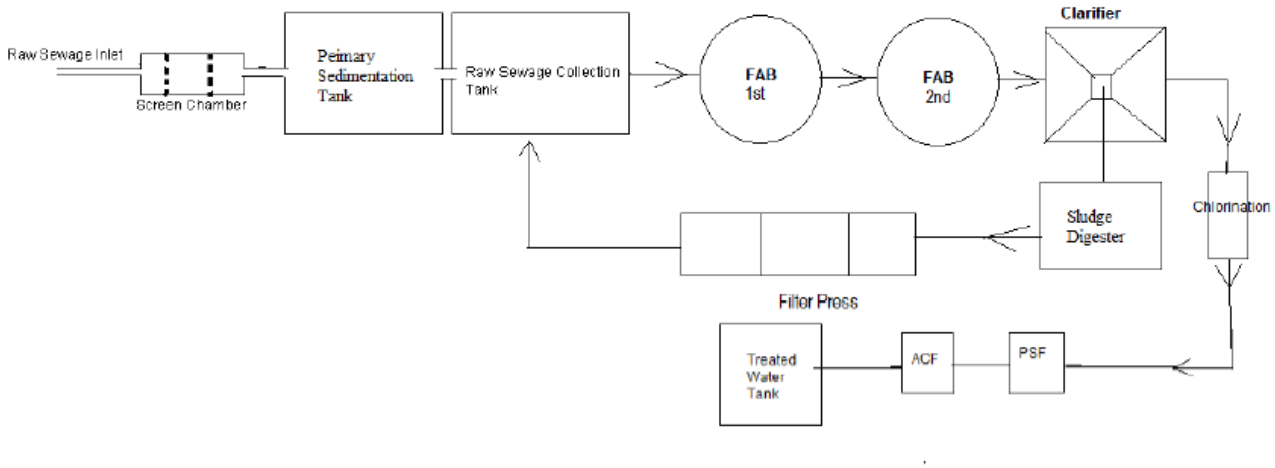
The treated sewage is then added with chlorine to kill the pathogens / E-Coliform, so that it becomes fit for disposal in the lake / water ways. Chlorine being a very strong oxidizing agent, a small dose of chlorine is enough to achieve desired levels of dis-infection. Small residual chlorine also ensures that there is no re-growth of E-coli, till the final disposal point.

The treated sewage now substantially free from organic contamination, free from coliform bacteria can be safely disposed off.

The sludge formation in this process of bio-degradation is send to the sludge drying beds directly for natural de watering & drying. The dewatered sludge can be used as a soil conditioner.

The filtrate from drying beds is taken back to raw sewage sump by gravity.

Fluidized aerobic bioreactor (FAB)	electro-mechanical	Primary sedimentation is not required • Small space requirement • Capacity to handle shock loads Low and stabilized sludge production	• Periodic cleaning of the reactor bed is required as there is possibility of choking of the reactor bed • Excess biomass growth or low hydraulic loads can result in blockages • Long shutdowns may lead to septic conditions, and restart may involve along stabilization period



Flow Diagrame of Sewage Treatment Plant Based on MBBR/FAB Technology

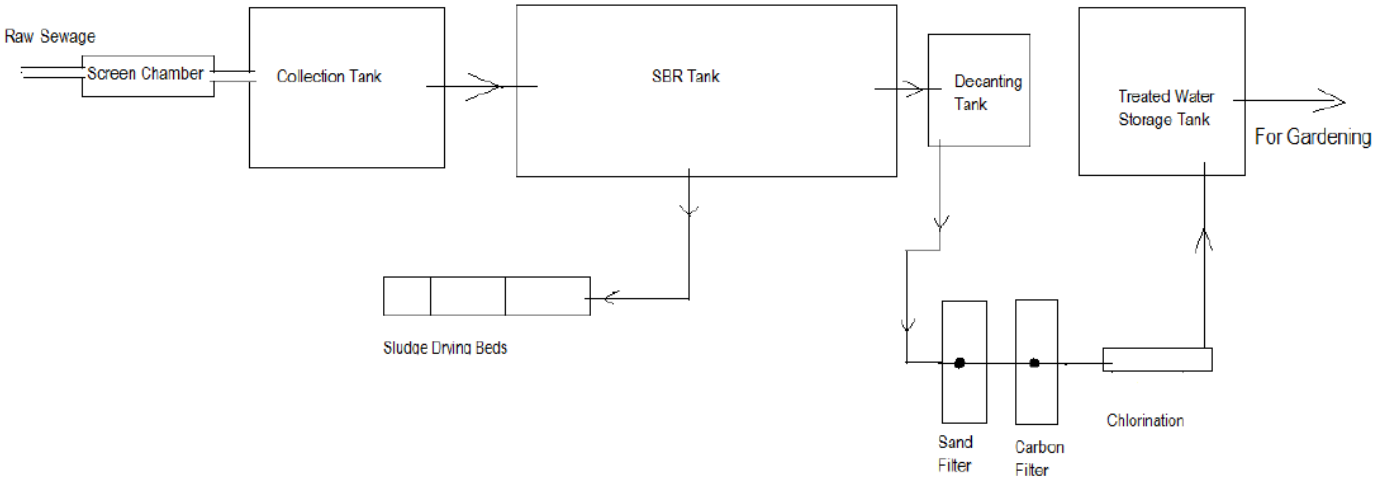
Sequential Batch Reactor (SBR)

PROCESS DESCRIPTION

- Fill during the fill operation, volume substrate (raw waste water) are added to reactor. The fill process typically allows the liquid level in the reactor to rise from 75% of capacity (at the end of the idle period) to100%.
- React during the react period, the biomass consumes the substrate under control environment conditions.
- Settle solids are allowed to separate from liquid under quiescent conditions resulting in a clarified supernatant that can be discharge as effluent.
- Decant Clarified effluent is removed during the decant period. An effluent decant mechanism is located centrally or side wall across the width of each react tank.
- The objective of the project is to efficiently treat raw sewage on a continuous basis utilizing SBR technology.

Screened raw sewage will be collected in collection tank. Free oil and grease will be removed with manual slotted pipe oil skimmer. After primary treatment (Screens / FOG), raw sewage will be fed to SBR reactors.

Name	**Treatment Method**	**Treatment capacity**		Op. cost power	Op. cost chemical	Capital Cost
Sequential batch reactor (SBR)	Electro mechanical	• Excellent effluent quality • Smaller footprint because of absence of primary, secondary clarifiers and digesters • Biological nutrient (N&P) removal • High degree of coliform removal • Less chlorine dosing required for post disinfection • Ability to withstand hydraulic and organic shock loads	• Comparatively higher energy consumption • To achieve high efficiency, complete automation is required Highly skilled operators needed • No energy production • Uninterrupted power supply	0.055	11.5	45.12



Scatch Diagrame of SBR based Sewge Treatment Plant.

7. Certificate of Audit & Accreditation Certificate

Usha Management Consultants
2/111, SFS, Agarwal Farm, Jaipur- 302020
Telefax: +91-141-2708981 Phone: +91-141-4916960 Mobile: +91-98296-24819
E-Mail: luhadiya_vinod@yahoo.co.in

Consultants for **Energy Saving**

UMC/GREEN/2021/04 Date: 10-11-2021

Certificate

This is to certify that team of M/s Usha Management Consultants, Jaipur has done Green Audit of Kanoria PG Mahila Vidyalaya, Jaipur against Order No. - KMH2021-22/0119 Dated 26-6-21 for NAAC accreditation

The audit has been carried out under guidance and supervision of undersigned.

Enclosed: Accreditation Certificate of BEE ,MoP

(V.K.Luhadiya)

ENERGY IS LIFE
BEE
CONSERVE IT

BUREAU OF ENERGY EFFICIENCY

Examination Registration No. : EA-1906

Accreditation Registration No.: AEA-0025

Certificate of Accreditation

This is to certify that Mr./Ms. Vinod Kumar Luhadiya having its trade/registered office at Jaipur has been given accreditation as accredited energy auditor. The certificate shall be effective from 26th day of February 2013

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

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

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

Your name has been entered at AEA No. 0025 in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this 26th day of May 2014

Secretary,
Bureau of Energy Efficiency
New Delhi