WATER REPORT

Calendar Year 2024

"Saving Water – Shaping Tomorrow"

Courtesy:- Office of Infrastructure Development

S No.	Activity
1	Water Management- Water conscious operation.
2	Recycling Water- Sewage Treatment Plant
3	Water Conservation- Rainwater Harvesting System
4	Double Plumbing and Water Efficient Plumbing Fixture
5	Water Usage Policy
6	Annual Meeting Contract (AMC)
7	Water Awareness Photos
8	Awards & Recognitions

WATER MANAGEMENT

Sources of fresh water

The source of the fresh water of the university is groundwater. Two tube wells have been installed in the university. The details of the tube wells are given below:

Location	Depth (meters)	Diameter (mm)	Operatio nal hours/d ay	H.P. of Pump	Whether electromagnetic flow meter with Telemetric module installed
Tubewell / 2014	350.00	200	7/365	33.00	Yes
Tubewell/ 2022	492	200	7/365	33.00	Yes
Tubewell/ 2023	492	200	7/365	33.00	Yes
Tubewell/ 2024	492	200	7/365	33.00	Yes

There is no surface water supply or any alternate source of water supply for the institution campus. “The University has obtained the Permission / NOC from the Punjab Water Regulation & Development Authority (PWRDA) for total freshwater”. Tube wells installed with electromagnetic flow meter with telemetric module. The maximum annual water abstraction of the university during the calendar year 2024 was 687.43 m^3.

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Photographs of Tubewells along with Flowmeters at University Campus

The University has maintained a record of ground water abstraction.

Months	2024-25
Jan-24	71.27 m³
Feb-24	64.14 m³
Mar-24	68.17 m³
Apr-24	84.60 m³
May-24	74.26 m³
Jun-24	41.20 m³
Jul-24	27.34 m³
Aug-24	45.14 m³
Sep-24	48.40 m³
Oct-24	50.98 m³
Nov-24	55.97 m³
Dec-24	55.96 m³
Yearly total	**687.43 m³**
Treated Water generated	**577.44 m³**
Used in Dual Plumbing	**230.98 m³**
Used in Horticulture	**219.43 m³**
Used in Karnal Technology	**127.03 m³**

Day-Wise Water Abstracted (March 2024)

WATER STORAGE FACILITIES WITHIN THE CAMPUS

1. One Overhead Tank of Capacity 400 KL
2. One Underground Storage Tank of capacity 400 KL
3. One Underground storage Tank of capacity 100KL

Overhead Tank of Capacity 400KL

Underground storage tank of 400 KL

RECYCLING WATER- SEWAGE TREATMENT PLANTS

The university has two Sewage Treatment plants based on the MBBR technology to treat wastewater of capacity 250 KLD and 1 MLD. A new STP of 2 MLD is going to be commissioned in August 2024.

General Process Description for 250 KLD STP with FAB Technology

The Treatment Plant is based on FAB Technology and has 250 KLD capacity with the following treatment scheme.

I. Stage 1: Primary Treatment

Bar Screen & Collection Chamber – Bar screen chamber is the first step at STP which removes large solid waste particles, such as plastics, rags, and debris from the incoming sewage before further treatment. The chamber consists of a series of vertical bars or grates, spaced at a predetermined distance. As sewage flows through, these solids are caught by the bars, while the filtered water continues into the next stage of treatment. The collected debris is then manually or mechanically removed at regular intervals.

Equalization Tank - After the bar screen chamber, the sewage flows to the equalization tank, which helps to stabilize the flow and characteristics of the wastewater before further treatment. The equalization tank serves as a buffer, allowing fluctuations in sewage volume or quality to be balanced. It helps to ensure a steady, uniform flow to the next treatment stages, reducing the risk of overloading or damaging equipment. The tank allows for the mixing of wastewater, homogenizing its properties, such as pH and chemical composition, to ensure efficient treatment in subsequent.

II. Stage 2: Secondary or biological treatment

Fab Reactor - After the equalization tank, the sewage flows into the FAB (Fluidized Aerobic Bioreactor) reactor, where biological treatment occurs. The FAB reactor uses suspended plastic media, which are aerated and kept in motion by the incoming wastewater. This media provides a surface area for microorganisms to attach and grow. As the sewage passes through, the microorganisms degrade organic pollutants, breaking them down into simpler compounds. The aeration helps maintain an oxygen-rich environment for microorganisms to thrive, enhancing the treatment efficiency. This process effectively reduces the biochemical oxygen demand (BOD) and other contaminants before the water moves on to further treatment stages.

Flocculation Tank –After the FAB reactor, the treated wastewater flows into the flocculation tank, where coagulation and flocculation processes occur. In this stage, chemicals (such as coagulants) are added to the water to neutralize the charges on suspended particles. This causes the particles to clump together, forming larger aggregates called flocs. The tank is gently stirred to promote the formation of these flocs, which can then be easily removed in subsequent stages, like sedimentation or filtration. The flocculation tank helps further reduce suspended solids and prepares the water for final clarification, improving the overall treatment quality before discharge or further processing.

Clarifier-After the flocculation tank, the wastewater flows into the clarifier, where the flocs formed during the flocculation process are allowed to settle. The clarifier is a large tank with a calm water zone, where gravity helps separate the heavier flocs from the treated water. The settled sludge collects at the bottom, while the clearer water rises to the top and flows out for further treatment or discharge. The sludge is periodically removed and sent for further processing, such as dewatering. The clarifier effectively reduces the suspended solids in the water, ensuring that the treated effluent meets the required quality standards before it moves on to the next treatment step.

Filter Feed Tank –After the clarifier removes larger solids, the effluent is directed to the filter feed tank, which serves as a holding and equalization chamber. It ensures a steady flow of water with a consistent quality to the filters. The tank also helps to mix and stabilize the water before it enters the filtration units, allowing finer particles and remaining suspended solids to be removed more efficiently.

III. Stage 3: Tertiary treatment

Pressure Sand Filter – The PSF removes fine particles and impurities from the domestic effluent. Treated effluent from the filter feed tank enters the filter under pressure, passing through layers of sand and gravel. These layers act as a medium to trap suspended solids, organic matter, and other contaminants. As the water moves through the filter, the sand captures finer particles, improving water clarity and quality. The filtered water is then sent for further treatment in ACF.

Activated Carbon Filter –The ACF placed after the PSF which further purifies the water by adsorbing dissolved organic compounds, chemicals, and residual odours. Water from the PSF flows through a bed of activated carbon, which has a high surface area and is highly effective at trapping pollutants. The activated carbon attracts and holds contaminants like chlorine, heavy metals, and organic molecules, improving the water's quality and clarity. This step ensures that the treated water meets higher standards before being discharged or reused.

IV. Stage 4: Sludge Treatment

Sludge Drying Beds- Once the sewage is clarified, the remaining sludge, which contains water and solid waste, is pumped into these drying beds. The beds are designed to allow water to drain through the porous material, such as gravel or sand, while the sludge is left to dewater and dry. The sludge is exposed to sunlight and air, which helps in evaporation of water content. Over time, the solid matter reduces in volume, making it easier to dispose of or further process. The dried sludge can be removed periodically for disposal or reuse, depending on its composition and the plant's specific needs. Sewage Treatment Plant of Capacity 250 KLD

General Process Description for 1 MLD STP With MBBR Technology

The Treatment Plant is based on MBBR Technology having 1 MLD capacity with following treatment scheme.

I. Stage 1: Primary Treatment

Bar Screen Chamber - The bar screen chamber removes large debris and solid waste from the incoming sewage. As the wastewater flows through the chamber, a series of vertical bars or screens catch and trap larger particles such as plastics, rags, sticks, and other non-biodegradable materials. These materials are then mechanically removed and disposed of. The bar screen chamber helps prevent damage to subsequent treatment equipment and ensures that only finer particles proceed to the next stages of treatment, improving the overall efficiency of the sewage treatment process.

Equalization Tank – The equalization tank helps to stabilize and balance the flow and quality of incoming wastewater. It serves as a holding reservoir, where the flow of wastewater is regulated to ensure consistent and uniform feed to the next stages of treatment. By holding the water for a period, the tank allows for the equalization of variations in flow rate and pollutant concentrations. This helps prevent overloading of the treatment system, ensuring more efficient processing and optimal performance of downstream equipment, such as the clarifiers and filters.

Oil & Grease Trap – The oil and grease trap remove oils, fats, and grease from the wastewater. As the water enters the trap, these lighter substances float to the surface due to their lower density. The trap captures and separates the oils and grease, preventing them from interfering with the treatment process and clogging equipment. The separated oil and grease are then removed regularly for disposal. This step ensures that the subsequent treatment stages, such as filtration and disinfection, operate efficiently, and it helps meet environmental standards for wastewater discharge.

II. Stage 2: Secondary or biological treatment

MBBR Reactor 1 – The MBBR (Moving Bed Biofilm Reactor) Reactor 1 is a biological treatment unit that helps further degrade organic matter in the wastewater. In this reactor, the treated water is passed over plastic biofilm carriers that are suspended and move freely within the tank. These carriers provide a surface for beneficial microorganisms to attach and grow. As the wastewater flows through, these microorganisms consume organic pollutants, breaking them down into simpler substances. The MBBR reactor improves the efficiency of the treatment process by enhancing biological treatment and reducing the load on subsequent stages like clarification and filtration.

MBBR Reactor 2 –MBBR Reactor 2 serves as a secondary biological treatment stage to further enhance the removal of organic pollutants. Similar to Reactor 1, it uses moving bed biofilm carriers to provide a surface for microorganisms to break down residual organic matter in the wastewater. The water flows through the reactor, where the microorganisms continue to degrade pollutants. The second reactor allows for more thorough treatment, ensuring that the effluent meets the required quality standards before moving on to subsequent stages like clarification or filtration. This step optimizes the overall biological treatment process, improving the efficiency of the plant.

Coagulation Tank –The coagulation tank, located after MBBR Reactor 2, is where chemicals (usually coagulants like alum) are added to the treated wastewater to destabilize and aggregate fine particles, colloids, and remaining contaminants. As the coagulants mix with the water, they bind with suspended particles, forming larger clumps or "flocs." These flocs can then be easily removed in subsequent treatment stages, such as clarification or sedimentation. The coagulation process enhances the removal of fine particles that were not fully degraded or removed in the biological treatment process, improving the overall quality of the effluent before final discharge or reuse.

Clarifier –The clarifier, located after the coagulation tank, is a sedimentation unit which remove suspended particles from the wastewater. After coagulation, the flocs formed by the coagulants settle to the bottom of the clarifier due to gravity. The clarified water rises to the surface and is then collected for further treatment or discharge. The settled sludge at the bottom is periodically removed and sent for disposal or further processing. The clarifier helps ensure that the water is free from suspended solids and meets the required quality standards before moving on to final treatment stages like filtration or disinfection.

Filter Feed Tank – The filter feed tank, located after the clarifier serves as a reservoir to stabilize and store the clarified water before it moves to the filtration stage. It helps ensure a steady, even flow of water to the filters by preventing fluctuations in the incoming water quality and flow rate. The tank also allows for the removal of any remaining suspended particles that may have escaped the clarifier. By providing a controlled environment, the filter feed tank ensures that the water entering the filtration system is consistent, optimizing the performance and efficiency of subsequent treatment processes like pressure filtration.

III. Stage 3: Tertiary treatment

Pressure Sand Filter – The pressure sand filter removes fine suspended solids from the clarified water. As the water is pumped under pressure through the filter, it passes through layers of sand and gravel, which trap and retain the remaining particles. This filtration process improves the water quality by removing smaller impurities that were not captured during previous stages. Over time, the filter becomes clogged with trapped solids, and periodic backwashing is performed to clean the filter, ensuring its continued efficiency in producing high-quality effluent.

Activated Carbon Filter – The activated carbon filter, located after the pressure sand filter, further purifies the water by removing dissolved organic compounds, chemicals, and odors. Water flows through a bed of activated carbon, which has a high surface area that absorbs pollutants such as chlorine, pesticides, and organic contaminants. This step helps to improve the clarity and taste of the treated water, ensuring it meets higher standards for discharge or reuse. Over time, the activated carbon becomes saturated with contaminants and requires replacement or regeneration to maintain its effectiveness in the filtration process.

Hypochlorite Dosing – Hypochlorite dosing, applied after the activated carbon filter, is a disinfection step to eliminate any remaining pathogens or microorganisms in the treated water. Sodium hypochlorite, commonly known as bleach, is dosed into the water to kill bacteria, viruses, and other harmful microorganisms. The hypochlorite reacts with the pathogens, breaking down their cell walls and rendering them inactive. The dosing is carefully controlled to ensure effective disinfection while avoiding over-chlorination. This step ensures the treated water is safe for discharge or reuse, meeting health and environmental standards.

Treated Water Tank – The treated water tank serves as a storage and final holding point for the disinfected water. After the hypochlorite dosing process, the water is stored in this tank to allow for any residual chlorine to dissipate and ensure proper mixing. It also provides a buffer to maintain a steady flow of treated water for discharge or reuse. The tank ensures that the treated water has undergone sufficient disinfection and has a consistent quality before it is reuse of flushing & gardening purpose inside the University.

IV. Stage 4: Sludge Treatment

Sludge Drying Beds

Sludge Drying Machine – The sludge drying machine is used to reduce the volume of the sludge by removing excess water. After the clarifier separates solids from the treated wastewater, the remaining sludge is transferred to the drying machine. The machine uses heat, mechanical pressure, or a combination of drying the sludge, causing the water content to evaporate. This results in a significantly drier, more concentrated sludge that is easier to handle, store, or dispose of. The dried sludge can also be repurposed for use as a soil conditioner or disposed of in a more environmentally friendly manner.

Sludge Drying Beds – The sludge drying beds provide an additional stage for the further drying and dewatering of sludge. After the sludge has been partially dried in the machine, it is spread onto the drying beds, which consist of a porous material like sand or gravel. These beds allow excess moisture to drain away, while the sun and air help to evaporate the remaining water. The sludge is periodically turned or moved to speed up the drying process. Drying beds effectively reduce the volume of sludge, making it easier to handle, store, or dispose of while minimizing environmental impact.

Treated wastewater being used in the campus and Sewage Treatment Plant of capacity 1 MLD

Treated wastewater being used in the campus and Sewage Treatment Plant of capacity 1 MLD

DUAL PLUMBING AND EFFICIENT WATER FIXTURES

Dual Plumbing: Treated water is utilized for horticulture and double plumbing systems in several buildings. This practice helps in reducing the consumption of freshwater, and the treated water is further processed in the Sewage Treatment Plants (STPs) during its use.

Dual plumbing system at Chitkara University, Punjab

Treated water being used in horticulture

Efficient Water Fixtures: Other methods adopted to minimize water wastage include the installation of aerators on all taps to reduce flow without compromising usability, the use of low-flow showerheads in washrooms to limit excessive water consumption, and the implementation of automated motors for efficient and controlled filling of water tanks. Additionally, sensor-based taps have been installed in selected washrooms to ensure water flows only when needed, preventing unnecessary usage. Regular maintenance of plumbing systems, prompt repair of leaks, and awareness campaigns to encourage responsible water use among building occupants further contribute to conserving water resources and promoting sustainable practices.

Usage of water Sprinklers: Water sprinklers play a vital role in maintaining the lush, green landscape across Chitkara University. Strategically placed throughout the campus, these sprinklers provide consistent and adequate irrigation to lawns, gardens, and recreational areas. This automated system ensures even water distribution, reducing the reliance on manual watering and helping keep all parts of the campus vibrant and healthy. The number of sprinklers on campus has increased from 18 last year to 20 this year, further enhancing the efficiency and coverage of the irrigation system.

Drip Irrigation: Drip irrigation is a method where, instead of watering the entire plant from above, water is delivered slowly and directly to the plant's roots through a network of pipes. This technique helps conserve between 20–50% of water compared to traditional irrigation methods, while also minimizing issues such as runoff, surface evaporation, and the risk of overwatering. On the Chitkara University campus, drip irrigation is primarily used for maintaining vertical gardens, ensuring efficient and targeted water usage.

Karnal Technology: With Karnal Technology, trees are planted on ridges that are one meter board and fifty centimeters high, and treated wastewater is disposed of in furrows. The age, kind of plants, soil texture, climate, and effluent quality all affect how much waste needs to be disposed of. The whole effluent flow is controlled such that no standing water remains in the trenches after 12 to 18 hours of consumption. This method allows for the daily disposal of 0.3 to 1.0 ML of wastewater per acre.

Karnal technology in which treated STP water is used

WATER CONSERVATION-RAINWATER HARVESTING SYSTEM

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

There are typically four components in a rainwater harvesting system:

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

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

GROUND WATER LEVELS IN PATIALA

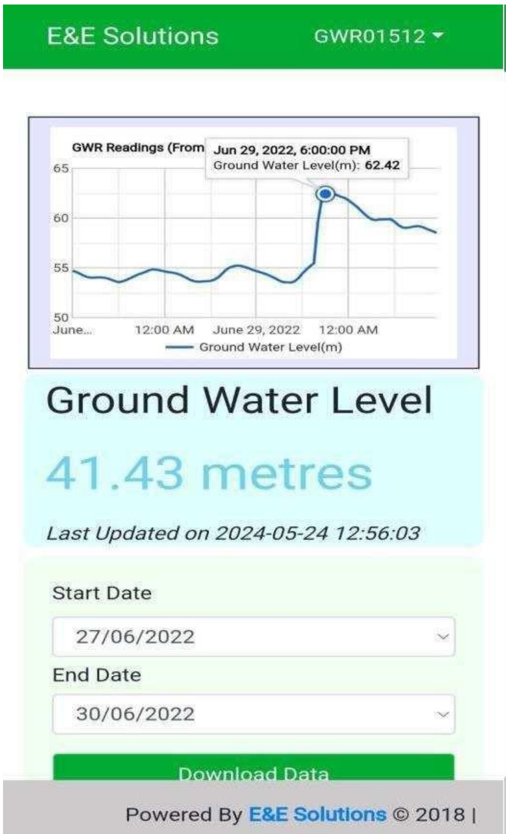
The depth to water level ranges from 4.43 to 20.62 m bgl during pre-monsoon period and 6.99 to 24.28 m bgl during post monsoon period. The seasonal fluctuation varies from 0.03 to (-) 3.66 m in the area. The long-term water levels trend indicates average fall of 0.50 m/year.

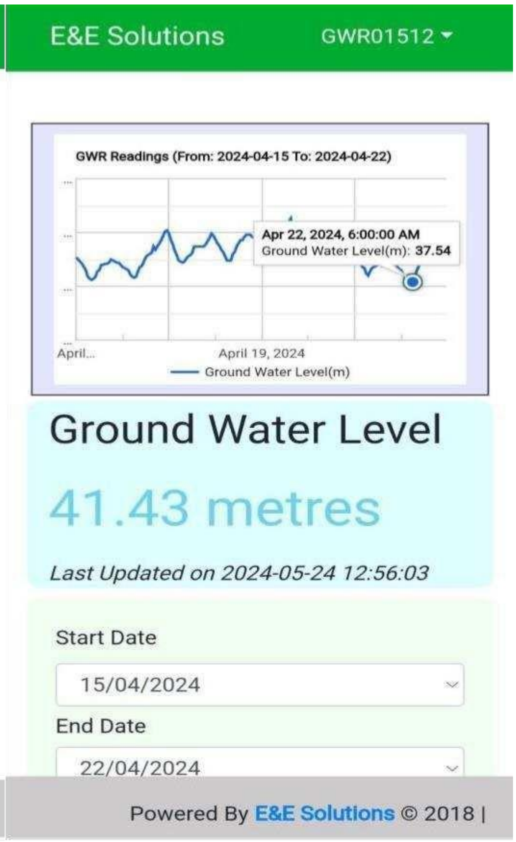
RAINWATER CONSERVATION POLICY AT CHITKARA UNIVERSITY

The clayey soil is found to be dominant in the soil of campus, so the campus has been provided with a deep well borewell harvesting system. The rainwater collected in the catchment areas (Roofs, Roads and Ground) is conserved by recharging the ground water. The water falling on the roof of the building and roads is made to fall into ground and a steep slope is provided at the ground and the water from the ground will flow to the recharging pit. The runoff water may contain silts and Grits so to prevent the entry of the silts entering the water must pass through the filtration Media (layer of sand and gravels). The filtered water will then pass through the perforated pipes which are connected to borewell pipe, and the rainwater will join the

aquifer. Chitkara University has 18 Rainwater Harvesting points at different locations.

GROUND WATER LEVEL IMPROVEMENTS





The ground water table has considerably increased to 37.54 Meter from all-time low of above 60 Meters.

WATER USAGE POLICY

1. Introduction:

Chitkara University, Punjab, is committed to sustainable water management practices to minimize freshwater consumption and promote environmental stewardship. This Water Usage Policy outlines the university's commitment to reusing treated water efficiently for non-potable applications, thereby reducing the burden on freshwater resources and contributing to broader sustainability goals.

2. Objectives:

- **Minimize Freshwater Consumption and Wastage:** Reduce reliance on freshwater sources by maximizing the use of treated wastewater and adopt measures to reduce water wastage.
- **Sustainable Water Management:** Promote water conservation through the reuse of treated water for landscaping, dual plumbing, and other non-potable applications.
- **Reduce Environmental Impact:** Contribute to environmental sustainability by minimizing the discharge of wastewater and promoting efficient water use.
- **Reuse of Treated Water:** Maximize the use of treated wastewater for non-potable applications like landscaping, toilet flushing, and agricultural purposes.

3. Scope:

This policy applies to all water-related activities on the Chitkara University campus, including water extraction, treatment, and reuse. It covers all campus departments, buildings, and facilities that generate and utilize water, including the management of the Sewage Treatment Plant (STP).

4. Policy Guidelines:

1. **Water Treatment and Reuse:**

- All wastewater generated on campus will be treated through the university's Sewage Treatment Plant (STP) to meet the standards required for reuse.
- Treated water will be reused for:
    - **Horticulture and Landscaping:** Watering plants, lawns, and gardens.
    - **Dual Plumbing Systems**: Flushing toilets and urinals in campus buildings equipped with dual plumbing systems.
    - **Agriculture:** Utilization of treated water in agricultural applications, including research fields using methods like Karnal Technology.

2. **Rainwater Harvesting**:

The university's existing rainwater harvesting systems will be maintained and expanded to capture rainwater for groundwater recharge and non-potable uses such as irrigation and cleaning.

3. **Monitoring and Reporting:**

   - Regular monitoring of water consumption and reuse will be conducted to ensure efficient water management and compliance with environmental standards.
   - Monthly reports on water extraction, treatment, and reuse will be reviewed for continuous improvement.

4. **Water Conservation Techniques:**

   - Low-flow fixtures (faucets, showers, and toilets) will be installed in all new constructions and renovations to minimize water wastage.
   - Automated water motors and censor-based water taps and fixtures, to reduce wastage of water.
   - Immediate attention to water leakages to arrest wastage of water.
   - Accurate irrigation strategy leads to minimizing water wastage and keeping costs down
   - Water-efficient irrigation systems such as drip irrigation and sprinkler systems will be employed to reduce water use in landscaping.
   - Drought-tolerant plantation and organic farming should be encouraged. Choose plants that are adapted to local conditions and won't need much supplemental watering. Organic farming requires less water for irrigation and improves soil health, which increases its water-storage capacity
   - Instructions to all users and spread awareness for responsible usage and reducing waste of water like washing clothes only on full loads and switching off taps when not in use etc.

5. **Awareness and Training**

The university will conduct periodic awareness programs for students, staff, and faculty on the importance of water conservation and reuse. Specialized training will be provided to the facility management team on maintaining and operating water treatment and reuse systems effectively.

6. **Responsibilities:**

   - **Sustainability Manager:** Oversee the implementation of the Water Reuse Policy, monitor water usage and ensure compliance with policy guidelines.

- **Infrastructure Management Team:** Ensure the proper functioning of water treatment plants, plumbing systems, and rainwater harvesting systems.
- **Campus Community:** Actively participate in water conservation efforts and adhere to guidelines for water use on campus.

7. Review and Evaluation:

The Policy will be reviewed every year or when amendment of the policy is inevitable, whichever is earlier, by the Sustainable Development Management Committee to assess its effectiveness and update any necessary measures in line with technological advancements and regulatory requirements.

Chitkara University's Water Reuse Policy is integral to its sustainability framework, ensuring responsible water use while protecting natural resources for future generations. Through these efforts, the university aims to set a benchmark for water stewardship in higher education institutions.

Annual Meeting Contract (AMC), Water Testing and Water Awareness at Chitkara University

Annual Meeting Contract (AMC): - The Annual Meeting Contract (AMC) at Chitkara University is a critical agreement that ensures regular maintenance and checks of water systems. The AMC mentioned in the provided document, typically such a contract covers regular inspections of water infrastructure, ensuring all equipment like pumps, filters, and plumbing systems are functioning properly. This helps in avoiding disruptions in the water supply and ensuring that the water distributed throughout the campus is safe for consumption.

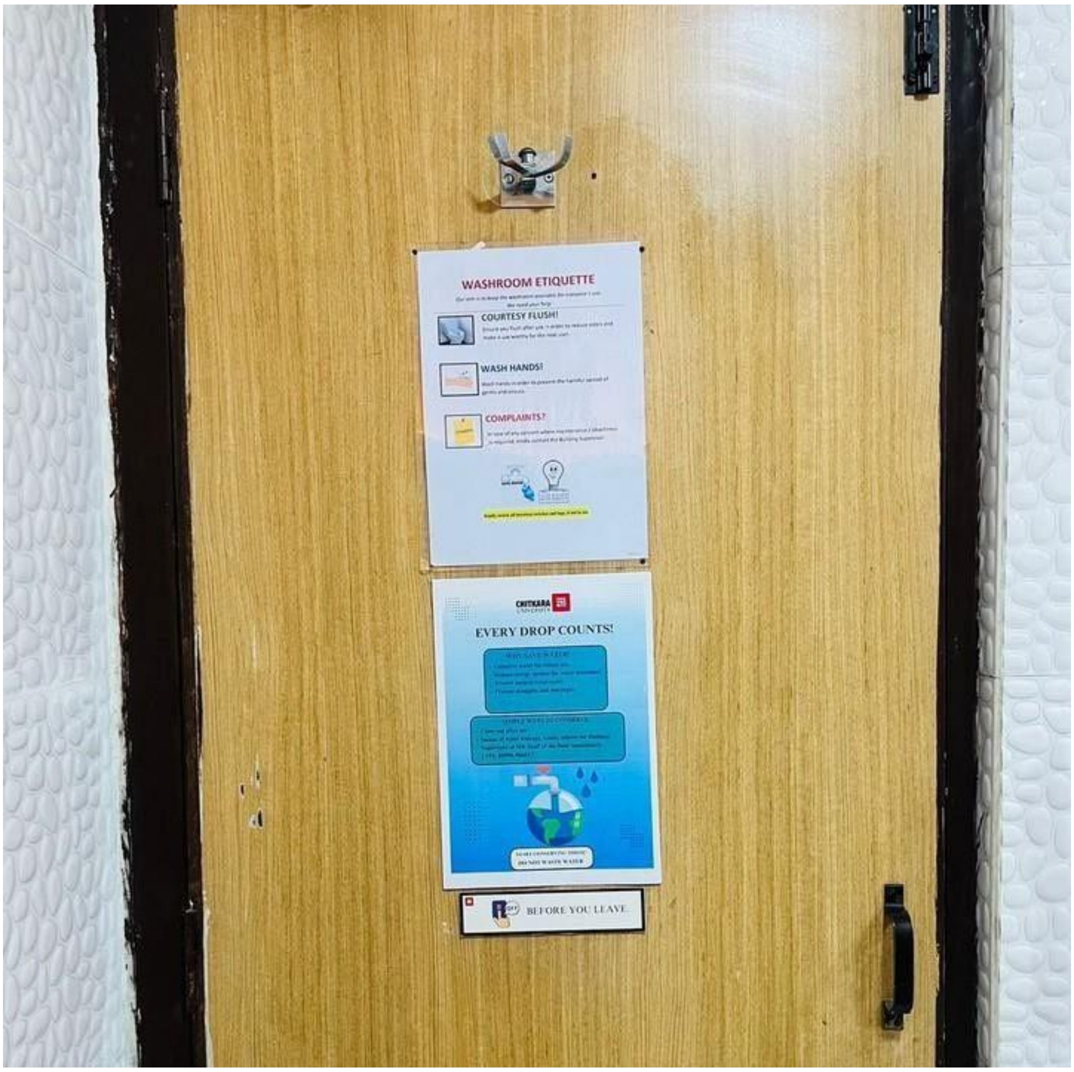
Water Testing: **-** Chitkara University likely conducts water testing as part of its health and safety measures. Regular water testing ensures that the water on campus meets both national and international quality standards. This process involves checking contaminants like bacteria, heavy metals, and chemical pollutants, and assessing parameters such as pH, hardness, and turbidity. Water testing safeguards the health of students and staff, ensuring access to clean and potable water across the campus.

Water Awareness: **-** Chitkara University emphasizes water awareness among students and staff, promoting conservation and responsible usage through various initiatives. The provided document highlights an awareness poster encouraging everyone to:

- **Save Water**: The poster stresses that every drop counts and urges people to close taps after use and report leaks immediately to the building supervisor or housekeeping staff. A contact number is provided for quick reporting of water issues.
- **Simple Ways to Conserve**: It suggests ways to conserve water, like reducing the energy needed for water treatment, protecting natural ecosystems, and preventing droughts and shortages. This message is aimed at instilling a habit of mindful water consumption in the university community.

These efforts reflect Chitkara University's commitment to environmental sustainability and resource conservation, ensuring that future generations benefit from their water-saving initiatives.

Awareness Posters for Staff & Students



CHITKARA UNIVERSITY

EVERY DROP COUNTS!

WHY SAVE WATER?

- Conserve water for future use.
- Reduce energy needed for water treatment.
- Protect natural ecosystems.
- Prevent droughts and shortages.

SIMPLE WAYS TO CONSERVE:

- Close tap after use
- Incase of water leakage, kindly inform the Building Supervisor or HK Staff of the floor immediately. [+91. 86996.96661]

START CONSERVING TODAY!

AWARDS AND RECOGNITIONS


THE ENERGY AND RESOURCES INSTITUTE
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UNDP

Government of India
Minsitry of Jal Shakti
Department of Water Resources,
River Development & Ganga Rejuvenation

Water Sustainability Awards 2023-24

Certificate of Best Initiative

Category : Innovation in Water Technology

Presented to

Chitkara University

for facilitating the

Development and usage of innovative water technologies

towards the achievement of

Sustainable Development Goal on Clean Water and Sanitation

Mr Anshuman
Director - Water Resources
The Energy and Resources Institute
New Delhi

Mr Sanjay Seth
Senior Director
Sustainable Infrastructure Programme
The Energy and Resources Institute
New Delhi

Dr S K Sarkar
Distinguished Fellow
The Energy and Resources Institute
New Delhi

Dr Vibha Dhawan
Director General
The Energy and Resources Institute
New Delhi