Actions taken in relation to water conservation

Following the recommendations of Green audit the university has implemented all necessary steps to save water. A dedicated team regularly checks water related issues and fix them to ensure zero water wastage. The university has dedicated online portal for addressing water related complaints. The RO plant, STP plant, harvesting pits are regularly monitored and maintained for maximum performance. The university also has a water management plan.

Water conservation measures

1. RO Plant

2. Water harvesting pits

(Behind C Block)

(Behind E Block)

3. Kitchen sink tap meter

4. RO Plant in main water tank

5. Meter with the RO plant at the main water tank

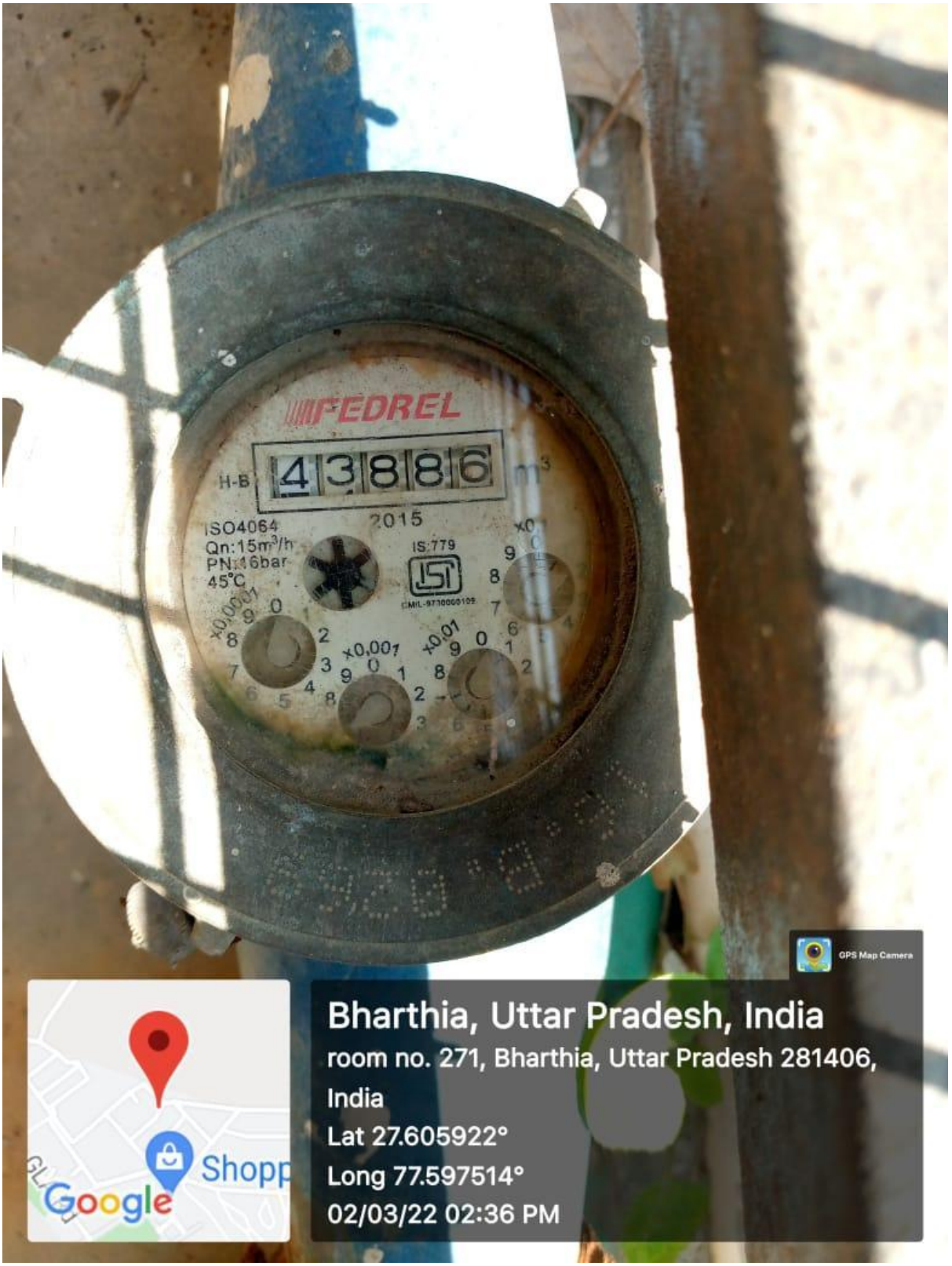
6. Main water tank meter

7. STP Plant

8. Pipeline of treated water

9. Flow water STP plant

10. Water meter (behind F block)



11. Water meter (overhead tank)

Water Management Plan

2020-2021

GLA University

17km Stone, NH-2,

Mathura-Delhi Road Mathura,

Chaumuhan, Uttar Pradesh 281406

Table of Content

1. EXECUTIVE SUMMARY

Water is a limited natural resource that is crucial to sustain life. There are several interrelated factors that contribute to the decrease in the availability of water. These factors include climate change, increasing demand, lowered water tables and environmental degradation of water quality. It is therefore important that the GLA University, as a responsible academic institution, manages its water resources properly.

The GLA University Mathura acknowledges the importance of water as an essential resource for successfully meeting its operational objectives. The University also realizes the need to use this resource in a responsible manner that is sustainable and efficient. GLA University is in the process of formalizing its current water management approach to be aligned with local and national policies.

In this process, the University endeavours to:

- Incorporate water efficiency measures into all new and refurbished facilities through best practice in water efficient design, the selection and sizing of equipment, systems and other water infrastructure;
- Maintain equipment and control and manage water infrastructure in order to maximise efficiency;
- Monitor and report on the University's water consumption at micro and macro levels and identify and implement opportunities for improved water efficiency;
- Promote awareness of the responsibility for water conservation to faculty, staff, and students;
- Pursue the use of alternate water sources to supplement potable water use;
- Strive to meet legislative requirements and to minimise environmental impact; and
- Strive to procure, distribute and maintain water resources at the lowest cost.

The Civil maintenance department of University is responsible for:

- Acquisition of water;
- Design and construction of new, and maintenance of existing facilities and their fixed water infrastructure;
- Identification, development and implementation of water conservation awareness programs and
- Making treatment, reuse and recycle of water more efficient.

2. INTRODUCTION

The Water Management Plan (WMP) seeks to provide a simplified overarching framework which allows different department works together and develop a shared understanding of the most suitable solutions to water problems inside GLA University premises.

The WMP details the importance of water management on campus, various approaches taken to date with campus metering, building, irrigation, and process systems, and methodologies for analysing water data. The WMP is driven by the University's Environmental as well as Sustainability Policies which aims to ensure that the relevant environmental laws and regulations are complied with and that the protection of the environment is enhanced by keeping impacts to a minimum in a sustainable, financially rewarding and technically feasible manner. The University recognises its responsibility to the community and to the environment and has allocated resources to ensure that water is managed in an efficient and sustainable manner.

The WMP is written to ensure that water at the University is used in an efficient manner and that strategies are implemented to ensure a reduction in potable water consumption in accordance with the University Water Management Policy.

The University will;

- Ensure that all environmental regulations are met and ensure all relevant approvals are acquired;
- Regulate water use through monitoring to identify any potential problems with the network ; and
- Apply "Best Environmental Practices" in the overall management of water.

GLA University strives to sustain its local and global environment, organizational health and ability to create a positive, viable future. GLA University endeavors to include environmental sustainability principles and targets in all aspects of its decision- making.

3. THE IMPORTANCE OF WATER MANAGEMENT

Water resources in Indian cities and towns are under increasing pressure from population growth, climate change, drought and waterway degradation. Per capita water consumption has increased to unsustainable levels and increasing amounts of technology and energy are used to provide water for human need.

Benefits of Water Management

The benefits of water management for the University include:

- Improved operational efficiency.
- Lowered water system operational costs.
- Reduced potential for contamination.
- Extended life of facilities.
- Reduced potential property damage and water system liability.
- Reduced water outage events.

In addition to providing a dependable, locally-controlled water supply, water recycling provides tremendous environmental benefits. By providing an additional source of water, water recycling decreases the diversion of water from sensitive ecosystems. Other benefits include decreasing waste water discharges and reducing and preventing pollution.

4. VISION FOR WATER MANAGEMENT

The GLA University envisions that water is actively and adaptively managed as a valuable and reliable resource on campus and other properties. While the Sustainability Management Plan lays out concrete three-year goals toward this vision, the GLA University anticipates that these activities serve as the foundation for more comprehensive, longer-term initiatives that are fully coordinated with energy, storm water, and risk management planning. Such coordination will result in:

1. Energy: The relationship between energy and water, also known as the energy water nexus, is evident on campus. Water reductions lead to energy savings in pumping.
2. Storm water: Effective management of storm water will reduce potable water used for irrigation. Infrastructure put in place to manage storm water present opportunities for storing water to be used in lieu of potable water.

3. Risk Management: Reduced water use alleviates stress on utility infrastructure, making the University campuses less vulnerable to unforeseen events and more resilient in the long term.

Future efforts in water management planning shall be further guided by a set of shared principles like the Sustainability Planning Principles, these principles capture the strength of short-term activities, provide direction for future development, and should be taken collectively to motivate and focus work:

- Collecting and analyzing water-use data creates educational and research opportunities for students and faculty here and beyond the university.
- The GLA University shall encourage university-wide participation and stewardship of water management.

5. APPROACH TO WATER MANAGEMENT

The Water Management Plan will amongst others address the following:

- The design of new buildings or refurbishment of existing buildings to include building systems that will reduce water usage such as high-efficiency plumbing fixtures.
- Measures to stop water flow into buildings after hours and holidays and thus prevent water loss through leakage.
- Leakage detection and repairs as well as preventative maintenance.
- The implementation of water wise gardening.
- The use of water efficient irrigation systems.
- The use of reclaimed water.
- Rain water harvesting and storage.
- The use of storage tanks and reservoirs to store borehole water.
- Water use monitoring.

5.1 The design of new buildings or refurbishment of existing buildings

The GLA University needs to continuously update existing design standards and planning documents to reflect the most current requirements for water metering, water efficiency, and reclaimed water strategies. The University has piloted a number of systems over the past several years, and has reviewed the performance of many of these pilots to intentionally inform future direction on campus. Over the past few years, the University has installed a variety of high- efficiency plumbing systems that reduces consumption of potable water in new and renovated buildings.

Future projects, including those designated as Comprehensive, Small Scope, and Limited Scope, will be executed in accordance with design standards and planning documents updated and aligned with water management goals. This strategy will focus on the following two tactics:

- Update sections of the University Design Standards for Capital Projects to reflect requirements for water-efficient plumbing fixtures, water metering, and water

sub-metering within buildings.

- Prepare internal resources and guidelines to inform the design, installation, and operation of reclaimed water systems and irrigation systems on campus. The University has committed staff, time and resources to these tactics. Considerable progress has been made to date toward internal reclaimed water and irrigation system guidelines.

5.2 Leakage detection and repairs as well as preventative maintenance.

Detecting and repairing leaks is one of the main components of water conservation. Old or poorly constructed pipelines, inadequate corrosion protection, poorly maintained valves and mechanical damage are some of the factors contributing to leakage. Leak detection has historically assumed that leaks rise to the surface and are visible. In fact, many leaks continue below the surface for long periods of time and remain undetected. With an aggressive leak detection program previously undetected leaks can be detected. Active leak control will reduce expensive emergency overtime repairs and the associated liability costs.

The most important element in a leak detection and repair program is accurate and detailed water use records that are consistent over time and easy to analyse. Generally, the leak detection system should keep three sets of records:

- Monthly reports on unaccounted – for water;
- Leak repair reports; and
- Updated maps of the distribution system showing the location, type, and class of leaks.

The following actions are proposed at the University:

- Extremely wet areas above an underground pipe would possibly indicate a broken pipe or joint.
- Examine equipment routinely and look at exposed pipes to see if any leaking water can be detected.
- Comparison of records with the same month of previous years. While the amount of water used will vary due to weather and processes, sharp increases in water consumption could indicate a leak.
- A weekly or monthly visual inspection of water equipment.

The leak detection programme should include documented evidence that:

- A leak detection survey using best available technologies has been completed on the system within the past three years;
- All leaks found have been repaired;
- The leak detection system is unable to locate additional leaks; and,
- On-going efforts to minimise leakage are included as part of the system's water-use efficiency program.

Maintenance of current metering infrastructure and quarterly data collection processes are important for any leak detection undertaken on campus. Data at building level should be analysed and published on an annual basis. Access to accurate and detailed water data is a critical component in identifying opportunities to save water and setting appropriate goals.

5.3 The implementation of water wise gardening.

The University has always been very proud of the beautiful gardens and landscapes inside campus. With water wise gardening one can create a peaceful environment that will provide shade, perfume and even colour throughout the year. With careful planning, appropriate plant choices and proficient maintenance a water wise garden can survive with minimal water during the dry season.

Water wise gardening is about using plants that are appropriate to the local climate. It is becoming increasingly popular. A water wise garden includes indigenous plants, ornamental grasses, succulents; drought-resistant vegetation and hard landscaping materials like bark chips, mulch, rocks and gravel. For hot, dry areas plants are chosen that need only minimal watering. Plants with high and low watering needs should not be planted in the same area. Trees help to reduce evaporation by blocking wind and shading the soil. The GLA University is implementing the following:

- Adding organic matter to the soil.
- Watering.
- Use mulch to retain water.
- Use free water.
- Take care of the plants.

5.4 The use of reclaimed water.

The demand for fresh water in India is growing as the population increases. This demand can potentially exceed supply during times of even moderate drought. In recent

years, the normal seasonal droughts that have occurred in India have caused government to enact water conservation ordinances. These ordinances limit the use of potable water for activities such as washing of cars and landscape irrigation. Conservation measures, such as irrigating with reclaimed water, help to ensure that existing water supplies are utilized as efficiently as possible.

Grey water is reusable wastewater from residential, commercial and industrial bathroom sinks, bath tub shower drains, and clothes washing equipment drains. Grey water is reused onsite, typically for landscape irrigation. Reclaimed water systems collect a proportion of the reusable water from around the campuses. This water is usually filtered and fed into a tank from where it is used in sanitary fittings, typically water closets and urinals.

Reclaimed water systems: A reclaimed water system is a general term to describe a system that retains non-potable water to be used for non-potable demand, such as sewage conveyance, and irrigation. Recently the GLA University has commenced with the installation of reclaimed water systems on its campus, with various design and operational approaches and a range of performance outcomes.

5.5 Rain water harvesting and storage

Rainwater harvesting refers to the concentration and entrapment of rainwater runoff from a catchment. A catchment is any discrete area draining into a common system and thus can be a roof, a threshing floor or a mountain watershed. Rainwater harvesting can provide a reliable, cheap and good quality alternative water source. Rainwater harvesting also complements groundwater. Rainwater harvesting systems are implemented and effectively maintained in GLA University.

5.6 Adapt management plan goals

The WMP is presented to support an adaptive and iterative process to promote water conservation at the GLA University. Over the next three fiscal years, GLA will have a more robust water-use data set, as well as a portfolio of projects implemented explicitly for water conservation. It will be important to critically assess the performance of these projects and the level of activity necessary to fulfil all of the commitments outlined in this plan as part of the adaptive management process.

This will require the following two tactics:

- Establish best practice methodology for evaluating representative water use given that data quality and thermal conditions vary annually.
- Formulate preliminary costs and benefits for water conservation projects and

activities prior to goal-setting, so that goals and respective tactics are appropriately defined.

6. CONCLUSION

The GLA University is committed to reducing its potable water usage sufficiently over the next three years. With active and adaptive management, GLA has the opportunity to serve as a leader in sharing water data and water conservation initiatives with the broader public. This plan presents a suite of strategies to reduce water usage, improve water use data, and to plan for the future.

ANNEXURE

Explore possibilities of STP capacity enhancement of GLA

Sewage treatment plants (STPs) are the operational units for the treatment of Municipal or Domestic sewage. It helps in reducing water and soil pollution by removing pollutants from it.
After treatment sewage can be safely discharges in water bodies or in public sewer, It can also be reuse for land applications like ground water recharge, agriculture, horticulture, recreational activities or in building construction. Treated water can be reused in water closets.

Method followed for the calculation for water demand is as follows:

Fixed population (Residential) 150 lpcd × 6000= 900000 lpcd (IS1172:1993 of BIS)
Floating population (Non-Residential) 45 lpcd × 7000= 292500 lpcd (IS1172:1993 of BIS)
Total= 1192500 lpcd
Considering 80% water supply is converted to the waste water
Waste water generated 1192500*0.8=954000 lpcd **(954 KLD)**
lpcd= liter per capita per day
KLD= Kilo liter per day

Present treatment Capacity of STP

Old STP (Based on Extended aeration system) = 350 KLD
New STP (Based on MBBR) = 1000 KLD
Total Present treatment capacity =**1350 KLD**
Requirement for Enhancement of Capacity = NIL

New STP has provision for the enhancement of the capacity of the STP by 500 KLD as mention in consultant documents.

Minimize impurity and TDS of STP water for maximization of utility

Operational units of Sewage treatment plant (STP) are generally divided into three steps viz. Primary, Secondary and tertiary treatment.

Primary treatment mainly consists of Physical processes like Screening, Grit removal, Oil and grease trap and Primary sedimentation tank. Main aim of theses process is to remove setelable solids, Wood and Papers, Large solid particles and oil and grease.

GLA University installed two STPs inside the campus for the treatment of domestic waste water of the campus. First STP was installed in the year 2010 having capacity of 350 KLD, another STP was installed in the year 2017 having capacity of 1000 KLD. Both the existing STPs having Primary sedimentation tank (PST), Screening and oil and grease trap. Old STP also having Grit chamber that is missing in new STP.

Secondary treatment unit consists of Biological treatment process for the removal of soluble organic compounds. Secondary biological unit of old STP is based on extended aeration system of activated sludge process(ASP) while new STP is based on Moving bed Biofilm reactor (MBBR).

Tertiary treatment also called as advanced treatment is for removal of microbes and further reduction/removal of Total dissolved solid (TDS) and Total suspended Solids (TSS).

Old sewage treatment plant (STP) having operational units like chlorine dosing for disinfection, Dual media filter for suspended particles removal and Activated carbon filter (ACF) for TDS removal by the process of adsorption.

Similarly new STP having Chlorine contact Tank for disinfection, Dual media filter (DMF) for TSS removal and Multi grade filter (MGF) for retaining both large and small suspended solids and un-dissolved impurities like dust particles.

All the tertiary treatment operation unit require regular cleaning and maintenance.

Test results shows that treated water contain all the impurities within permissible limit, TDS of the treated water is around 1500 mg/l. TDS is high but still it is within permissible limit of 2100 mg/l as per effluent discharge standard (inland surface water) of Environmental (protection) act, 1986.

Old STP is under annual maintenance contract (AMC) of SIMA lab (pvt) ltd. New Delhi since 2015 while new STP is designed, constructed, commissioned and maintained by SIMA lab since its inception. Thus it is expected that the treated water can be discharge safely or reuse for non potable use.

Water requirement in GLA University Campus

RO Water Demand for Fixed (residential) Population

For Drinking Purpose
Consider 5 LPCD (Liter per capita per day)

Hostels

Considering 5250 students in all the hostels
5250×5=26250 Liters

For Cooking Purpose
Consider 5 LPCD
5250×5=26250 Liters

Total RO water Requirement in hostels
26250+26250= **52500 Liters**

Considering 500 Mess and other Staffs in Hostels
Drinking 500×5=2500
Cooking 500×5=2500
Mess Total= 5000 Liters

Total= 57500 Liters

Residence Blocks

There are 105 Staff flats and considering 4 persons in one flat
Thus total population 420 persons
Drinking water requirement
5×420=2100 Liters
For cooking Purposes
5×420= 2100 Liters
Total= 4200 Liters

RO Water demand for floating (Day boarding) Population

Considering 3 Liters per head
Day scholar students 5000
3×5000=15000 Liters
Non residential employees
3×1500=4500 Liters

Visitors

Considering 200 Persons per day
3×200=600 Liters

Total for Floating Population
15000+4500+600=20100 Liters per day

Other requirement of RO Water

In laboratories for Distillation

RO water taps are available in Civil engineering, Chemistry, Biotech, Pharmacy and Agriculture department, considering one Tap each in department and 5 liters requirement per day

5×5=25 Liters per day

In cooling tower of Generator, considering 500 liters per generator per day
Since there are 3 generators
3×500=1500 Liters per day

Others total= 25+1500=1525 Liters per day

Total RO Water Requirement=57500+20100+1525=79125 Liters per Day

Raw water demand
For Fixed Population
Considering 5250 students in all the hostels
Consider 130 LPCD
130×5250=682,500 LPCD

Considering 500 Mess and other Staffs in Hostels
130×500=65000 LPCD

There are 105 Staff flats and considering 4 persons in one flat, thus total population 420 persons
130×420=54,600 LPCD
Total=682,500+650,00+54,000=801,500 LPCD

For Floating (non-residential) Population
Considering 45 Liters per day for non residence population
Day scholar students 5000
45×5000=225,000 Liters per day
1200 Non residential Employees
45×1200=54,000
Considering 200 visitors per day
45 × 200=9000 Liters Per day

Total for floating Population=225,000+54,000+9000=288,000 Liters per day

Other Requirement of Raw Water
In Generator: 5000 liters of raw water required per generator per day
Since there are 3 generator in the campus
3×5000=15000 Liters per day

Considering 30% of raw water waste in the Production of RO water
30% of 79125=23737 Liters
Others total=15000+23737=38737

Total Raw Water requirement (Resident+ Nonresident+ others)
=801500+288000+15000+38737=1128237 Liters per day

	Resident (Liters per day)	***Non Resident (Liters per day)***	***Other (Liters per day)***	***Total (Liters per day)***
RO Water	*57500*	*20100*	*1525*	*79125*
Raw Water	*801500*	*288000*	*38737*	*1128237*

Suggestion for Minimizing Water requirement

Installation of metering or monitoring equipment can be a crucial to encourage water saving behavior

Installation of Water Tap aerators

Replacement of old toilet flush with a low flush toilet (6 litres per flush)

Since water meters are available in Hostels ,A,B,C,E,I,H, Yamuna, Kalpana, Ganga and In residence Block I,III,IV,V,VI,VII,IX,X as well as in Academic Blocks III,IV,VI,VII,VIII,IX , thus there should be monitoring of average usage of water at these buildings.

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Improve water quality of STP for use in toilets of wings hostel. Supply system are already existing

Tertiary treated domestic waste water can be reuse for toilet flush. Some metro cities of India have made mandatory for urban societies to reuse its treated water in toilet flushes.

Reuse for toilet flushing alone can reduce the water demand by 10–20 % which is very significant and research found that reuse for toilet flushing and garden irrigation can reduce fresh water demand by up to 50 %.

GLA have the provision for the reuse of STP treated water in the toilet flush of Wings hostel.

We should immediately start the reuse of STP treated water in toilet flushes.

Portal records of water related complaints

17km Stone, NH-2, Mathura-Delhi Road P.O.
Chaumuhan, Mathura-281 406 (U.P.) INDIA
Tel.: +91-5662-250900, 250909

Maintenance - GANGA HOSTEL MAI CHHAT KI WATER TANK FULL NHI ★ Urgent

Printed On: 18.02.2022 03:48 PM

Kirti Chaudhary kirti.chaudhary@gla.ac.in
HOSTEL (ASSISTANT WARDEN)
: 8192086458 **Status: Completed**

Ganga - 150
Time:NORMAL
Updated On: 23.12.2021 04:58 PM

Complaint Details

GANGA HOSTEL MAI CHHAT KI WATER TANK FULL NHI HO PA RHA HAI JAISE HI PANI CHLA RHE HAI YAMUNA HOSTEL KE WATER TANK FULL HO JATYE HAI JISKI VJH SE MOTER BAND KARNI PADHTI HAI PLZ CHECK URGENT

Kirti Chaudhary | 11.12.2021

Conversation With Officers

Work Completed.

Site Supervisor | Govind Chand Sharma | 23.12.2021 04:58 PM

17km Stone, NH-2, Mathura-Delhi Road P.O.
Chaumuhan, Mathura-281 406 (U.P.) INDIA
Tel.: +91-5662-250900, 250909

Plumber - R O water tap is not working ★ Urgent

Printed On: 18.02.2022 04:05 PM

Anoop Kumar Upadhyay anoop.upadhyay@gla.ac.in
HOSTEL (HOSTEL INCHARGE)
: 9634814128 **Status: Completed**

G: Apj Abdul Kalam - Second F
Time:NORMAL
Updated On: 21.01.2022 11:10 AM

Complaint Details

R O water tap is not working

Anoop Kumar Upadhyay | 06.01.2022

Conversation With Officers

ok

Civil Supervisor | Pravesh Kumar | 21.01.2022 11:10 AM

17km Stone, NH-2, Mathura-Delhi Road P.O.
Chaumuhan, Mathura-281 406 (U.P.) INDIA
Tel.: +91-5662-250900, 250909

Plumber - 1. On top floor front side, water in wash basi ★ Urgent

Printed On: 18.02.2022 04:13 PM

Pooja pooja.gla@gla.ac.in

COMPUTER ENGG. AND APPLICATIONS (ASSISTANT PROFESSOR)

: 8826262012 **Status: Completed**

Ganga - Ganga Ho

Time:NORMAL

Updated On: 15.02.2022 12:46 PM

Complaint Details

1. On top floor front side, water in wash basin is leaking.
2. on ground floor, front side washroom western toilet flush is not working.

Pooja | 12.02.2022

Conversation With Officers

Work Completed.

Site Supervisor | Govind Chand Sharma | 15.02.2022 12:46 PM

17km Stone, NH-2, Mathura-Delhi Road P.O.
Chaumuhan, Mathura-281 406 (U.P.) INDIA
Tel.: +91-5662-250900, 250909

Plumber - All Washroom tap is not working proper & allmo ★ Urgent

Printed On: 18.02.2022 03:47 PM

Kirti Chaudhary kirti.chaudhary@gla.ac.in
HOSTEL (ASSISTANT WARDEN)
: 8192086458 **Status: Completed**

Ganga - 150
Time:NORMAL
Updated On: 23.12.2021 05:03 PM

Complaint Details

All Washroom tap is not working proper & allmost tap leakage
Ist floor washroom ki chhat se water leakage ho rha hai
Ist floor watercooler ke paas sink ka tap khraab hai
Ist floor washroom mai western toilet khraab hai
Ist floor front side sink wastepipe leakage hai
Top floor pr washroom me tap se pani nhi aa rha
Top floor washroom ka chamber banega

Kirti Chaudhary | 03.12.2021

Conversation With Officers

Work Completed.

Site Supervisor | Govind Chand Sharma | 23.12.2021 05:03 PM