## 7.1.4 WATER CONSERVATION FACILITIES AVAILABLE IN THE INSTITUTION:

1. RAIN WATER HARVESTING
2. BOREWELL /OPEN WELL RECHARGE
3. CONSTRUCTION OF TANKS AND BUNDS
4. WASTE WATER RECYCLING
5. MAINTENANCE OF WATER BODIES AND DISTRIBUTION SYSTEM IN THE CAMPUS

**Index**

# CERTIFICATE OF THE HEAD OF INSTITUTION

**Campus:**
RIICO Institutional Area, Sitapura, Tonk Road, JAIPUR – 302 022 (Raj.) INDIA | Phone : +91-141-2771804 • 2771777 | Fax : +91-141-2771805 • 2771807
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MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

**Dr. Ajay Kumar Sharma., PhD**
**Registrar**

## TO WHOM SO EVER IT MAY CONCERN

This is to certify that our Institution has the following facilities for Water conservation

1. Rain water harvesting
2. Borewell / Open well recharge
3. Construction of tanks and bunds
4. Waste water recycling
5. Maintenance of water bodies and distribution system in the campus

**Registrar**

REGISTRAR
Mahatma Gandhi University of
Medical Sciences & Technology
Sitapura, JAIPUR-302 022

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AJAY KUMAR SHARMA
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# RAIN WATER HARVESTING

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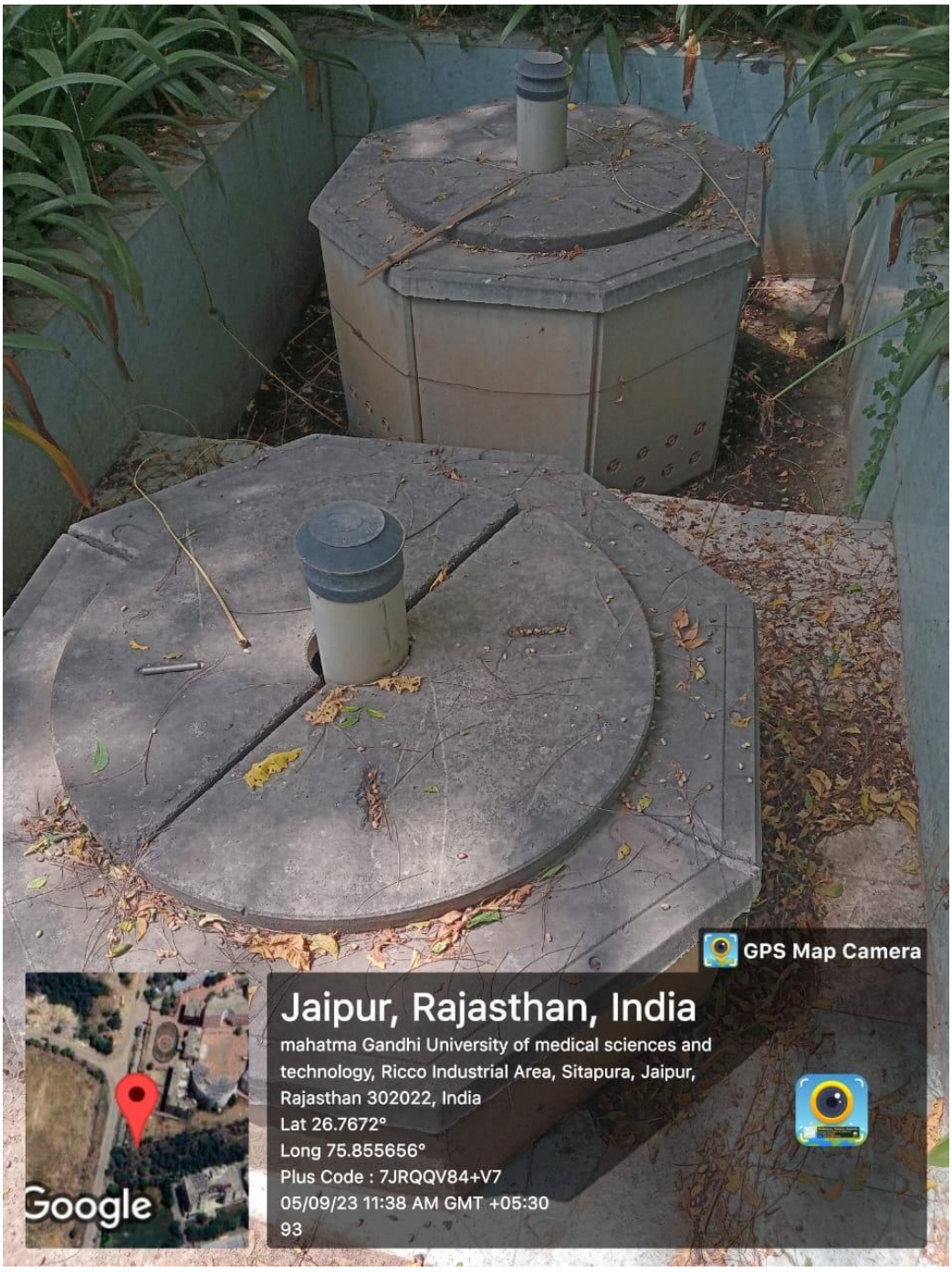


## RAINWATER HARVESTING PITS IN THE CAMPUS

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**RAINWATER HARVESTING PITS IN THE CAMPUS**

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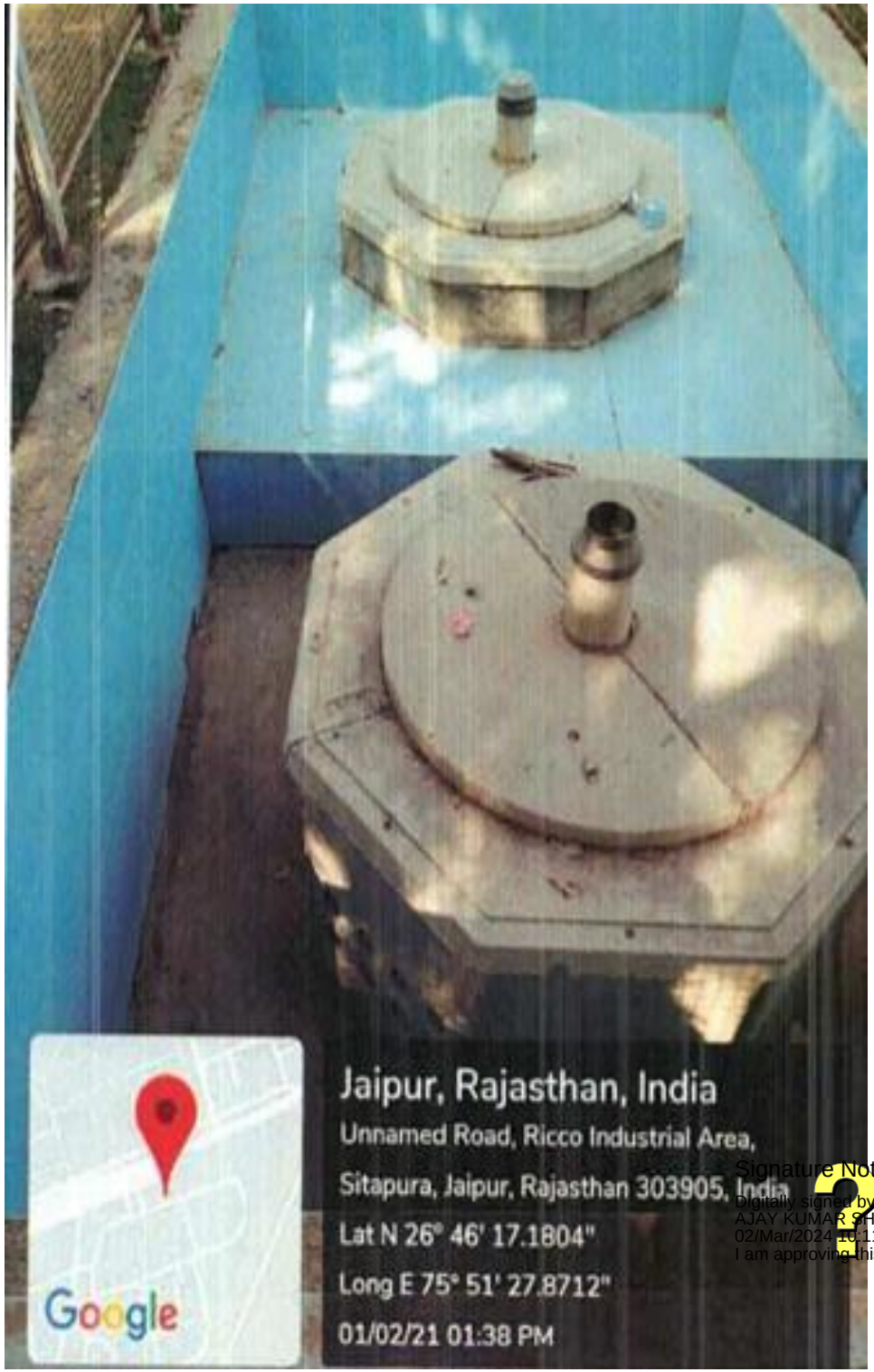
## RAINWATER HARVESTING PITS IN THE CAMPUS




# RAIN WATER HARVESTING PITS

# BOREWELL / OPEN WELL RECHARGE

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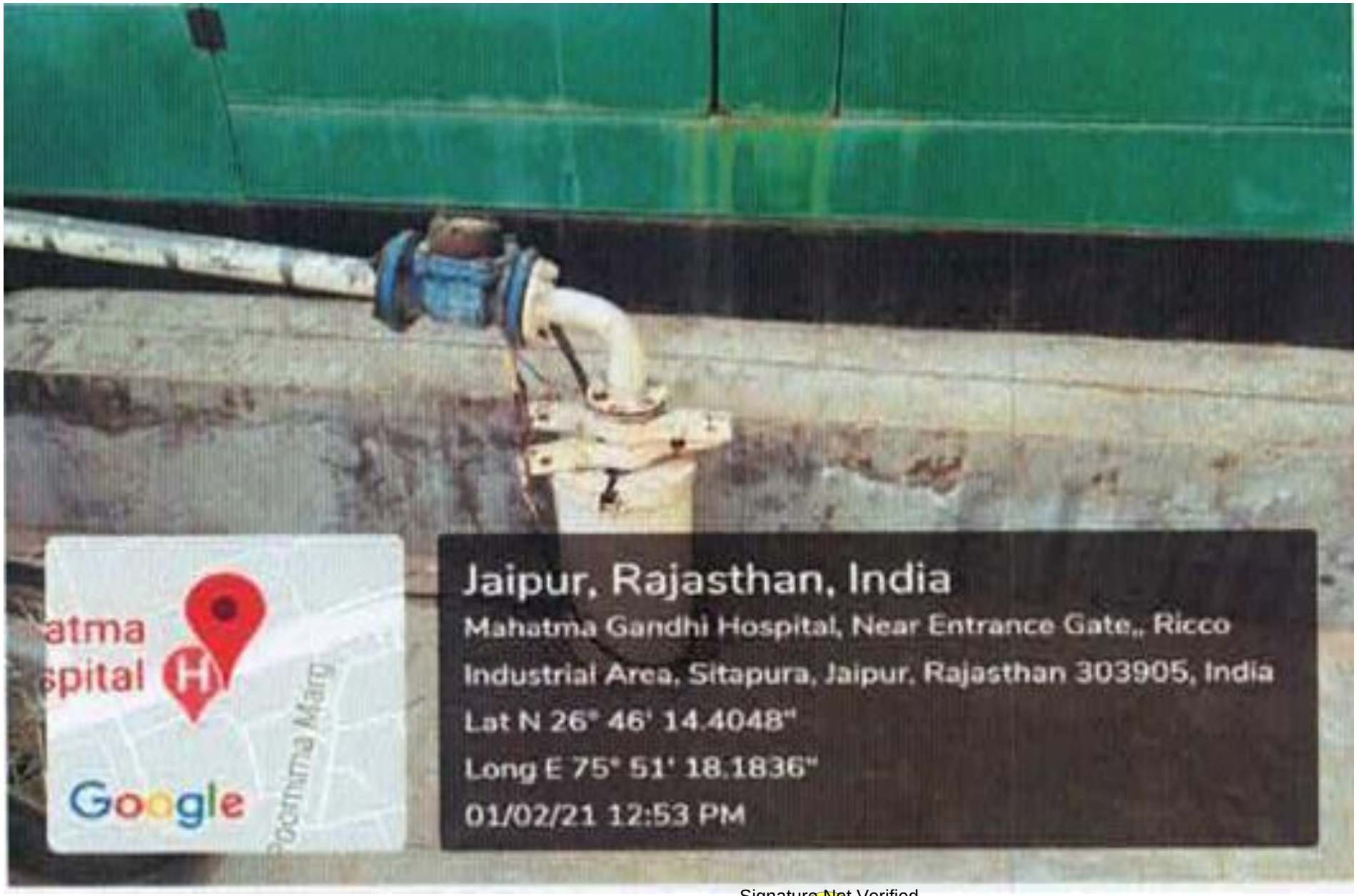
# BOREWELL /OPEN WELL RECHARGE



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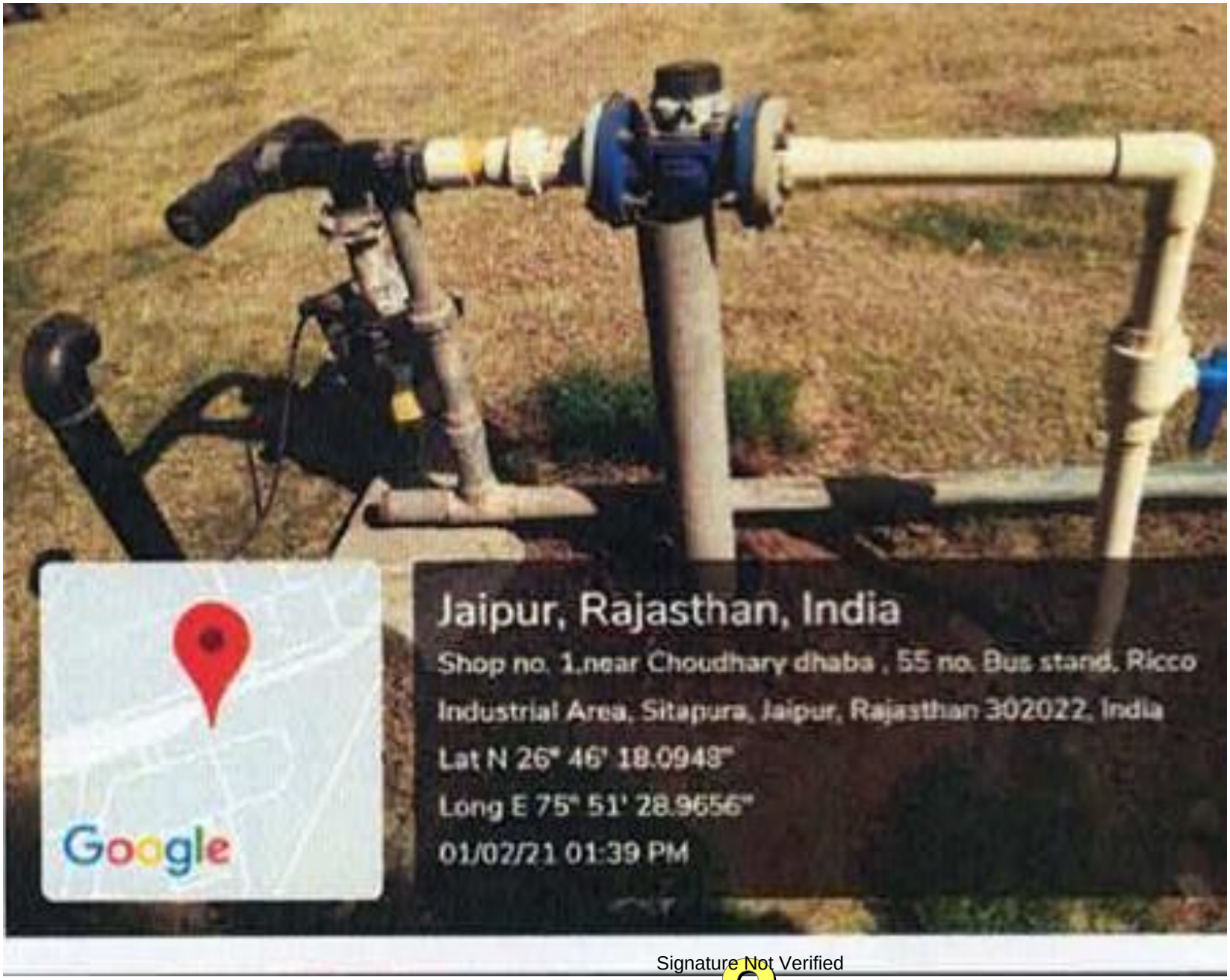




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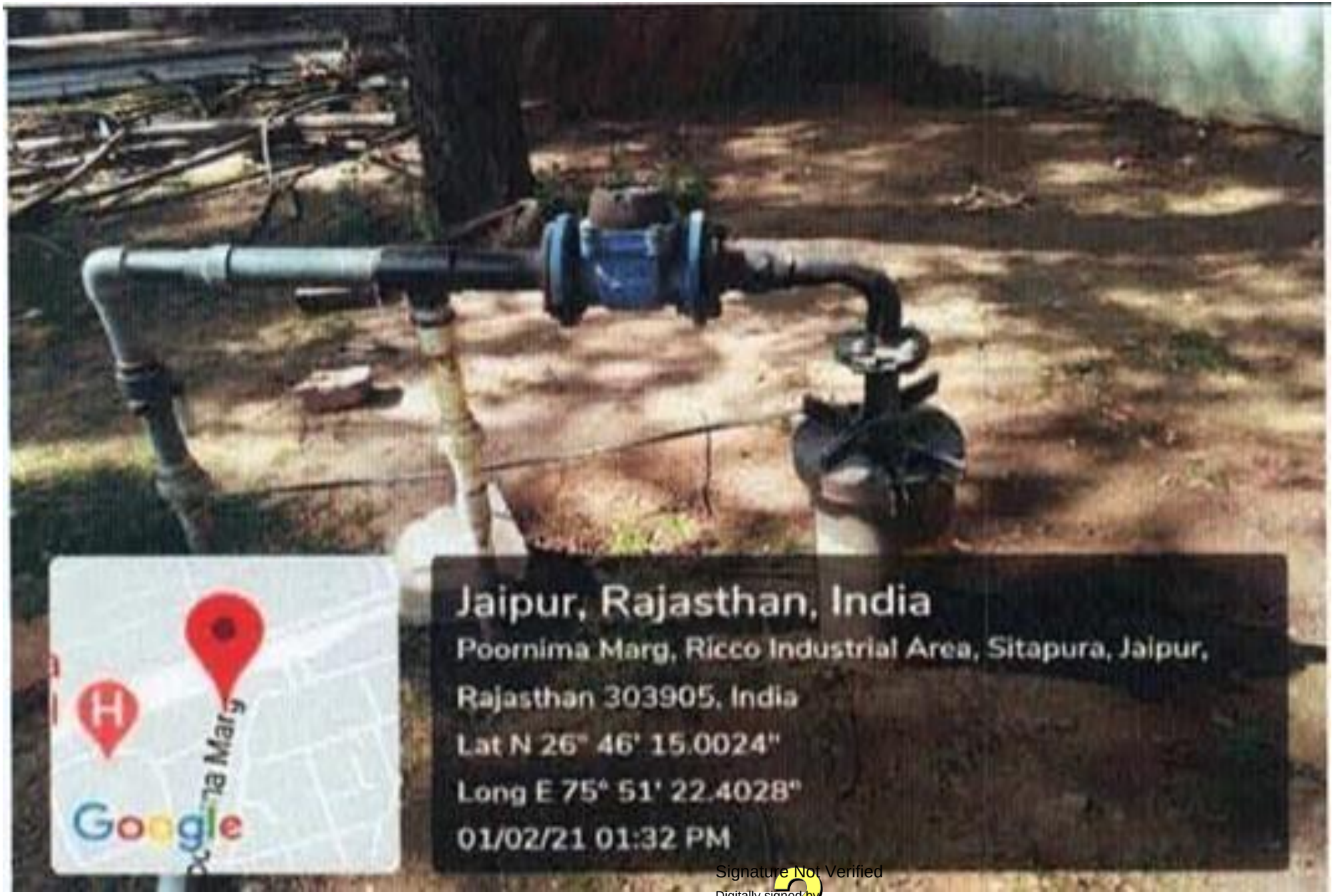




# BOREWELL IN THE CAMPUS



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**BOREWELL PLACED IN MAHATMA GANDHI MEDICAL COLLEGE FRONT GARDEN**


# WATER DISTRIBUTION PLAN

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# CONSTRUCTION OF TANKS AND BUNDS

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**TANK NEAR MAHATMA GANDHI HOSPITAL**
**SRCC BUILDING**

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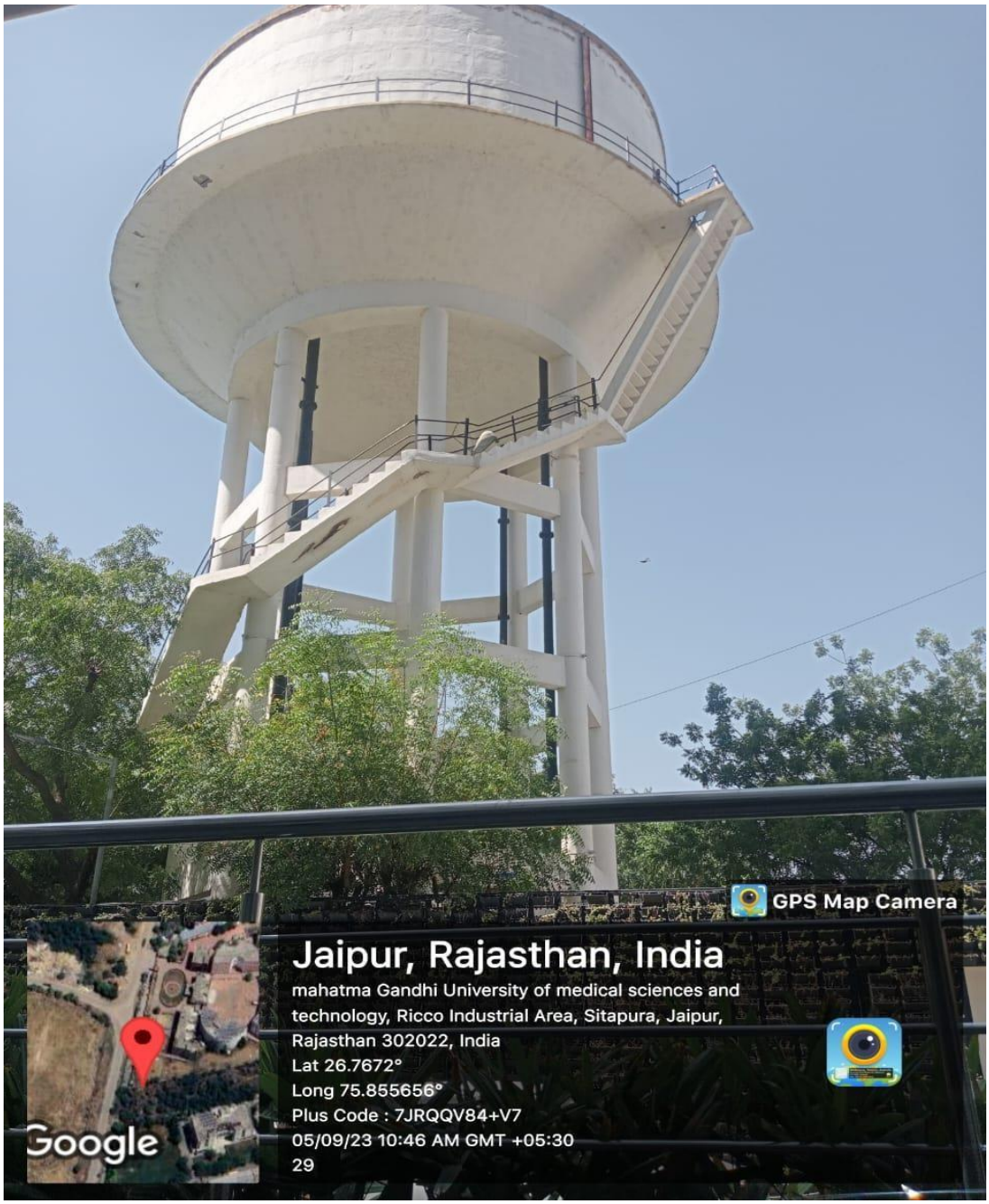


# TANK NEAR MAHATMA GANDHI HOSPITAL SRCC BUILDING

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JAIPUR


**TANK NEAR MAHATMA GANDHI HOSPITAL**
**SRCC BUILDING**


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**WATER STORAGE TANK**




# WATER STORAGE TANK FOR DISTRIBUTION OF WATER IN THE CAMPUS


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# WATER STORAGE TANK LOCATED NEAR NURSING BUILDING


# HYPOCHLORITE SOLUTION FOR LIQUID WASTE DISPOSAL

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# EFFLUENT TREATMENT PLANT




# Effluent Treatment Plant

# WASTE WATER RECYCLING

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**SEWAGE TREATMENT PLANT NEAR MAHATMA GANDHI HOSPITAL (MAIN BUILDING)**

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# PLAN OF SEWAGE TREATMENT PLANT

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**PUMPS HOUSE IN SEWAGE TREATMENT PLANT**

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# FILTERS & LAMILA CLARIFIER IN SEWAGE TREATMENT PLANT

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**PUMPS HOUSE IN SEWAGE TREATMENT PLANT**

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# FILTERS & LAMILA CLARIFIER IN SEWAGE TREATMENT PLANT

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# PUMPS FOR DISTRIBUTING TREATED WATER IN SEWAGE TREATMENT PLANT

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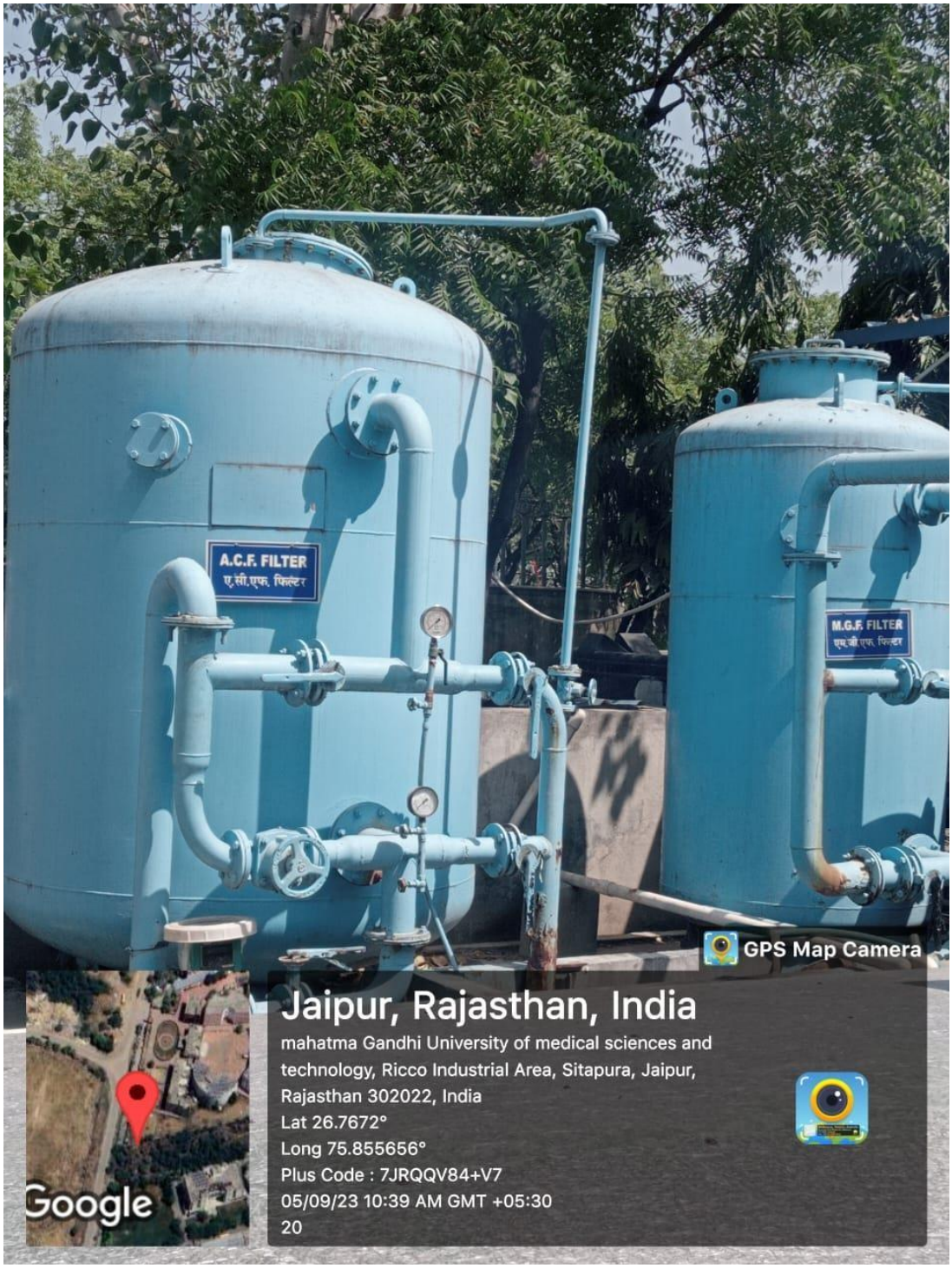


# A.C.F. & M.G.F. FILTERS IN SEWAGE TREATMENT PLANT

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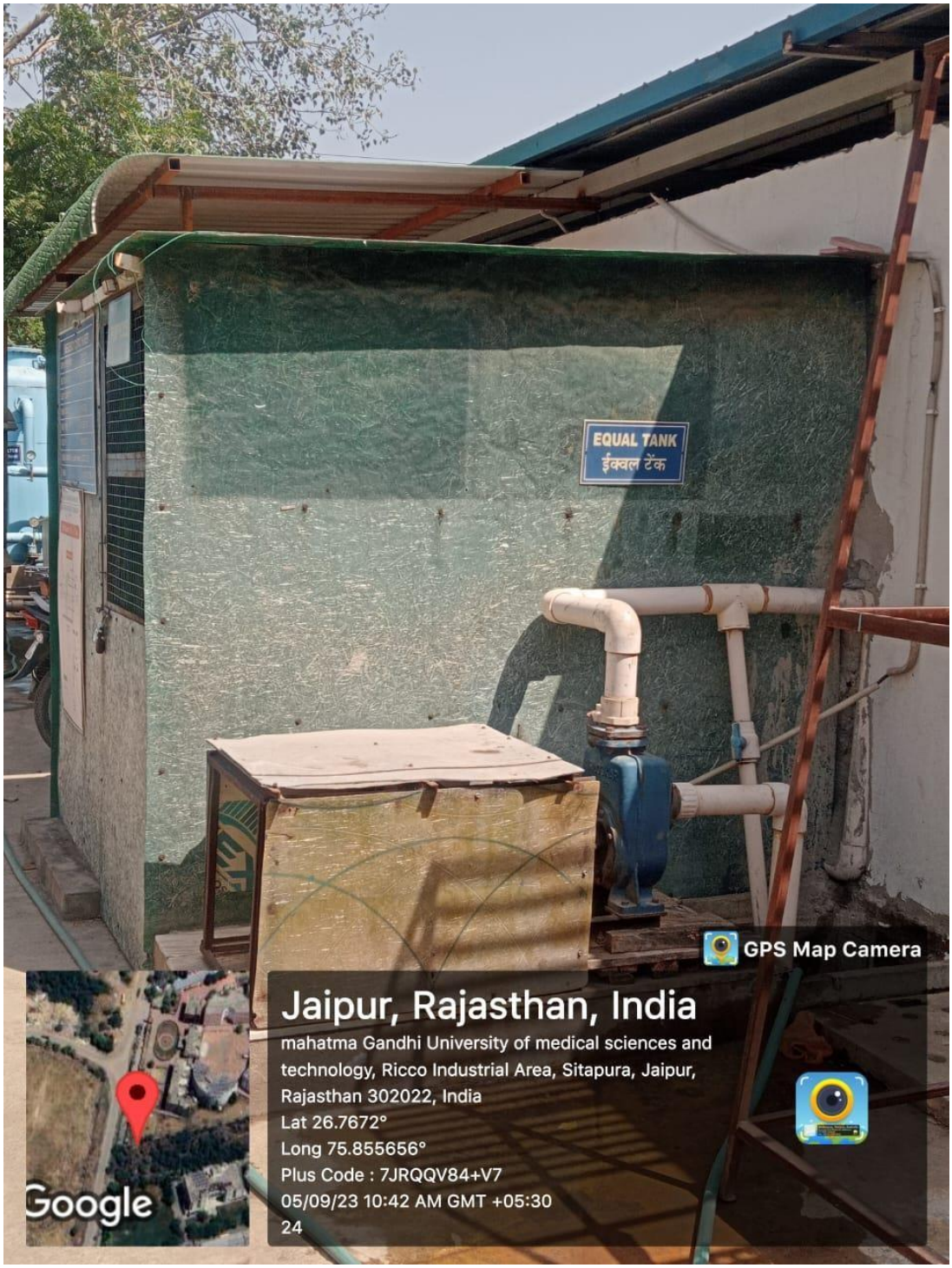


# EQUAL TANK IN SEWAGE TREATMENT PLANT

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# WATER TRATMENT FACILITY AND PUMP ROOM


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# STP PLANT

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JAIPUR


**LIQUID WASTE TREATMENT TANK PLACED NEAR SRCC ANNEX HEMATOLOGY TOWER**

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# MAINTENANCE OF WATER BODIES AND DISTRIBUTION SYSTEM

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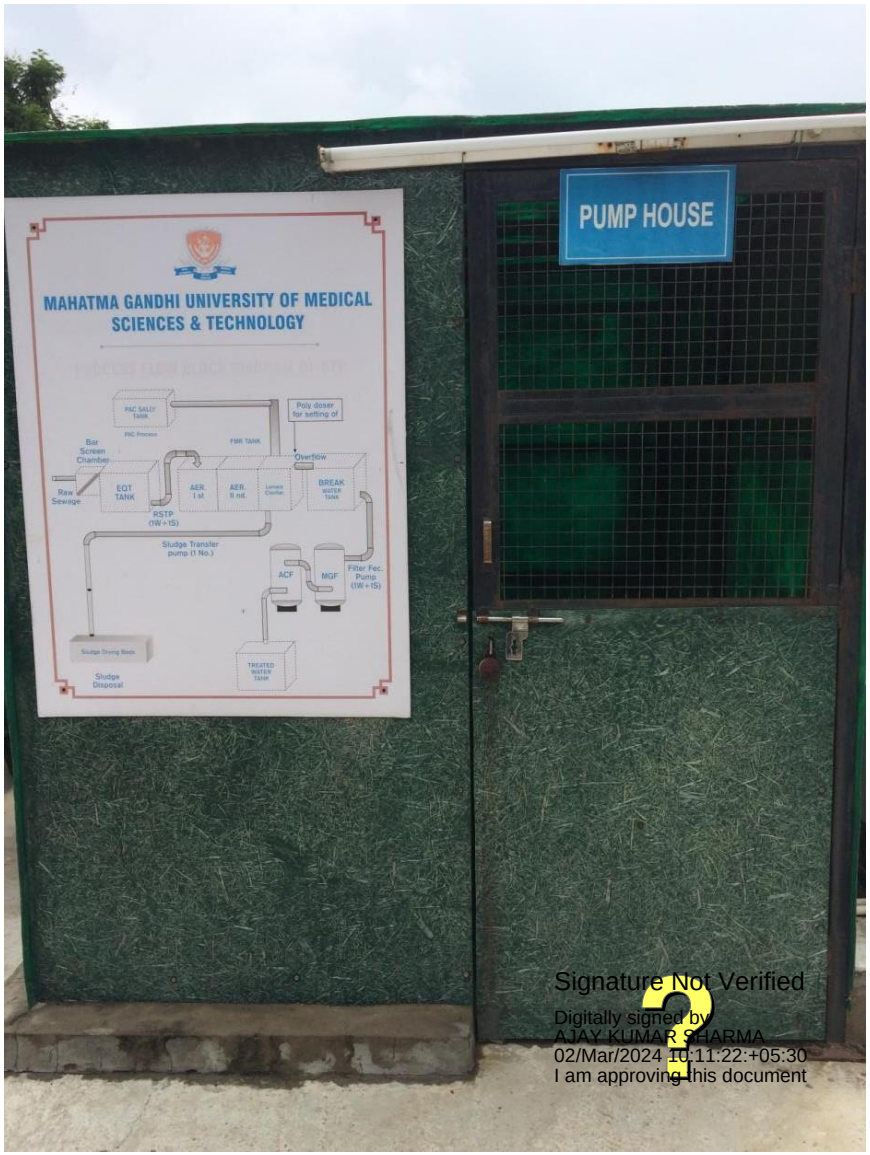
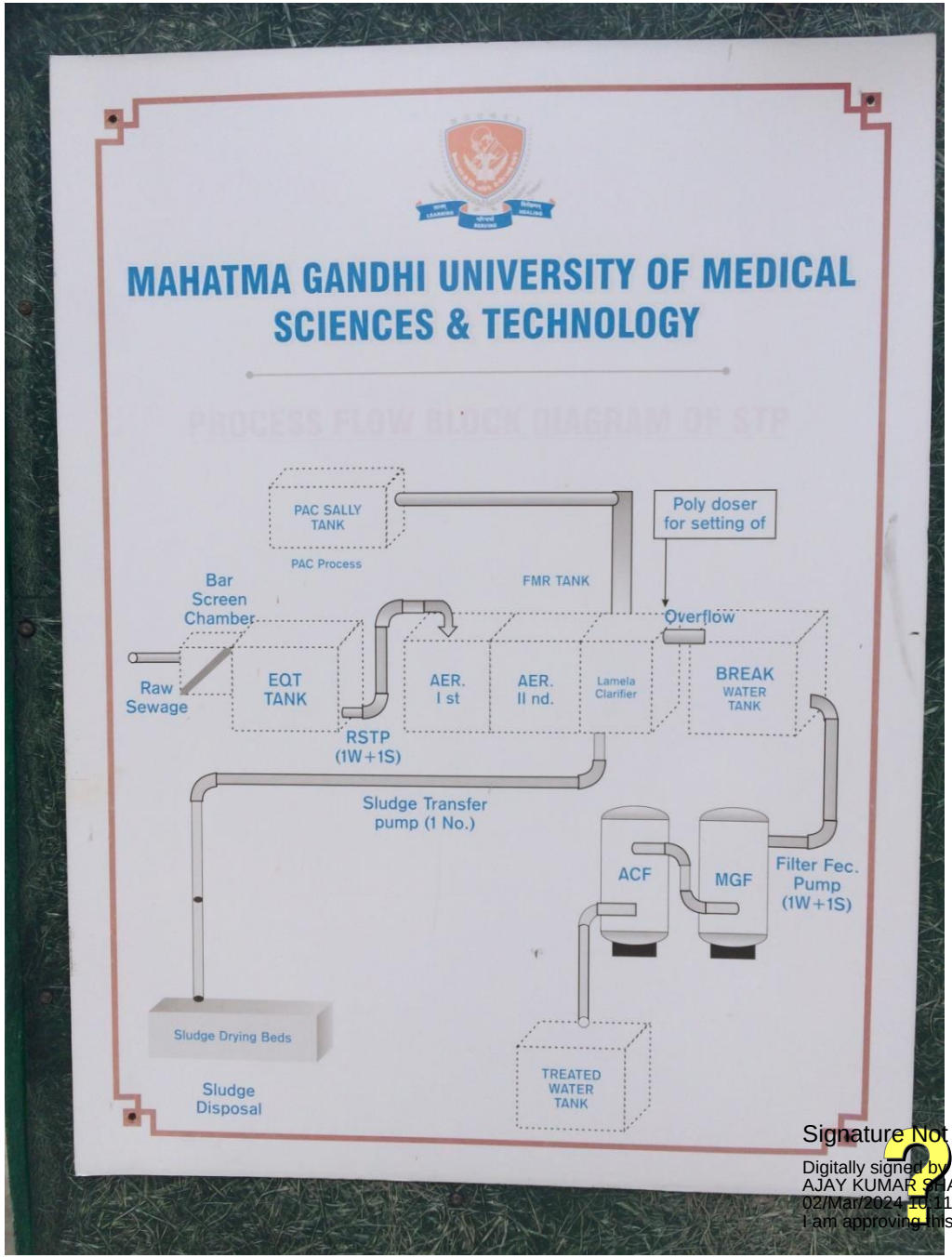
Website : www.mgumst.org | Email : info@mgumst.org | **Sponsoring Body : India Education Trust**

# MAINTENANCE OF WATER BODIES AND DISTRIBUTION SYSTEM IN THE CAMPUS






# WATER DISTRIBUTION SYSTEM

# WATER AUDIT REPORT

**AS PER THE GUIDELINES OF CGWA MINISTRY OF JAL SHAKTI**

**For**

**MAHATMA GANDHI UNIVERSITY OF MEDICAL SCIENCES AND TECHNOLOGY, RIICO INSTITUTIONAL AREA, SITAPURA, JAIPUR-RAJASTHAN, INDIA**


**CONDUCTED & PREPARED BY**

**ACCREDITED WATER AUDITING AGENCY**

**LAGHU UDYOG BHARATI**

**NEW DELHI**

**JUNE – 2023**

# Contents

# DISCLOSURE

Auditor places on record its sincere thanks to the Management of Mahatma Gandhi University of Medical Sciences and Technology RIICO Institutional Area, Sitapura Jaipur-Rajasthan for entrusting the task of conducting Water Audit assignment at RIICO Institutional Area, Sitapura Jaipur-Rajasthan in line with CGWA Notification.

We are grateful to the management of Mahatma Gandhi University of Medical Sciences and Technology for their continuous support and guidance during work. We also extend our sincere thanks to the team members of the University premises for their full-fledged support in execution of the assignment. The team Members are

| | |
|---|---|
| 1. Mr. Subodh Beaspal | General Manager Hospital operation |
| 2. Mr. Mukesh Khandelwal | Sr Manager (University Admin) |
| 3. Mr. Ganga Singh Chaudhary | STP In-charge |

The water auditor is indebted to the staff team for showing keen interest in the water audit and the wholehearted support and cooperation during the conduct of the field study, without which the study would not have steered to its successful completion.

It is well worthy to mention that the efforts being taken and the enthusiasm shown by all the personnel towards water conservation are really admirable.

# DECLARATION

**We certify the following:**

The report is based on the data collected at site during Audit and information provided by the Mahatma Gandhi University of Medical Sciences and Technology RIICO Institutional Area, Sitapura Jaipur-Rajasthan.

The data collection has been carried out diligently and truthfully. All data measuring devices used in good working condition, have been calibrated and have valid certificate from the authorized approved agencies and tampering of such devices has not occurred.

All reasonable professional skill, care and diligence have been taken in preparing the water audit report and the contents thereof are a true representation of the facts and figures.

# EXECUTIVE SUMMARY

This report is an attempt of water audit team to provide an overview of the water distribution system and water usage at Mahatma Gandhi University of Medical Sciences and Technology RIICO Institutional Area, Sitapura Jaipur-Rajasthan. The report also highlights the major water sources, consumption area, wastewater treatment facilities and available water saving opportunities in the University premises. A set of recommendations which will assist in improving water efficiency has also been highlighted in this report. This report has emerged after a detailed water audit conducted in university premises at 26/06/2023.

| Project Title: | Report Number: |
|---|---|
| Mahatma Gandhi University of Medical Sciences and Technology | MGH/JP/RJ. /01 |
| Client: | |
| Mahatma Gandhi University of Medical Sciences and Technology, Sitapura, Jaipur, Rajasthan | |
| Contact Person: Mr. Mukesh Khandelwal | |
| Date of Audit: | Source of Water: |
| 26/06/2023 | Ground Water from 08 tube wells |
| Date of this Report: | Date of Approval: |
| 26/06/2023 | 26/06/2023 |
| No Distribution without permission from the client or responsible organization or unit | |

| | | |
|---|---|---|
| Final Report Approved: | By LAGHU UDYOG BHARATI<br>New Delhi | |
| | For LAGHU UDYOG BHARATI<br>OM PRAKASH GUPTA<br>Authorised Signatory | Date:26/06/2023 |

# BRIEF SUMMARY

Mahatma Gandhi University of Medical Sciences and Technology was formally inaugurated on 2nd October, 2000. At present this multi - specialty teaching University has 1450 operational beds. MGUMST also provides adequate clinical teaching materials as envisaged by Medical Council of India, Dental Council of India, and Indian Nursing Council.

The world - class infrastructure with the state- of- art medical equipment and highly reputed and experienced medical consultants / doctors / paramedical staff of MGUMST provides clinical support to the faculty of medicine resulting into most efficient teaching in these institutions.

MGUMST has a fully developed central diagnostic laboratory in biochemistry, microbiology and pathology. A well-trained and senior faculty supervises this lab which is one of the biggest in the State. MGUMST provides well-developed, unique services in the field of Advanced Reproductive Techniques (ART), medical and surgical endoscopy and modern blood banking with component therapy. MGUMST has started its Regional Emergency and Trauma Centre approved for Medico Legal Cases (MLC) along with well - equipped ambulance facilities meant to save lives of the victims of road accidents. The efficient and effective emergency department is well equipped with intensive care therapy, diagnostics, radio-diagnostic including ultrasonography and CT scan, MRI, Haematology and fully equipped operation theatres manned by eminent professionals and experts round-the-clock. This is the first trauma centre in the state approved by the Govt. of Rajasthan to deal with medico-legal cases including road traffic accident and post mortem under the Dept. of Forensic Medicine of MGMCH.

MGUMST has recently been upgraded with a state-of-art Cardiac & Critical Care Centre. The services at Cardiac & Critical Care Centre are available for patients by experienced Cardiologists & Cardiothoracic surgeons round the clock along with latest equipment's & ultra-modern technology.

The University has a modern Kidney Transplant & Urology Centre namely Mahatma Gandhi Kidney Transplant Centre which has started its functioning under expert Kidney Transplant Surgeons and Nephrologists. This centre gives quality medical services with ultra-modern techniques at affordable cost for all kinds of kidney ailments. A full-fledged Department of Oncology is launched with two linear accelerators for Radiotherapy services.

The University premises is located at RIICO Institutional Area Sitapura Jaipur Rajasthan.

The location of the "Mahatma Gandhi University of Medical Sciences and Technology" is shown in **Fig-1**and layout plan of the University premises is shown in **Fig-2**

Summary of Water Audit findings are presented in Table-1.

| **Table 1: Fact File – Mahatma Gandhi University (MGUMST) Jaipur** | |
|---|---|
| **University premises Name and Location** | Mahatma Gandhi University of Medical Sciences and Technology, RIICO Institutional Area, Sitapura, Jaipur-Rajasthan |
| **Name of Block and category** | Sanganer – Over Exploited |
| **No. of working days/year** | 365 |
| **Major Water Usage Area in the University premises** | Domestic uses and Gardening |
| **Main Source of Freshwater** | 08 Tube wells |
| **Total annual Fresh Water consumption (Feb2021 to Jan 2023)** | 100732 $m^3$ (2023 Up to Jun)<br>202876 $m^3$ (2022)<br>68193 $m^3$ (2021) |
| **Total Water Use (Freshwater, & Treated Water) in University premises** | • Freshwater: 850 $m^3$/day<br>• STP Treated Water: 786 $m^3$/day |
| **Pumping Device** | • 08 numbers Submersible pump of 7.5 HP |
| **Installation of Digital water meter** | • Installed |
| **Distribution for uses** | • From borewell to collection tank then through pipe line in different Buildings |
| **NOC for Ground water Extraction** | • For 850 $m^3$/day from CGWA |
| **Average Effluent Generation in the STP and Reuse ($m^3$/day)** | 786 $m^3$/day sewerage water treated and used in flushing and gardening. |

## FINDINGS:

- As per water balance flow chart total water requirement in the University premises is 850 $m^3$/day.
- The main source of freshwater for the University premises is 8 borewells. The depth of the Borewells is 150 to 170 m
- Around 786 $m^3$ of water treated by two STP having 400 $m^3$/day capacity each, out of total 786 $m^3$ of treated water 235 $m^3$/day is used in landscaping ,451$m^3$/day in road cleaning and dust suppression.
- It is analysed that daily average extraction of ground water by the University from Jan 2022 to December 2022 was 556 m3/day only.
- Average daily fresh water consumption from Jan 2023 to Jun 2023 was 553.45 $m^3$/day. • University premises has 08 tube wells, there are 7.5 HP pump in each tube wells.
- Water extraction data analysed and concluded that extraction quantity is below the limit as per NOC.

Sometimes water have to purchase from other sources.

- Water pumped by well first collected in tanks and distributed from here for further domestic uses by different lines.
- Digital Water meter is installed on all tube wells readings are recorded properly.
- Effluent water first collected in collection tank at STP and then send for further treatment.

**RECOMMENDATIONS:**

- Water meter should be installed on inlet and outlet of the all-RO systems.
- Few borewells are feeding water to overhead tanks, in this way water flow reached in overhead tank get so slow due to head losses. Water from all the borewells first collected in underground tank then lift up to overhead tank through high efficiency suitable pump with auto on off system to save unnecessary energy consumption.
- There are five rainwater harvesting pit has been seen during the visit in which runoff of roof top area with surface runoff of sounding area is harvested, it should be cleaned and modify with runoff area. It is batter that in these rain water harvesting structures only roof top runoff water should be harvested. For road paved and open area separate structures should be made in low lying area like shallow ponds or tanks.
- Fixing one rubber washer of ID 04 mm at the output of water taps in washrooms and in all existing water taps to reduce water flow. This modification will result in 50% water saving in taps.
- In toilets fresh groundwater is used for flushing and about 15 litres per flush . To reduce the flushing water per flush, it is suggested to install scientifically designed easy to install ‘Tank- Bank’ in the existing flush tanks with 'Dual Flush Cisterns'. This will save about 60% of flush water in toilets.
- Road paved area runoff should be collected in in tanks and use in washing etc with proper treatment as per consultation with CGWB. There is total 25891m3 of rain water generated from paved area in a year, **in this way around 8% ground water can be saved easily.**
- **Total 32479m3 of water can be saved yearly which is around 10.46% of total ground water extraction as per water conservation opportunities and Implementation Plan Table-9**
- **As such around *18.46 % of water can be saved yearly.***

**********

**Fig-1: Location of the Mahatma Gandhi University of Medical Sciences and Technology Jaipur**

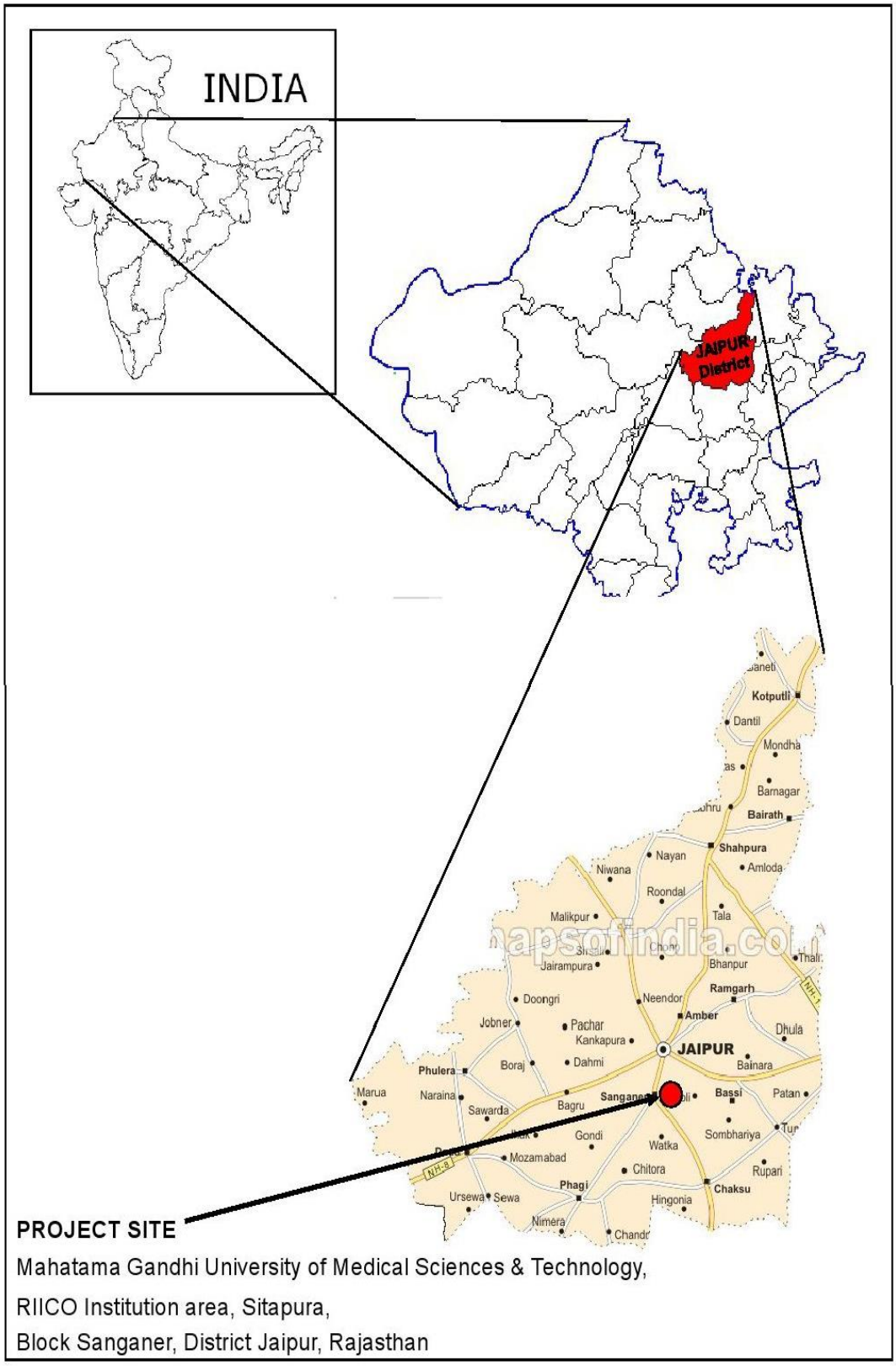
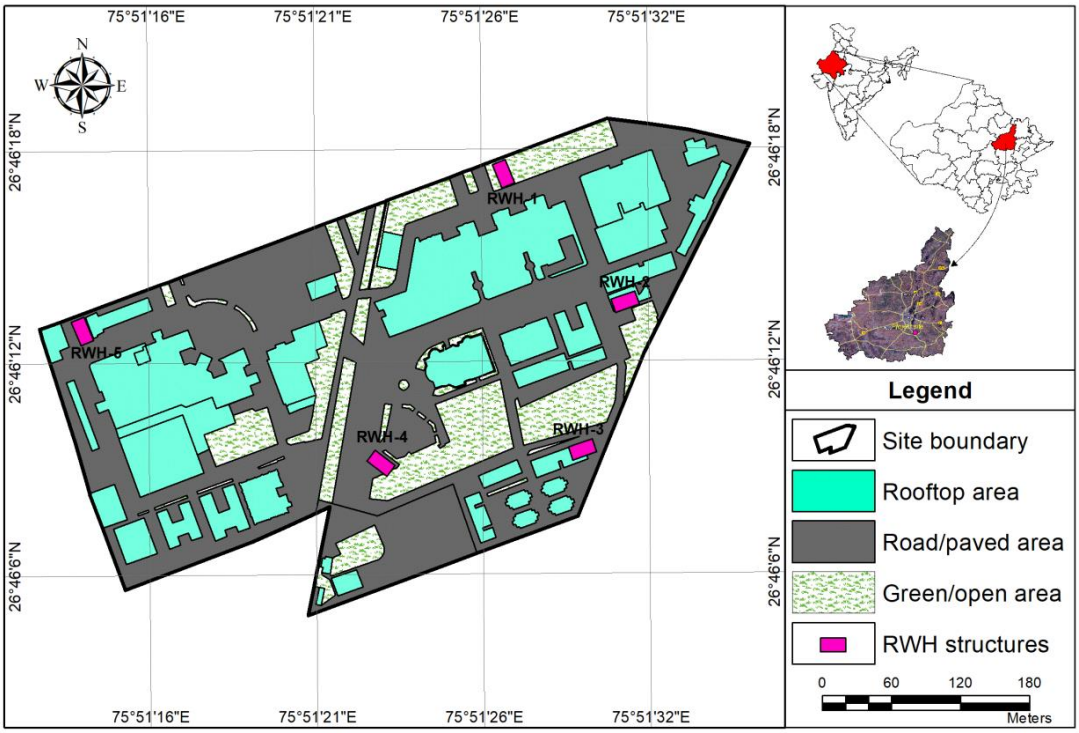


**Fig-2: Layout plan of the University premises.**



# CHAPTER-I

# INTRODUCTION

## 1.1 ABOUT THE UNIVERSITY:

Mahatma Gandhi University of Medical Sciences and Technology RIICO Institutional Area, Sitapura Jaipur premises is having the total area of 48152 $m^2$. The University premises located towards south at 20 km from the Jaipur City. The nearest railway station is Jaipur junction which is 22 km from the project site. Nearest airport at 10 Km towards North of the premises.

**Mahatma Gandhi University of Medical Sciences and Technology RIICO Institutional Area, Sitapura Jaipur was formally inaugurated on 2nd October, 2000.** At present this multi - specialty teaching University has **1450 operational beds**. MGUMST also provides adequate clinical teaching materials as envisaged by Medical Council of India, Dental Council of India, and Indian Nursing Council.

The world - class infrastructure with the **state- of- art** medical equipment and highly reputed and experienced medical consultants / doctors / paramedical staff of MGUMST provides clinical support to the faculty of medicine resulting into most efficient teaching in these institutions.

MGUMST has a fully developed central diagnostic laboratory in biochemistry, microbiology and pathology. A well-trained and senior faculty supervises this lab which is one of the biggest in the State. MGUMST provides well-developed, unique services in the field of Advanced Reproductive Techniques (ART), medical and surgical endoscopy and modern blood banking with component therapy. MGUMST has started its Regional Emergency and Trauma Centre approved for Medico Legal Cases (MLC) along with well - equipped ambulance facilities meant to save lives of the victims of road accidents. The efficient and effective emergency department is well equipped with intensive care therapy, diagnostics, radio-diagnostic including **ultrasonography** and **CT scan, MRI, Haematology and fully equipped operation theatres** manned by eminent professionals and experts round-the-clock. This is the first trauma centre in the state approved by the Govt. of Rajasthan to deal with medico-legal cases including road traffic accident and post mortem under the Dept. of Forensic Medicine of MGMCH.

**MGUMST has recently been upgraded with a state-of-art Cardiac & Critical Care Centre**. The services at **Cardiac & Critical Care Centre** are available for patients by experienced Cardiologists & Cardiothoracic surgeons round the clock along with latest equipment's & ultra- modern technology.

The University has a modern Kidney Transplant & Urology Centre namely Mahatma Gandhi Kidney Transplant Centre which has started its functioning under expert Kidney Transplant Surgeons and Nephrologists. This center gives quality medical services with ultra-modern techniques at affordable cost for all kinds of kidney ailments. A full-fledged Department of Oncology is launched with two linear accelerators for Radiotherapy services.

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# CHAPTER-II

# SCOPE OF WORK

The main objective of the study is to identify the water uses and water saving opportunities includes the flowing:

- Water System analysis
- Quantification of baseline water mapping
- monitoring and measurements using pressure and flow meters and other devices.
- Quantification and identification of leaks
- Quantification of water quality loads and discharge
- Quantification of variability in flow and quality parameters
- Strategies for water treatment and reuse or direct use.
- Water balance
- Mapping of water quality requirement at various use

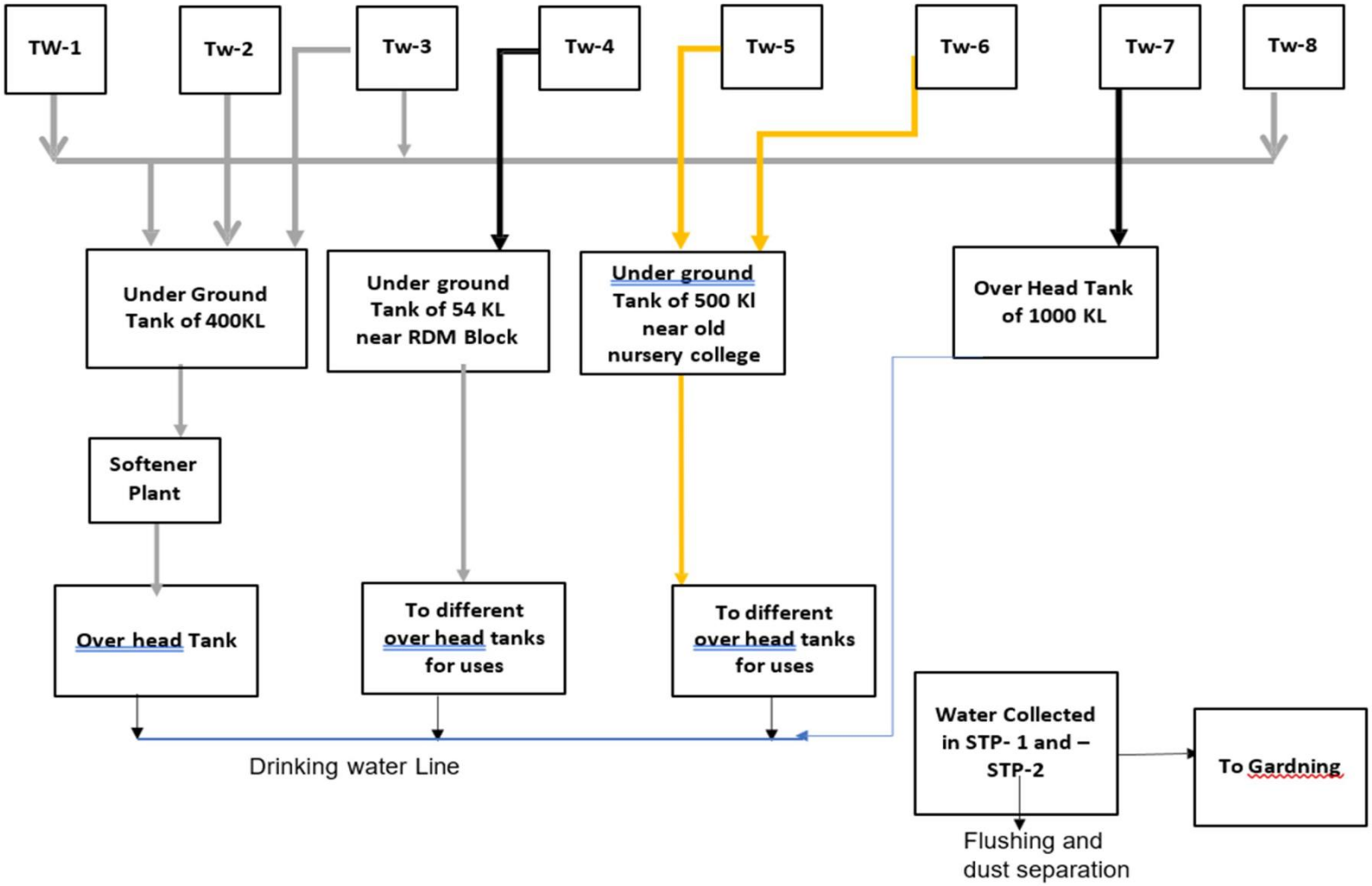
## 2.1: Water system analysis:

Water distribution system is a part of water supply network with components that carry water from a centralized treatment in university premises or wells to consumers to satisfy residential, requirements. Here water lifted from seven borewells and collected in overhead collection tanks and another one underground tank then distribute from here through different pipe lines.

## 2.2: QUANTIFICATION OF BASELINE WATER MAPPING:

Water audit comprises preparation of layout of water sources, distribution network, and service/delivery points to water users and return flow of waste or excess water. In this premises the sources of water is ground water, extracting through seven bore wells fitted with digital water meter and auto start sensors there is around 850 $m^3$/day water extracted by bore wells and collected in tanks and distributed from here for further uses. Treated water from STP is used in flushing and greenbelt development in University premises. Layout for water mapping is given as **Fig-3.**

**Fig-3: Base Line water Mapping**



## 2.3: MONITORING AND MEASUREMENTS:

Flow measurement devices were installed at all strategic points to calculate the water consumption at in various activities such as supply to the manufacturing units and domestic consumption.

Meter fitted on each tube wells was examined and crossed check for different cycle of running. Data provided by university and measure data is given as **annexure -I and annexure-II** respectively.

**Piezometer:** A piezometer has installed in premises and working properly. Photograph of the same is given as **fig-4** and data is given in **annexure-III**

## 2.4: QUANTIFICATION AND IDENTIFICATION OF LEAKS:

Measurement methodology from the intake point of the system through various sub-systems to the ultimate user points ware verified periodically for its suitability, efficiency and accuracy. Regular metering was done at the source and discharge point but ***no leakage was found in water distribution network.***

## 2.5: QUANTIFICATION OF WATER QUALITY LOADS, DISCHARGE AND FLOW VARIABILITY:

Water quality of the distribution system is monitor regularly at strategic points to find out the level and nature of contaminants present in the supplied water. The University premises has conducted the water quality test for raw water and reviewed all test reports and found acceptable as the results are in compliance to various standards as required. Analysis report of ground water is given in **annexure -IV**

## 2.6:RATEGIES FOR WATER TREATMENT AND REUSE OR DIRECT USE:

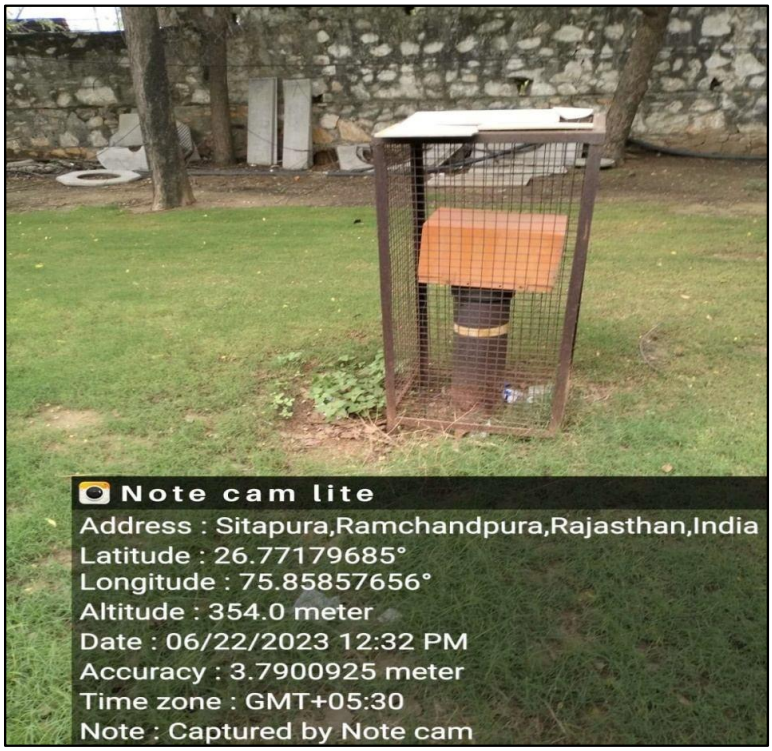
The unit has two sewerage treatment plant in premises for treating the wastewater. Currently 786 $m^3$ of treated water used in different area of university as shown in Table-2. The process flow diagram of STP is illustrated in **Fig-5**

**Table-2: Utilization of treated water**

| Area | Treated water quantity |
|---|---|
| **Flushing in new University building** | **100 $m^3$/day** |
| **Green belt development (Land scaping)** | **235 $m^3$/day** |
| **Road cleaning** | **451m3'day** |

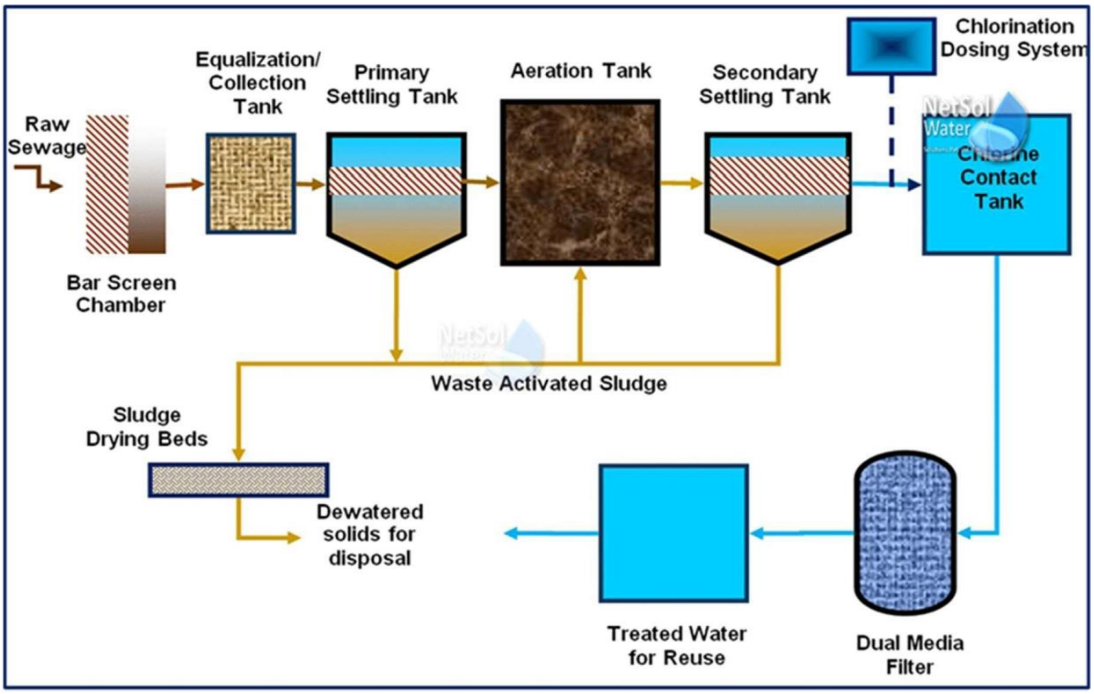
**Fig-4: Piezometers**


**PZ-1**




**PZ-2**

**Fig-5 STP Flow Chart**

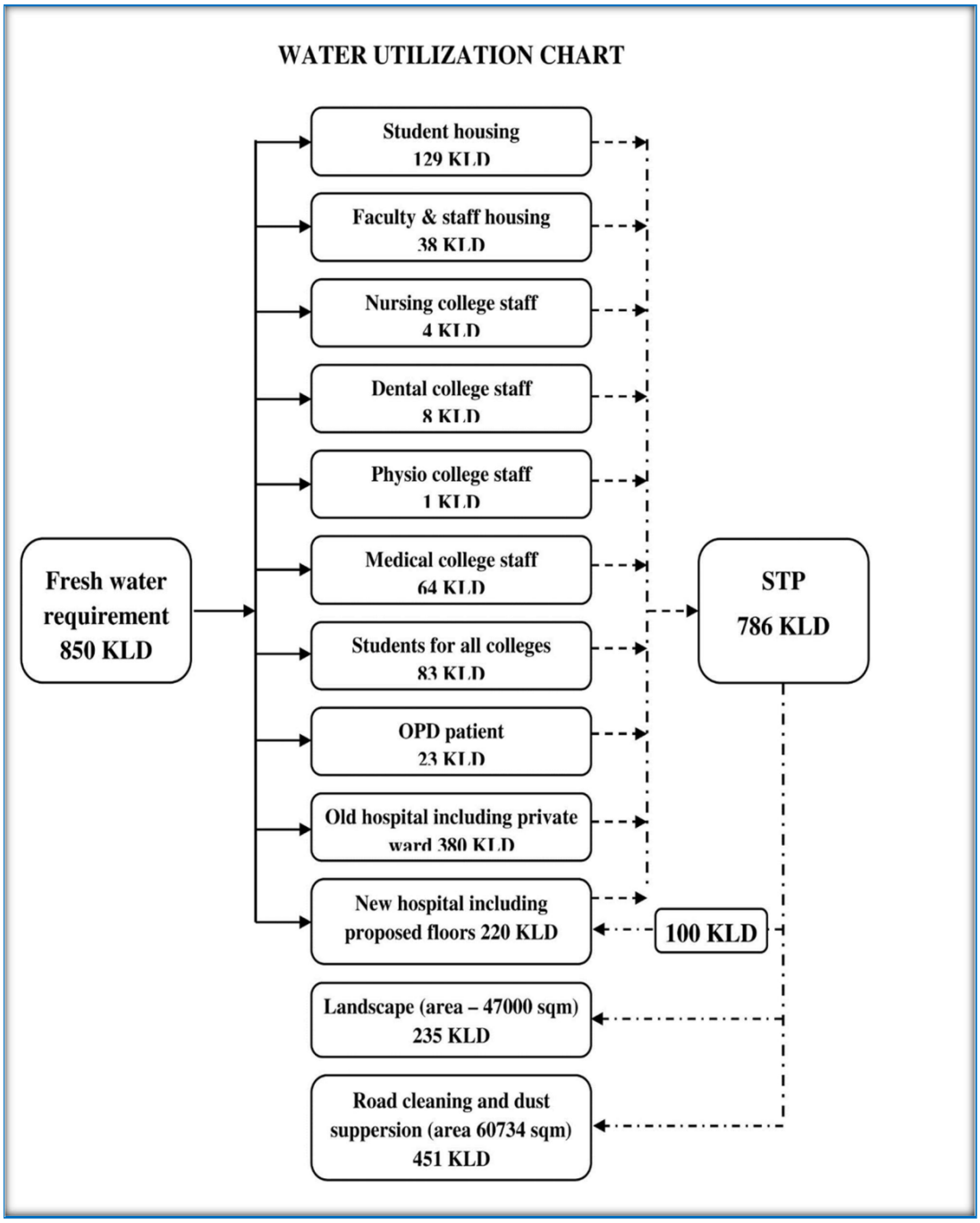



## 2.7 :WATER BALANCE:

The total water requirement in the University premises is 850 $m^3$/day out of which 129 $m^3$/day (fresh water) is used in student hostels. 38 $m^3$/day for faculty and staff,4 $m^3$/day in nursing college staff,8 $m^3$/day, Physio college staff 1$m^3$/day, medical college staff 64 m3/day. Students of all colleges 83 $m^3$/day, OPD patient 23 $m^3$/day, old University including privet ward 380m3/day and new University including proposed floors 220 m3/day.

Monitoring is the most important prerequisite for efficient water management. Thus, in the water supply network, it is necessary to have a robust system of monitoring. During the audit, the available flow meters were identified, and their working conditions were checked the assessment team has reviewed the water supply and consumption as well as the losses in the water distribution network at university premises. The water balance diagram of the system is given in **Fig-6.**

**Fig-6: Water Balance Flow Chart**



## 2.8 :MAPPING OF WATER QUALITY REQUIREMENT AT VARIOUS USE:

For any water body to function adequately in satisfying the desired use, it must have corresponding degree of purity. Drinking water should be of highest purity. As the magnitude of demand for water is fast approaching the available supply, the concept of management of the quality of water is becoming as important as its quantity.

Each water use has specific quality need. Therefore, to set the standard for the desire quality of a water body, it is essential to identify the uses of water in that water body. In India, the Central Pollution Control Board (CPCB) has developed a concept of designated best use. According to this, out of the several uses of water of a particular body, the use which demands highest quality is termed its designated best use. Five designated best uses have been identified. This classification helps the water quality managers and planners to set water quality targets and design suitable restoration programs for various water bodies. Water quality analysis report of tube wells is given in **Annexure-IV.**

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# CHAPTER-III

# METHODOLOGY

The following step by step methodology and approach were adopted while carrying out the Water Audit at University premises. Audit team visited on 23/06/2023 for the field measurement and conducting the audit. The broad methodology adopted for the Water Audit at Mahatma Gandhi University of Medical Sciences and Technology premises is furnished below.

- Preliminary discussions with university premises personnel and observations in all water consuming areas.
- Data collection through discussions, past records, specifications.
- Field studies in each of the areas involving: -Measurement of flow parameters, pressure, power wherever possible using portable instruments such as ultrasonic flowmeter, pressure gauge and power analyzer.
- Identification of water conservation options on short, medium & long terms.
- Preparation, discussion and submission of report to the management.

The study focused on improving water use efficiency and identifying water saving opportunities. The analysis included simple payback calculations where investments are required to be made to implement recommendations, to establish their economic viability.

During the audit, there was continuous interaction between the audit team and facility personnel, to ensure that the suggestions made are realistic, practical and implementable to allow for possible concurrent implementation.

The broad methodology adopted for the Water Audit is furnished below.

## 3.1: PRE-AUDIT INFORMATION:

- Preliminary literature review of concepts and methodologies related to water audit for utility, facilities and households.
- Walk through the entire premises, water receiving pump stations, premises to understand the nature of water uses and the systems installed in the premises.
- Discussion with the administrative officers, pump operators, STP staff, housekeeping and kitchen employees on the various water uses during the day and the source of water.

## 3.2: BASE-LINING AND BENCHMARKING:

The water audit for Mahatma Gandhi University of Medical Sciences and Technology included both primary and secondary data collection for various identified water uses. Primary data collection included the following components:

- Development of questionnaire format for individual water use, gardening etc.
- Sample survey of premises office staff to estimate individual water consumption on sanitary and drinking purposes based on questionnaire format.
- Flow rate calculation from the taps flow rates and number of all water using fixtures/ equipment was also undertaken.
- Secondary data collection included compilation of number of staff along with their duration of stay.
- Collecting records of water pumped to the overhead and underground tanks and average running hours of all pumps etc. to estimate actual supply.

## 3.3: CONDUCTING A WATER AUDIT AT THE UNIVERSITY PREMISES LEVEL:

- The data collection and processing for personal water use including drinking, supply to the lunch rooms, office buildings, administrative building, etc. was done on the basis of actual consumption.
- As part of the survey, waste water supply to irrigation and horticulture was also carried out.
- The data for all the above uses was calculated for varying time period for Mahatma Gandhi University of Medical Sciences and Technology to calculate per capita use.

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# CHAPTER- IV

# ASSESSMENT OF PRESENT WATER USAGE

## 4.1. : WATER CONSUMPTION TRENDS

The total water requirement in the University premises is 850 $m^3$/day out of which 129 m3/day (fresh water) is used in student hostels. 38 m3/day for faculty and staff,4 m3/day in nursing college staff,8 m3/day, Physio college staff 1m3/day, medical college staff 64 m3/day. Students of all colleges 83 m3/day, OPD patient 23 m3/day, old University including privet ward 380 $m^3$/day and new University including proposed floors 220 m3/day. Around 786 $m^3$/day water treated from STP from which 100 $m^3$/day again used in flushing in new University building,235 $m^3$ for land scaping and 451 $m^3$ /day used in road cleaning and dust suspension.

Thus, net fresh groundwater requirement for various uses within the premises is 850 i.e.,310250 $m^3$/annum considering 365 days. The source of water to the University premises is Ground Water supplied from eight tube wells. Groundwater after extraction is supplied to various areas through collection tanks. Average water consumption pattern for the year 2022 and 2023 (Up to June) is given in **Table-2 (a), Table -2 (b)** with Bar diagram as **fig-7(a) and 7 (b)**

**Table-2(a): Monthly water Extraction (Jan-2022 to December 2022)**

| Month | Extraction of water in $m^3$ |
|---|---|
| Jan-22 | 18270 |
| Feb-22 | 16175 |
| Mar-22 | 16731 |
| Apr-22 | 17558 |
| May-22 | 15236 |
| Jun-22 | 15902 |
| Jul-22 | 15793 |
| Aug-22 | 16482 |
| Sep-22 | 17139 |
| Oct-22 | 17860 |
| Nov-22 | 17793 |
| Dec-22 | 17937 |
| **Monthly Average** | **16906** |
| **Yearly Total** | **202876** |

Analysis of these data shows that daily average extraction of ground water by the University from Jan 2022 to December 2022 was 556 $m^3$/day only.

**Fig-7(a)**

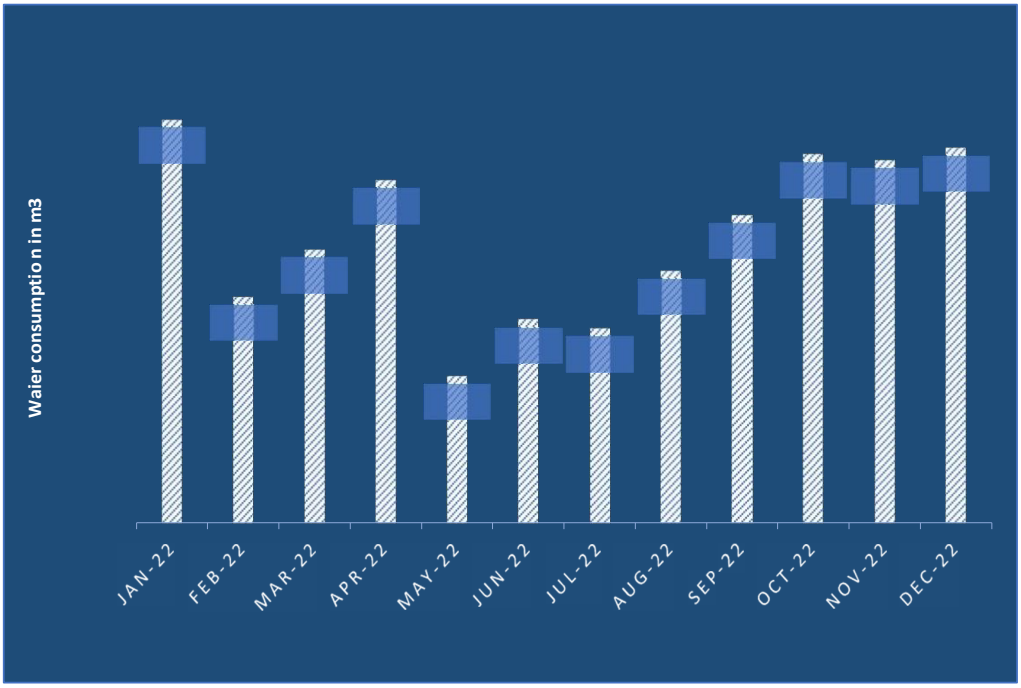
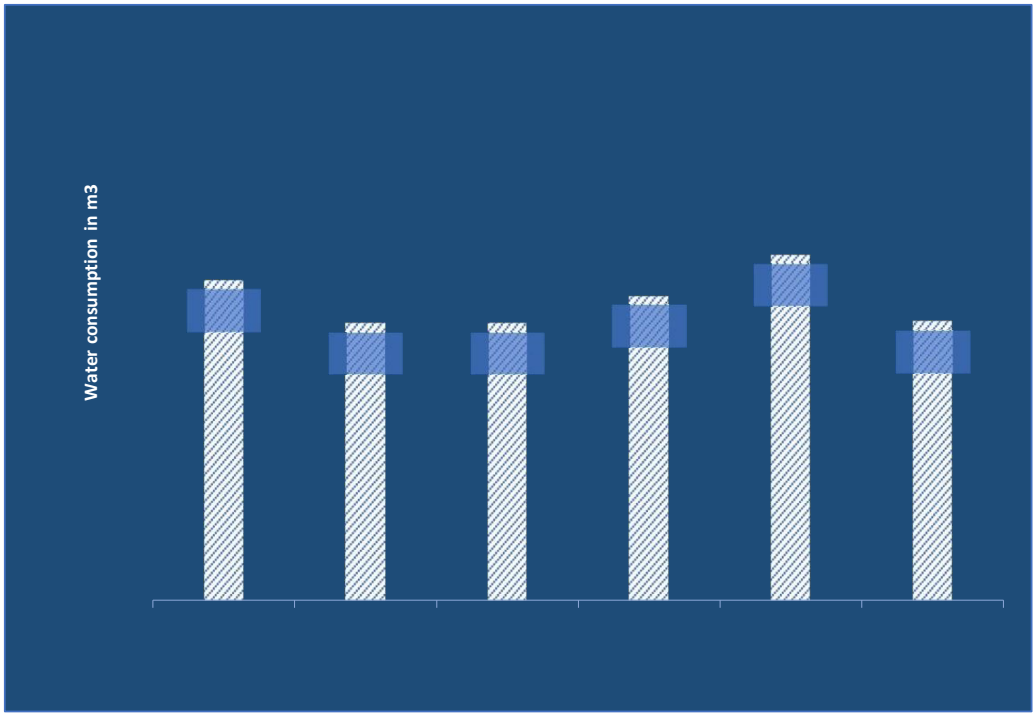



**Table-2(b): Monthly water Extraction (Jan-2023 to Jun2023)**

| Month | Extraction of water in $m^3$ |
|---|---|
| Jan-23 | 17890 |
| Feb-23 | 15499 |
| Mar-23 | 15499 |
| Apr-23 | 17001 |
| May-23 | 19271 |
| Jun-23 | 15572 |
| Total | 100732 |
| Average per day | 553.45 |

Analysis of these data shows that daily average extraction of ground water by the University from Jan 2023 to Jun 2023 was 553.45 $m^3$/day.

**Fig-7(b)**




## 4.2. : WATER SOURCES

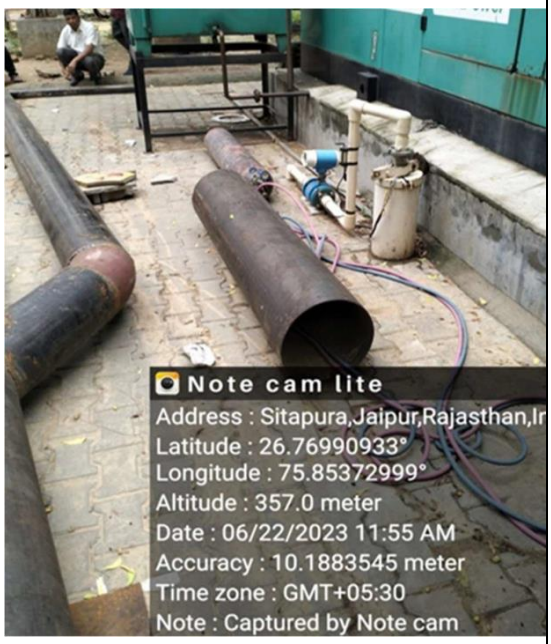
The main source of freshwater for the University premises is 8 borewells. The depth of the Borewells is 150 to 170 m. The TDS of borewell water ranging from 1800 to 2200 mg/lit.The University premises abstracts about 850 $m^3$/day of groundwater. The groundwater from borewell first collected in storage tank then supplied to different areas.

There are 8 no. of borewells are located in the different areas of the University premises. The yield is very from 2 $m^3$/hr to 4.5 $m^3$/hr. All the tube wells having 7.5 HP capacity of pump. The measurements done by audit team using ultrasonic flow meters is provided in annexures. The operation of the borewells is controlled based on the level of the overhead tanks connected to the discharge of borewells. At present, digital meters have been installed at the borewells. The detail of borewells is shown below as **Table No 3.** Photographs of the tube wells as shown in **Fig-8**.

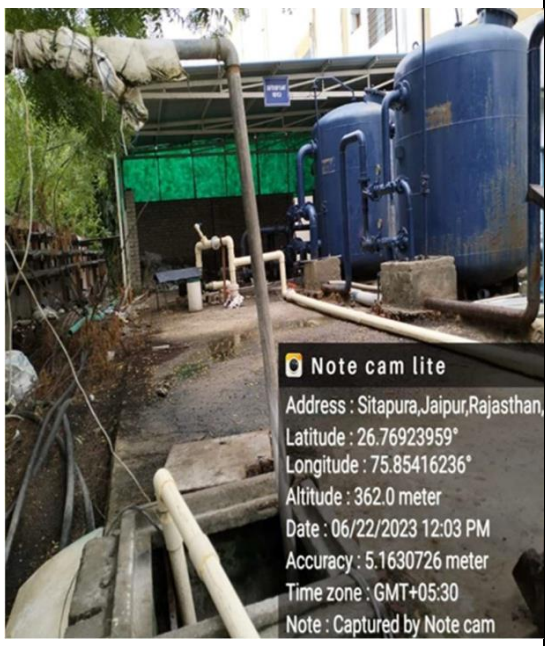
**Table 3: Details of borewell**

| Location | Depth (m) | Type of Pump | Pump Capacity (HP) | Yield |
|---|---|---|---|---|
| Bore well no. 1 | 150 | Submersible | 7.5 | 4.5 |
| Bore well no. 2 | 150 | Submersible | 7.5 | 4.5 |
| Bore well no. 3 | 170 | Submersible | 7.5 | 6 |
| Bore well no. 4 | 170 | Submersible | 7.5 | 2 |
| Bore well no. 5 | 170 | Submersible | 7.5 | 2 |
| Bore well no. 6 | 160 | Submersible | 7.5 | 8 |
| Bore well no. 7 | 170 | Submersible | 7.5 | 2 |
| Bore well no. 8 | 170 | Submersible | 7.5 | 4.5 |

**Fig-7: Geotag photographs of Tube well**




Tw-1




Tw-2


Tw-3


TW-4


Tw-5


Tw-6


Tw-7


Tw-8

## 4.3. : WATER METERING SYSTEM:

There are 8 water meters in the University premises. Some of the meters are digital and some are mechanical. The meter readings are recorded regularly. The details of meters are mentioned in the **Table 4** below.

**Table 4: Location of Identified Water Meters**

| S. No. | Meter Location / Name | Type of meter | Regularly recorded (Yes/No) |
|---|---|---|---|
| 1 | Tubewell-1 | Digital | Yes |
| 2 | Tubewell-2 | Digital | Yes |
| 3 | Tubewell-3 | Digital | Yes |
| 4 | Tubewell-4 | Digital | Yes |
| 5 | Tubewell-5 | Digital | Yes |
| 6 | Tubewell-6 | Digital | Yes |
| 7 | Tubewell-7 | Digital | Yes |
| 8 | Tubewell-8 | Digital | Yes |
| 9 | Inlet of STP-I | Digital | Yes |
| 9 | Out let of STP-I | Digital | Yes |
| 10 | Inlet of STP-II | Digital | Yes |
| 11 | Out let of STP-II | Digital | Yes |

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# CHAPTER-V

# WATER TREATMENT PRACTICES

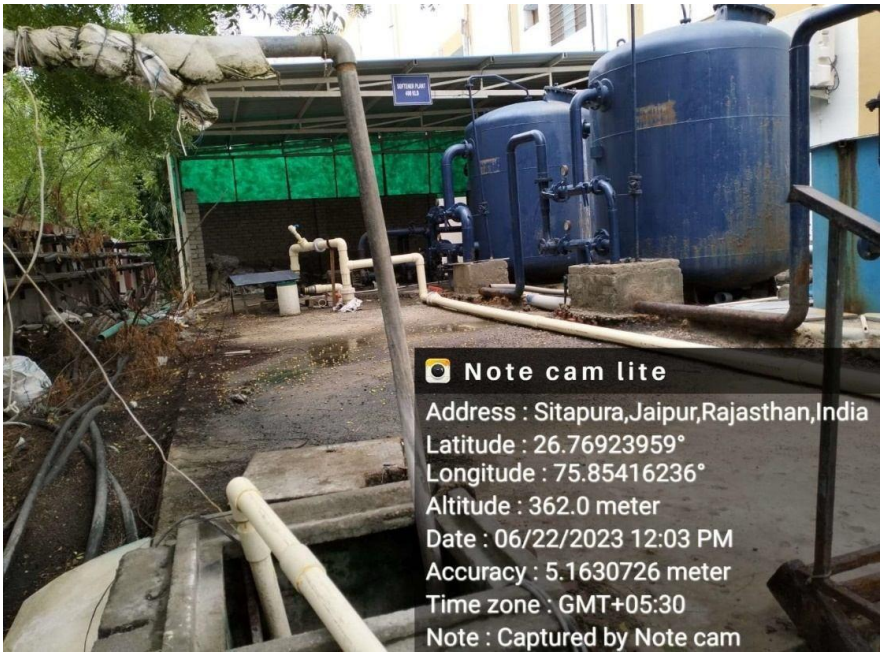
The University has installed the following water and wastewater treatment systems for treating west water:

- RO plant -01 Numbers
- Sewerage treatment plant (STP) 02Number

## 5.1: RO PLANT FOR DRINKING WATER:

The University has installed 03 numbers of RO plant. Two plants having capacity of 01 $m^3$/Hour and another one is having 1.2 $m^3$/hour capacity for drinking water. The reject during regeneration is drained to STP Photographs of the RO System is shown in **Fig- 8**

**Fig-8: Photographs of RO Plant**




## 5.2: WASTE WATER TREATMENT & RECYCLING PRACTICES:

Recycling of process water, reuse of treated wastewater and rainwater harvesting are the important measures of reducing/saving groundwater and conservation on the premises.

Mahatma Gandhi University of Medical Sciences and Technology has two STP. The STP design capacity is of 400 $m^{3/}$day whereas, the average peak load never exceeds beyond 395 $m^3$/ day which is within the available treatment capacity. Processes of sewerage treatment in university premises is as under:

**Screening and Pumping:**

The incoming wastewater passes through screening equipment where objects such as rags, wood fragments, plastics, and grease are removed. The material removed is washed and pressed and disposed of in a landfill. The screened wastewater is then pumped to the next step: grit removal.

**Grit Removal:**

In this step, heavy but fine material such as sand and gravel removed from the wastewater. This material is also disposed of in a landfill.

**Primary Settling:**

The material, which will settle, but at a slower rate than step two, is taken out using large circular tanks called clarifiers. The settled material, called primary sludge, is pumped off the bottom and the wastewater exit the tank from the top.

**Aeration / Activated Sludge:**

In this step, the wastewater receives most of its treatment. Through biological degradation, the pollutants are consumed by microorganisms and transformed into cell tissue, water, and nitrogen.

**Secondary Settling:**

Large circular tanks called secondary clarifiers allow the treated wastewater to separate from the biology from the aeration tanks at this step, yielding an effluent, which is now over 90% treated. The biology (activated sludge) is continuously pumped from the bottom of the clarifiers and returned to the aeration tank.

**Filtration:**

The clarified effluent is polished in this step by filtration media. The material captured on the surface of the disc filters is periodically backwashed and returned to the head of the plant for treatment.

**Disinfection:**

To assure the treated wastewater is virtually free of bacteria, Chlorine disinfection is used after the filtration step.

**Sludge Treatment:**

The sludge which settles down at the bottom of secondary clarifier is partially recirculated to the aeration tank and partially sent to the sludge tank. The re-circulated sludge in the aeration tank acts as food for bacterial and this process is called activated sludge process. capacity of each STP is 400 $m^3$/day where ‘as average waste water uses is around 786 $m^3$/day.

Photograph of STP and flow meter on outlet is given in **Fig-9.**

**Fig-9: STP Plant-1**


**STP-2**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# CHAPTER-VI

# DATA ANALYSIS AND RESULTS

## 6.1: WATER CONSUMPTIVE UNITS AND WASTEWATER MAPPING

### 6.1.1 WATER DEEMAND AND CONSUMPTION PATTERN:

The water consumption pattern shows that out of total fresh water (**850 $m^3$/day**) about 488.14 $m^3$ (57%) is consumed for domestic use and 319 $m^3$ of fresh water i.e., 37.52 % (fresh water) is used in flushing. and green belt development. There is total. 786 $m^3$ of treated water available from which 100 $m^3$ used for flushing in new University building around 235 $m^3$ using for greenbelt and around 450 m3 of treated water used in road cleaning and dust suppression.

The major water utilization areas are mentioned below in **Table-5**.

**Table 5: Water Utilization Scenario at MGUMST**

| Description | Total water Consumption | | | | | | |
|---|---|---|---|---|---|---|---|
| | LPD Domestic | LPD Flushing | Total LPD | Population | Domestic | Flushing | Total |
| Student Housing | 60 | 30 | 90 | 1523 | 91380 | 45690 | 137070 |
| Faculty and Staff Housing | 60 | 30 | 90 | 420 | 25200 | 12600 | 37800 |
| Nursing College staff | 30 | 15 | 45 | 95 | 2850 | 1425 | 4275 |
| Dental college staff | 30 | 15 | 45 | 183 | 5490 | 2745 | 8235 |
| Physio therapy college staff | 30 | 15 | 45 | 27 | 810 | 405 | 1215 |
| Medical college staff | 30 | 15 | 45 | 1407 | 42210 | 21105 | 63315 |
| Student for all colleges | 30 | 15 | 45 | 1840 | 55200 | 27600 | 82800 |
| OPD Patient | 10 | 5 | 15 | 1500 | 15000 | 7500 | 22500 |
| Bed in old University including private ward | 2510 | 200 | 450 | 1000 | 250000 | 200000 | 450000 |
| Beds in new University including proposed floors | 250 | 200 | 450 | 500 | 125000 | 100000 | 225000 |
| Landscape area | | | | 47000 Sqm | | | 235000 |
| Road cleaning and dust suppression | | | | 60734.25 Sqm | | | 450648.135 |
| **Total demand** | | | | **7995** | **488140 lit = 488.14 $m^3$** | **319070 lit = 319 $m^3$** | **1717858 lit = 1717.85 $m^3$** |

### 6.1.2 WASTEWATER GENERATION AND MAPPING:

The total wastewater generation in the University premises is in the tune of 786 $m^3$/day, which is generated from domestic uses.

### 6.1.3 FINDINGS:

- As per water balance flow chart total water requirement in the University premises is 850 $m^3$/day.
- The main source of freshwater for the University premises is 8 borewells. The depth of the Borewells is 150 to 170 m
- Around 786 $m^3$ of water treated by two STP having 400 $m^3$/day capacity each, out of total 786 $m^3$ of treated water 235 $m^3$/day is used in landscaping ,451$m^3$/day in road cleaning and dust suppression.
- Around 100 $m^3$/day for flushing in new University building.
- It is analysed that daily average extraction of ground water by the University from Jan 2022 to December 2022 was 556 m3/day only.
- Average daily fresh water consumption from Jan 2023 to Jun 2023 was 553.45 $m^3$/day.
- University has 08 tube wells, there are 7.5 HP pump in each tube wells.
- Water extraction data analysed and concluded that extraction quantity is below the limit as per NOC. Sometimes water have to purchase from other sources.
- Water pumped by well first collected in tanks and distributed from here for further domestic uses by different lines.
- Digital Water meter is installed on all tube wells readings are recorded properly.
- Effluent water first collected in collection tank at STP and then send for further treatment.

### 6.1.4 RECOMMENDATIONS:

- Water meter should be installed on inlet and outlet of the all-RO systems.
- Few borewells are feeding water to overhead tanks, in this way water flow reached in overhead tank get so slow due to head losses. Water from all the borewells first collected in underground tank then lift up to overhead tank through high efficiency suitable pump with auto on off system to save unnecessary energy consumption.
- There are five rainwater harvesting pit has been seen during the visit in which runoff of roof top area with surface runoff of sounding area is harvested, it should be cleaned and modify with runoff area. It is batter that in these rain water harvesting structures only roof top runoff water should be harvested. For road paved and open area separate structures should be made in low lying area like shallow ponds or tanks.
- Fixing one rubber washer of ID 04 mm at the output of water taps in washrooms and in all existing water taps to reduce water flow. This modification will result in 50% water saving in taps.
- In toilets fresh groundwater is used for flushing and about 15 litres per flush. To reduce the flushing water per flush, it is suggested to install scientifically designed easy to install ‘Tank- Bank’ in the existing flush tanks with 'Dual Flush Cisterns'. This will save about 60% of flush water in toilets.

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# CHAPTER-VII

# WATER CONSERVATION OPPORTUNITIES

## 7.1: WATER SAVINGS IN THE BUILDINGS FOR DOMESTIC USE

### DOMESTIC WATER USES:

The University premises uses about 214 $m^3$/day of fresh water as domestic water. From the total flow, this filtered fresh water is also consumed in canteen and is used directly as for domestic activities like drinking, handwashing, bathing in the University premises. canteen water is used in dish washing with minor consumption in food preparation.

It is observed that the groundwater is a marginal in quality and is used in all area of the University premises for domestic activities and for drinking purpose through RO system.

During the audit, a detailed building survey including hostels was conducted to representatively measure the flow rates of the fixtures, inspection of flushes and analyzing the water use practices of officials. The average flow rates of the taps in various buildings are given in **Table -6**.

**Table 6: Water Flow rate Measurements from representative Taps.**

| Identification | LPM | Remarks |
|---|---|---|
| Water Taps- 980 nos | 6 | High flow |
| Urinal with Flush - 800 nos | 4 | High flow |
| Bathroom taps- 960nos | 6 | High flow |
| Toilets with flush -546 nos | 15 | Extremely high flow |

To optimize water, use in the buildings for domestic purpose, the following observations and suggestions are made based on the water audit:

### OPTIMISE WATER FLOW IN HANDWASHING AND OTHER TAPS:

- Water flow rates in hand washing taps vary around 6 lpm. Fixing one rubber washer of ID 04 mm at the output of water tap in wash basin and in washroom in existing water taps to reduce water flow. This modification will result in 50% water saving in taps

- Flush tank capacities are about 15 litres/flush – Use tank bank in existing flush tanks to reduce 5-6 litres water per flush or install water efficient cistern/flush tank with capacity 3/6 liters per flush.

**RECOMMENDATIONS:**

- It is suggested to install following water efficient fixtures in the buildings to save domestic water consumption. Overall, more than 50% domestic water consumption will be reduced by installing and maintaining suggested fixtures:
- Fixing one rubber washer of ID 04 mm at the output of inlet water tap (below washbasin) in washroom in existing inlet water taps to reduce water flow. This modification will result in 50% water saving in taps
- Retrofit high flowrate handwashing taps with 'aerators and flow restrictors' so as to have 3- 4 lpm flow rate in hand washing taps in the buildings.
- Install 'Tank Bank (For Flush Tanks)' or install with Water efficient flushes with dual
- In toilets fresh groundwater is used for flushing and about 15 litres of freshwater flushed per flush. To reduce the flushing water per flush, it is suggested to install scientifically designed easy to install 'Tank-Bank' in the existing flush tanks. By just placing tank bank in the flush tank, we displace and save water equal to the space occupied by the tank bank for every flush with 'Dual Flush Cisterns'. This will save about 50% of flush water in toilets. The, existing 15 litres tanks should be replaced with 'Dual Flush Cisterns'.

**Total 277740 $m^3$ of water can be saved yearly which is around 9% of total ground water extraction as per water conservation Opportunities and Implementation Plan Table-9.**

**Fig-10**

Tank Bank (For Flush Tanks)



Dual flush Cistern 3-6 litres

**Suggested water efficient fixtures and approximate estimated investment is given in Table-7.**

**Table 7: Suggested Water Efficient Fixtures and Estimated Investment.**

| Water consuming equipment | Scheme/ Options | Cost (Rs/ Piece) | Water Consumption by existing flushes / taps) | Water Consumption by water efficient fixture (litre/flush) | Estimated freshwater saving (%) | Estimated No. of fixture replacements / retrofits | Estimated Expenditure (Rs) |
|---|---|---|---|---|---|---|---|
| Handwashing and other Taps | Fixing one rubber washer of ID 04mm at the inlet of water tap (below washbasin) | 50 | 6 lpm | 3 lpm | 50% | 2740 | 137000 |
| Toilet Flushes | Install 'Dual Flush Cisterns' in place of existing Flush Tanks | 5000 | 15 litre per flush | 7.5 | 50% | 546 | 2730000 |
| **Total investment (Rs)** | | | | | | | **2867000** |

## 7.2 : : RAIN WATER HARVESTING:

The rainwater harvesting structures have already been implemented in the project premises as per CGWA guideline. The locations of existing structures are shown in Figure - 4.

Following catchment areas are considered to recharge groundwater in project premises:

### 7.1.1 Rooftop rainwater harvesting in project premises:

Rooftop area of various is 36880 $m^2$ which would account for total recharge to ground water to the tune of 17968 $m^3$/annum at an average annual rainfall of 609 mm.

36880 x 0.80 x 0.609 = 17968 $m^3$/annum

### 7.1.2 Road storm water harvesting:

The roadside/paved area rainwater harvesting structures would add rainwater to ground water regime of the order of 25891 $m^3$/annum from 60734 $m^2$ area of roads/paved area considering 0.70 m as paved area catchment factor and 0.609 m as annual rainfall.

60734 x 0.70 x 0.609 = 25891 $m^3$/annum

### 7.1.3 : Recharge through unpaved open area:

As 47000 $m^2$ area of unpaved open area. Average rainfall is 0.609 m/annum, the runoff generated is 28623 $m^3$/annum. Recharge through unpaved area is considered as 15%, total addition to ground water from unpaved open area is:

28623 x 0.15 = 4293 $m^3$/annum

**Table - 8: Runoff Available for Recharge.**

| S No | Land use type | Approx. Area ($m^2$) | Co-efficient of runoff | ainfall (m) | Available runoff ($m^3$) |
|---|---|---|---|---|---|
| 1 | Rooftop area | 36880 | 0.80 | 0.609 | 17968 |
| 2 | Road/paved area | 60734 | 0.70 | 0.609 | 25891 |
| 3 | Green/open area | 47000 | 0.15 | 0.609 | 4293 |
| Total | | | | | 48152 |

### 7.1.4 Total recharge potential:

On completion of Rainwater Harvesting, open area storm water harvesting & other recharge factors, recharge potential in & around project premises is as under:

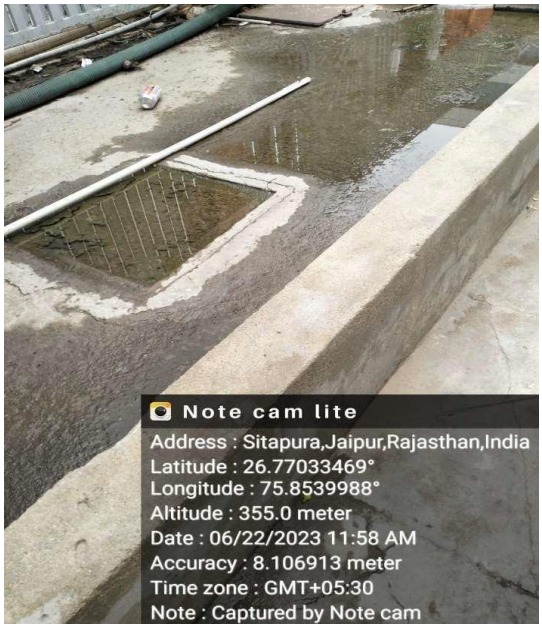
1. Rooftop Rainwater harvesting in the project premises = 17968 $m^3$/annum
2. Road storm water harvesting in the project premises = 25891 $m^3$/annum
3. Recharge due to unpaved area in the project premises = 4293 $m^3$/annum

**Total = 48,152 $m^3$/annum**

Total recharge potential is 48,152 $m^3$/annum as per CGWA norms which would help in improving groundwater regime due to recharge. The locations of existing structures are shown in Figure - 4. The photographs of all the installed rainwater harvesting structures in the project premises are shown as **Fig-11.**

**Fig-11: RWH Structures**

RWH-1




RWH-2


RWH-1


RWH-2

RWH-5


**********

# CHAPTER -VIII

## IMPLEMENTATION PLAN

The summary of, recommendations and implementation plan for water savings is briefed in below **Table-9**

**Table 9: Summary of water conservation Opportunities and Implementation Plan.**

| S. No. | Key Observations | Recommendations | Annual water savings $m^3$ | Estimated Time Frame for Implementation |
|---|---|---|---|---|
| 01 | Inefficient water fixtures(washer of ID 04 mm) at many locations leading to water wastages | Flow restrictors in the existing hand washing and others tapes around 50 % of fresh water will be saved | 9280 $m^3$ (Approx.) . | One year |
| 02 | Flushing System in toilets | Replacement of single flush cisterns with dual flush cisterns. Around 50 % of fresh water will be saved | 23199 $m^3$(Approx) | One year |
| 03 | Total | | 32479 $m^3$(Approx) | |

**Hence total 32479 $m^3$ of water can be saved yearly which is around 10.46% of total ground water extraction.**

**********

**ANNEXURE**-I

## Water Consumption Data provided by University (Jan 2022 to Dec,2022)

| Well | | Monthly consumption (KL) | | | | | | | | | | | | Total annual (KL) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan-22 | Feb-22 | Mar-22 | Apr-22 | May-22 | Jun-22 | Jul-22 | Aug-22 | Sep-22 | Oct-22 | Nov-22 | Dec-22 | |
| TW-1 | Meter start reading | 9432 | 10993 | 12112 | 13465 | 14771 | 16098 | 17405 | 18711 | 20037 | 21366 | 22713 | 23987 | |
| | Meter end reading | 10993 | 12112 | 13465 | 14771 | 16098 | 17405 | 18711 | 20037 | 21366 | 22713 | 23987 | 25280 | |
| | **Consumption (m3)** | **1561** | **1119** | **1353** | **1306** | **1327** | **1307** | **1306** | **1326** | **1329** | **1347** | **1274** | **1293** | **15848** |
| TW-2 | Meter start reading | 4437 | 6461 | 8312 | 10513 | 12440 | 14262 | 15908 | 17552 | 19311 | 21166 | 23187 | 25239 | |
| | Meter end reading | 6461 | 8312 | 10513 | 12440 | 14262 | 15908 | 17552 | 19311 | 21166 | 23187 | 25239 | 27361 | |
| | **Consumption (m3)** | **2024** | **1851** | **2201** | **1927** | **1822** | **1646** | **1644** | **1759** | **1855** | **2021** | **2052** | **2122** | **22924** |
| TW-3 | Meter start reading | 22178 | 28276 | 32969 | 37791 | 43013 | 45521 | 49419 | 54146 | 59245 | 64490 | 70097 | 75508 | |
| | Meter end reading | 28276 | 32969 | 37791 | 43013 | 45521 | 49419 | 54146 | 59245 | 64490 | 70097 | 75508 | 80840 | |
| | **Consumption (m3)** | **6098** | **4693** | **4822** | **5222** | **2508** | **3898** | **4727** | **5099** | **5245** | **5607** | **5411** | **5332** | **58662** |
| TW-4 | Meter start reading | 6464 | 7677 | 8822 | 9844 | 11128 | 12454 | 13709 | 15080 | 16333 | 17556 | 18932 | 20321 | |
| | Meter end reading | 7677 | 8822 | 9844 | 11128 | 12454 | 13709 | 15080 | 16333 | 17556 | 18932 | 20321 | 21468 | |
| | **Consumption (m3)** | **1213** | **1145** | **1022** | **1284** | **1326** | **1255** | **1371** | **1253** | **1223** | **1376** | **1389** | **1147** | **15004** |
| TW-5 | Meter start reading | 6698 | 8413 | 10028 | 11868 | 13651 | 15456 | 17209 | 18710 | 20457 | 22328 | 24054 | 25976 | |
| | Meter end reading | 8413 | 10028 | 11868 | 13651 | 15456 | 17209 | 18710 | 20457 | 22328 | 24054 | 25976 | 27836 | |
| | **Consumption (m3)** | **1715** | **1615** | **1840** | **1783** | **1805** | **1753** | **1501** | **1747** | **1871** | **1726** | **1922** | **1860** | **21138** |
| TW-6 | Meter start reading | 6253 | 9157 | 12061 | 14683 | 17788 | 21177 | 24060 | 26850 | 29664 | 32632 | 35865 | 39149 | |
| | Meter end reading | 9157 | 12061 | 14683 | 17788 | 21177 | 24060 | 26850 | 29664 | 32632 | 35865 | 39149 | 42344 | |
| | **Consumption (m3)** | **2904** | **2904** | **2622** | **3105** | **3389** | **2883** | **2790** | **2814** | **2968** | **3233** | **3284** | **3195** | **36091** |
| TW-7 | Meter start reading | 5257 | 7097 | 8880 | 10495 | 12300 | 14015 | 15768 | 17058 | 18559 | 20209 | 22049 | 23832 | |
| | Meter end reading | 7097 | 8880 | 10495 | 12300 | 14015 | 15768 | 17058 | 18559 | 20209 | 22049 | 23832 | 25447 | |
| | **Consumption (m3)** | **1840** | **1783** | **1615** | **1805** | **1715** | **1753** | **1290** | **1501** | **1650** | **1840** | **1783** | **1615** | **20190** |
| TW-8 | Meter start reading | 3883 | 4798 | 5863 | 7119 | 8245 | 9589 | 10996 | 12160 | 13143 | 14141 | 14851 | 15529 | |
| | Meter end reading | 4798 | 5863 | 7119 | 8245 | 9589 | 10996 | 12160 | 13143 | 14141 | 14851 | 15529 | 16902 | |
| | **Consumption ($m^3$)** | **915** | **1065** | **1256** | **1126** | **1344** | **1407** | **1164** | **983** | **998** | **710** | **678** | **1373** | **13019** |
| | | **18270** | **16175** | **16731** | **17558** | **15236** | **15902** | **15793** | **16482** | **17139** | **17860** | **17793** | **17937** | **202876** |

## Water Consumption Data provided by University (Jan-2023 to June-2023)

| Well | | Monthly consumption (KL) | | | | | | Total annual (KL) |
|---|---|---|---|---|---|---|---|---|
| | | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | |
| TW-1 | Meter start reading | 25280 | 26649 | 27909 | 29262 | 30569 | 31633 | |
| | Meter end reading | 26649 | 27909 | 29262 | 30569 | 31633 | 32866 | |
| | Consumption (m3) | 1369 | 1260 | 1353 | 1307 | 1064 | 1233 | 7586 |
| TW-2 | Meter start reading | 27361 | 29475 | Under maintenance | 29680 | 30265 | 32716 | |
| | Meter end reading | 29475 | 29680 | | 30265 | 32716 | 34527 | |
| | Consumption (m3) | 2114 | 205 | 0 | 585 | 2451 | 1811 | 7166 |
| TW-3 | Meter start reading | 80840 | 86178 | 91042 | 95502 | 100462 | 105167 | |
| | Meter end reading | 86178 | 91042 | 95502 | 100462 | 105167 | 107994 | |
| | Consumption (m3) | 5338 | 4864 | 4460 | 4960 | 4705 | 2827 | 27154 |
| TW-4 | Meter start reading | 184 | 1265 | 2280 | 3340 | 4205 | 5351 | |
| | Meter end reading | 1265 | 2280 | 3340 | 4205 | 5351 | 6468 | |
| | Consumption (m3) | 1081 | 1015 | 1060 | 865 | 1146 | 1117 | 6284 |
| TW-5 | Meter start reading | 163 | 1274 | 2319 | 3540 | 4659 | 5733 | |
| | Meter end reading | 1274 | 2319 | 3540 | 4659 | 5733 | 6646 | |
| | Consumption (m3) | 1111 | 1045 | 1221 | 1119 | 1074 | 913 | 6483 |
| TW-6 | Meter start reading | 691 | 4575 | 8051 | 12519 | 16769 | 20849 | |
| | Meter end reading | 4575 | 8051 | 12519 | 16769 | 20849 | 24956 | |
| | Consumption (m3) | 3884 | 3476 | 4468 | 4250 | 4080 | 4107 | 24265 |
| TW-7 | Meter start reading | 25447 | 27314 | 49 | 2876 | 5948 | 9514 | |
| | Meter end reading | 27314 | 29663 | 2876 | 5948 | 9514 | 12633 | |
| | Consumption (m3) | 1867 | 2349 | 2827 | 3072 | 3566 | 3119 | 16800 |
| TW-8 | Meter start reading | 16902 | 18028 | 19313 | 20230 | 21073 | 33 | |
| | Meter end reading | 18028 | 19313 | 20230 | 21073 | 22258 | 478 | |
| | Consumption (m3) | 1126 | 1285 | 917 | 843 | 1185 | 445 | 5801 |
| **Total** | | **17890** | **15499** | **15499** | **17001** | **19271** | **15572** | **100732** |

**STP Data STP-I**

| S.N. | Month | Total water Treated in $m^3$ | Per day Average in $m^3$ |
|---|---|---|---|
| 1 | Jan 2023 | 6098 | 203 |
| 2 | Feb | 5114 | 170 |
| 3 | March | 7056 | 235 |
| 4 | April | 6096 | 203 |
| 5 | May | 5539 | 184 |
| 6 | Jun | 6025 | 200 |

**STP-II**

| S.N. | Month | Total water Treated in $m^3$ | Per day Average in $m^3$ |
|---|---|---|---|
| 1 | Jan 2023 | 5901 | 196 |
| 2 | Feb | 4859 | 284 |
| 3 | March | 6845 | 210 |
| 4 | April | 5867 | 229 |
| 5 | May | 5329 | 209 |
| 6 | Jun | 5732 | 191 |

**ANNEXURE-II**

## Measured data

| Location | Depth (m) | Type of Pump | Pump Capacity (HP) | Yield |
|---|---|---|---|---|
| Bore well no. 1 | 150 | Submersible | 7.5 | 4.5 |
| Bore well no. 2 | 150 | Submersible | 7.5 | 4.5 |
| Bore well no. 3 | 170 | Submersible | 7.5 | 6 |
| Bore well no. 4 | 170 | Submersible | 7.5 | 2 |
| Bore well no. 5 | 170 | Submersible | 7.5 | 2 |
| Bore well no. 6 | 160 | Submersible | 7.5 | 8 |
| Bore well no. 7 | 170 | Submersible | 7.5 | 2 |
| Bore well no. 8 | 170 | Submersible | 7.5 | 4.5 |

**ANNEXURE-III**

## Piezometer data

### Average monthly water level

### Monthly groundwater level data (2022)

| S. No. | Month | Water level (mbgl) | |
|---|---|---|---|
| | | PZ-I | PZ-2 |
| 1 | January | 33.35 | 28.35 |
| 2 | February | 32.28 | 29.35 |
| 3 | March | 33.46 | 28.28 |
| 4 | April | 33.36 | 29.46 |
| 5 | May | 33.70 | 29.36 |
| 6 | June | 33.90 | 29.71 |
| 7 | July | 32.95 | 28.90 |
| 8 | August | 32.25 | 28.95 |
| 9 | September | 32.50 | 28.25 |
| 10 | October | 32.35 | 28.52 |
| 11 | November | 32.48 | 28.45 |
| 12 | December | 32.52 | 28.8 |

**ANNEXURE**-IV

## Water Quality report

### Bore well near Dental college

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TC-7099

**ENVIRONMENTAL MONITORING REPORT**

**LABORATORY TEST REPORT – WATER**

**REPORT NO.: MAY23/221/07 (ULR- TC709923000012138F)**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23GW01 | 3. | Client Representative: Mr. Mukesh Khandelwal |
| 4. | Sample Date: 22.05.2023 | 5. | Sample Collected By: Mr. Ratan Rai |
| 6. | Analysis commenced on: 07.06.2023 | 9. | Analysis Completed on: 15.06.2023 |
| 8. | Reporting Date: 19.06.2023 | 9. | Discipline: Chemical |
| 10. | Packing Condition & Quantity: Sealed √ | 11. | Group: Water |
| 12. | Sampling Location: Dental College (MGU) | 13. | Product: Ground Water |
| 14. | Sampling Method: IS:3025 (Part 1)-1987 | 15. | Sample Received Date: 07.06.2023 |

**TEST RESULTS**

| S. No. | Parameters | Unit (SI) | | Results | IS 10500 : 2012 Standard Limits for Drinking Water | | Method Used |
|---|---|---|---|---|---|---|---|
| | | | | | Acceptable Limits | Permissible Limits | |
| 1. | pH | | : | 7.52 | 6.5-8.5 | NR | APHA 23rd Edition 4500-H+ B |
| 2. | Temperature | °C | : | 26.5 | NS | NS | APHA 23rd Edition 2550- B |
| 3. | Turbidity | NTU | : | <0.1 | 1 | 5 | APHA 23rd Edition 2130- B |
| 4. | Total Dissolved Solids | mg/L | : | 1968 | 500 | 2000 | PHA 23rd Edition 2540 C |
| 5. | Conductivity | µmhos/cm | : | 3260 | NS | NS | APHA: 23rd Edition 2510 B |
| 6. | COD | mg/L | : | <5 | NS | NS | APHA 23rd Edition 5220 B |
| 7. | BOD | mg/L | : | <2 | NS | NS | IS 3025 (Part 44) : 1993 |
| 8. | Ammonical Nitrogen | mg/L | : | <0.05 | NS | NS | IS 3025 (PP 34): 1988 |
| 9. | Phenolic Compound | mg/L | : | <0.001 | 0.001 | 0.002 | APHA 23rd Edition 5530 D |
| 10. | Chlorides | mg/L | : | 754 | 250 | 1000 | APHA 23rd Edition 4500 Cl- B |
| 11. | Sulphates | mg/L | : | 243 | 200 | 400 | APHA 23rd Edition 4500 $SO^4$ E |
| 12. | SAR | - | : | 8.06 | NS | NS | LAB-SOP-138 |
| 13. | Total Hardness | mg/L | : | 350 | 200 | 600 | APHA 23rd Edition 2340 C |
| 14. | Calcium Hardness | mg/L | : | 198 | NS | NS | APHA 23rd Edition 3500 - Ca B |
| 15. | Magnesium Hardness | mg/L | : | 152 | NS | NS | APHA 23rd Edition 3500 - Mg B |
| 16. | Alkalinity | mg/L | : | 80 | 200 | 600 | APHA 23rd Edition 2320 B |
| 17. | Nitrate | mg/L | : | 7.39 | 45 | NR | IS 3025 (Part 34) (ii): 1988 |
| 18. | Fluoride | mg/L | : | <0.05 | 1 | 1.5 | APHA 23rd Edition 4500 F—D |
| 19. | Sodium | mg/L | : | 348 | NS | NS | APHA 23rd Edition 3500 - Na B |
| 20. | Potassium | mg/L | : | 32 | NS | NS | APHA 23rd Edition 3500 - K B |
| 21. | Calcium | mg/L | : | 79.36 | 75 | 200 | APHA 23rd Edition 3500 - Ca B |
| 22. | Magnesium | mg/L | : | 36.94 | 30 | 100 | APHA 23rd Edition 3500 - Mg B |
| 23. | Total Phosphorous | mg/L | : | <0.02 | NS | NS | APHA 23rd Edition 4500 P – C |
| 24. | DO | mg/L | : | 3.1 | NS | NS | APHA 23rd Edition 4500 - O C |
| 25. | **Heavy Metals** | | | | | | |
| a. | Arsenic | mg/L | : | <0.01 | 0.01 | 0.05 | APHA 23rd Edition 3500 As - B |
| b. | Cadmium | mg/L | : | <0.003 | 0.003 | NR | APHA 23rd Edition 3111 B |
| c. | Chromium | mg/L | : | <0.02 | 0.05 | NR | APHA 23rd Edition 3500 Cr - B |
| d. | Copper | mg/L | : | <0.03 | 0.05 | 1.5 | APHA 23rd Edition 3111 B |
| e. | Iron | mg/L | : | <0.05 | 0.3 | NR | APHA 23rd Edition 3111 B |
| f. | Lead | mg/L | : | <0.01 | 0.01 | NR | APHA 23rd Edition 3111 B |
| g. | Mercury | mg/L | : | <0.001 | 0.001 | NR | APHA 23rd Edition 3112-B |
| h. | Manganese | mg/L | : | <0.02 | 0.1 | 0.3 | APHA 23rd Edition 3111 B |
| i. | Nickel | mg/L | : | <0.02 | 0.02 | NR | APHA 23rd Edition 3111 B |
| j. | Zinc | mg/L | : | <0.03 | 5 | 15 | APHA 23rd Edition 3111 B |

**Remark :**

**Authorised By -**

**Name : Sapana Amin** **Designation: Lab Incharge**

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2) Re analysis of sample will be done, if requested within 15 days from the date of Reporting of sample if the samples are not consumed during analysis.
3) The results reported above relate to the sample identified under Sample Details.

----------**END OF REPORT**----------

| TEST REPORT FORMAT - WATER | | |
|---|---|---|
| DOC. NO.: LAB-FMT-055 | Issue No.: 02 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01-01-2015 | Revision Date: 01.03.2021 |

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**ENVIRONMENTAL MONITORING REPORT**

## LABORATORY TEST REPORT – WATER

**REPORT NO.: MAY23/221/09**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23GW01 | 3. | Client Representative: Mr. Mukesh Khandelwal |
| 4. | Sample Date: 22.05.2023 | 5. | Sample Collected By: Mr. Ratan Rai |
| 6. | Analysis commenced on: 07.06.2023 | 9. | Analysis Completed on: 15.06.2023 |
| 8. | Reporting Date: 19.06.2023 | 9. | Discipline: Chemical |
| 10. | Packing Condition & Quantity: Sealed √ | 11. | Group : Water |
| 12. | Sampling Location: Dental College (MGU) | 13. | Product: Ground Water |
| 14. | Sampling Method: IS:3025 (Part 1)-1987 | 15. | Sample Received Date: 07.06.2023 |

**TEST RESULTS**

| S. No. | Parameters | Unit (SI) | | Results | IS 10500 : 2012 Standard Limits for Drinking Water | | Method Used |
|---|---|---|---|---|---|---|---|
| | | | | | Acceptable Limits | Permissible Limits | |
| 1. | Salinity | mg/L | : | 1359.39 | NS | NS | APHA 23rd Edition 4500 Cl- B |
| 2. | Total Nitrogen | mg/L | : | 1.75 | 0.5 | NR | IS 3025 (PP34) |
| 3. | **Heavy Metals** | | | | | | |
| a. | Cyanide | mg/L | : | <0.03 | 0.05 | NR | APHA: 23rd Edition 4500 CN E |

**Remark :**

**Authorised By -**

**Name : Sapana Amin** **Designation: Lab Incharge**

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2) Re analysis of sample will be done, if requested within 15 days from the date of Reporting of sample if the samples are not consumed during analysis.
3) The results reported above relate to the sample identified under Sample Details.

----------END OF REPORT----------

| TEST REPORT FORMAT - WATER | | |
|---|---|---|
| DOC. NO.: LAB-FMT-055 | Issue No.: 02 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01-01-2015 | Revision Date: 01.03.2021 |

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TC-7099

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**ENVIRONMENTAL MONITORING REPORT**

### LABORATORY TEST REPORT - MICROBIOLOGY

**REPORT NO.: MAY23/221/21(ULR- TC709923000012146F)**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23GW01 | 8. | Client Representative: Mr. Mukesh Khandelwal |
| 3. | Sample Date: 07.06.2023 | 9. | Sample Collected By: Mr. Ratank Rai |
| 4. | Packing Condition & Quantity: Sealed √ | 10. | Discipline: Biological |
| 5. | Analysis commenced on: 12.06.2023 | 11. | Group: Water |
| 6. | Analysis Completed on: 15.06.2023 | 12. | Product: Ground Water |
| 7. | Reporting Date: 19.06.2023 | 13. | Sampling Method: IS 1622 |
| 14. | Sampling Location: Dental College (MGU) | 15. | Sample Received Date: 12.06.2023 |

**TEST RESULTS**

| S. No. | Parameters | Results | Unit (SI) | Specification/ SPCB Norms/ BIS Standards | Method Used |
|---|---|---|---|---|---|
| 1. | Total Coliform Bacteria | N.D.(<1.8) | MPN/100ml | Shall not be detectable in any 100ml Sample | APHA 23rd Edition (9221 B, C) |
| 2. | Fecal Coliform Bacteria | N.D.(<1.8) | MPN/ 100ml | N.A | APHA 23rd Edition(9221 C, E) |

**Remarks: N.D. – Not Detected.**

**Authorized by:** PRKOMTC

**Name: Priyanka Kotak** **Designation: Microbiologist**

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2) Re-sampling may be done,if required,with written approval of the laboratory.
3) The results reported above relate to the sample identified under Sample Details.

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| TEST REPORT FORMAT- MICROBIOLOGY | | |
|---|---|---|
| DOC. NO.: LAB-FMT-203 | Issue No.: 01 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01.04.2019 | Revision Date: 01.03.2021 |

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## Bore well near DG Room

TC-7099

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**ENVIRONMENTAL MONITORING REPORT**

### LABORATORY TEST REPORT – WATER

**REPORT NO.: MAY23/221/08 (ULR- TC709923000012139F)**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23GW02 | 3. | Client Representative: Mr. Mukesh Khandelwal |
| 4. | Sample Date: 22.05.2023 | 5. | Sample Collected By: Mr. Ratan Rai |
| 6. | Analysis commenced on: 07.06.2023 | 9. | Analysis Completed on: 15.06.2023 |
| 8. | Reporting Date: 19.06.2023 | 9. | Discipline: Chemical |
| 10. | Packing Condition & Quantity: Sealed √ | 11. | Group: Water |
| 12. | Sampling Location: DG Room (MGU) | 13. | Product: Ground Water |
| 14. | Sampling Method: IS:3025 (Part 1)-1987 | 15. | Sample Received Date: 07.06.2023 |

**TEST RESULTS**

| S. No. | Parameters | Unit (SI) | Results | IS 10500 : 2012 Standard Limits for Drinking Water | | Method Used |
|---|---|---|---|---|---|---|
| | | | | Acceptable Limits | Permissible Limits | |
| 1. | pH | | 7.26 | 6.5-8.5 | NR | APHA 23rd Edition 4500-H+ B |
| 2. | Temperature | °C | 26.4 | NS | NS | APHA 23rd Edition 2550- B |
| 3. | Turbidity | NTU | <0.1 | 1 | 5 | APHA 23rd Edition 2130- B |
| 4. | Total Dissolved Solids | mg/L | 1872 | 500 | 2000 | PHA 23rd Edition 2540 C |
| 5. | Conductivity | µmhos/cm | 3100 | NS | NS | APHA: 23rd Edition 2510 B |
| 6. | COD | mg/L | <5 | NS | NS | APHA 23rd Edition 5220 B |
| 7. | BOD | mg/L | <2 | NS | NS | IS 3025 (Part 44) : 1993 |
| 8. | Ammonical Nitrogen | mg/L | <0.05 | NS | NS | IS 3025 (PP 34): 1988 |
| 9. | Phenolic Compound | mg/L | <0.001 | 0.001 | 0.002 | APHA 23rd Edition 5530 D |
| 10. | Chlorides | mg/L | 745 | 250 | 1000 | APHA 23rd Edition 4500 Cl- B |
| 11. | Sulphates | mg/L | 173 | 200 | 400 | APHA 23rd Edition 4500 $SO^4$ E |
| 12. | SAR | - | 6.60 | NS | NS | LAB-SOP-138 |
| 13. | Total Hardness | mg/L | 390 | 200 | 600 | APHA 23rd Edition 2340 C |
| 14. | Calcium Hardness | mg/L | 178 | NS | NS | APHA 23rd Edition 3500 - Ca B |
| 15. | Magnesium Hardness | mg/L | 212 | NS | NS | APHA 23rd Edition 3500 - Mg B |
| 16. | Alkalinity | mg/L | 150 | 200 | 600 | APHA 23rd Edition 2320 B |
| 17. | Nitrate | mg/L | 8.34 | 45 | NR | IS 3025 (Part 34) (ii): 1988 |
| 18. | Fluoride | mg/L | <0.05 | 1 | 1.5 | APHA 23rd Edition 4500 F—D |
| 19. | Sodium | mg/L | 301 | NS | NS | APHA 23rd Edition 3500 - Na B |
| 20. | Potassium | mg/L | 29 | NS | NS | APHA 23rd Edition 3500 - K B |
| 21. | Calcium | mg/L | 71.34 | 75 | 200 | APHA 23rd Edition 3500 - Ca B |
| 22. | Magnesium | mg/L | 51.52 | 30 | 100 | APHA 23rd Edition 3500 - Mg B |
| 23. | Total Phosphorous | mg/L | <0.02 | NS | NS | APHA 23rd Edition 4500 P – C |
| 24. | DO | mg/L | 2.8 | NS | NS | APHA 23rd Edition 4500 - O C |
| 25. | **Heavy Metals** | | | | | |
| a. | Arsenic | mg/L | <0.01 | 0.01 | 0.05 | APHA 23rd Edition 3500 As - B |
| b. | Cadmium | mg/L | <0.003 | 0.003 | NR | APHA 23rd Edition 3111 B |
| c. | Chromium | mg/L | <0.02 | 0.05 | NR | APHA 23rd Edition 3500 Cr - B |
| d. | Copper | mg/L | <0.03 | 0.05 | 1.5 | APHA 23rd Edition 3111 B |
| e. | Iron | mg/L | <0.05 | 0.3 | NR | APHA 23rd Edition 3111 B |
| f. | Lead | mg/L | <0.01 | 0.01 | NR | APHA 23rd Edition 3111 B |
| g. | Mercury | mg/L | <0.001 | 0.001 | NR | APHA 23rd Edition 3112-B |
| h. | Manganese | mg/L | <0.02 | 0.1 | 0.3 | APHA 23rd Edition 3111 B |
| i. | Nickel | mg/L | <0.02 | 0.02 | NR | APHA 23rd Edition 3111 B |
| j. | Zinc | mg/L | <0.03 | 5 | 15 | APHA 23rd Edition 3111 B |

**Remark :**

**Authorised By -**

**Name : Sapana Amin** **Designation: Lab Incharge**

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3) The results reported above relate to the sample identified under Sample Details.

----------END OF REPORT----------

| TEST REPORT FORMAT - WATER | | |
|---|---|---|
| DOC. NO.: LAB-FMT-055 | Issue No.: 02 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01-01-2015 | Revision Date: 01.03.2021 |

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**ENVIRONMENTAL MONITORING REPORT**

## LABORATORY TEST REPORT – WATER

**REPORT NO.: MAY23/221/10**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23GW02 | 3. | Client Representative: Mr. Mukesh Khandelwal |
| 4. | Sample Date: 22.05.2023 | 5. | Sample Collected By: Mr. Ratan Rai |
| 6. | Analysis commenced on: 07.06.2023 | 9. | Analysis Completed on: 15.06.2023 |
| 8. | Reporting Date: 19.06.2023 | 9. | Discipline: Chemical |
| 10. | Packing Condition & Quantity: Sealed √ | 11. | Group : Water |
| 12. | Sampling Location: DG Room (MGU) | 13. | Product: Ground Water |
| 14. | Sampling Method: IS:3025 (Part 1)-1987 | 15. | Sample Received Date: 07.06.2023 |

**TEST RESULTS**

| S. No. | Parameters | Unit (SI) | | Results | IS 10500 : 2012 Standard Limits for Drinking Water | | Method Used |
|---|---|---|---|---|---|---|---|
| | | | | | Acceptable Limits | Permissible Limits | |
| 1. | Salinity | mg/L | : | 1342.39 | NS | NS | APHA 23rd Edition 4500 Cl- B |
| 2. | Total Nitrogen | mg/L | : | 1.96 | 0.5 | NR | IS 3025 (PP34) |
| 3. | **Heavy Metals** | | | | | | |
| a. | Cyanide | mg/L | : | <0.03 | 0.05 | NR | APHA: 23rd Edition 4500 CN E |

**Remark :**

**Authorised By :**

**Name : Sapana Amin** **Designation: Lab Incharge**

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3) The results reported above relate to the sample identified under Sample Details.

----------END OF REPORT----------

| TEST REPORT FORMAT - WATER | | |
|---|---|---|
| DOC. NO.: LAB-FMT-055 | Issue No.: 02 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01-01-2015 | Revision Date: 01.03.2021 |

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**ENVIRONMENTAL MONITORING REPORT**

### LABORATORY TEST REPORT - MICROBIOLOGY

**REPORT NO.: MAY23/221/22(ULR- TC709923000012146F)**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23GW02 | 8. | Client Representative: Mr. Mukesh Khandelwal |
| 3. | Sample Date: 07.06.2023 | 9. | Sample Collected By: Mr. Ratank Rai |
| 4. | Packing Condition & Quantity: Sealed √ | 10. | Discipline: Biological |
| 5. | Analysis commenced on: 12.06.2023 | 11. | Group: Water |
| 6. | Analysis Completed on: 15.06.2023 | 12. | Product: Ground Water |
| 7. | Reporting Date: 19.06.2023 | 13. | Sampling Method: IS 1622 |
| 14. | Sampling Location: DG Room (MGU) | 15. | Sample Received Date: 12.06.2023 |

**TEST RESULTS**

| S. No. | Parameters | Results | Unit (SI) | Specification/ SPCB Norms/ BIS Standards | Method Used |
|---|---|---|---|---|---|
| 1. | Total Coliform Bacteria | N.D.(<1.8) | MPN/100ml | Shall not be detectable in any 100ml Sample | APHA 23rd Edition (9221 B, C) |
| 2. | Fecal Coliform Bacteria | N.D.(<1.8) | MPN/ 100ml | N.A | APHA 23rd Edition(9221 C, E) |

**Remarks: N.D. – Not Detected.**

**Authorized by:**

**Name: Priyanka Kotak** **Designation: Microbiologist**

**NOTE:**
1) Reports may be reproduced, if required, but only in full and only with written approval of the laboratory.
2) Re-sampling may be done, if required, with written approval of the laboratory.
3) The results reported above relate to the sample identified under Sample Details.

----------**END OF REPORT**----------

| TEST REPORT FORMAT- MICROBIOLOGY | | |
|---|---|---|
| DOC. NO.: LAB-FMT-203 | Issue No.: 01 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01.04.2019 | Revision Date: 01.03.2021 |

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TC-7669

**ENVIRONMENTAL MONITORING REPORT**

## LABORATORY TEST REPORT - EFFLUENT

**REPORT NO.: MAY23/221/03 (ULR- TC709923000012135F)**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23EF01 | 3. | Client Representative: Mr. Mukesh Khandelwal |
| 4. | Sample Date: 22.05.2023 | 5. | Sample Collected By: Mr. Ratan Rai |
| 6. | Analysis commenced on: 07.06.2023 | 7. | Analysis Completed on: 15.06.2023 |
| 8. | Reporting Date: 19.06.2023 | 9. | Discipline: Chemical |
| 10. | Packing Condition & Quantity: Sealed √ | 11. | Group: Pollution and Environment |
| 12. | Sampling Location: STP Inlet 400 KLD | 13. | Product: Waste Water |
| 14. | Sampling Method: IS : 3025 (Part 1) - 1987 | 15. | Sample Received Date: 07.06.2023 |

**TEST RESULTS**

| S.No. | Parameters | Unit (SI) | Results | Specification/ SPCB Norms/ BIS Standards | Method Used |
|---|---|---|---|---|---|
| 1. | pH | | 7.36 | N.A. | APHA: 23rd Edition 4500-H+ B |
| 2. | BOD | mg/L | 29 | N.A. | IS 3025 (Part 44) : 1993 |
| 3. | COD | mg/L | 96 | N.A. | APHA 23rd Edition 5220 B |
| 4. | Suspended Solids | mg/L | 28 | N.A. | APHA 23rd Edition 2540 D |
| 5. | Residual Chlorine | mg/L | <0.1 | N.A. | IS 3025 (Part – 26): 1986 |

**Remark :**

**Authorised By -**

**Name : Sapana Amin** **Designation: Lab Incharge**

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3) The results reported above relate to the sample identified under Sample Details.

----------**END OF REPORT**----------

| TEST REPORT FORMAT - EFFLUENT | | |
|---|---|---|
| DOC. NO.: LAB-FMT-050 | Issue No.: 02 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01-01-2015 | Revision Date: 01.03.2021 |

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**ENVIRONMENTAL MONITORING REPORT**

## LABORATORY TEST REPORT - EFFLUENT

**REPORT NO.: MAY23/221/04 (ULR- TC709923000012136F)**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23EF02 | 3. | Client Representative: Mr. Mukesh Khandelwal |
| 4. | Sample Date: 22.05.2023 | 5. | Sample Collected By: Mr. Ratan Rai |
| 6. | Analysis commenced on: 07.06.2023 | 7. | Analysis Completed on: 15.06.2023 |
| 8. | Reporting Date: 19.06.2023 | 9. | Discipline: Chemical |
| 10. | Packing Condition & Quantity: Sealed √ | 11. | Group: Pollution and Environment |
| 12. | Sampling Location: STP Outlet 400 KLD | 13. | Product: Waste Water |
| 14. | Sampling Method: IS : 3025 (Part 1) - 1987 | 15. | Sample Received Date: 07.06.2023 |

**TEST RESULTS**

| S.No. | Parameters | Unit (SI) | | Results | Specification/ SPCB Norms/ BIS Standards | Method Used |
|---|---|---|---|---|---|---|
| 1. | pH | | : | 7.45 | N.A. | APHA: 23rd Edition 4500-H+ B |
| 2. | BOD | mg/L | : | 16 | N.A. | IS 3025 (Part 44) : 1993 |
| 3. | COD | mg/L | : | 54 | N.A. | APHA 23rd Edition 5220 B |
| 4. | Suspended Solids | mg/L | : | 17 | N.A. | APHA 23rd Edition 2540 D |
| 5. | Residual Chlorine | mg/L | : | 1.77 | N.A. | IS 3025 (Part – 26): 1986 |

**Remark :**

**Authorised By -**

**Name : Sapana Amin** **Designation: Lab Incharge**

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----------**END OF REPORT**----------

| TEST REPORT FORMAT - EFFLUENT | | |
|---|---|---|
| DOC. NO.: LAB-FMT-050 | Issue No.: 02 | Revision No.: 04 |
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**ENVIRONMENTAL MONITORING REPORT**

## LABORATORY TEST REPORT - EFFLUENT

**REPORT NO.: MAY23/221/05 (ULR- TC709923000012137F)**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23EF03 | 3. | Client Representative: Mr. Mukesh Khandelwal |
| 4. | Sample Date: 22.05.2023 | 5. | Sample Collected By: Mr. Ratan Rai |
| 6. | Analysis commenced on: 07.06.2023 | 7. | Analysis Completed on: 15.06.2023 |
| 8. | Reporting Date: 19.06.2023 | 9. | Discipline: Chemical |
| 10. | Packing Condition & Quantity: Sealed √ | 11. | Group: Pollution and Environment |
| 12. | Sampling Location: STP Inlet 200 KLD | 13. | Product: Waste Water |
| 14. | Sampling Method: IS : 3025 (Part 1) - 1987 | 15. | Sample Received Date: 07.06.2023 |

**TEST RESULTS**

| S.No. | Parameters | Unit (SI) | | Results | Specification/ SPCB Norms/ BIS Standards | Method Used |
|---|---|---|---|---|---|---|
| 1. | pH | | : | 7.63 | N.A. | APHA: 23rd Edition 4500-H+ B |
| 2. | BOD | mg/L | : | 150 | N.A. | IS 3025 (Part 44) : 1993 |
| 3. | COD | mg/L | : | 496 | N.A. | APHA 23rd Edition 5220 B |
| 4. | Suspended Solids | mg/L | : | 21 | N.A. | APHA 23rd Edition 2540 D |
| 5. | Residual Chlorine | mg/L | : | <0.1 | N.A. | IS 3025 (Part – 26): 1986 |

**Remark :**

**Authorised By -**

**Name : Sapana Amin** **Designation: Lab Incharge**

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----------END OF REPORT----------

| TEST REPORT FORMAT - EFFLUENT | | |
|---|---|---|
| DOC. NO.: LAB-FMT-050 | Issue No.: 02 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01-01-2015 | Revision Date: 01.03.2021 |

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**ENVIRONMENTAL MONITORING REPORT**

## LABORATORY TEST REPORT - EFFLUENT

**REPORT NO.: MAY23/221/06 (ULR- TC709923000000275F)**

**SAMPLE DETAILS**

| | | | |
|---|---|---|---|
| 1. | Name & Address of Client: Mahatma Gandhi University of Medical Science & Technology RIICO Institutional Area, Sitapura, Tonk Road, Jaipur 302022, Rajasthan. | | |
| 2. | Sample ID: 2150828115 – 221MY23EF04 | 3. | Client Representative: Mr. Mukesh Khandelwal |
| 4. | Sample Date: 22.05.2023 | 5. | Sample Collected By: Mr. Ratan Rai |
| 6. | Analysis commenced on: 07.06.2023 | 7. | Analysis Completed on: 15.06.2023 |
| 8. | Reporting Date: 19.06.2023 | 9. | Discipline: Chemical |
| 10. | Packing Condition & Quantity: Sealed √ | 11. | Group: Pollution and Environment |
| 12. | Sampling Location: STP Outlet 200 KLD | 13. | Product: Waste Water |
| 14. | Sampling Method: IS : 3025 (Part 1) - 1987 | 15. | Sample Received Date: 07.06.2023 |

**TEST RESULTS**

| S.No. | Parameters | Unit (SI) | | Results | Specification/ SPCB Norms/ BIS Standards | Method Used |
|---|---|---|---|---|---|---|
| 1. | pH | | : | 7.89 | N.A. | APHA: 23rd Edition 4500-H+ B |
| 2. | BOD | mg/L | : | 144 | N.A. | IS 3025 (Part 44) : 1993 |
| 3. | COD | mg/L | : | 438 | N.A. | APHA 23rd Edition 5220 B |
| 4. | Suspended Solids | mg/L | : | 15 | N.A. | APHA 23rd Edition 2540 D |
| 5. | Residual Chlorine | mg/L | : | 1.15 | N.A. | IS 3025 (Part – 26): 1986 |

**Remark :**

**Authorised By -**

**Name : Sapana Amin** **Designation: Lab Incharge**

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----------**END OF REPORT**----------

| TEST REPORT FORMAT - EFFLUENT | | |
|---|---|---|
| DOC. NO.: LAB-FMT-050 | Issue No.: 02 | Revision No.: 04 |
| Effective Date:. 01.03.2021 | Issue Date: 01-01-2015 | Revision Date: 01.03.2021 |

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