# NATIONAL INSTITUTE OF TECHNOLOGY AGARTALA

**DEPARTMENT OF CIVIL ENGINEERING**

A REPORT ON

INDUSTRIAL VISIT TO

## 8.5 MLD CAPACITY GROUND WATER TREATMENT PLANT PANCHAMUKH UNDER AMRUT PROJECT

Under Tripura Jal Board

GOVERNMENT OF TRIPURA


Under the supervision of :-

Mr. Raghvan Engineer

(Incharge of Plant)

Submitted By :-

Md Taarique Anwar

# Declaration

I hereby declare that the Industrial Visit to “Panchamukh Water Treatment Plant is an authentic record of work carried out at Panchamukh Water Treatment Plant. Civil Engineering students of NIT AGARTALA visited the Panchamukh Water Treatment Plant under the guidance of Mr Rghvan Engineer, Assistant Engineer, Incharge of Plant and also respected faculties Dr. Rajib Saha, HOD & Professor, Dr. Animesh Debnath, Assistant Professor, Dr. Manu S Nadesan, Assistant Professor, Dr. Tilottama Chakraborty, Assistant Professor, Nabina Khanam, Assistant Professor, Mrs. Sadaria Begam, Assistant Professor of Civil Engineering Department of NIT Agartala.

Date: 23/03/2024

Under the supervision of :-

Mr. Raghvan Engineer

(Incharge of Plant)

Submitted By :-

Md Taarique Anwar

# ACKNOWLEDGEMENT

We extend our deepest appreciation to all those who played a pivotal role in making our industrial visit to the Groundwater Treatment Plant a rewarding and enlightening experience.

First and foremost, our sincere gratitude goes to the management and staff of the Groundwater Treatment Plant for their warm reception, informative guidance, and willingness to share their expertise with us. Their dedication to ensuring the provision of safe and clean drinking water is truly commendable.

A special word of appreciation goes to our esteemed faculty members, whose encouragement, guidance, and mentorship have been invaluable throughout the planning and execution of the visit. Their passion for imparting knowledge has inspired us to delve deeper into the field of civil engineering.

Furthermore, we are grateful to our fellow students whose active participation and insightful contributions enriched our collective learning experience. Their enthusiasm and camaraderie made the visit even more enjoyable and meaningful.

Thank you all for your generosity, cooperation, and hospitality. Your efforts have left an indelible mark on us, reinforcing the importance of collaborative learning and community engagement.

**Submitted By:-**

Md Taarique Anwar

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# 1. Introduction of the Plant

Water treatment plants constitute a critical infrastructure element, safeguarding public health by transforming raw water into safe and potable drinking water. These facilities employ sophisticated processes to remove impurities, harmful microorganisms, and contaminants, mitigating waterborne diseases and promoting well-being. This report delves into the water treatment system in Agartala, India, focusing on Panchamukh Water Treatment Plant and its vital role in ensuring the city's water security.

# 2. Location and Backgrounds

Situated in **Agartala**, **Panchamukh Water Treatment Plant** was established in to cater to Agartala's growing water needs. With a treatment capacity of **4** MGD, it draws its raw water primarily from **groundwater**. This vital facility plays a crucial role in serving a significant portion of the city's population, underlining its importance for public health and sustainable development.


## 3. Water Treatment Process

Panchamukh Water Treatment Plant utilizes a multi-stage treatment process adhering to stringent quality standards. This comprehensive approach ensures the delivered water meets all safety and quality parameters.

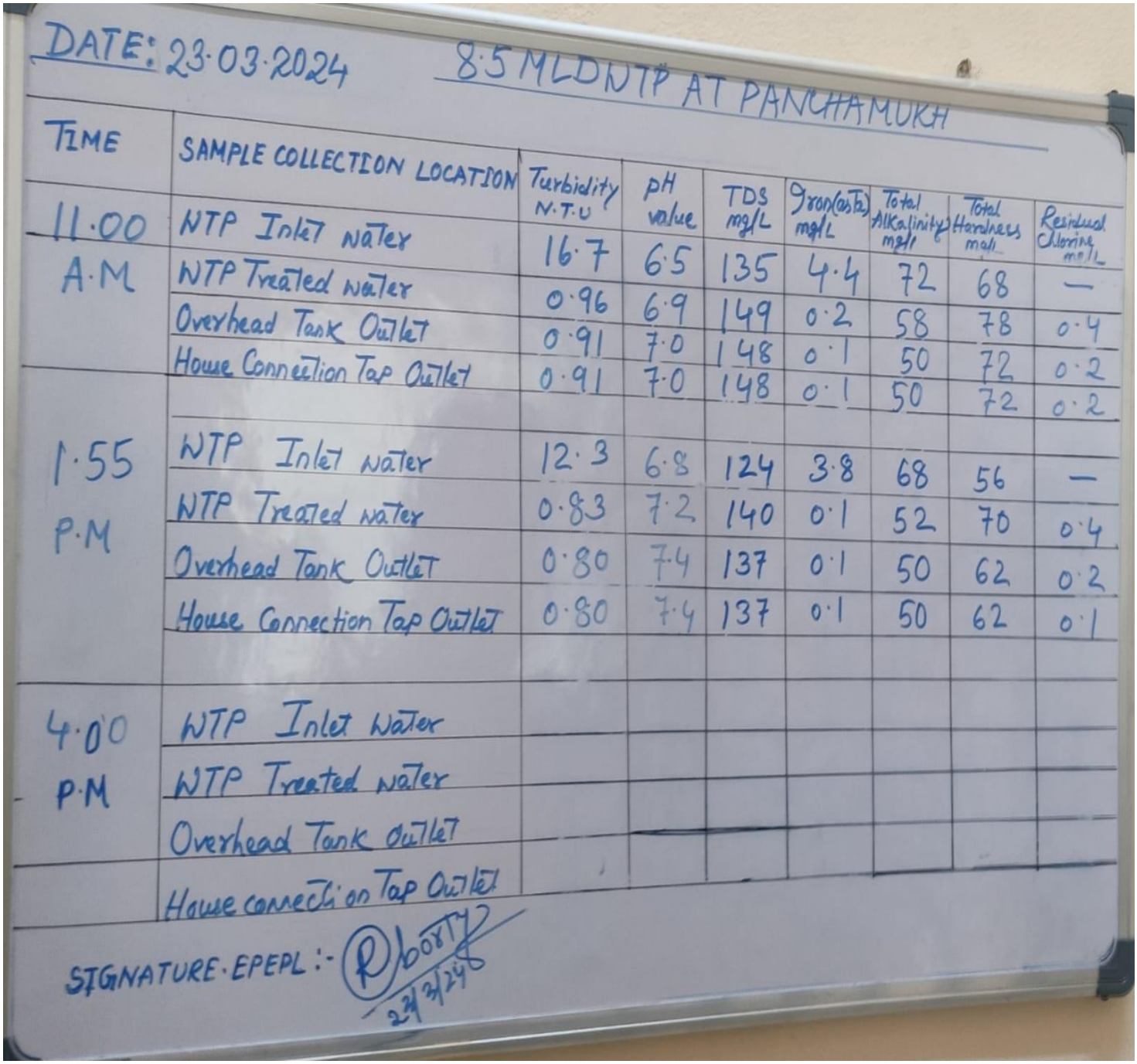
**Coagulation:** Chemicals like alum are meticulously introduced to induce the formation of flocs, facilitating the clumping together of suspended particles in the raw water. These larger flocs are

**Sedimentation:** The water containing the newly formed flocs is then directed into large settling tanks. Due to gravity, the heavier flocs settle at the bottom, separating them from the treated water above. This process removes a significant portion of suspended particles and impurities.

**Filtration:** The clarified water, now considerably free of larger particles, is subsequently passed through sand and gravel filters. These filters act

as a final barrier, capturing any remaining suspended matter or impurities that might have escaped the sedimentation stage

**Disinfection:** To ensure microbiological safety, disinfectants such as chlorine are precisely added to the filtered water. These disinfectants effectively inactivate or eliminate harmful bacteria, viruses, and other pathogens that may still be present, safeguarding against potential waterborne diseases.



DATE: 23.03.2024 — 8.5 MLD NTP AT PANCHAMUKH

| TIME | SAMPLE COLLECTION LOCATION | Turbidity N.T.U | pH value | TDS mg/L | Iron (as Fe) mg/L | Total Alkalinity mg/l | Total Hardness mg/l | Residual Chlorine mg/L |
|---|---|---|---|---|---|---|---|---|
| 11.00 A.M | NTP Inlet Water | 16.7 | 6.5 | 135 | 4.4 | 72 | 68 | — |
| | NTP Treated Water | 0.96 | 6.9 | 149 | 0.2 | 58 | 78 | 0.4 |
| | Overhead Tank Outlet | 0.91 | 7.0 | 148 | 0.1 | 50 | 72 | 0.2 |
| | House Connection Tap Outlet | 0.91 | 7.0 | 148 | 0.1 | 50 | 72 | 0.2 |
| 1.55 P.M | NTP Inlet Water | 12.3 | 6.8 | 124 | 3.8 | 68 | 56 | — |
| | NTP Treated Water | 0.83 | 7.2 | 140 | 0.1 | 52 | 70 | 0.4 |
| | Overhead Tank Outlet | 0.80 | 7.4 | 137 | 0.1 | 50 | 62 | 0.2 |
| | House Connection Tap Outlet | 0.80 | 7.4 | 137 | 0.1 | 50 | 62 | 0.1 |
| 4.00 P.M | NTP Inlet Water | | | | | | | |
| | NTP Treated Water | | | | | | | |
| | Overhead Tank Outlet | | | | | | | |
| | House connection Tap Outlet | | | | | | | |

SIGNATURE · EPEPL :- R Boorty 24/3/24

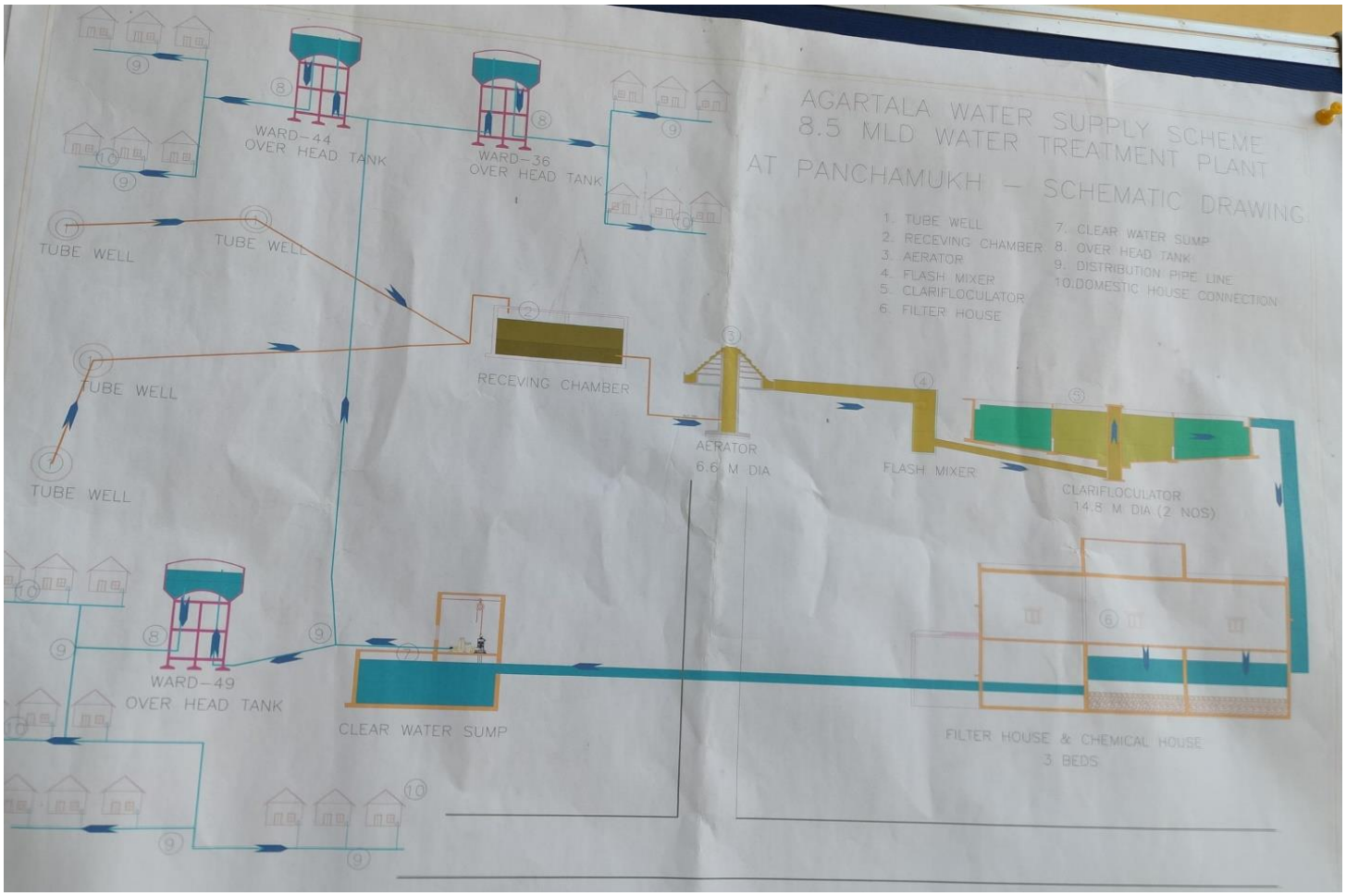
# 4. Water Quality Parameters

Panchamukh Water Treatment Plant rigorously monitors various water quality parameters to ensure consistent delivery of safe and high-quality drinking water. These parameters act as vital indicators and include:

**PH:** This parameter measures the water's acidity or alkalinity, ideally falling within the range of 6.5 to 8.5 for optimal taste and to prevent corrosion of pipes.

**Turbidity:** This value indicates the water's cloudiness, with lower values signifying better clarity and less suspended matter. Clearer water typically translates to more aesthetically pleasing and potentially healthier drinking water.

**Total Dissolved Solids (TDS):** This parameter measures the quantity of dissolved minerals and salts present in the water, which can affect its taste and potentially impact specific appliances like water heaters. While some minerals are essential for human health, excessive TDS levels can be undesirable.




**Microbial Contamination:** The absence of harmful bacteria like E. coli is paramount for ensuring safe drinking water. Regular testing for these microorganisms is crucial to guarantee the water's microbiological safety.

## 5. Treatment Techniques

Panchamukh Water Treatment Plant leverages a range of advanced techniques and technologies to achieve efficient and effective water treatment. These sophisticated methods contribute significantly to the quality and safety of the delivered water:

**Chemical Dosing:** Precisely controlled amounts of various chemicals are meticulously added at different stages of the treatment process, playing crucial roles in coagulation, disinfection, and other essential water treatment functions.

**Membrane Filtration:** In certain situations,  may utilize a Panchamukh Water Treatment Plant dvanced membrane filtration systems. These membranes act as

highly selective barriers, capable of removing even smaller particles and contaminants that might evade conventional filtration methods.

**UV Disinfection:** As an alternative or supplement to chemical disinfection, Panchamukh Water Treatment Plant may employ ultraviolet (UV) light technology. This method effectively inactivates bacteria and viruses present in the water by disrupting their DNA or RNA, further enhancing water safety.


## 6. Environmental Impact

Panchamukh Water Treatment Plant acknowledges the potential environmental implications of its operations and strives to minimize its environmental footprint through various proactive measures:

**Optimizing Chemical Usage:** The plant prioritizes the responsible use of treatment chemicals by implementing precise dosing practices and continuously exploring alternative, less harmful chemicals where feasible.

**Proper Waste Management:** PANCHAMUKH WATER TREATMENT PLANT implements responsible waste management practices to minimize environmental impact. This involves the safe disposal of treatment residuals, such as sludge generated during the sedimentation process. The plant adheres to stringent environmental regulations to ensure proper handling and disposal of these materials.**Water Conservation:** Panchamukh Water Treatment Plant acknowledges the importance of water conservation and actively promotes responsible water usage

practices within the community. This can involve collaborating with local authorities and NGOs to organize educational campaigns and public awareness programs. Additionally, the plant may explore implementing water-efficient technologies within its own operations to minimize water wastage.

# 7. Challenges and Solutions

**Challenges:**

**Water Scarcity:** Panchamukh Water Treatment Plant faces the challenge of ensuring a consistent supply of raw water, particularly during periods of drought or seasonal variations in water availability. This necessitates exploring alternative water sources to supplement existing resources.

**Emerging Contaminants:** The continuous emergence of new contaminants in water sources presents a significant challenge. Panchamukh Water Treatment Plant actively

monitors its water sources and adapts its treatment processes based on the latest findings. This might involve implementing additional treatment steps or utilizing more advanced technologies to effectively remove these emerging contaminants.

**Aging Infrastructure:** Maintaining and upgrading aging infrastructure presents another challenge for Panchamukh Water Treatment Plant . The plant requires ongoing maintenance and timely modernization of its facilities to ensure optimal performance, efficiency, and adherence to evolving safety standards.

**Solutions:**

**Exploring Alternative Water Sources:** One potential solution to water scarcity involves investigating sustainable options like rainwater harvesting, desalination (if feasible), or utilizing treated wastewater for non-potable purposes. These alternative sources can supplement the existing raw water supply and enhance the plant's resilience to droughts.

**Investing in Research and Development:** Investing in research and development is crucial for addressing emerging contaminants. This allows PANCHAMUKH WATER TREATMENT PLANT to stay updated on the latest advancements in treatment technologies and explore their potential implementation in its processes. By proactively adapting to evolving challenges, the plant can continue to deliver safe and clean drinking water.

**Infrastructure Upgrade and Maintenance:** Prioritizing regular maintenance and timely upgrades of existing infrastructure is essential for the long-term sustainability of PANCHAMUKH WATER TREATMENT PLANT. This ensures the plant operates efficiently, minimizes environmental impact, and adheres to safety regulations.

# 8. Role of Technologies

Technological advancements play a critical role in enhancing the efficiency and effectiveness of water treatment processes. Panchamukh Water Treatment Plant actively seeks to integrate innovative technologies to improve its operations:

**Automated Monitoring and Control Systems:** Utilizing automated systems allows for real-time monitoring of various water quality parameters. This enables prompt adjustments to the treatment process based on real-time data, ensuring optimal efficiency and consistent water quality.

**Data Analytics:** Leveraging data analytics allows Panchamukh Water Treatment Plant to identify trends in water quality, predict potential issues, and optimize treatment processes accordingly. This data-driven approach fosters proactive management and enhances the overall effectiveness of the plant's operations.

**Advanced Treatment Technologies:** Panchamukh Water Treatment Plant continuously explores the potential of advanced treatment technologies like advanced membrane filtration and innovative disinfection techniques. These technologies offer improved performance, allowing the plant to remove a wider range of contaminants and further enhance the quality and safety of the treated water.

# 9. Community Engagement

**Importance:**

Community engagement is crucial for sustainable water management and fostering responsible water usage practices. PANCHAMUKH WATER TREATMENT PLANT recognizes this significance and actively participates in various initiatives:
**Organizing Awareness Programs:** The plant collaborates with local communities, educational institutions, and NGOs to organize awareness programs. These programs educate the public about the importance of clean water, the complexities of water treatment, and the need for responsible water consumption practices.

**Promoting Water-Saving Initiatives:** Panchamukh Water Treatment Plant actively promotes water-saving initiatives within the community. This can involve collaborating with local authorities to distribute water-saving devices like showerheads and faucet aerators. Additionally, the plant may participate in community outreach programs to educate residents on water-saving tips and techniques in daily activities, such as gardening, laundry, and dishwashing.

**Open Communication:** Maintaining open communication with the community is essential for building trust and addressing concerns. Panchamukh Water Treatment Plant strives to maintain transparency by providing regular updates on water quality, operational challenges, and ongoing initiatives. This can be achieved through various channels, such as community meetings, media publications, and user-friendly online platforms.

**Benefits:**


Engaging with the community fosters a sense of shared responsibility for water security. By educating individuals on the value of clean water and encouraging responsible water usage, PANCHAMUKH WATER TREATMENT PLANT promotes sustainable water management practices and empowers the community to contribute to its continued access to safe drinking water.

## 10. Future Prospects

The future of water treatment plants in Agartala, including PANCHAMUKH WATER TREATMENT PLANT, is shaped by several key trends:

**Technological Advancements:** Continued advancements in water treatment technologies will offer opportunities for improved efficiency, effectiveness, and cost-effectiveness. Implementing these advancements, such as advanced membrane filtration and real-time water quality monitoring systems, can further enhance the quality and safety of the delivered water.

**Climate Change Mitigation:** With the increasing concerns around climate change, water scarcity and extreme weather events are likely to pose challenges in the future. PANCHAMUKH WATER TREATMENT PLANT may need to adapt its operations to address these challenges, potentially by exploring alternative water sources, implementing water reuse strategies, and enhancing its resilience to drought conditions.

**Sustainability Focus:** Growing emphasis on sustainability necessitates adopting environmentally friendly practices and minimizing the environmental impact of water treatment processes. Panchamukh Water Treatment Plant can continue to strive towards this goal by optimizing resource utilization, exploring renewable energy sources, and implementing sustainable waste management strategies.

By embracing these future prospects and continuously adapting to evolving needs and challenges, Panchamukh Water Treatment Plant can ensure its continued role in delivering safe and clean drinking water for the residents of Agartala.

# 11. Conclusion

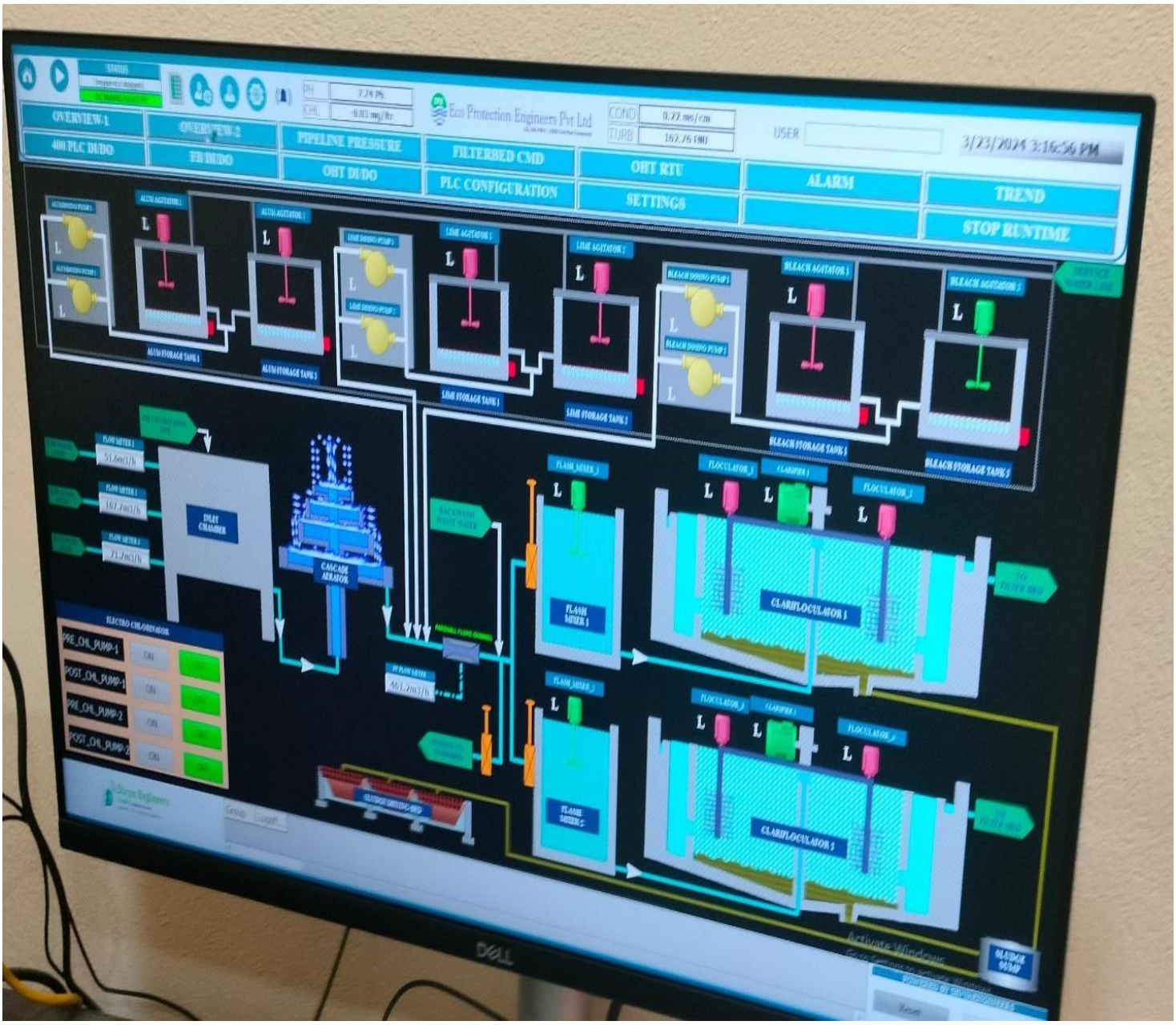
This report has provided a comprehensive overview of the water treatment process at Panchamukh Water Treatment Plant in Agartala. This vital facility plays a crucial role in safeguarding public health by transforming raw water into safe and reliable drinking water for the city's residents. By utilizing a multi-stage treatment process, rigorous quality control measures, and advanced technologies, PANCHAMUKH WATER TREATMENT PLANT ensures consistent delivery of high-quality water.

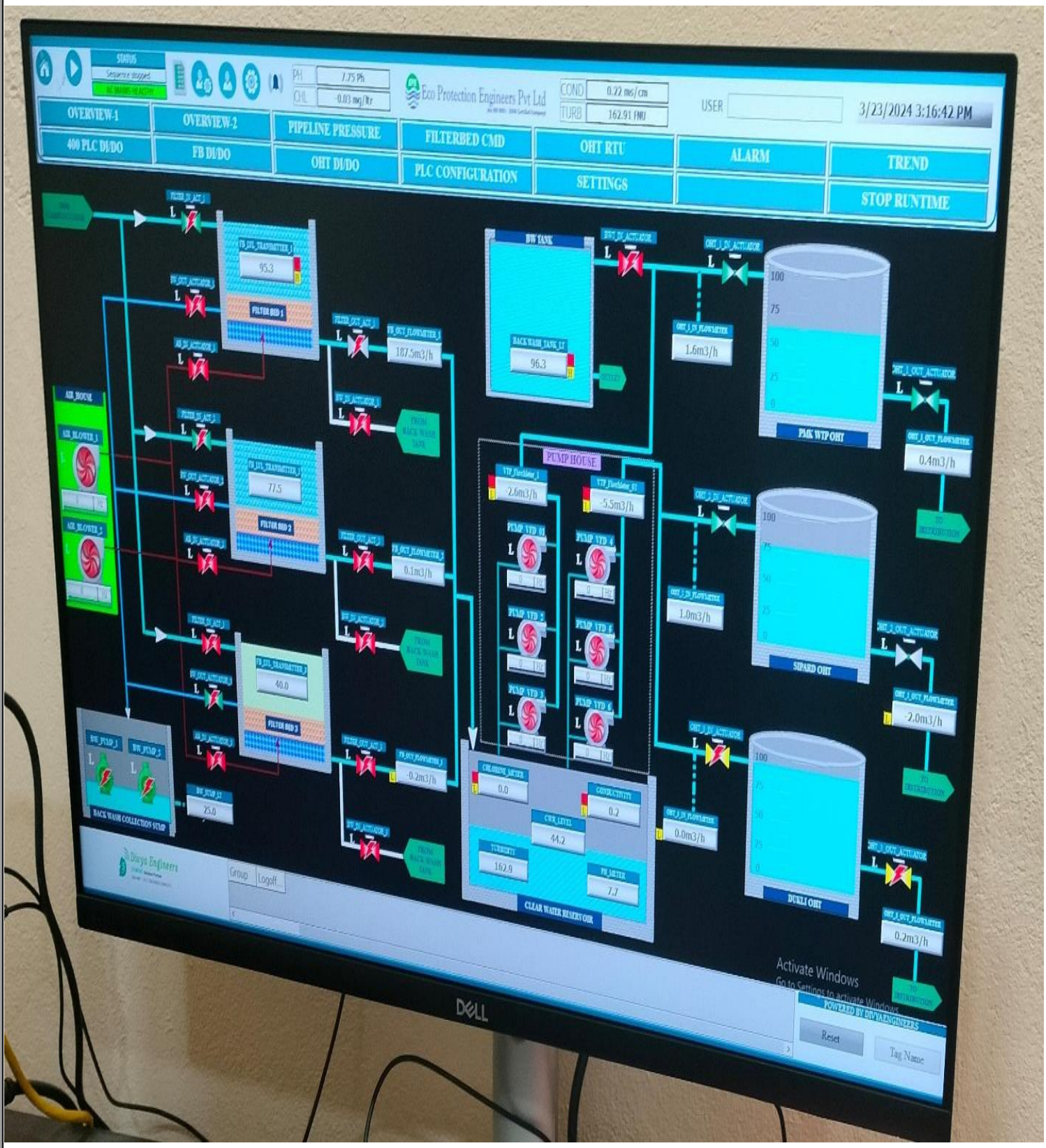
However, the plant also faces challenges, including water scarcity, emerging contaminants, and aging infrastructure. Nevertheless, ongoing efforts in exploring alternative water sources, embracing technological advancements, and fostering community engagement demonstrate Panchamukh Water Treatment Plant 's commitment to addressing these challenges and ensuring its long-term sustainability.

The continued operation and improvement of water treatment plants like PANCHAMUKH WATER TREATMENT PLANT are essential for guaranteeing access to safe and clean drinking water, a fundamental human right. Through ongoing advancements and collaborative efforts, these facilities can continue to play a vital role in ensuring healthy and thriving communities.

# SCADA SOFTWARE

(SOFTWARE USED IN PANCHAMUKH WATER TREATMENT PLANT)




Eco Protection Engineers Pvt Ltd
OVERVIEW-1
OVERVIEW-2
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ALARM
TREND
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FB DI/DO
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