MCGM CENTRE FOR MUNICIPAL CAPACITY BUILDING AND RESEARCH®

(An Initiative by Brihanmumbai Municipal Corporation)

State Level Training Institute for Urban Local Bodies

In association with

CENTRE FOR WATER AND SANITATION, CEPT UNIVERSITY

Training on

SCADA

For Water & Wastewater

Course Code : MNE3RE11

09, 10 & 11 Nov 2022 (3 Days Residential Program)

MCMCR POWAI CAMPUS, MUMBAI 400 072

The Module of the three days training program was as follows:

Day – 1 (Classroom Sessions)	Day – 2 (Field Visit)	Day – 3 (Technical Exhibition)
AMRUT 2.0 & SCADA for Water Supply & SCADA for Wastewater Treatment	Site visit : 1. Sewage Pumping Station 2. Water Treatment Plant	Presentations by exhibitors
SCADA: Basic and Instrumentation		Exhibition
Applications of SCADA for Water		
Applications of SCADA for Wastewater		
O & M of SCADA system		
Reports & Analysis: Benefits & Case Studies		

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AMRUT 2.0 focus points

Thrust Areas

1. Mission coverage, outlay and major objectives
2. Components of AMRUT 2.0
3. Funding and mechanism for release of funds
4. Mission Implementation
5. Institutional Mechanism
6. Synergies for effective outcomes of Mission

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Mission coverage, outlay and major objectives

- AMRUT 2.0 launched by Hon'ble PM on 1 Oct 2021, with aim to make cities '***Aatma Nirbhar***' and '**water secure**' achieved through **circular economy of water** and a total outlay of **INR 2,99,000 crores** (nearly 3 times of AMRUT) for five years. Total **indicative central share is INR 86,760 crore.**
- The **paperless mission** envisages providing water tap connections to households in **all 4800 statutory towns through 2.68 crore new household tap connections** and providing **universal household coverage of sewerage/septage** services in **500 AMRUT cities** through **2.64 crore new sewer connections/coverage with septage management**.
- Mission mandates implementation of **10% worth of funds allocated to million plus cities under PPP mode**. Projects on **24x7 water supply** with **'Drink from tap'** facility in **500 AMRUT cities** are encouraged.
- **Rejuvenation** of **water bodies** and **green spaces and parks**.
- Incentivized major reform on municipal governance (raising funds through **issuance of municipal bonds**), **reducing non-revenue water** to below 20%; **recycle of treated used water** to meet at least **2O% of total city** water demand and **40% for industrial water** demand at State level.
- **Outcome based funding** is a major feature of AMRUT 2.0.
- **Pey Jal Survekshan, Information Education & Communication (IEC) and Technology sub-Mission** to explore new technologies in water sector with inclusion of Start-ups.
- With **gig economy model** mission will co-opt women and youth inclusion and concurrent feedbacks about its progress.

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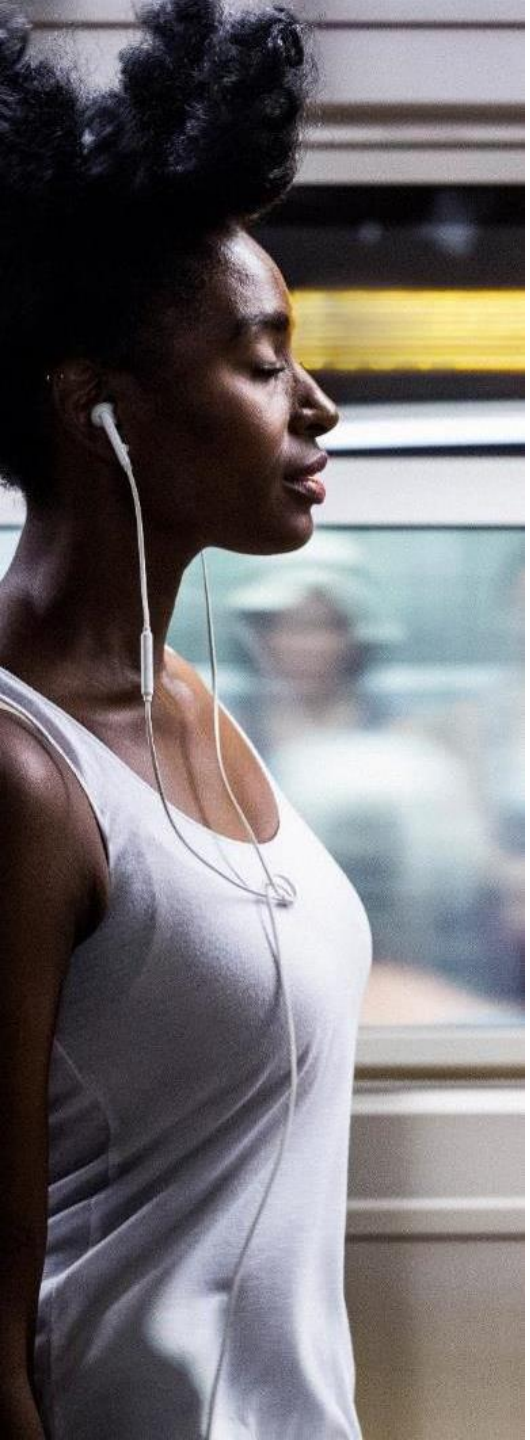

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Components of AMRUT 2.0 (1/4)

1. Projects

- Providing **universal piped water supply** with **household water tap connection** to all 4800 statutory cities and **universal coverage of sewerage and septage** management in 500 AMRUT cities and **promoting circular economy** of water (*All water supply and sewerage projects will have smart elements*)
- **Rejuvenation of water bodies** to augment water and enhance amenity value and development of green spaces
- Outcome based funding is to be considered for the **outcomes achieved with respect to sewer and water connections** after the launch of AMRUT 2.0 by projects taken up by States/ UTs and achievement beyond baseline established for the city as on 1 November 2021.

2. Administrative & Other Expenses (A&OE)

- **3.25% of annual budget** allocation will be earmarked for States/ UTs
- **At State Level**
  - A&OE can Capacity building, preparation of CWBPs, PMU/ PIU, DPRs, PDMC, SMMU, CMMU, publications like e-Newsletter, guidelines, brochures etc., promotional activities for Mission, and reform implementation.

At National Level / MoHUA

- **Capacity building, Convening national & regional workshops, Pey Jal Survekshan** components like **conferring awards and recognition,** up-scaling and replication of best practices & smart solutions,
- Commissioning of research and applied studies through Center of Excellence and other institutions,
- Independent Review and Monitoring Agency (IRMA) to be positioned at State/ sub-State/ regional level,
- **Feedback using gig economy model and International cooperation for capacity building** and technology development.

NOTE:

In addition to water sector experts, **hydrogeologists and data analysts may be part of mission management** units at State, regional and city level.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Components of AMRUT 2.0 (2/4)

3. Reforms

- Funds totalling **INR 5,340 Crore has been earmarked as reform incentive**. **Eight percent** of the **annual budget allocation will be given as reform incentive** to States/ UTs every year for achievement of Reforms from second year of Mission onwards. Unutilized funds for reform incentives will be transferred to project fund every year. .
- There will be two type of reforms:

A. Mandatory reforms:

- ✓ **Property tax reform:** notifying property tax calculation containing guidance value/ circle rate along with provision for its periodic increase and increase in coverage and collection efficiency.
- ✓ **Reforms on User Charge:** State on user charges for water supply and sewerage. User charges will offset O&M expenses substantially and a periodic increase mechanism has to be put in place. **500 AMRUT cities where water supply coverage has improved substantially shall submit road map for achieving 90% billing and collection**. The **status of billing and collection efficiency will be verified by Independent Review and Monitoring Agency (IRMA)** or in any other manner decided by MoHUA.
- ✓ Effective system for **grievance redressal**

B. Incentive based reforms

1. Reforms on water conservation:

- Reduction in **non-revenue water to below 20%**
- **Recycle of treated used water** to meet at least **20% of total city water demand** and **40% of industrial water demand** at State level
- Rejuvenation of water bodies with area preferably one acre
- **24x7 water supply with 'Drink from tap'** facility in the selected wards
- Development of **green spaces and parks**

2. Reforms on governance:

- Ease of getting water and sewer connections
- **Credit rating and issuance of municipal bond.** {*Credit rating will be a State level reform.*}
- Online municipal services system
- Electrical Vehicle Charging Points in cities with population above 50,000
- Augmenting double entry accounting system
- PPP project in non-million plus cities
- Involvement of community .

3.Reform on energy efficiency

- Effective O&M SOPs for water supply and sanitation infrastructure

4. Reforms on urban planning and unlocking land value

- **GIS based master plans of Class-II Towns** with population b/w 50k -1lac {Geo-database creation, GIS based master plans and capacity building}
- Sub-Scheme on Local Area Plan (LAP) and Town Planning Scheme (TPS) {*in select cities targeting* ***optimum land utilisation***}

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Components of AMRUT 2.0 (3/4)

4. Technology Sub-Mission

- Start- ups entrepreneurs:
  - ✓ **Start- ups will be encouraged in water/ sewerage sector. The Start-ups fulfilling the definition given by "Start-up India" initiative of DPIIT shall be eligible to participate.**
  - ✓ Projects costing up to INR 20 lakh will be approved by a **State Water Start-Up Screening Committee** consisting of State Mission Director, representative of technical institute and/ or practitioners in water sector and for more than INR 20 lakh representatives of MoHUA, CPHEEO and experts in water sector will approve
  - ✓ Funds will be released in three instalments of 50:40:10 based on achieved progress of the project and reported online
  - ✓ The **first shortlisting of start-ups projects** for funding should be **completed within six month of launch of mission** and **first instalment** should be released within **seven months from start of mission.**
- Technology Melas
  - ✓ Mission will support innovative, low-cost indigenous technologies including equipment, through technology challenge and melas at National/ State level
- Light house projects:
  - ✓ National and international agencies/entrepreneurs can propose lighthouse projects and demonstrate the results in water sector.
  - ✓ Initially, such projects will be funded by the concerned agency, however, on achieving the intended outcomes within Mission period**, 20% of project cost, restricted to INR 50 Lakhs will be reimbursed** to the agency by MoHUA,

5. Capacity Building and Information, Education and Communication (IEC)

- Capacity building will be taken up for **elected representatives, ULB functionaries, contractors and citizens**
- **1,00,000 persons** are targeted **to be trained** under capacity building program
- **Annual IEC action plan** will be submitted by States/UTs **along with SWAPs**
- NULM Mission management will help mobilizing SHGs in water quality testing and infrastructure management. **At least one project's O&M in each city may be considered for deployment of well-trained SHG.**
- Social media campaign and recognition of Water Warriors, exhibition and melas of success stories
- Community engagement using **'Train the Trainer' workshops**

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Components of AMRUT 2.0 (4/4)

6. Pey Jal Survekshan
   - Pey Jal Survekshan will foster healthy competition among ULBs, wherein following parameters will be assessed:
     - ✓ Water supply management & innovative practices,
     - ✓ Compliance of water supply service level benchmarks w.r.t. coverage, quality, quantity, and user charges reforms,
     - ✓ Reduction in Non-Revenue Water (NRW) through District Metered Areas (DMAs) and training to check leakages,
     - ✓ Operational efficiency of sewage and water treatment plants and evaluation of collection, treatment, and reuse of treated used water.
     - ✓ Rejuvenation of water bodies and wells,
   - Feedback will be taken from citizens and municipal officials including collection and testing of water samples.
   - The results of the survey will be the basis of ranking the ULBs in terms of water sector services and water security at city and household level.

7. Evidence based evaluation of outcomes **using online monitoring platform** combined with **citizen feedback through gig economy** will enable **community partnership**.

8. A mandate to **promote Public Private Partnership (PPP)** for cities having million plus population worth **minimum of 10%** of their total project fund allocation which could be on **Annuity/ Hybrid Annuity / BOT Model.**

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Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Funding and mechanism for release of funds (1/3)

1. Fund allocation
   - The total indicative outlay for AMRUT 2.0 is **INR 2,77,000 crore** including **central share of ₹ 76,760 crore for five years**
   - Projects with focus on selling treated water to industries and other users may be the potential projects for implementing under PPP mode. Such projects can be taken up in Hybrid Annuity Model (HAM). **Viability gap funding for such projects will be provided through CA**. **CA will be 50% of the viability gap subject to maximum of 30% of the project cost**. Balance viability gap will be borne by State/ ULB. **Total viability gap will not exceed 60% of project cost**.
   - States/ UTs and ULBs may augment their share of funding through alternative sources
   - like raising **municipal bonds, accessing capital markets, loans/ credits, State grants and central finance commission grants etc.** States/ UTs may **avail loan** from the funds earmarked by multi-lateral/ bilateral agencies **like ADB, KFW, AFD and World Bank etc**
2. Release of funds….
   - Central assistance will be processed through **online claims and settlement system**, on **actual progress updated on portal through physical/ financial data**, photos and videos **obtained through citizen feedback** and third-party assessment.
   - Adoption of **Public Financial Management System** stipulated by MoF will be the pre-condition to submit CWBPs. To receive funds under AMRUT 2.0, all transactions will have to be made through **Single Nodal Agency (SNA) by using EAT.**
   - **Central fund allocation** to States/ UTs for projects will be worked out by distributing entire central project funds giving weightage to urban population and area of States/ UTs in **ratio 90:10.**
   - **CA released for a particular tranche of SWAP can be utilized for implementation of approved projects of another tranche.** Similarly, States/ UTs can utilize CA for projects in any of the ULBs as per physical/ financial progress of the projects.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Funding and mechanism for release of funds (2/3)

2. Release of funds….

- Central assistance (CA) to the States/ UTs has been divided in two components as under:

Component-1: This component will comprise of CA for projects approved under SWAPs. This will be provided in three instalments of 20:40:40 as under

First instalment under component-1 *[20%]*

- ✓ This will be 20% of CA admissible against SWAP submitted by the State/ UT and approved by Apex Committee claimed in three (almost equal) tranches against submission and approval of each of three tranches of SWAP.

Second Instalment under component-1 *[40%]*

- ✓ AMRUT 2.0 projects for which contracts have been awarded will be eligible.
- ✓ Approved cost of projects, basis for working out instalment will be lower of appraised cost and contract award cost.
- ✓ Following should be achieved before claiming second instalment:
  - ✓ Second instalment will be applicable to projects which have achieved 15% physical and financial progress. **The work should have been started on site.**
  - ✓ **Submission of City Aquifer Management Plan** (At least 20% with first tranche, 30% with second tranche and remaining 50% AMRUT cities of the State with third tranche of SWAP) States having less than ten AMRUT cities may submit City Aquifer Management Plan with third tranche.
- ✓ **Submission of UC of A&OE grants and reform incentive**.
- ✓ Submission of assessment and compliance report of AMRUT 2.0 by IRMA and ATR by the State/ UT.
- ✓ Citizen feedback.

Third instalment under component-1 *[40%]*

- ✓ It will be released **entirely on achieving functional outcomes**[1] through AMRUT 2.0 projects.
- ✓ **Third instalment can be claimed in three tranches** against approved tranches of SWAPs.

1 Functional outcomes: Tap connections (both new and serviced through augmentation); Sewer/ septage connection (both new and serviced through augmentation); Water body rejuvenation projects; Parks & green spaces

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Funding and mechanism for release of funds (3/3)

2. Release of funds….

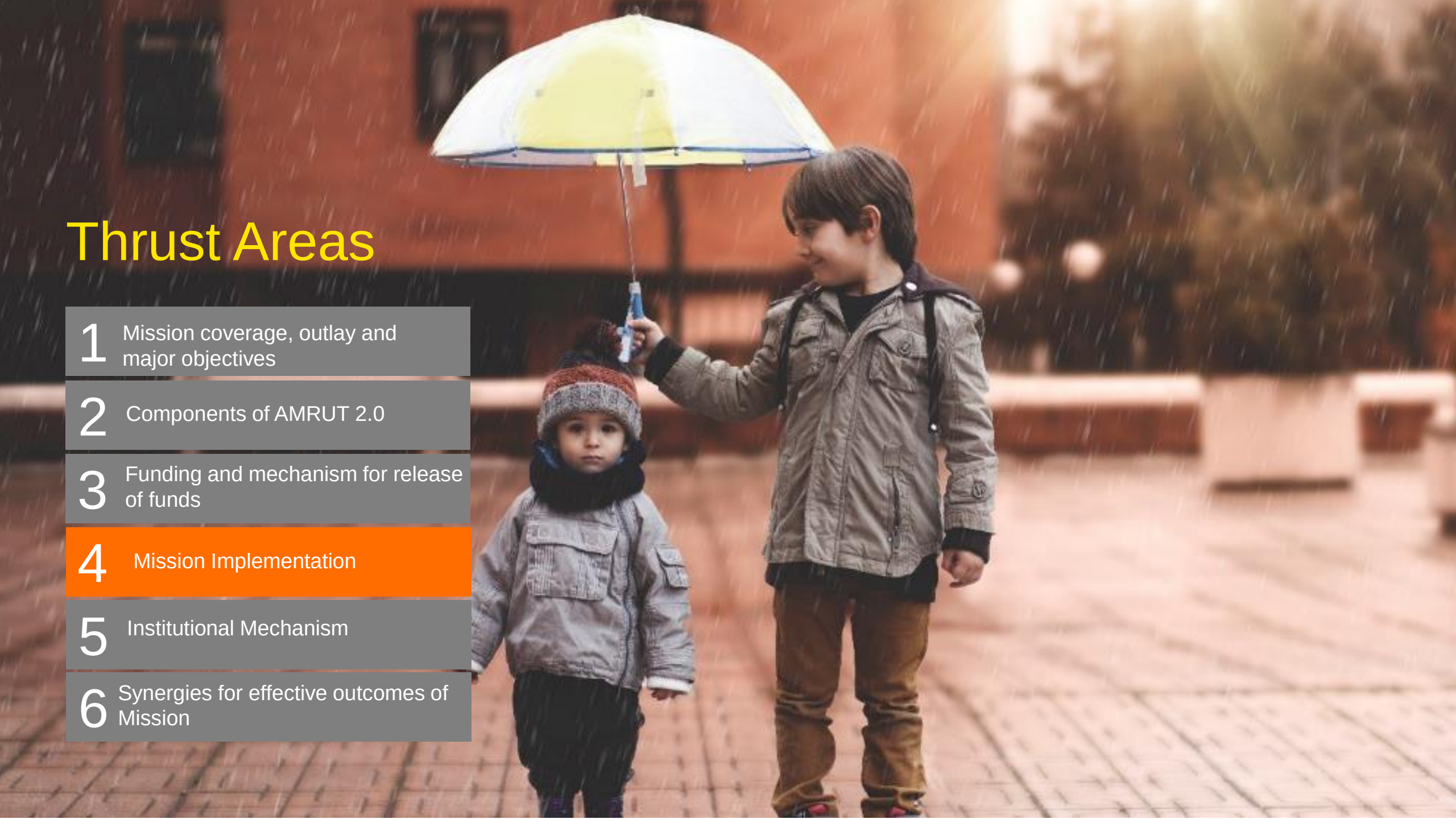
Component-2:

- Funding at the rate of **INR 3,000** per **new household** **water tap connection** for all ULBs and **new household sewer connection** provided in all 500 AMRUT cities will be awarded.
- Only new connections, which are not funded under AMRUT and AMRUT 2.0 will be considered.
- Funds against these outcomes can be **claimed once every quarter in tranches** after baseline is firmed up.
- Funds will be released after **due verification through citizen feedback and third-party**.
- Funds provided under component-2 will be used by the State/ UT/ ULB on components of AMRUT 2.0 only.

3. Funds for projects implemented in PPP mode: [*for in cities with population above ten lakh*]

- State/ ULB will prepare **appropriate financial model and work out viability gap** of such projects.
- **Total viability gap** for a project shall **not exceed 60% of the project cost**. **50% of the viability gap not exceeding 30% of project cost will be admissible to be funded as CA.**
- CA will be released in three instalments like non- PPP projects.
  - ✓ First instalment worth **20% of admissible CA** will be released on **approval of DPR** and **finalization of financial model** of PPP project.
  - ✓ Second instalment worth **40% of admissible CA** will be released on achieving **15% of physical as well as financial progress** of the project.
  - ✓ Third instalment **of 40% of admissible CA** will be released on achievement of **functional outcomes.**[1]
- Payment of annuity over the agreed period of time as per financial model will be done by the State/ ULB. To bring in confidence for PPP projects, States may facilitate **ULBs to operate Escrow accounts** for ensuring seamless fund flow.

1 Functional outcomes: Tap connections (both new and serviced through augmentation); Sewer/ septage connection (both new and serviced through augmentation); Water body rejuvenation projects; Parks & green spaces



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Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Mission Implementation (1/4)

1. Paperless Mission Implementation
   - Preparatory steps, project planning, reform outcome achievement reporting, progress reporting and claims will be made on a **robust online technology platform**.
   - Industry, community and implementing agencies will be **onboarded on a collaborative platform**.
2. City Water Balance Plans (CWBPs)
   - CWBPs will comprise **details of water sources** including water bodies, water treatment and distribution infrastructure, area-wise water coverage, **status of NRW** and sewerage network including STPs etc.
   - ULBs will compile baseline data on household water tap and sewer/ septage connections, and **gaps in service delivery** will be worked out.
   - Based on assessed gaps, potential projects will be identified **targeting functional outcomes.**
   - The extent of gaps proposed to be filled through AMRUT 2.0 or other sources will be clearly identified. CWBPs will be filled on the online formats provided for this purpose on the portal.
   - **CWBP** should also be **published** on respective **ULB and State websites**.
3. City Water Action Plans (CWAPs)
   - CWAP will **comprise the list of projects** proposed by the ULB in the **priority sectors** of water supply; sewerage/ septage management; rejuvenation of water bodies including green spaces & parks.
   - CWAP will ensured that projects are taken up with a view to **meet 20% of city water demand through recycle/ reuse of treated used water.**
   - CWAPs will be submitted to SHPSC by State Mission Director online on Mission portal.
   - PPP projects maybe identified in the CWAPs.
   - ULBs will furnish **year-wise roadmap** of providing household water tap connections to **achieve universal coverage of water supply** and **achieving universal coverage of household sewer/ septage connections** in 500 AMRUT cities will also be furnished

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Mission Implementation (2/4)

3. State Water Action Plans (SWAPs)

- **SWAPs will be prepared by** State Mission director by **aggregating CWAPs** submitted by the ULBs.
- SWAPs will comprise **entire list of projects, city-wise and sector-wise, proposed to be undertaken** by States/ UTs. **Cost of projects excluding cost of land acquisition.** It will be ensured that projects are taken up only when land is available with clear title without any disputes
- SWAP will include **project wise number of proposed new household water tap connections, sewer connections and coverage of existing water tap and sewer connections to be augmented,** which shall be outcomes of such projects.
- The projects to be implemented in PPP mode will be clearly identified.
- SWAPs will be submitted on portal to Apex committee in three tranches *(First tranche within five to nine months; second tranche within twelve to sixteen months and third tranche preferably within twenty-four months of launch of Mission.)*
- SWAPs will be approved by SHPSC before progressing to Apex Committee with following consideration:
  - ✓ SWAP is **oriented towards achieving universal coverage** of water supply and sewerage/ septage management
  - ✓ **Water body rejuvenation** and **parks & green spaces parks** have been taken in specified proportion
  - ✓ Water supply projects oriented towards **24x7 water supply** in AMRUT cities have been taken
  - ✓ There is **no duplication** of projects with AMRUT or any other government schemes
  - ✓ Low economic and informal settlements are duly included in SWAP
  - ✓ At least meeting **10% of fund allocation in PPP projects**
  - ✓ Projects facilitating **Rural-Urban Synergy** have been taken up wherever feasible
  - ✓ Ensure that used water is treated and put to **reuse** to meet **20% of cities water demand and 40% of Industry water demand** in aggregate at the state level.
  - ✓ Projects being proposed in **SWAP will have O&M for at least five years** to be f**unded by way of levy of user charges or other revenue streams**.
  - ✓ Project cost will exclude O&M. **ULBs shall fund O&M** through an **appropriate cost recovery mechanism** in order to make them **self-reliant and cost effective.**

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

Mission Implementation (3/4)

4. Urban aquifer management plan

- Mission intends to prioritize management of urban aquifer systems towards its **pursuit of water secure cities**.
- ULBs under Mission are expected to **develop sound strategies for management of groundwater resources** with specific focus on the following parameters:
  - ✓ ULB's dependence on groundwater
  - ✓ Key characteristics of city's aquifer systems
  - ✓ Available recharge potential within city limits
- Mission will promote and **encourage citizen's engagement** for groundwater management in cities.
- ULBs shall **monitor groundwater usage, identify aquifer potential and recharge opportunities**.
- Mission shall **support the development of protocols for operating a scientific routine around data collection on groundwater resources** that will assist in the development of aquifer management plan and its refinement.
- A **technical guidance manual specific to different aquifer systems** in urban India shall be developed under Mission to assist the cities in developing an aquifer management plan.
- The **City Aquifer Management Plan will be a dynamic document** that shall be revised every year until 2026 to assess the change in the dynamic groundwater balance over the mission period.
- Cities/ ULBs may **provide baseline information** in the first year of Mission to understand the relationship between the **urban area and its underlying aquifer systems** and work towards generating further information pertaining to the aquifer systems that shall be incorporated in the subsequent plans.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)

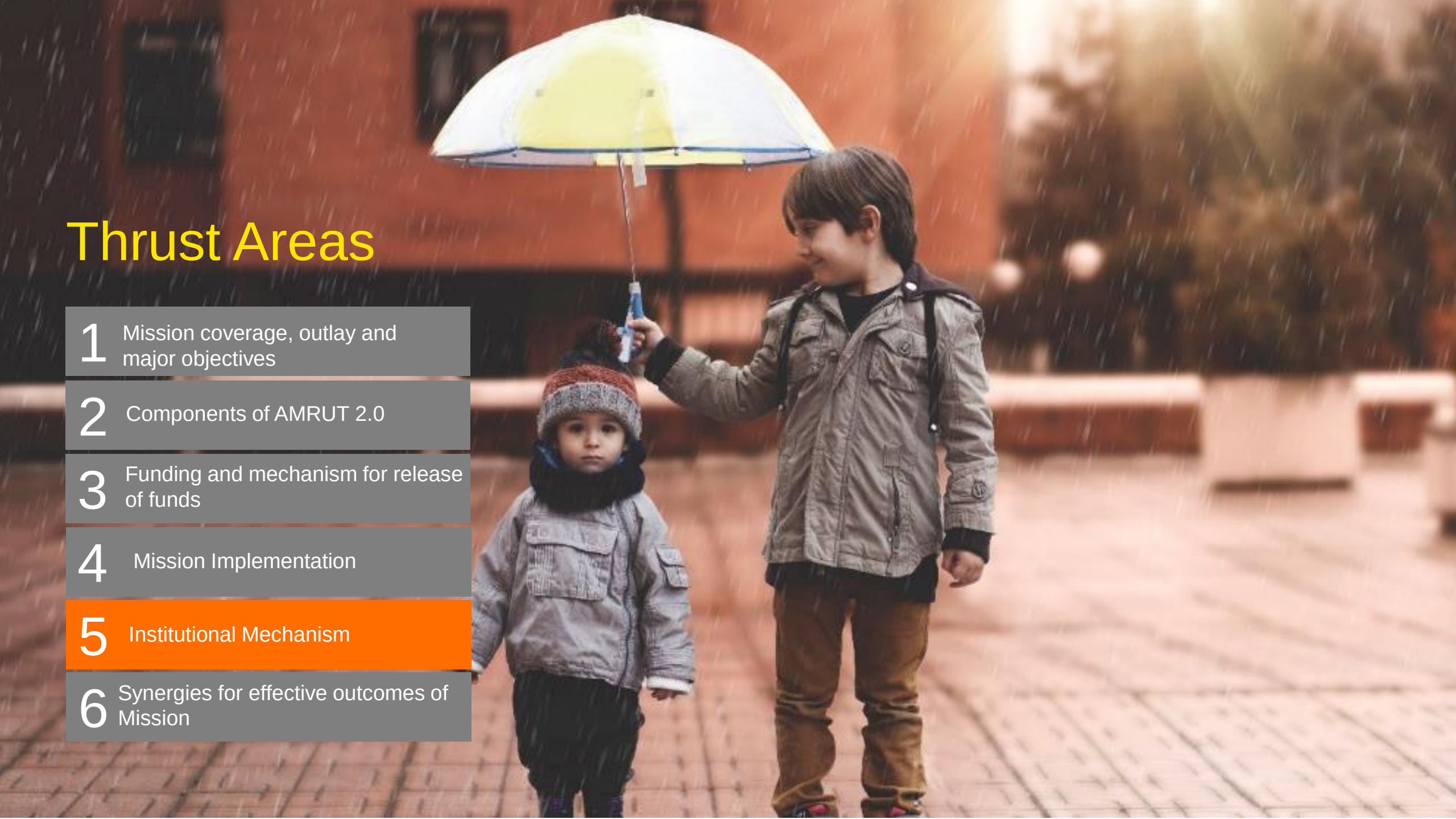
Mission Implementation (4/4)

4. Implementation of projects

- Projects as per approved SWAP will be **planned, tendered, awarded and implemented by ULBs**.
- Where ULBs do not have adequate capacity, specialized parastatal agencies will implement the projects.
- In order to ensure efficient implementation of projects, the States/ UTs, ULBs should follow an approach wherein **end-to-end support** for project design, development, implementation and management is **provided by external entities (PDMCs).**
- **Smart elements** will be part of the projects.

5. Monitoring of projects

- The achievement of mission objectives will be **monitored through an online module**.
- This module will directly be the **precursor for availing funds**.
- The fields to be updated will include **physical progress, financial progress, documents required for seeking central assistance**, **photographs, videos, third party reports, etc.**
- The progress reported on portal will be **randomly verified through citizen/ third party feedback**.
- Implementing agencies and community stakeholders will also be facilitated to access the portal and upload the progress and feedback.



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Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)
Institutional Mechanism (1/2)

A **three-tier institutional mechanism** has been devised for implementing Mission as under:

1. National Level:
   - Apex Committee (AC) *(chaired by the Secretary, MoHUA)*
     - ✓ **Policy guidance formulation, central assistance, and technical support** to States/ UTs.
     - ✓ **Approval of SWAPs**, **allocate and release funds** to the States/ UTs/ Mission Directorate.
     - ✓ **Monitoring of Mission progress** & fund utilization at State/UT level and advise on **reform implementation progress.**
     - ✓ Advise on innovative ways for resource mobilization, private financing, and land leveraging.
     - ✓ Take any decision required for uninterrupted progress of Mission within broad framework of approved Cabinet note.
     - ✓ Apex committee shall **meet once every quarter.**
   - National Project Management Unit (PMU)
     - ✓ Support National Mission Directorate by **monitoring the physical and financial progress of the overall Mission.**
     - ✓ Visit States/ cities as required, **liaise with PDMC/ CMMU** to keep the portal updated and undertake any other duties as directed by Mission director.
   - Independent Review and Monitoring Agency (IRMA)
     - ✓ **IRMAs shall be selected for a State/ UT or cluster of States/ UTs by MoHUA through bidding process. Payments to IRMAs will be made by MoHUA.** States/ UTs will facilitate IRMAs in undertaking reviews and feedbacks etc. **Periodic reports and other documents will be submitted by IRMA to MoHUA with copy to States/ UTs**.
     - ✓ Brief description of activities to be performed by IRMAs is as under:
       - ✓ Review of projects and reforms undertaken by the States/ UTs. Ascertaining if the projects are taken up in accordance with the approved SWAPs.
       - ✓ Verification of Action Taken Report furnished by States/ UTs against IRMA observations and confirmation to MoHUA.
       - ✓ **Assisting in updating the portal** on regular basis and **verification of outcomes** submitted/ uploaded on portal by the States/ UTs.
       - ✓ Collecting user feedback in form of recorded video interviews and testimonials etc.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT 2.0)
Institutional Mechanism (2/2)

2. State level:
   - State High Powered Steering Committee (SHPSC) *(Chaired by Chief Secretary of State)*
     - ✓ **Approve SWAP** and accord administrative approval of DPRs.
     - ✓ **Monitor mission** and **approve plan** including progress of projects capacity building, IEC and reform implementation, etc.
     - ✓ Recommend proposals for **release of instalment of funds from Centre in time** and **finalize State and ULB share of funds**
     - ✓ **Advise State Mission Director** on Operations & Maintenance of plants erected under Mission.
   - State Level Technical Committee (SLTC)
     - ✓ **Technical appraisal of DPRs and tender documents** and **ensuring availability of undisputed land for projects**, inclusion of **O&M** for at least five years and **last stretch of tap/ sewerage connectivity to households**.
   - Project Development and Management Consultant (PDMC)
     - ✓ The scope of PDMCs will broadly cover **planning, design, supervision, scheduling and management of projects.**
     - ✓ **Prepare CWBPs, CWAPs and SWAPs, DPRs** include financial plan and O&M strategy for complete life cycle of projects and carry out investigation, **design, procurement, and implementation using PMIS / latest IT tools and techniques.**
     - ✓ Monitoring physical & financial progress of projects and updating Mission portal. Conducting capacity building activities.
     - ✓ The PDMCs will examine convergence with other similar schemes in terms of coverage, fund flow, impact and outcomes.
     - ✓ During the process of developing the SWAP, the PDMCs shall **explore the possibility of PPP** in project implementation. PDMCs

3. ULB level / District level
   - City Mission Management Units (CMMUs)
     - ✓ **Submit CWBPs in time,** help State Mission Director/ PDMC in preparation of DPRs, ensure **reforms are achieved on time**
     - ✓ Tendering and award of contracts as per financial rules & regulations and ensure timely completion of work under contract.
     - ✓ Participate actively and provide necessary **support for Pey Jal Survekshan.**
   - District Level Advisory and Monitoring Committee (DLAMC)
     - ✓ Formed under District Magistrate (DM) to review and monitor several programs in urban sector including AMRUT 2.0.

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Synergies for effective outcomes of Mission

1. Rural-Urban Synergy:
   - Water markets for reuse of treated used water shall be ascertained in rural urban continuum. **Co-treatment of sewage/ septage** from nearby villages **in spare capacities of STPs** will be explored by ULBs.
   - **National, State and ULB level committees** on **water/ sewerage/ river/ water body coordination** shall be represented by members of rural areas also, especially for peri-urban areas.
   - Capacity building convergence between urban and rural, wherever feasible.

2. Urban-Urban synergy:
   - **ULBs** with very small **with population below 10,000**, water supply projects shall be **planned for a cluster** of ULBs which are adjacent to each other.
   - State/ULBs to plan such projects for cluster of cities wherever feasible and v**iability** of such projects will be **analysed specifically by the SHPSC**[1] before including in the SWAP.

3. Synergy among Missions:
   - Swachh Bharat Mission (SBM), Smart City Mission (SCM) and National Urban Livelihood Mission (NULM) have components common with AMRUT 2.0.
   - Convergence/ synergy among these Missions is essential to achieve the outcomes targeted towards enhancing ease of living. The **ULBs** which cannot plan projects to achieve intended outcomes due to resource crunch **can plan the projects in convergence**.

1 SHPSC: State High Powered Steering Committee

Thank You!

SCADA Basics & Instrumentation

By Nitin Fegade
Director & CEO

REGD. OFFICE:

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TOPICS: We will cover today….

- WHAT IS SCADA…?
- COMPONENT OF SCADA
- HARDWARE & SOFTWARE

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What is SCADA

SCADA- Supervisory Controls & Data Acquisition:

SCADA stands for Supervisory Control and Data Acquisition. SCADA technology was used to connect remote sites spread geographically.

It is a combination of hardware and software that enables the automation of industrial processes by capturing real-time data.

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What Is SCADA…?

SCADA- Supervisory Controls & Data Acquisition:

The control room does supervisory control by providing set points to the RTUs. To begin with, SCADA vendors supplied complete SCADA solutions with RTUs and SCADA software. Now there are many vendors who supply only SCADA software packages (based on the Windows platform) with which the user can build his own HMI or control application by using PLC as RTUs.

Now PLCs have advanced to include analog control and many other advanced control functions.

So, a combination of PLC with SCADA software packages works out to be functionally like DCS technology.

Such implementation will also be much cheaper than DCS technology. This type of solution will also not have proprietary control by one vendor.

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Components of SCADA:

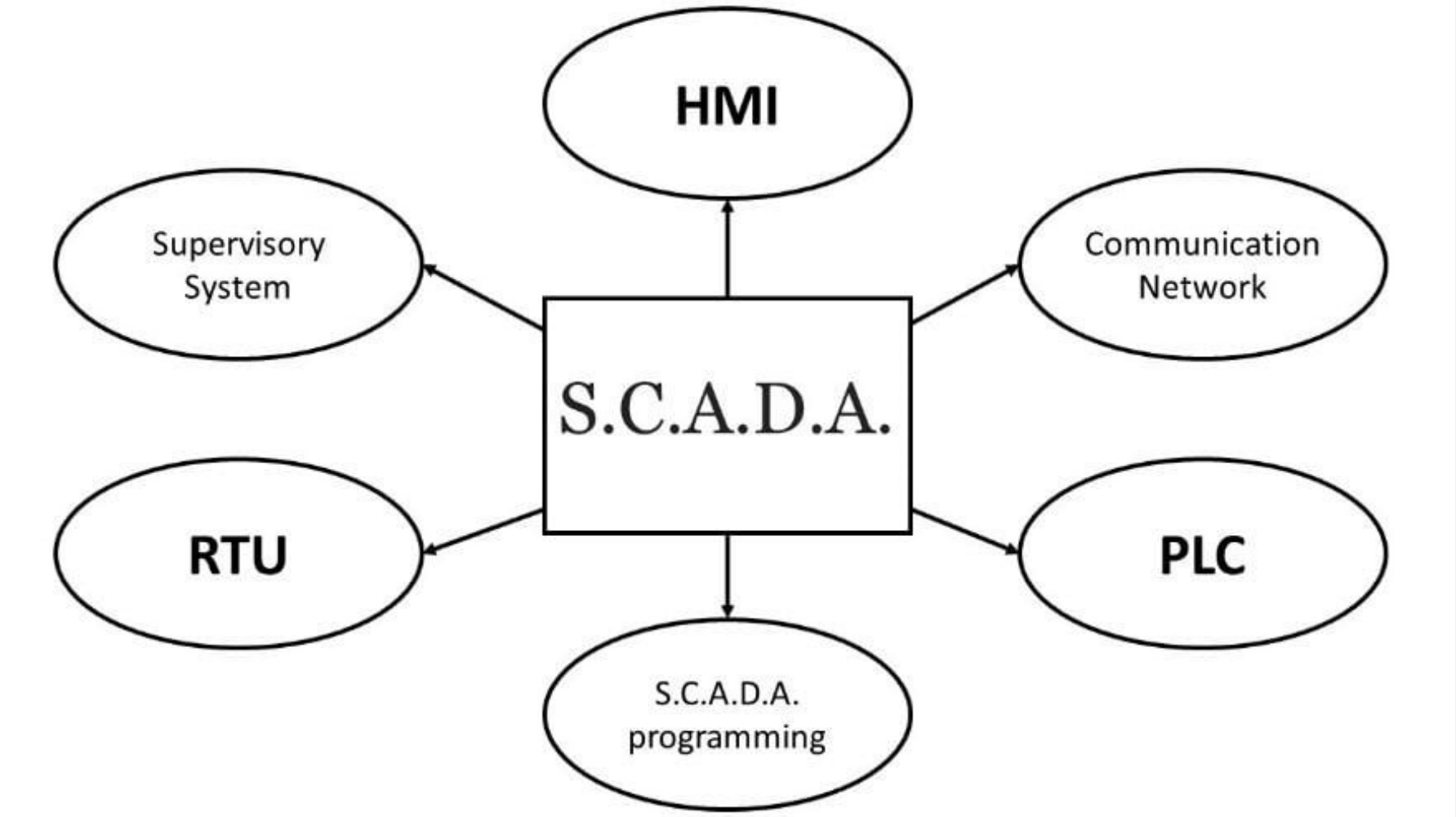
As the function of SCADA as the controller, there re some components of a SCADA system that we should know. They are:

1. Input hardware
2. Output hardware
3. Controllers
4. Networks
5. User interface
6. Communication equipment
7. Software

Below are the components of SCADA based on those four function mentioned:

1. Sensors and control relays that the function of to manage the system
2. RTUs that will respond the input of data automatically
3. SCADA master units that will serve the best function of processor
4. Communications network that will connects the RTU with the SCADA unit.

Components of SCADA:



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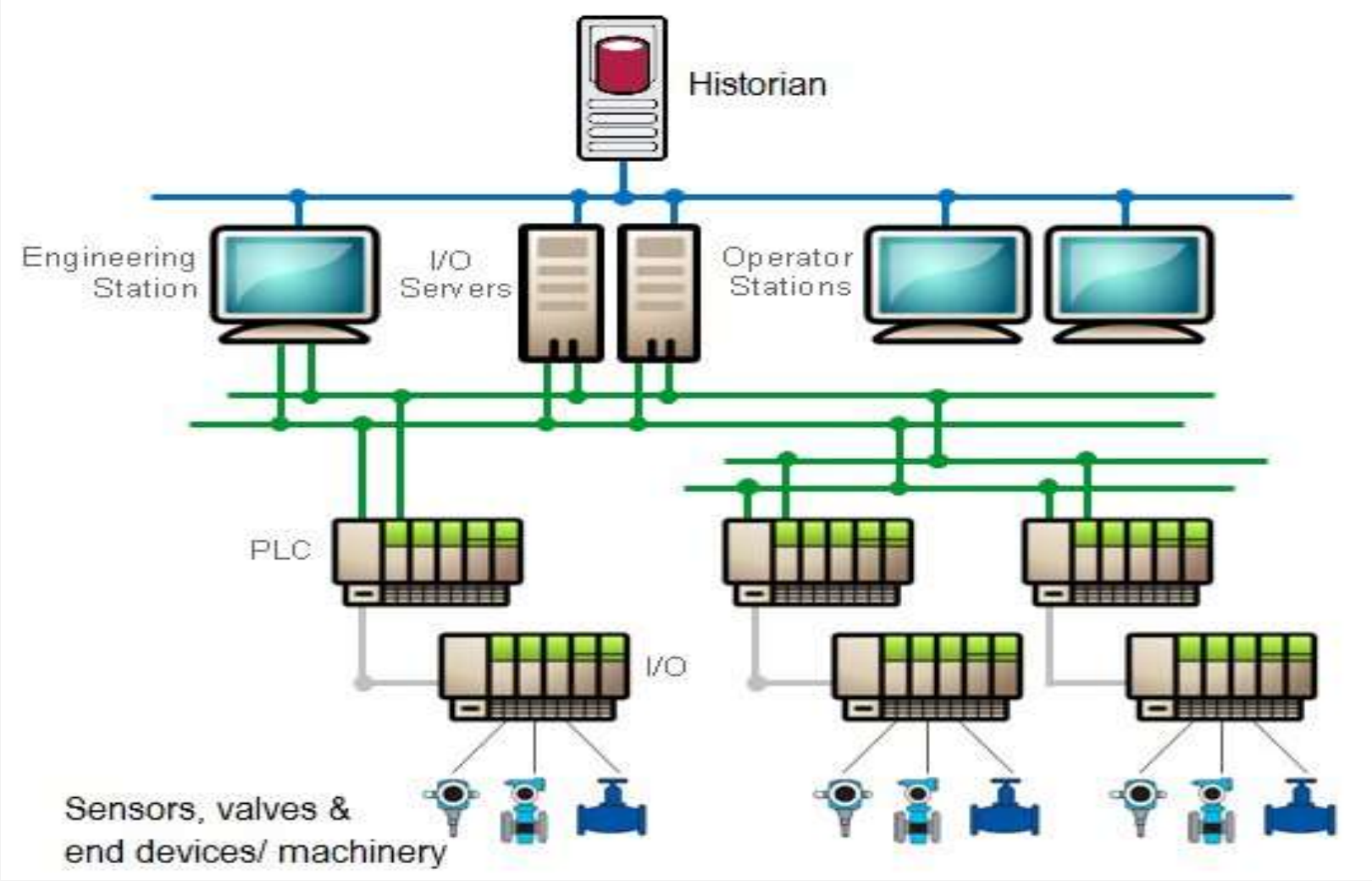
Components of SCADA:



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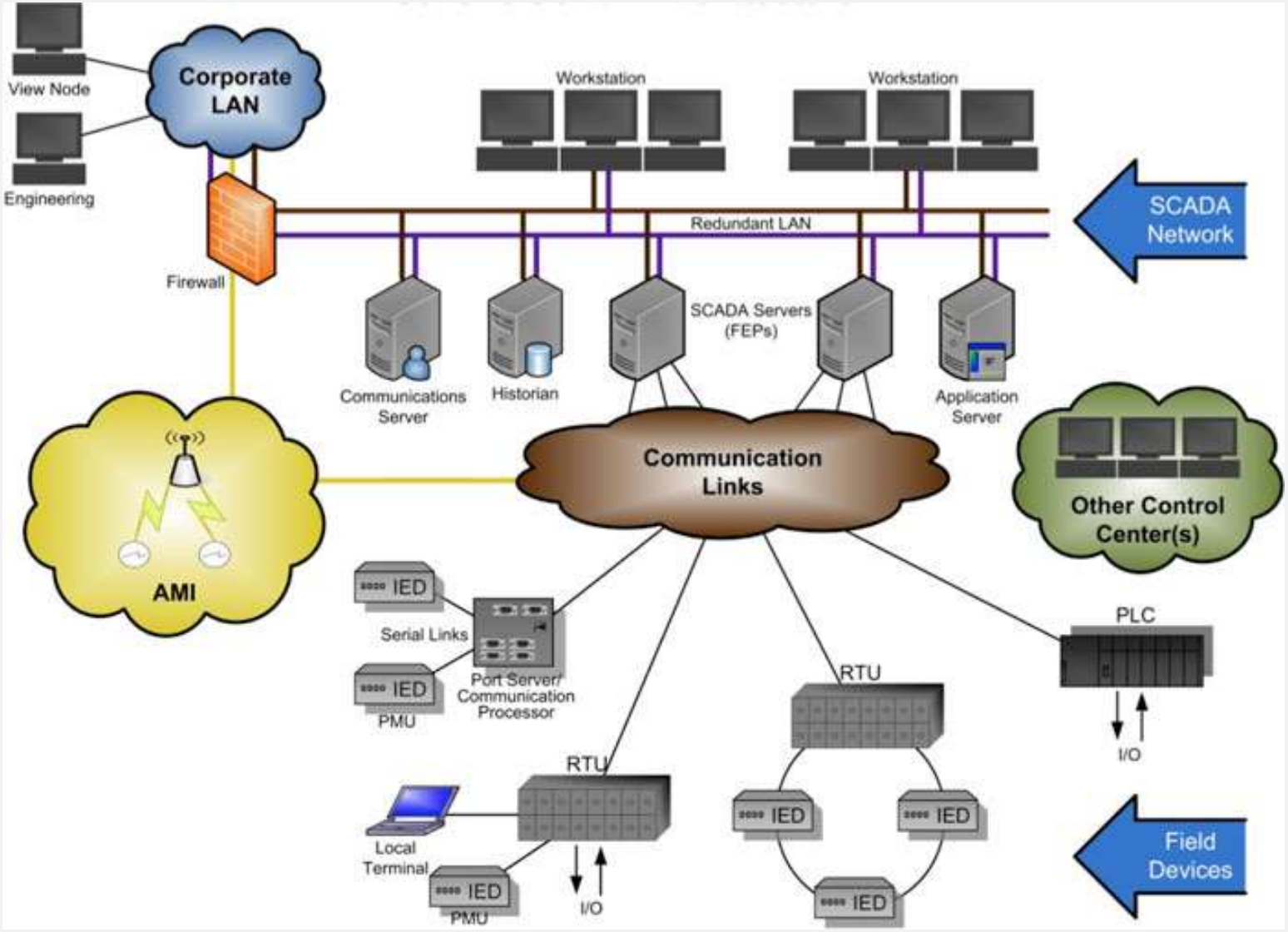
Components of SCADA:



Hardware & Software:

The major kind in components of a SCADA system

- An equipment collector

It is an operator provider that will give the best determination for distributing the information included. It is done unphysical present so the data will be automatically encrypted.

- An operator control

This component of a SCADA system provides the best technique for giving the best result of SCADA system.

- Data collector

It is important for communication function. So, the main function of the SCADA will be applied well.

- Water is a necessity of life used for many purposes one of which is industrial use.

- Industries generally take water from rivers or lakes, but they must pay heavy taxes for that. So, it's necessary for them to recycle that to reduce cost and conserve it.

- Main function of Effluent Treatment Plant (ETP) is to clean industry effluent and recycle it for further use.
- Many manufacturing industries produce their products with using water. With their products industries produce wastewater, otherwise known as effluent, which can be removed with the help of an effluent treatment plant (ETP).

- Automation is basically the delegation of human control functions to technical equipment. It uses controlled systems such as computers, PLCs, SCADA, Instrumentations, and Microcontrollers to control machinery and processes to reduce the necessity of human involvement and mental requirements, Automatic data records, etc.

- Automatic systems are being preferred over manual system because they reduce individual's effort., by use of PLCs everything seems to be more accurate, reliable, and more efficient than the existing manual controllers.

- Manufacturers face strict regulations on discharge and waste. Effluent from industries must meet the national effluent discharge quality standards (NEDQS) set by the Government.
- In this paper, we propose a few automated processes for a partial automation of the apartment which can be mostly used in residential areas and industries. It is developed using PLC.

- The main intent of the paper is to treat the wastewater which can be in turn used for many other purposes and can be cost effective as well

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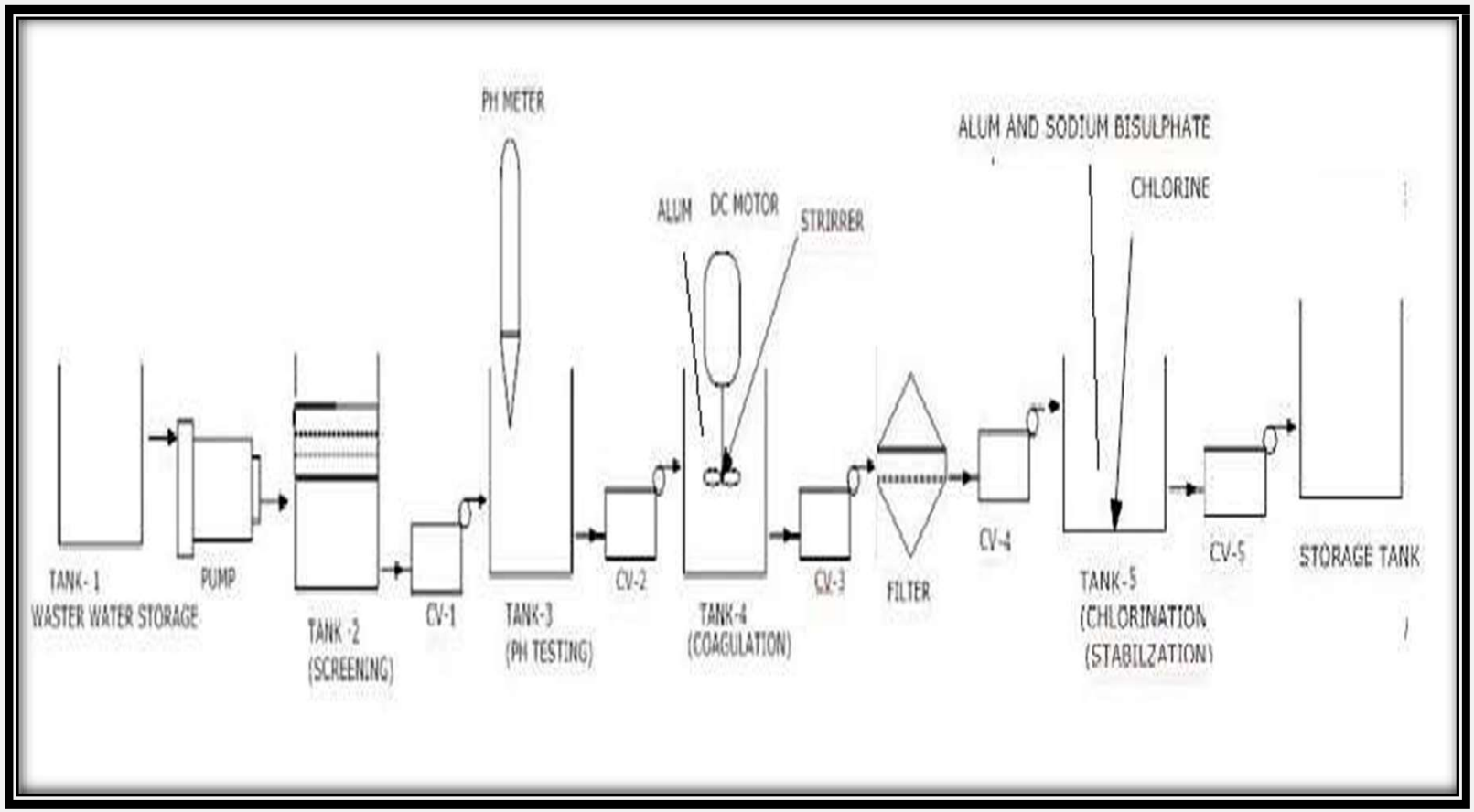
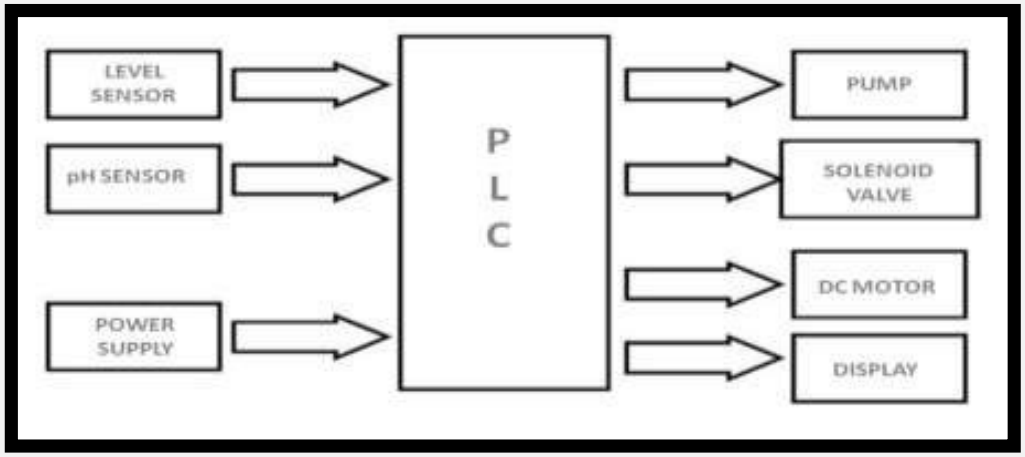
Process Flow



- The next stages consist of the flocculation, coagulation etc. as water treatment processes and the disinfection of water takes place by adding Alum, Sodium Bi sulphate, and chlorine.
- The solenoid valves open and close according to the controlling action of PLC to allow the water treatment in different stages.

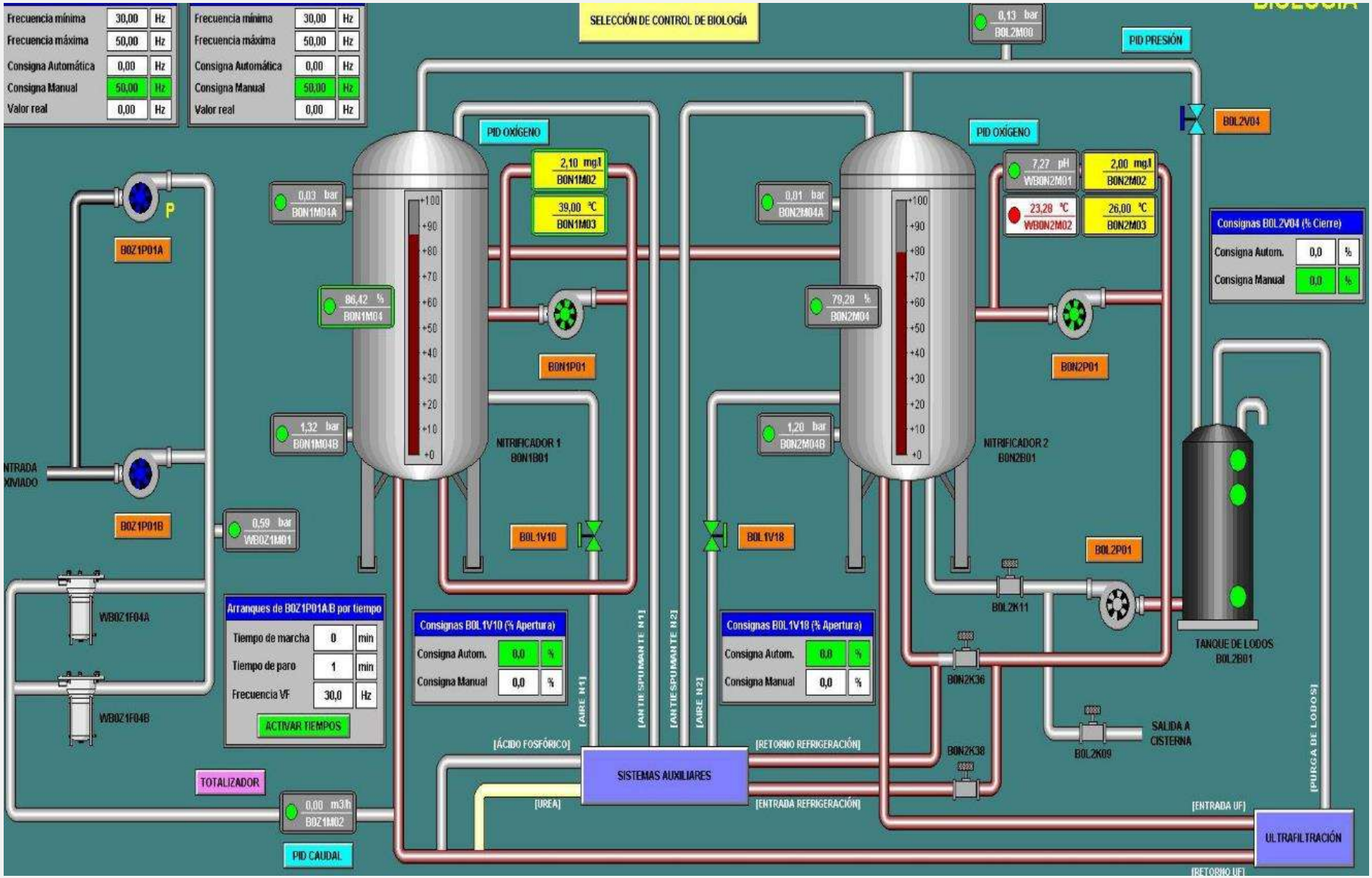
- The input action consists of a reservoir tank consisting of the wastewater to be treated. The pump controlled by PLC pumps the water through a stainless-steel mesh to filter macro particle macro particle like sand, stones etc..



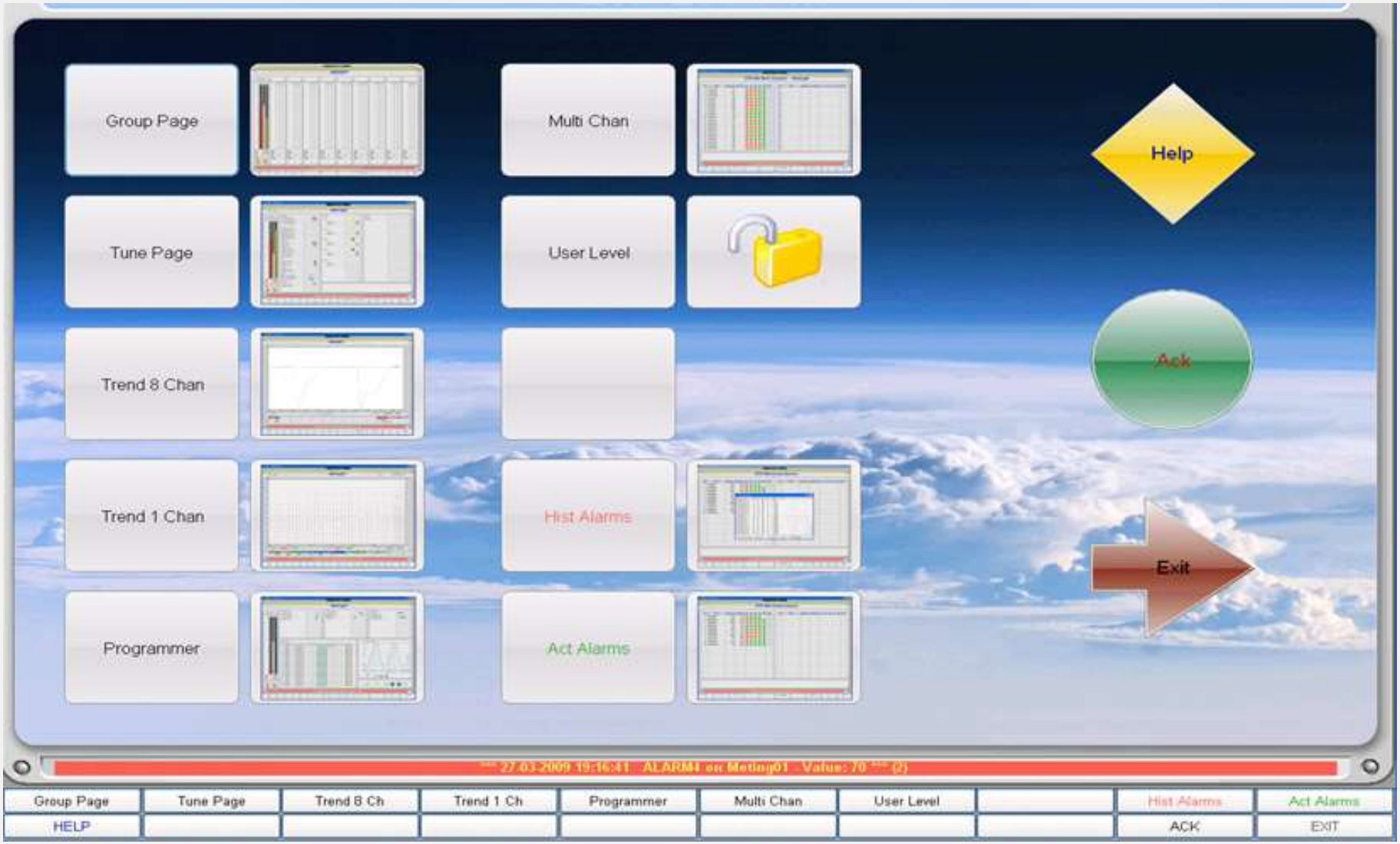
- The next stage consists of the filter membrane which filter minute or dissolved particle present in the water. The system also allows the sedimentation to take place as the heavier particles settle at the bottom of the tank.

- Level sensors are applied in final tank to check the total amount or level of the wastewater treated.
- The pH value of the treated water is checked if it lies in usable range the water is stored in the treated water tank and the untreated water i.e., the water which does not fulfil the pH criteria is pumped back to the wastewater reservoir and the whole process for effluent treatment is repeated

Navigation Screen-Examples



Main menu


Group Page
Multi Chan
Help
Tune Page
User Level
Trend 8 Chan
Ack
Trend 1 Chan
Hist Alarms
Exit
Programmer
Act Alarms
Group Page
Tune Page
Trend 8 Ch
Trend 1 Ch
Programmer
Multi Chan
User Level
Hist Alarms
Act Alarms
HELP
ACK
EXIT

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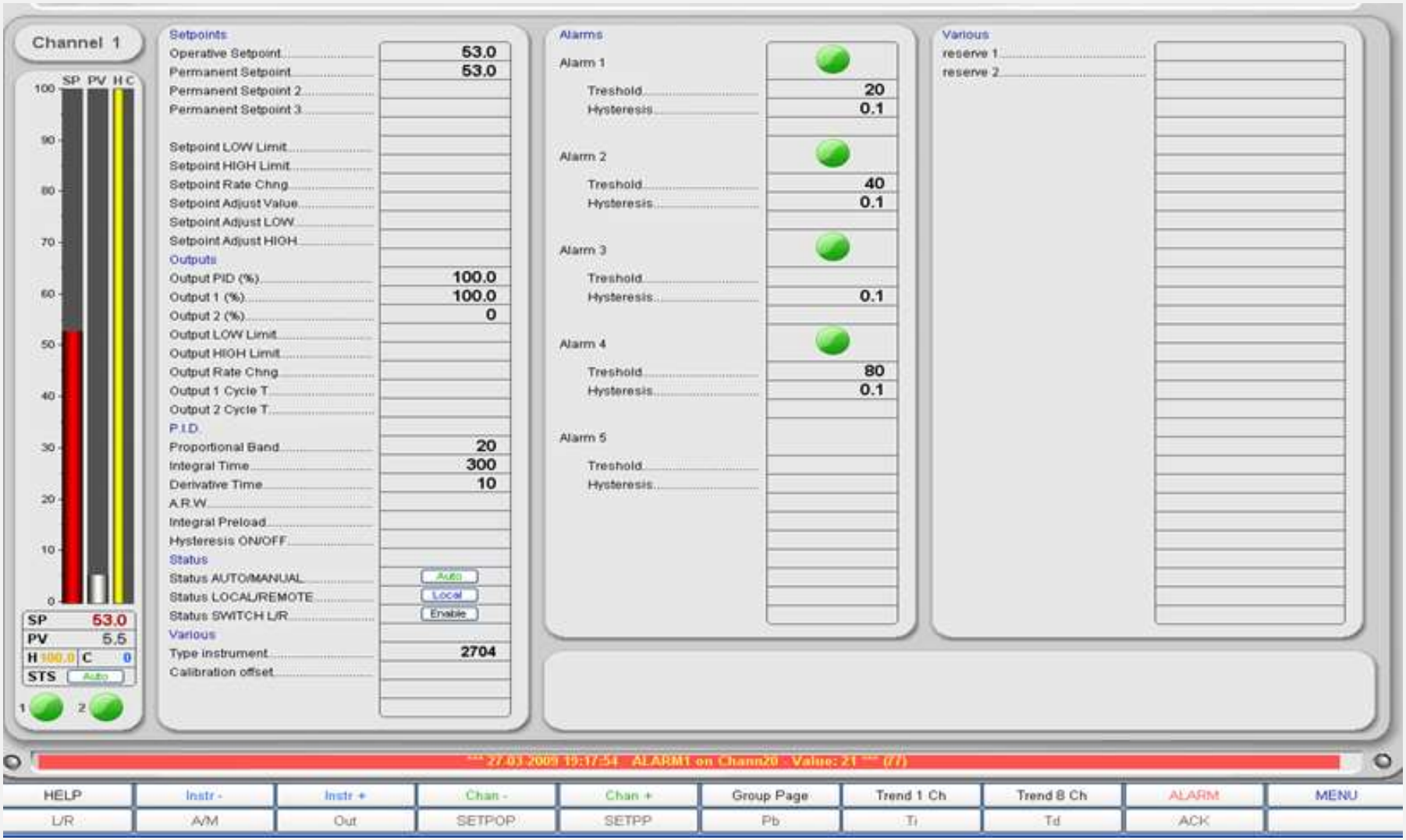
Instrumentation-Analytics



Trends-Historical

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Application of SCADA in Wastewater Management

What is SCADA

- Supervisory Control And Data Acquisition
  (Office of CE or City Engineer)

Monitor Key Parameter

Control the key parameter

Keep Record

Analyse the data

Plan improvements & Corrections/ Expansion

What is SCADA

- It is fully computerised system which works without Human intervention with following advantages.

Consistency in repetitive work

Elimination of Human Errors thus more accurate and reliable

Data on digital platform

Easy data transportation

In built analytical tools

Scalable

What is Waste Water Management

- Its Management of waste Water

a. Collection.
b. Transportation
c. Treatment
d. Disposal

Reuse

Why do we need Wastewater Management

- Till 20th Century, treatment of waste water was considered as least priority activity by most of the Governing Bodies in India
- Due to lack of awareness, compulsive needs, absence of Stringent Environmental Norms and allocation of funds

Why do we need Wastewater Management

- A 2010 survey by the Central Pollution Control Board found that Indian towns and cities treat less than 30% of their sewage, and discharge 26.5 million m3/d of untreated wastewater into rivers and coastal waters
- The Central Public Health Engineering (CPHEEO) has estimated the requirement of funds for 100 percent coverage of the urban population under safe water supply and sanitation services by the year 2021 at. 34,581.00MUS$

What needs to be managed in Wastewater

- What all do we manage ?

The things that are precious to us.

e.g.

Health

Wealth

Progress & Sustainability

What needs to be managed in Wastewater Management

So we manage ?

Quality of Waste Water

Cost of all the activities

Upkeep & Maintenance of Facility.

What are the activities in Wastewater Management

Collection & Transportation

Treatment

Disposal of Finished product, biproduct, Trash, Scrap

Collection and Transportation

- Collection Chambers,
- Sewerage Lines
- Sewage Pumping

Treatment

- Primary
- Secondary
- Tertiary

Types of processes in Wastewater Treatment

1) Extended Aeration
2) SBR
3) MBBR
4) MBR
5) IFAS

Disposal

- Release of treated water to Waterways,
- Pumping for reuse
- Transportation through Tankers for Reuse

What are the key parameters to monitor & control

- Collection and Transportation

1. Hydraulics
2. Power Consumption
3. Life and efficiency of Pumping Machinery

What are the key parameters to monitor

- Treatment

There are 4 different types of pollutants or different elements which decide quality of water.

- 1) Organics
- 2) Solids
- 3) Nutrients
- 4) Physical properties & Inorganic substances

What are the key parameters to monitor

- Treatment

The parameter to measure organic contamination are

1) BOD (Biological Oxygen Demand

2) COD (Chemical Oxygen Demand)

3) TOC (Total Organic Carbon)

4) Oil and Grease

More the value of any of above poor is the quality of water

What are the key parameters to monitor

- Treatment

The parameter to measure solids contamination are

- 1) TS (Total Solid)
- 2) TVS (Total Volatile Solid)
- 3) TSS (Total Suspended Solids)
- 4) TDS (Total Dissolved Solids)

More the value of any of above poor is the quality of water

What are the key parameters to monitor

- Treatment

Nutrients help growth of living micro organisms. And more presence of these organisms means poor quality of water.

The nutrients are in the form of Nitrogen and Phosphorous . And they can be measured in different form as

- 1) NH (Ammonia)
- 2) TKN (Total Kjaldah Nitrogen)
- 3) N-N (No2- N, NO3-N :Nitrate)
- 4) TP (Total Phosphate)

What are the key parameters to monitor

- Treatment

The physical properties can be measured in different parameters as

- 1) pH
- 2) Temp
- 3) Turbidity
- 4) Odour

What are the key parameters to monitor

- Disposal

- A. Treated Water
- B. Gas
- C. Sludge

Components of SCADA for Waste Water

- Sensors
- Controllers
- Communication Devices
- HMI

- Storage Devices

Sensors

- Pressure
- Flow
- Level
- Power

Controllers

- Stand Alone Controllers.
- PLC
- DCS

HMI

- Stand Alone On Control Panel
- PC Based Display systems
- Large Video Screens
- Printers, etc.

Communication Devices

- Modem (Radio)
- Modem (GPRS)
- ISP
- Network switches, Firewall

Data Storage Devices

- Servers (on site)
- UPS
- Control Room
- Network Connectivity
- Network switches, Firewall

Special Precautions

Protection from H2S :

- 1. Always use Conformal Coated Electronics.
- 2. Use Enclosures with MOC SS304 (Minimum).
- 3. Use Enclosures with IP protection of minimum IP55

Design Aspects

- Level of auto operations
- Redundancy
- Stand Alone /Network
- SLA (Service Level Agreement committed in main DPR of STP)
- End Use
- Budget

Data for various users

- Operation Team at Site
- Supervisory Team
- Top Management
- More Thrust on Exception Reports and Dash Boards rather than traditional daily report. (More Data leads to ignoring report review)

IP 67 TESTED PLC PANELS

SBR

CONTROL ROOM

60 MLD Palsana ,Surat


60 MLD PALSANA

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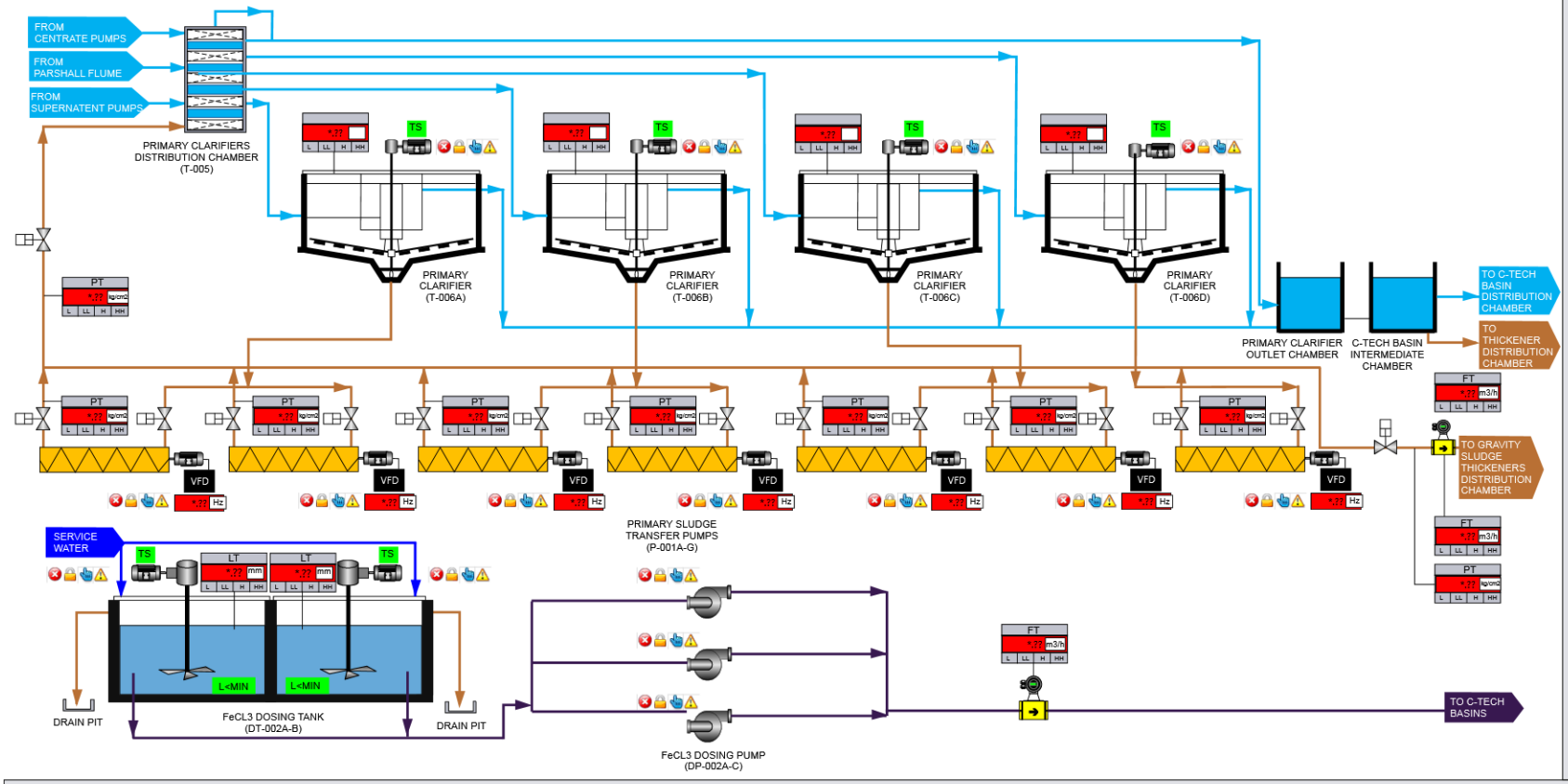
PRIMARY TREATMENT



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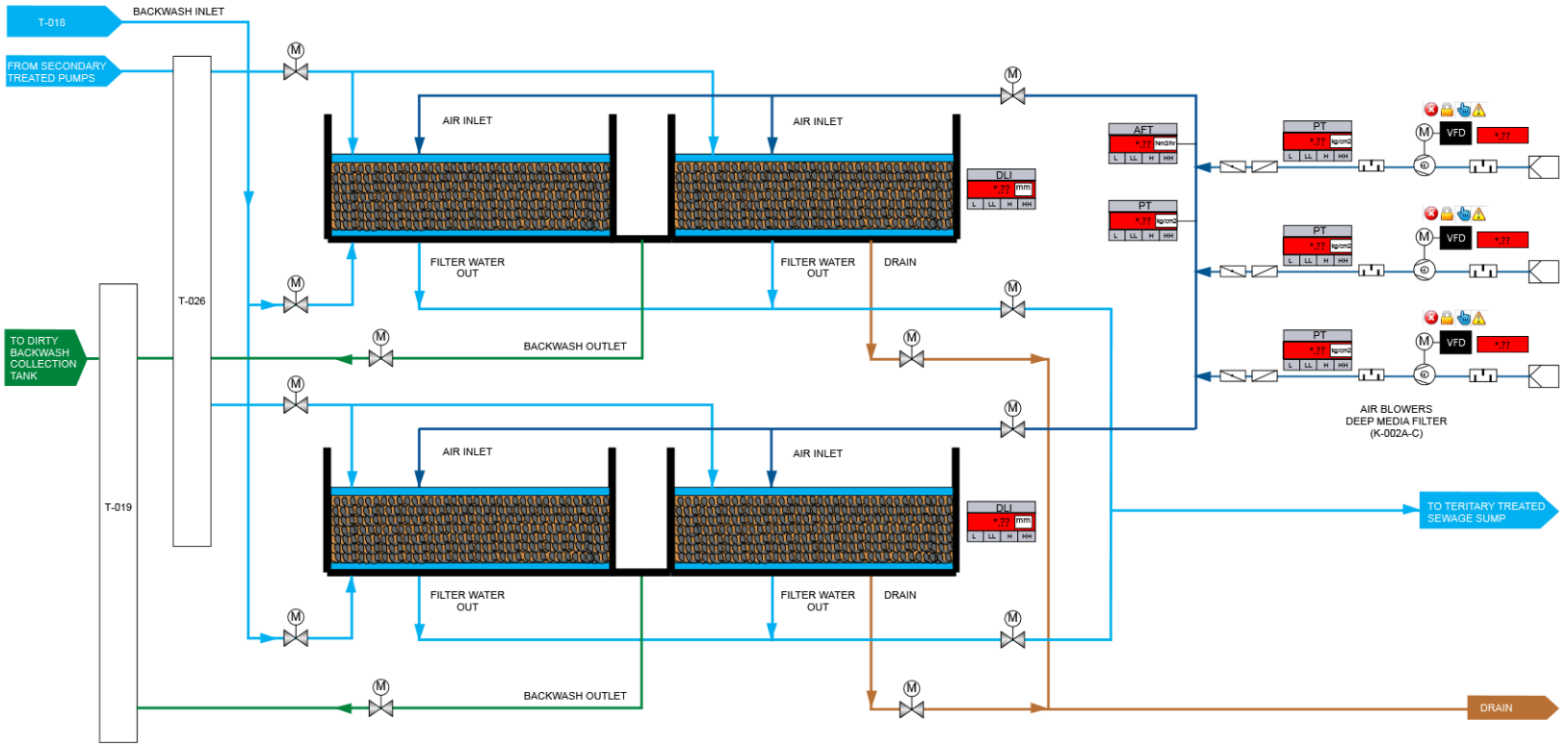
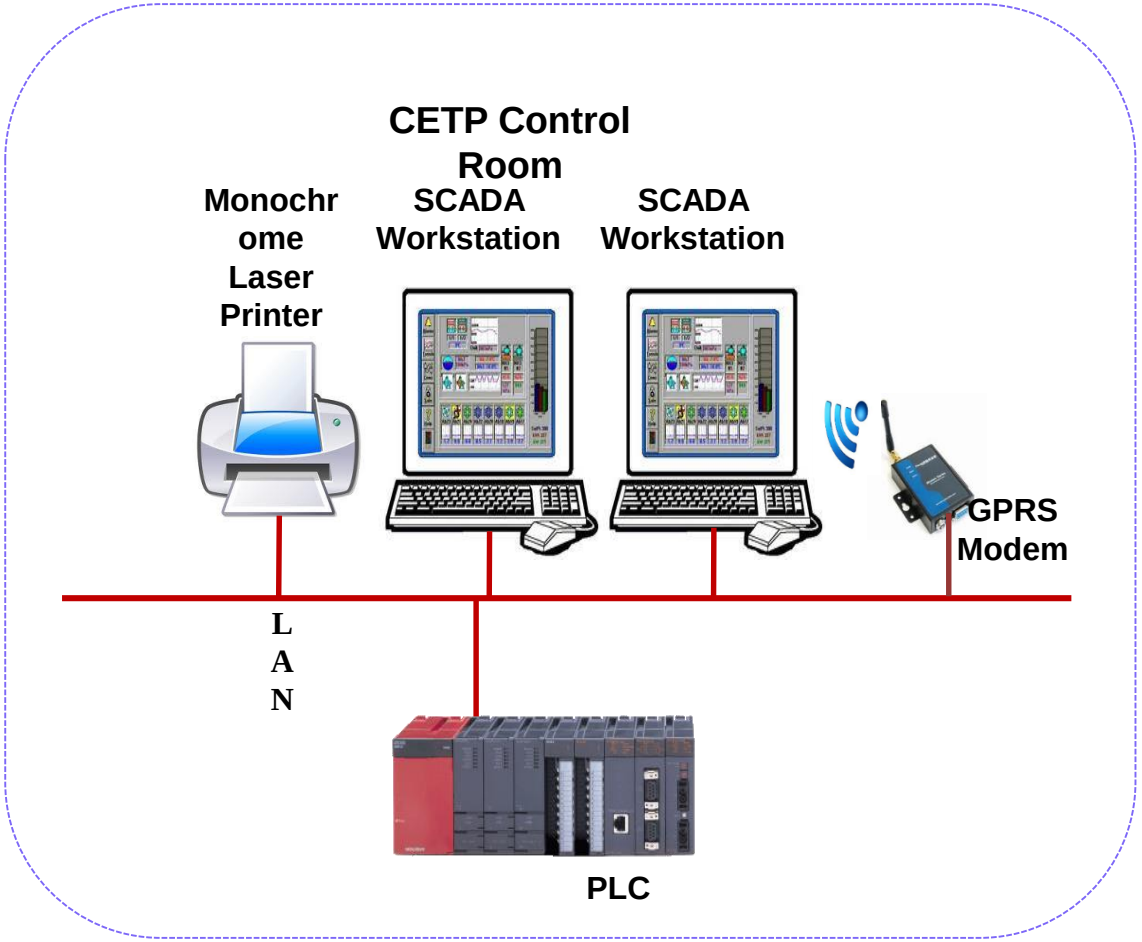
DEEP BED MULTI MEDIA FILTERS



165 MLD AURANGABAD

System Architecture: 5 MLD CETP, Amaravati



CHAVARE ENGINEERING

130 MLD STP+TTP NAGPUR

MAIN CONTROL ROOM

Online Analyser at STP

Analyser Sampling Station

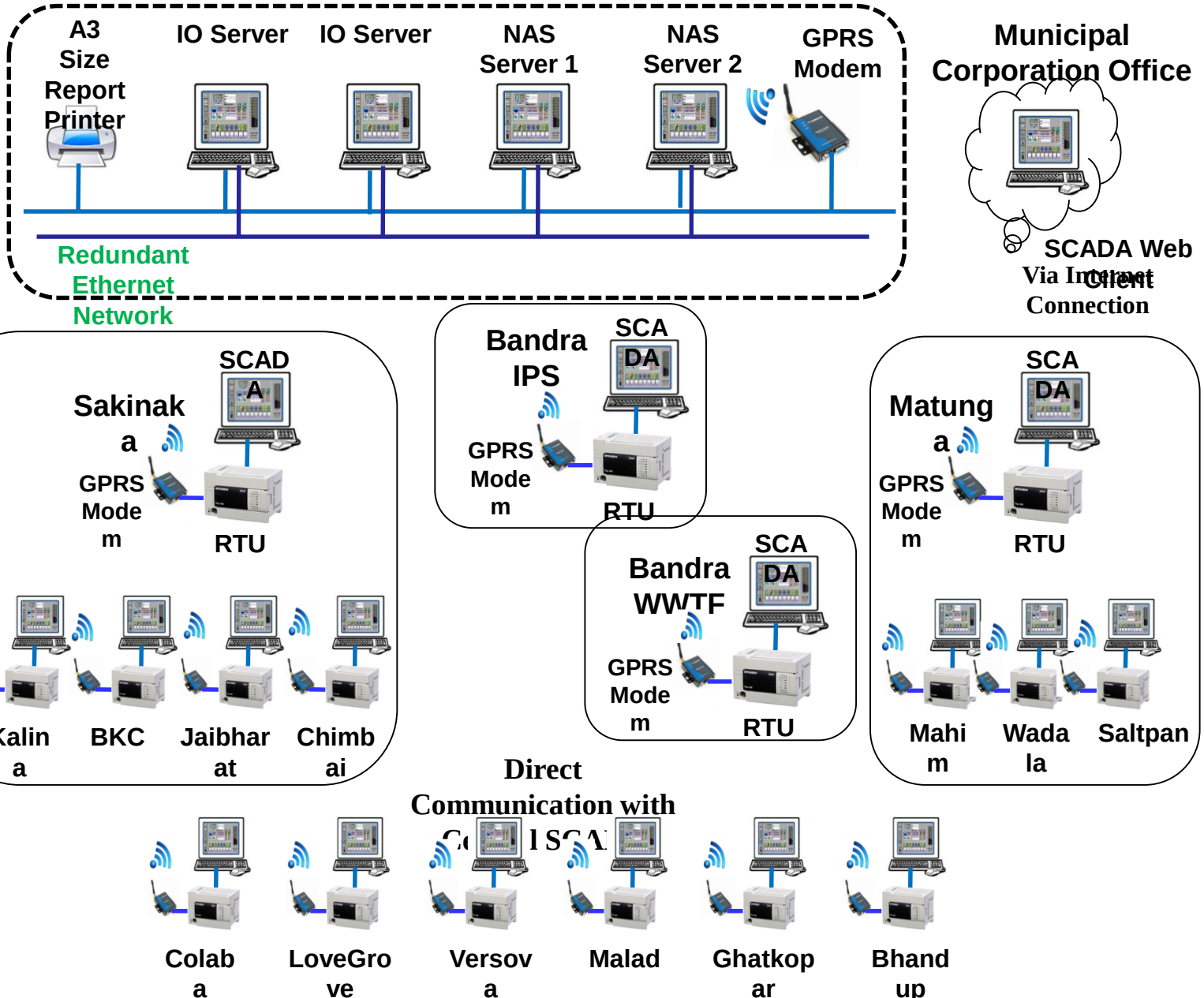
SEWAGE SCADA FOR MCGM

- Commissioned in March 2018

Scope Of Work

- Central SCADA System is divided into 3 Tiers
  - Tier 1 : Central SCADA system (1 No.)
  - Tier 2 : Group Station which will be connected to multiple Satellite Stations (4 Nos.)
  - Tier 3 : Satellite Stations (13 Nos.)
- Each Group Station & Satellite Station will have
  - Remote Terminal Unit (RTU)
  - Local SCADA
- Tier 3 Stations will exchange data with Tier 2 Stations using GPRS Network once every 10 Minutes.
- Tier 2 Stations will exchange data with Central SCADA using GPRS Network once every 10 Minutes

System Architecture

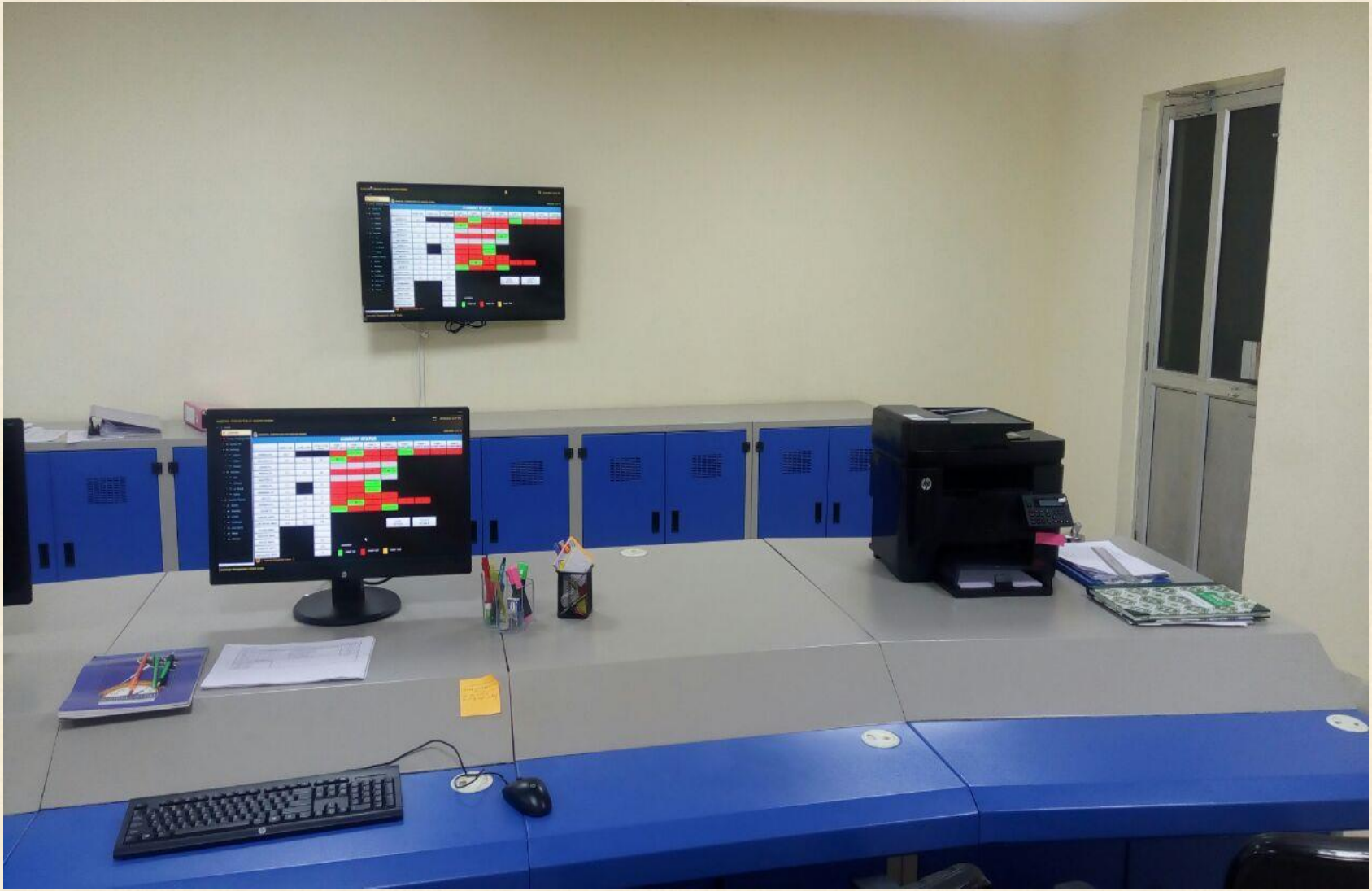


Five Pumping Stations Flow meters are installed on delivery of individual Pump.

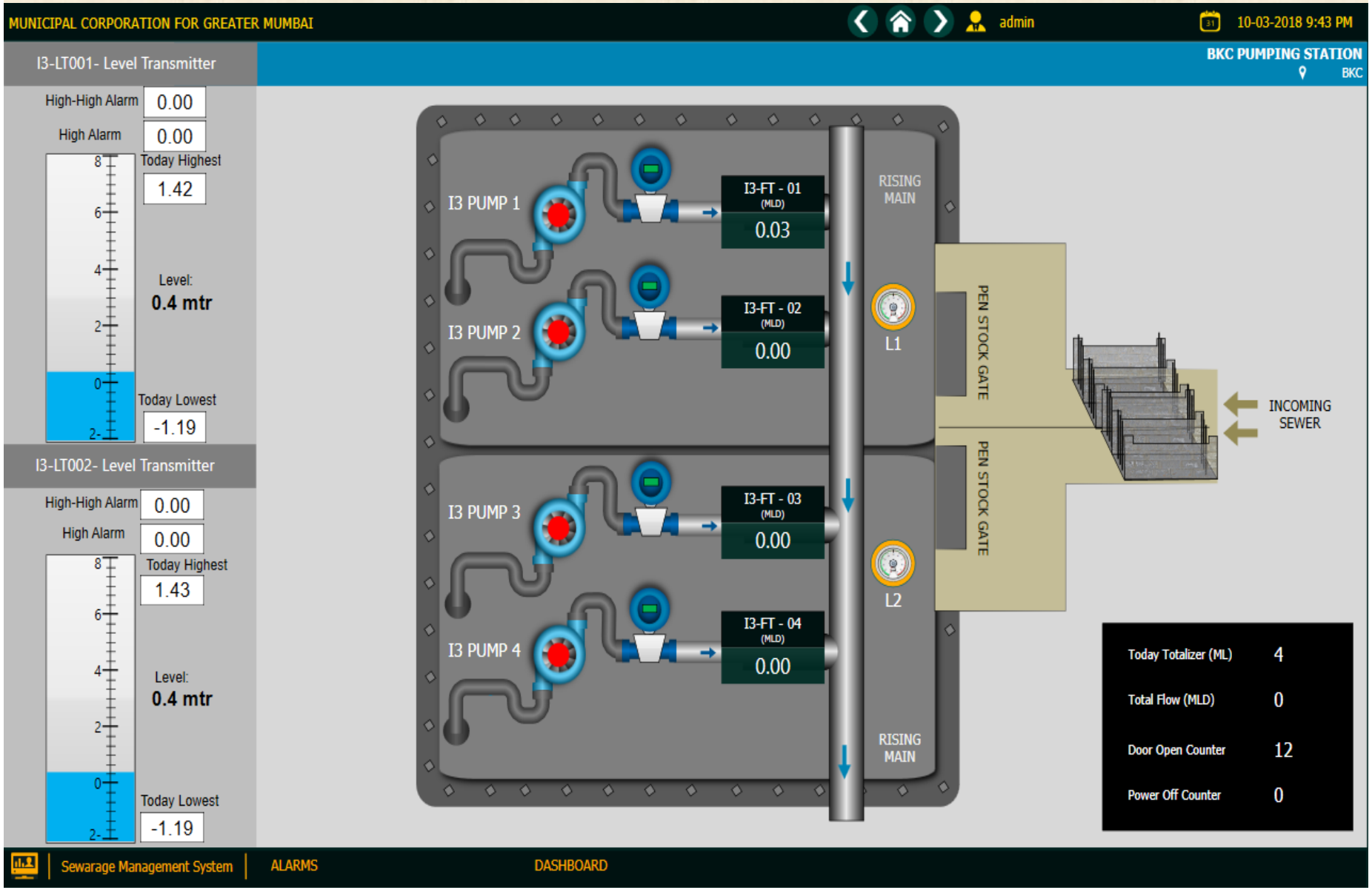
(Wadala-Mahim-Matunga-BKC-SakiNaka)

Level Sensors are installed on Partial Fume Chamber at WWTF and Bandra IPS For measuring Flow

Central Control Room



Typical Screens of SCADA



23 MLD REUSE PLANT AT RCF, MUMBAI

MBR + RO

Application of SCADA in Wastewater Management

Project 1 : RCF (Rashtriya Chemicals & Fertilisers, Mumbai)

- Buy Water from MCGM
- Use Treated Water for Self use and BPCL (40 MLD)

Application of SCADA in Wastewater Management

Project 2 : MAHAGENCO Nagpur

- Buy Sewage From Nagpur Corporation and use 120 MLD for Koradi and Khaperkheda

Application of SCADA in Wastewater Management

- Surat Municipal Corporation

WATER DISTRIBUTION SCADA

Use of SCADA for Water & Wastewater Treatment Plants

Topics

- Water Distribution SCADA
- Typical Architecture
- Highlights
- Benefits
- Example Displays

Water Distribution SCADA

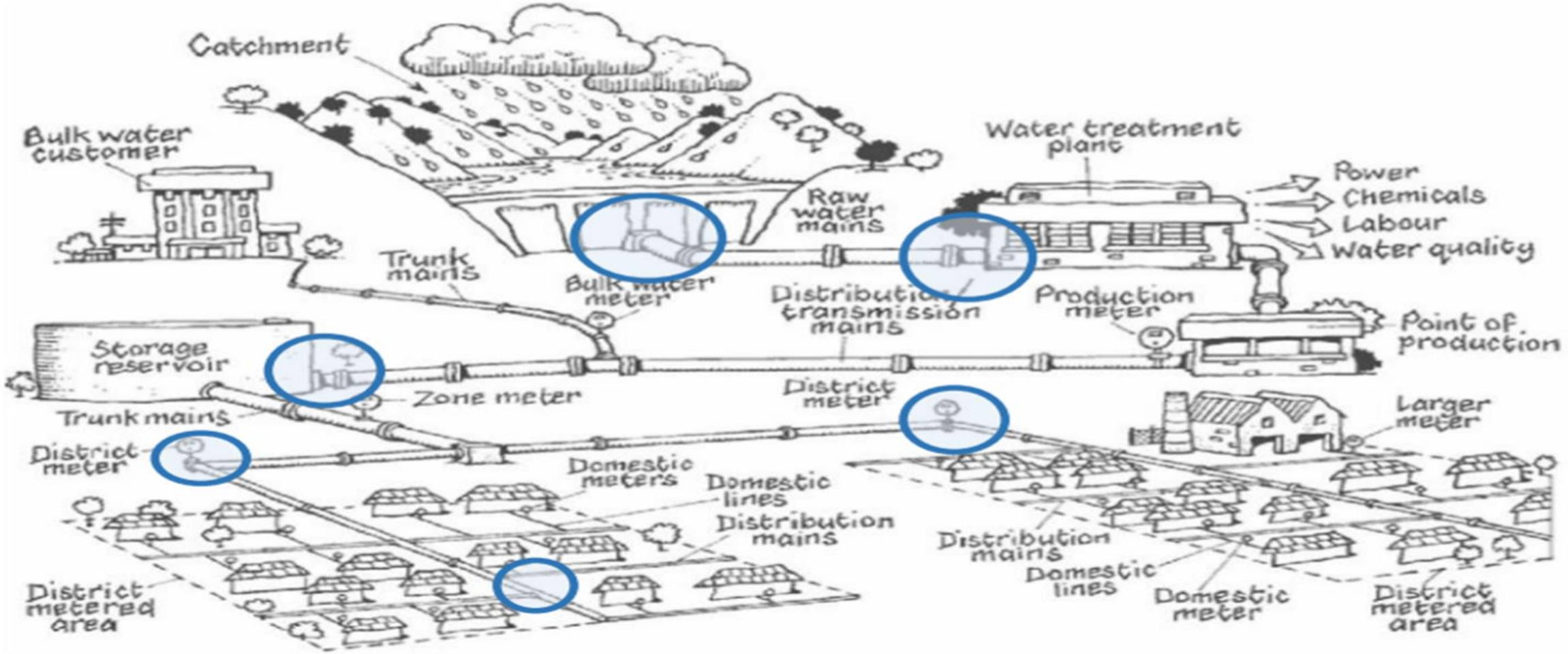
India is investing heavily in making its cities smarter, sustainable and livable for the ever-increasing population.

One of the most important areas is sourcing and supplying clean water to the citizens. Automation and centralized monitoring of the system are changing the approach of municipal bodies towards high efficiency and low wastage.

Monitoring the complete water flow system starting with the intake of water from the water body like river or lake/reservoir to processing the water & make it useable to the distribution up to the consumers is the need of the hour.

To plug all leakages or wastage is equally essential for sustaining the supply today and to plan for the future.

Water Distribution



Major Area in Water Network & Management

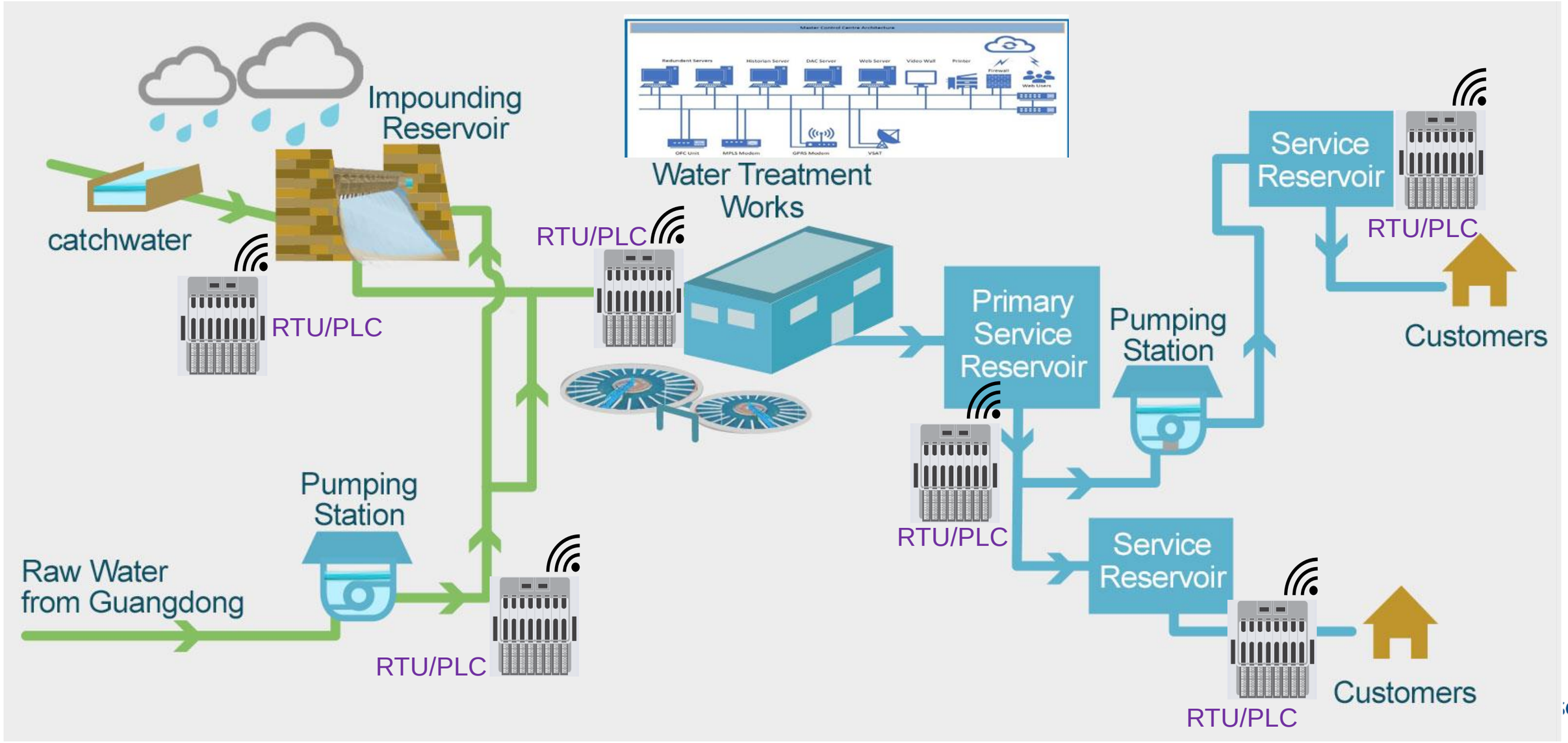
- Dam Automation
- Pipeline Network Operation & Monitoring
- Water Treatment Plant Operation & Monitoring
- Wastewater Treatment Plant Operation & Monitoring
- Pumping Station Automation
- Distribution from WTP to Service Reservoir
- Distribution from Service Reservoir to User

Inlet System

Process

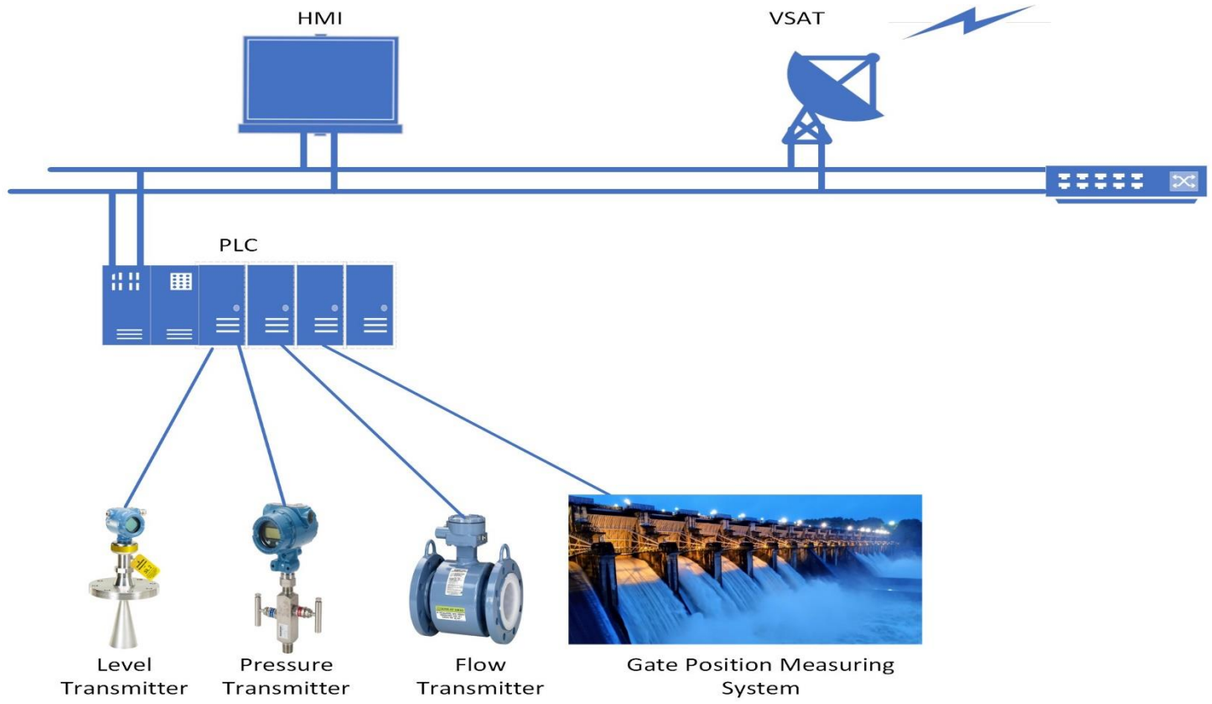
Distribution System

Typical Architecture



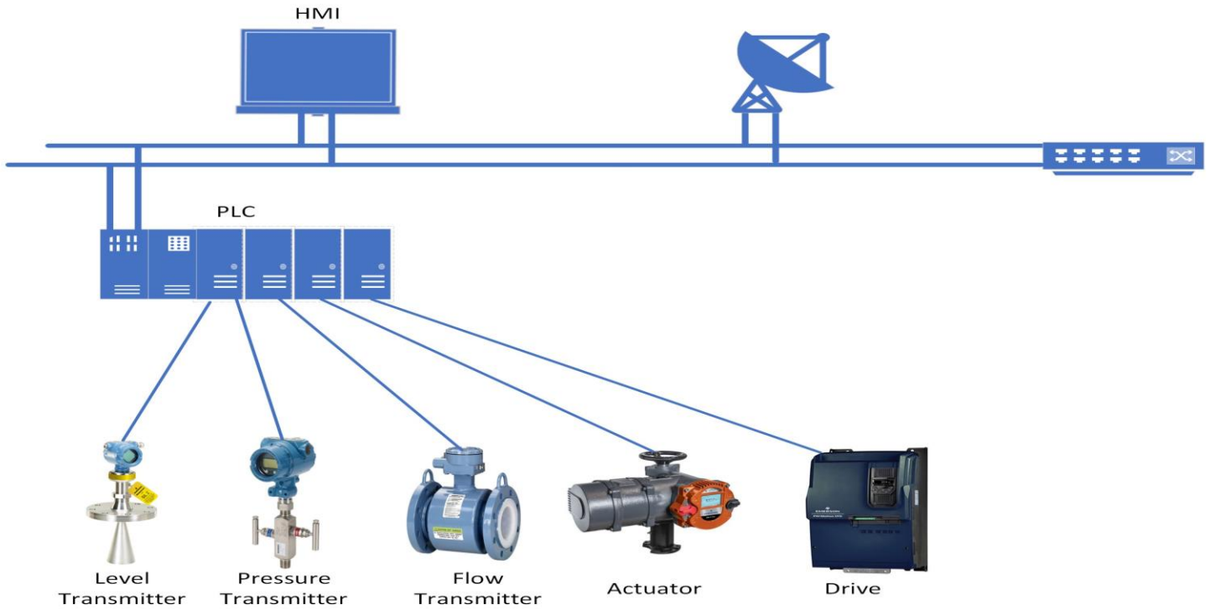
Dam Automation

- The main objective of Dam automation is to regulate the radial gates on the water reservoir by automation system to maintain either a constant level or a constant flow.
- DAM SCADA system collect & process data from instruments installed on Dam for operation & monitoring purpose.
- **Major Components of DAM Automation**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - PLC / RTU Panel
  - Gate Position Measuring System
  - Water Level Sensors
  - Pumps & Actuators
  - IP based cameras and PTZ cameras
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure



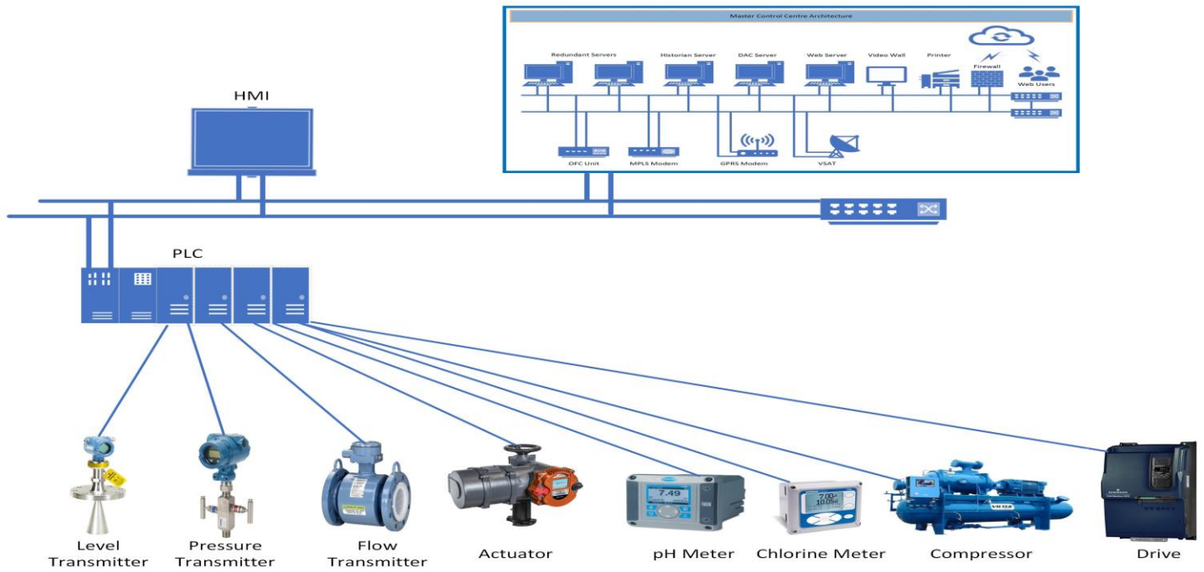
Pipeline Network Operation & Monitoring

- Improved water management by getting accurate data of instruments Cross regulator and headworks.
- Reduction in human intervention minimizes Operational errors.
- Remote monitoring of system will ensure the better supervision from management level.
- **Major Components of Pipeline Network Operation & Monitoring SCADA**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - PLC / RTU Panel
  - Flow & Pressure Meter
  - Pumps & Actuators
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure

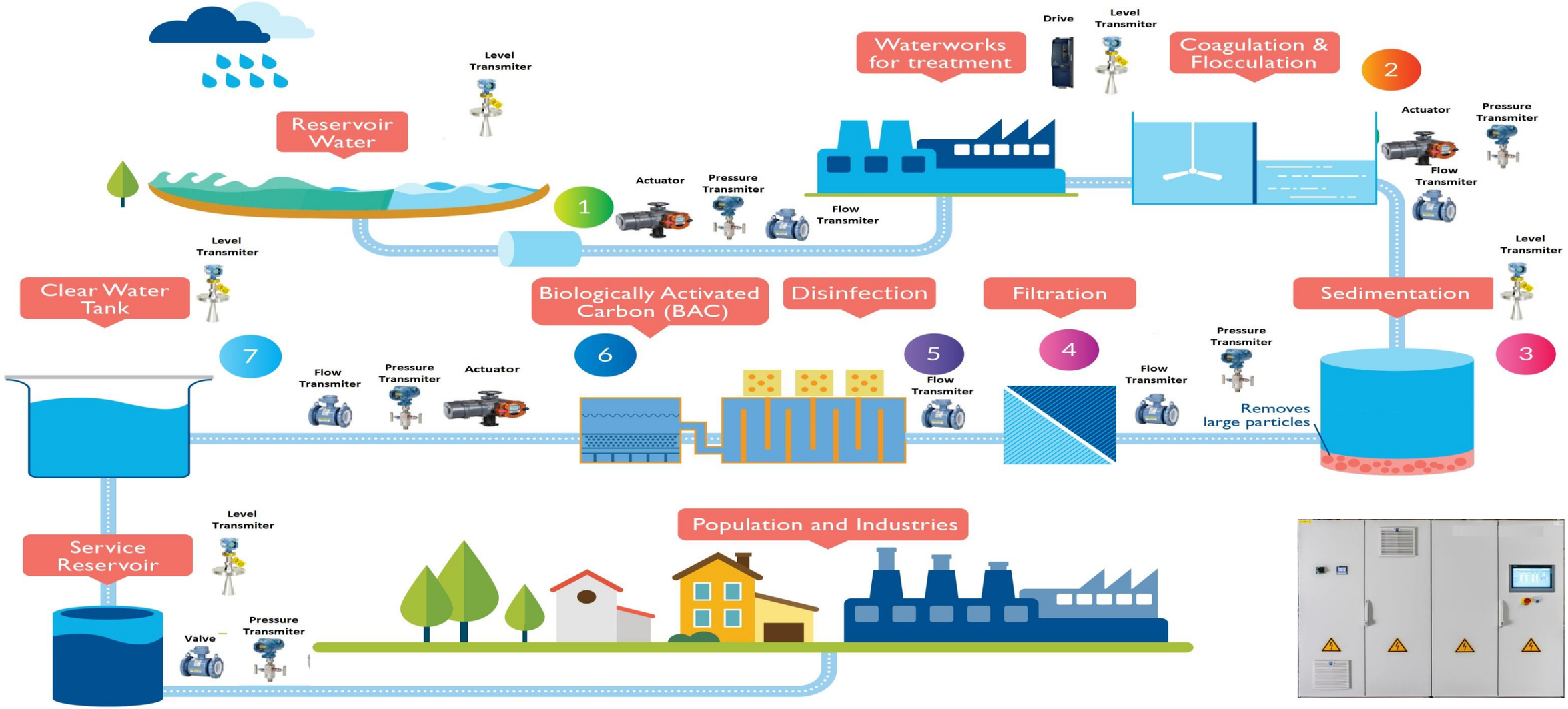


Water Treatment Plant Operation & Monitoring

- Water treatment removes contaminants and undesirable components or reduces their concentration so that the water becomes fit for its desired end-use. This treatment is crucial to human health and allows humans to benefit from both drinking and industrial use.
- The SCADA software is a complete automation solution providing graphical visualization, Data acquisition and Supervisory Control for field instrumentation program.
- **Major components of Water Treatment Plant Operation & Monitoring SCADA**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - Flow, Level & Pressure Meter
  - Ph Meter, Chlorine Meter
  - Compressor
  - Pumps, Actuators & Valves
  - SCADA System
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure

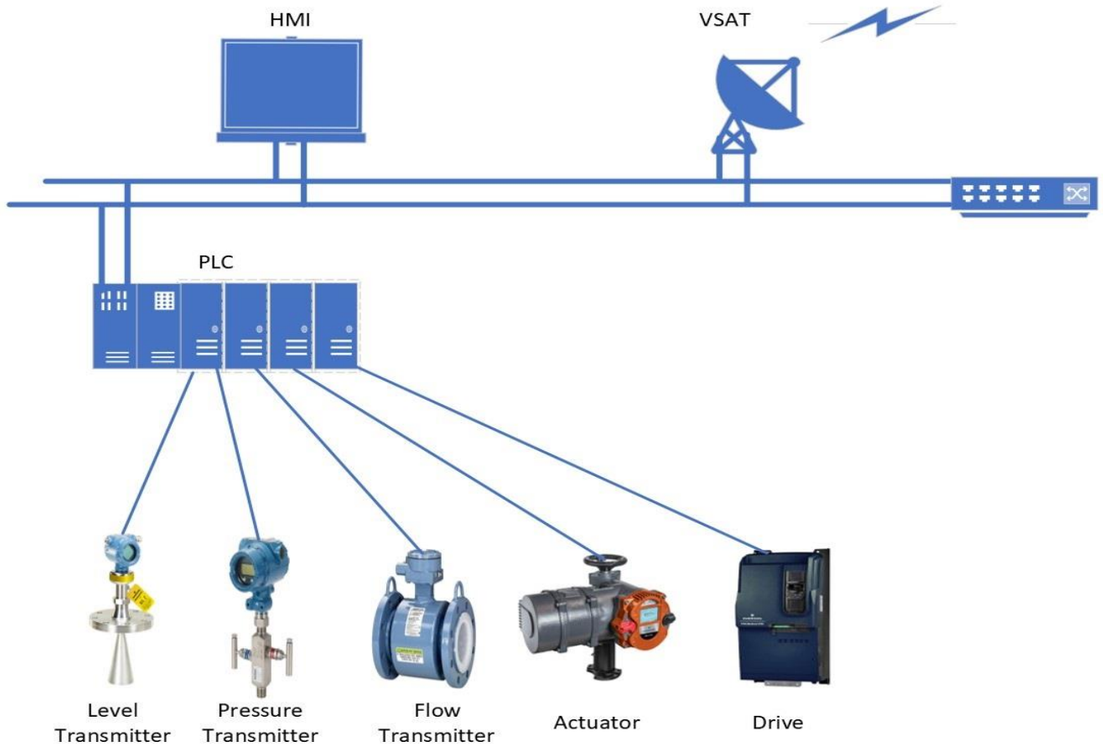


Water Treatment Plant Process



Pumping Station Automation

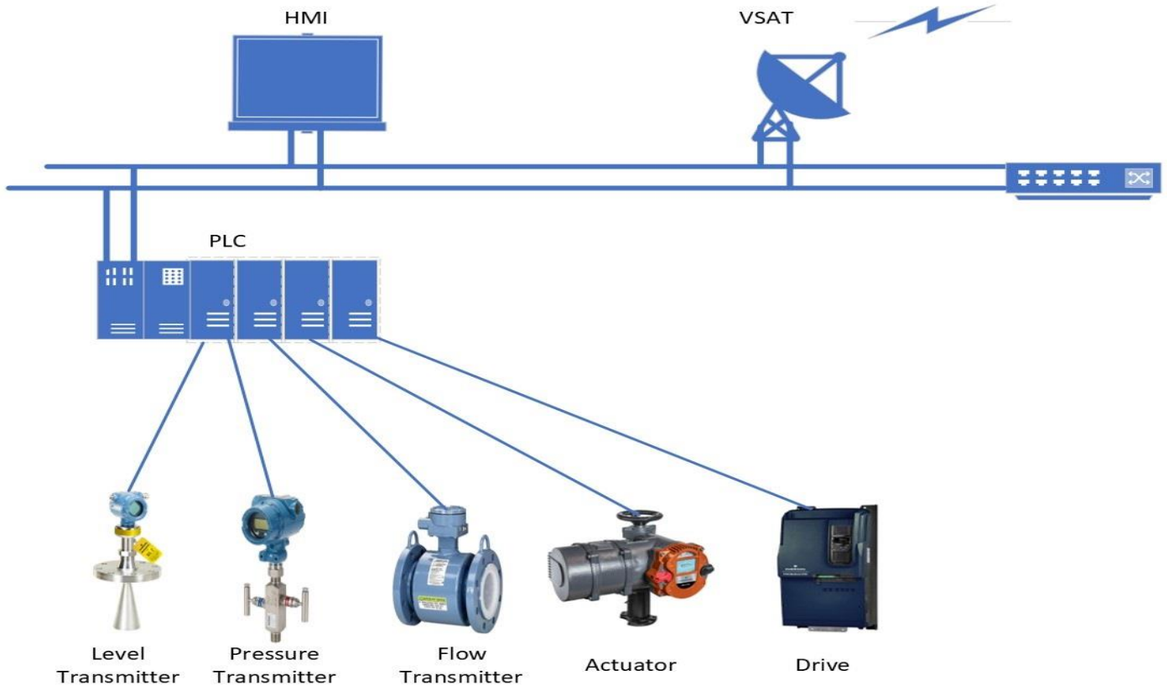
- Pumping stations in a water distribution system are necessary where water is pumped directly into the system or where pressure has to be increased because there is an insufficient difference in water levels in gravity flow distribution systems.
- **Major components of Pumping Station SCADA**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - Electrical Parameters (Voltage, Current, PF, etc..)
  - Pumps, Actuators & Valves
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure



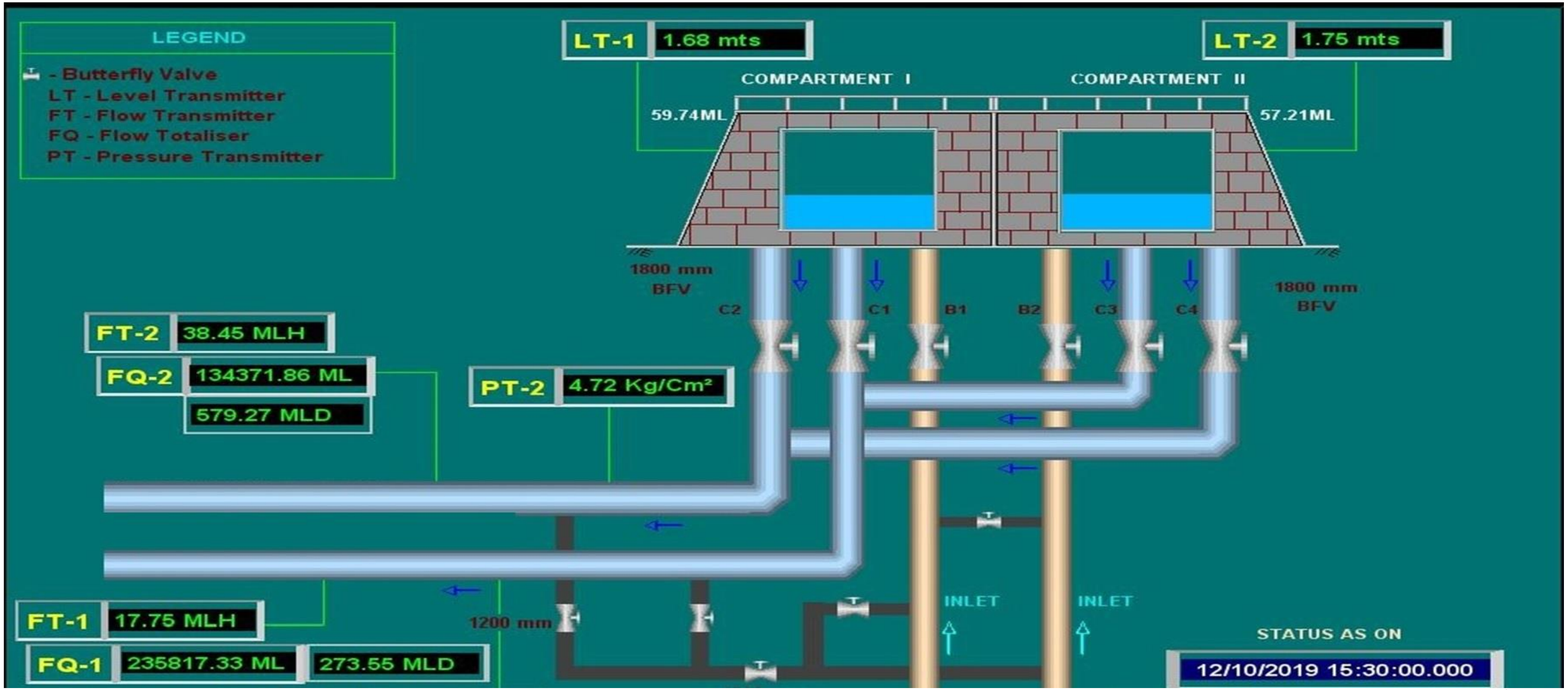
Pumping Station Automation

Distribution from WTP to Service Reservoir

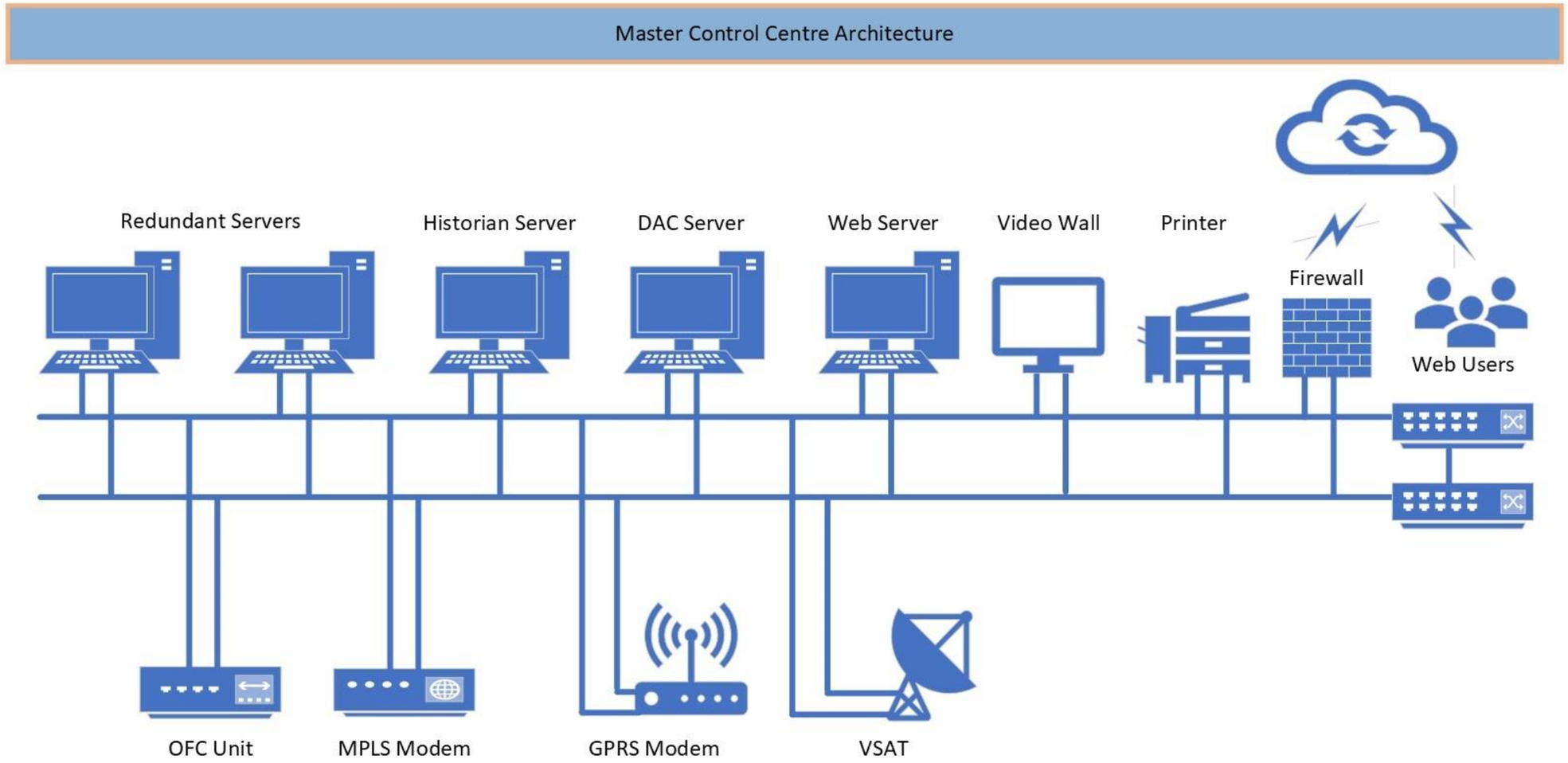
- The objectives of the water distribution system are to supply water equitably to the consumers with sufficient pressure so as to discharge the water at the desired location within the premises. A water distribution system consists of a network of pipelines of various sizes with control valves for carrying water to all streets and supplying water to the consumers through the service connections to the properties.
- **Major components of Distribution SCADA**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - Pumps, Actuators & Valves
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure



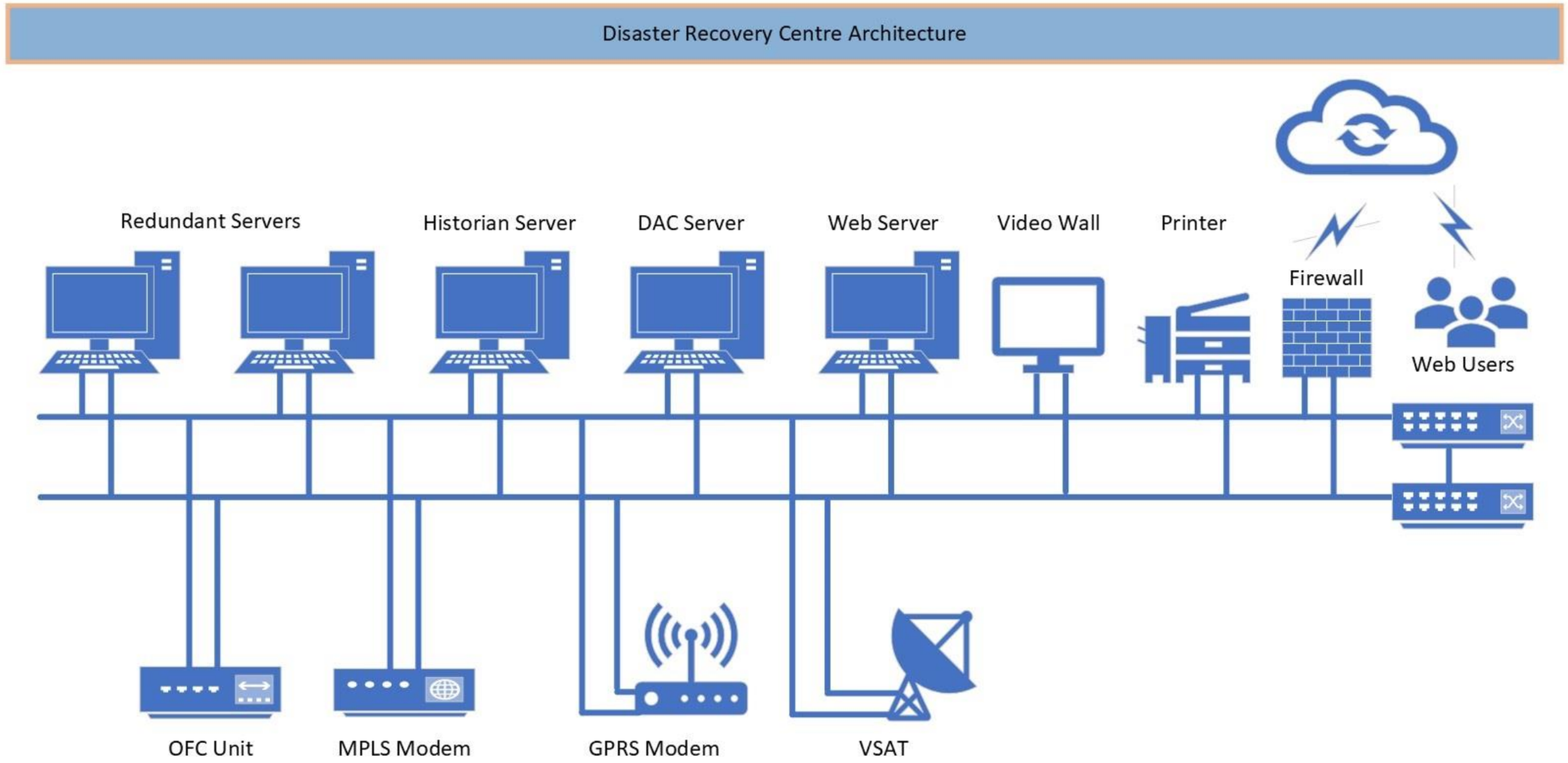
Distribution from WTP to Service Reservoir Display



Master Control Centre Architecture



Disaster Recovery Centre Architecture



SCADA Application in Water Management

- Monitor & Operate Water Network from Centralize Control System
- Get real time data from remotely connected instruments
- Graphical representation
- Control operation
- Store historical data
- Report
- Alarms & Trends
- Web Access to User

Highlights

A composite automation and tracking system - covering the system from the intake side to treatment plants and to the users

Water Quality Parameters can be easily monitored.

Minimize Supply Vs Demand Gaps.

Accurate Forecasting of Supply for Agricultural and Industrial Usage.

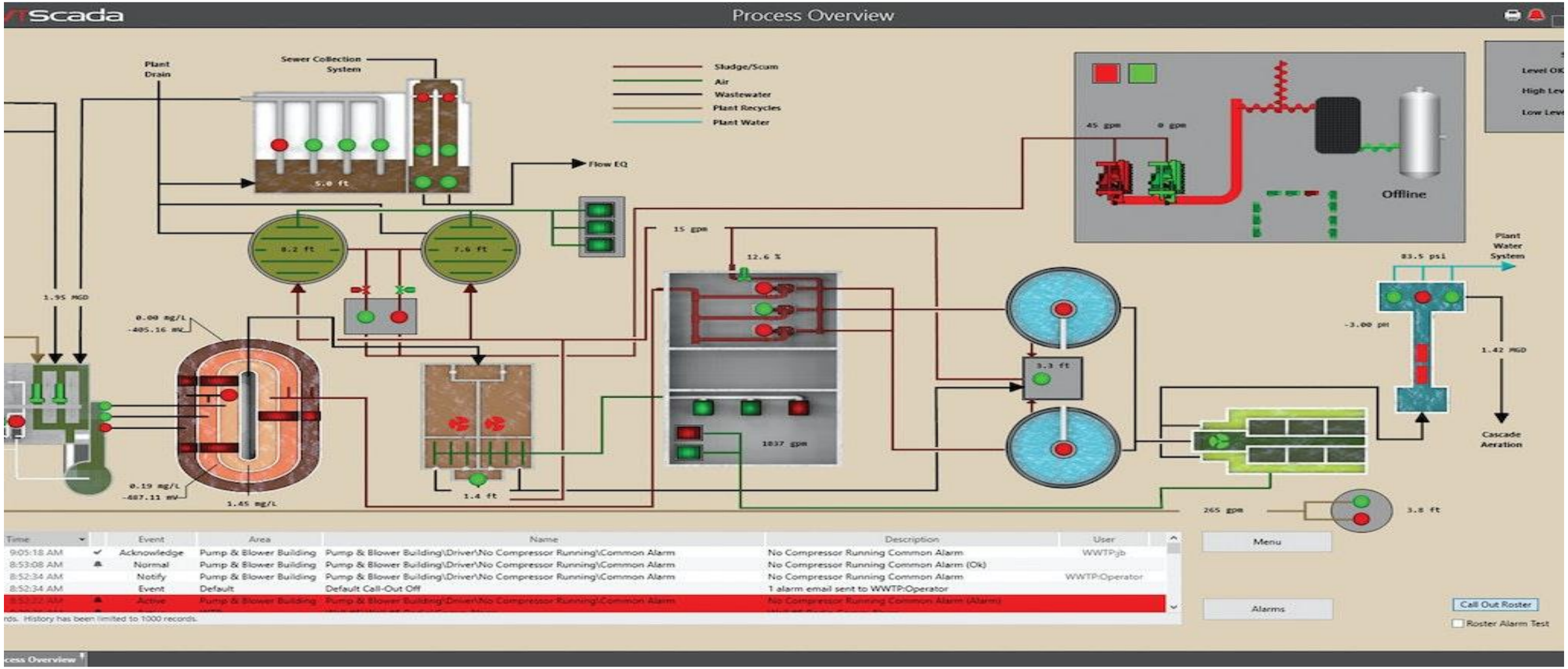
Zonal SCADA for Control Operations and Central Command Centre SCADA for Monitoring.

SMS alerts to be transmitted to the authority in case of any system or usage breach.

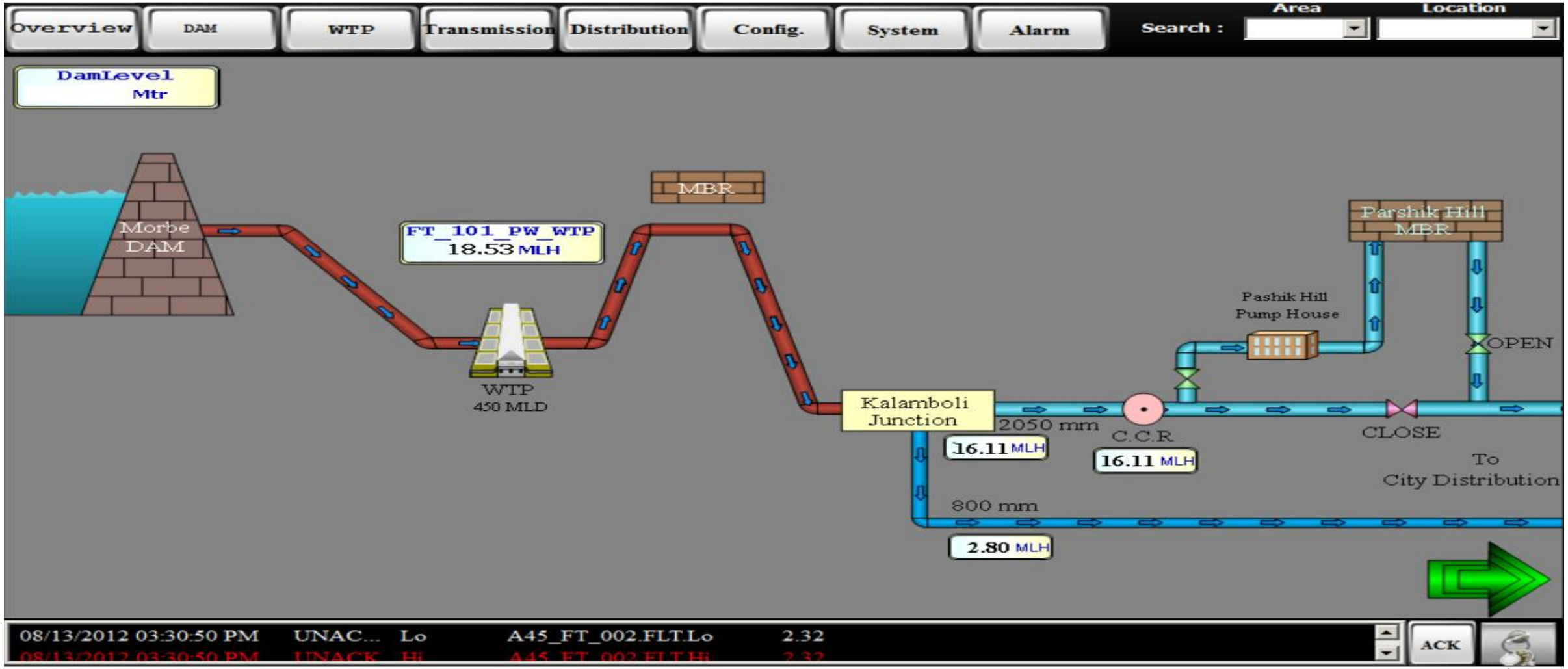
Benefits

- Total transparency in the clean water production and usage data in the city.
- Integrated alarm management will help in fast action and lower downtime
- Centralized data will help the corporation in devising future strategies of water management.
- The distribution network shall be very efficient and wastages shall be controlled.

Water Treatment SCADA Display



Typical SCADA Display



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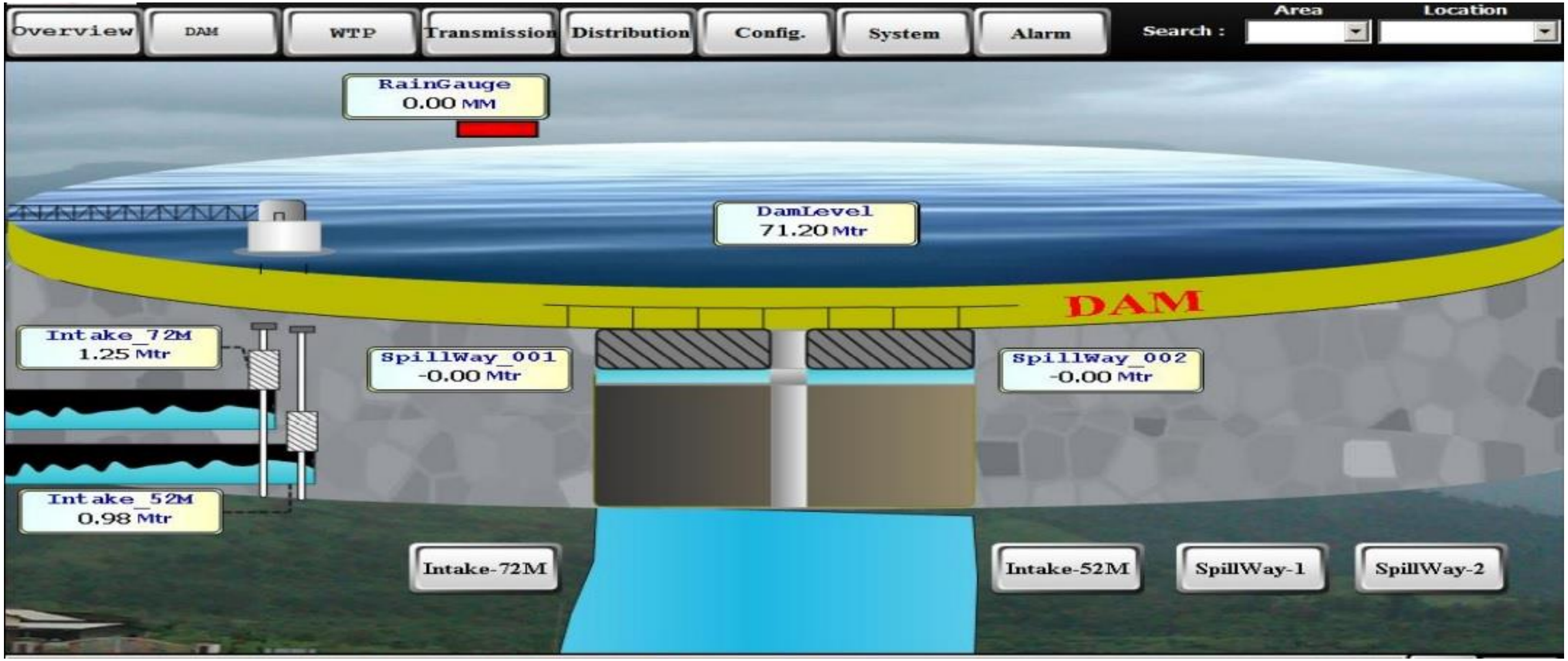
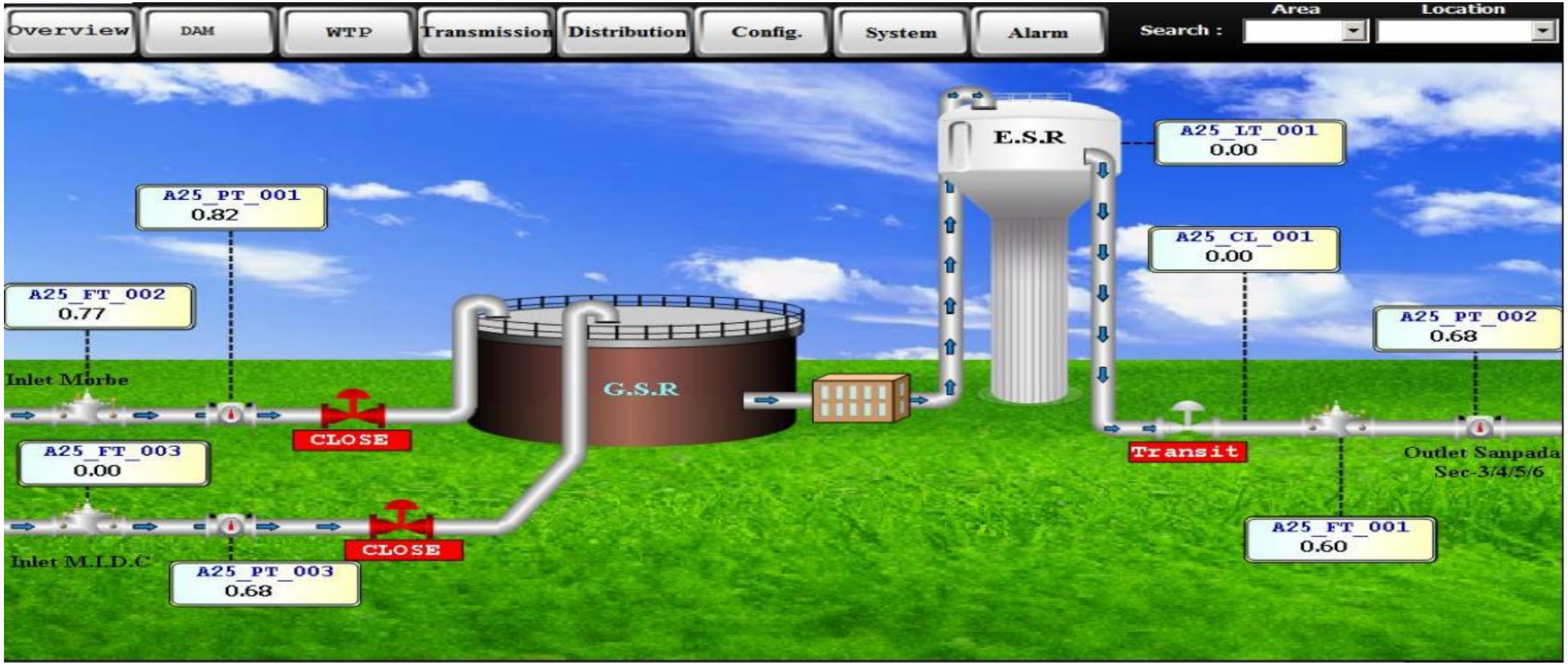
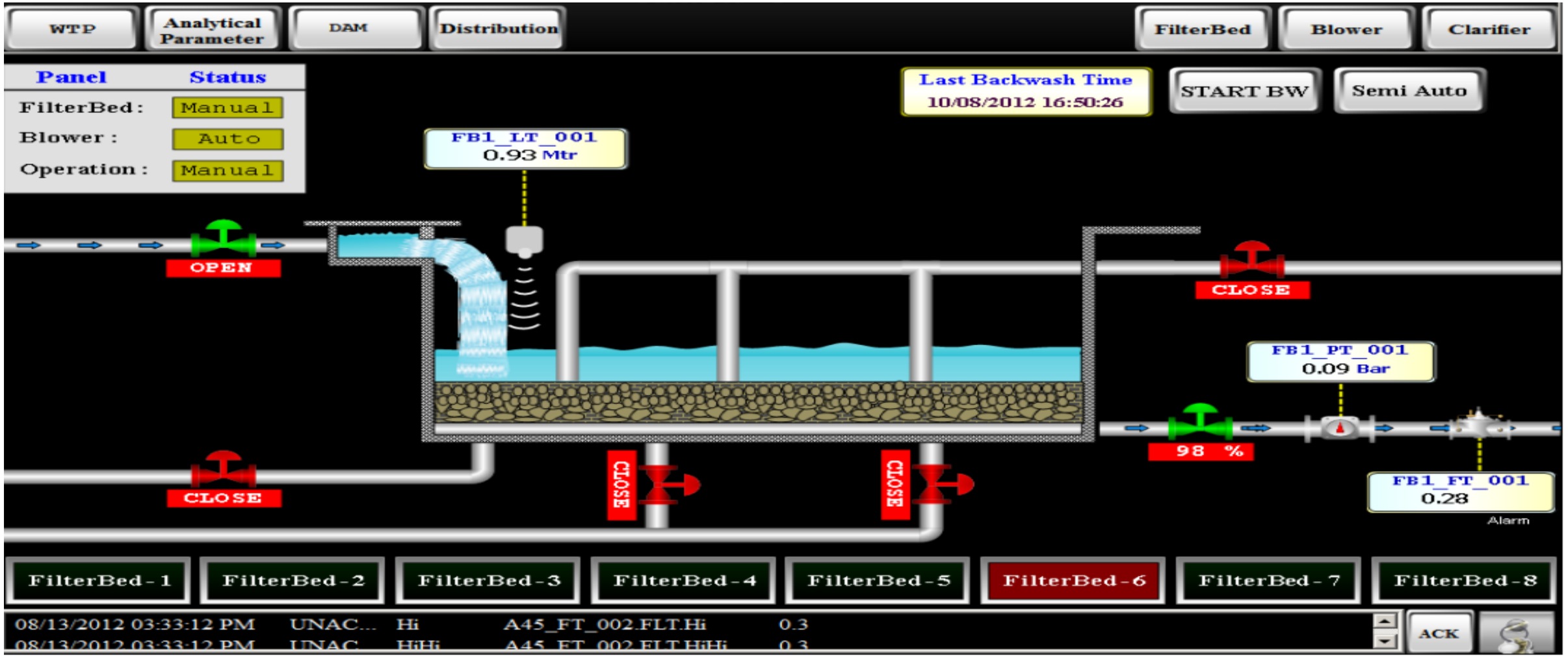
Typical SCADA Display



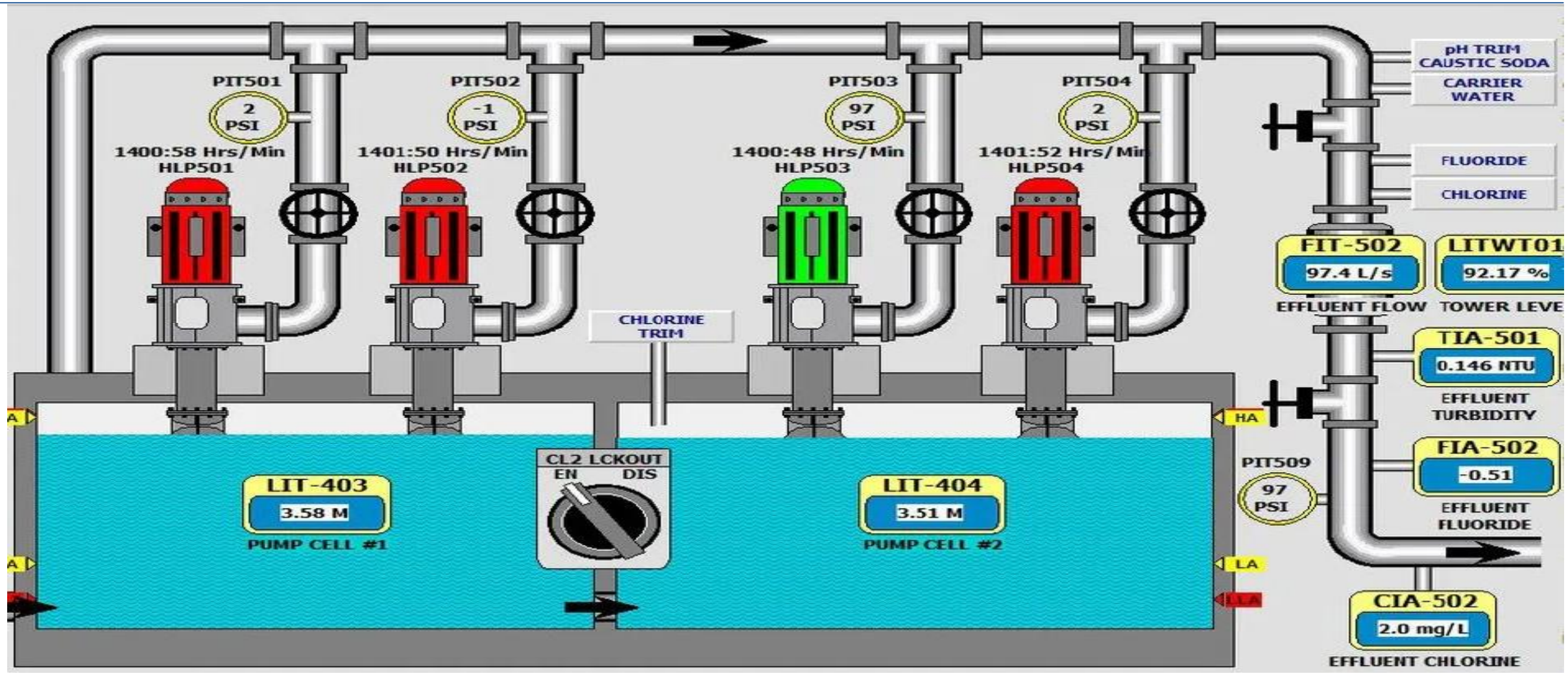
Typical SCADA Display



Typical SCADA Display



Pumping Station SCADA Display



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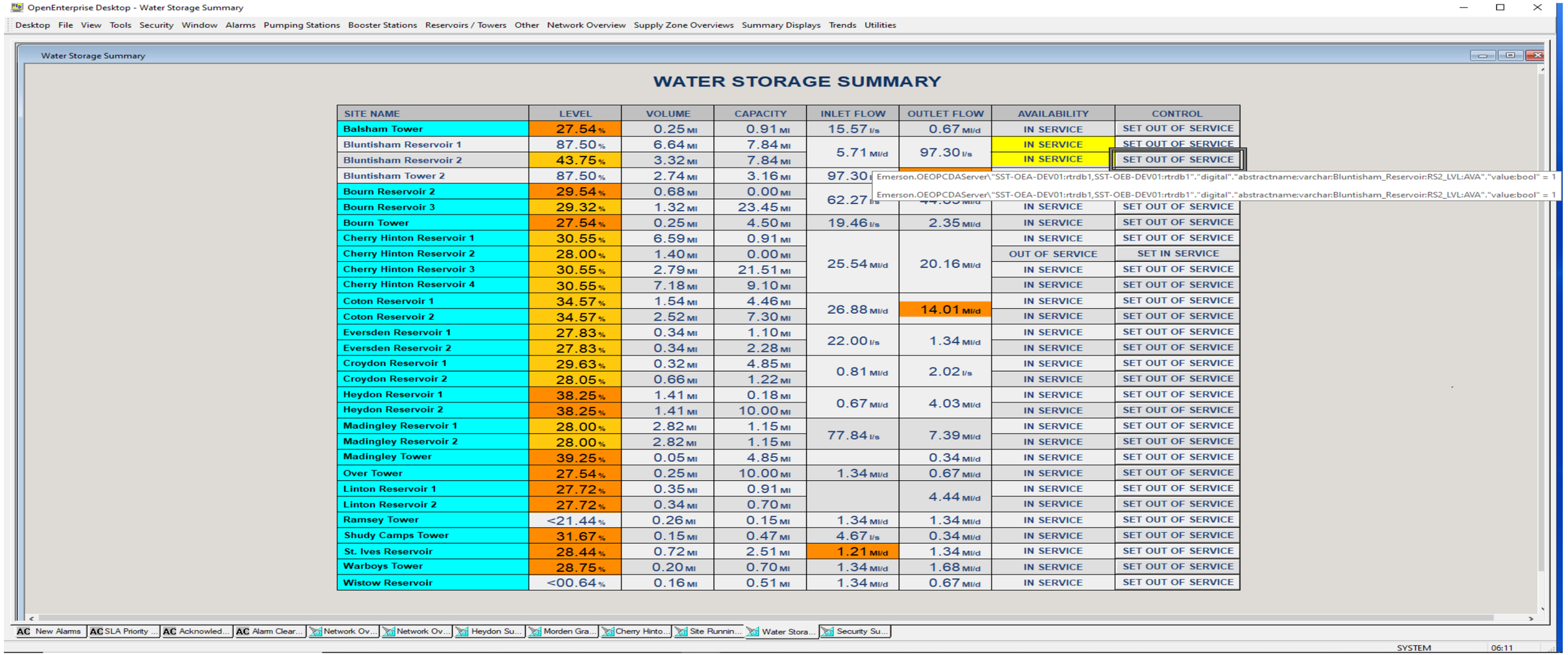
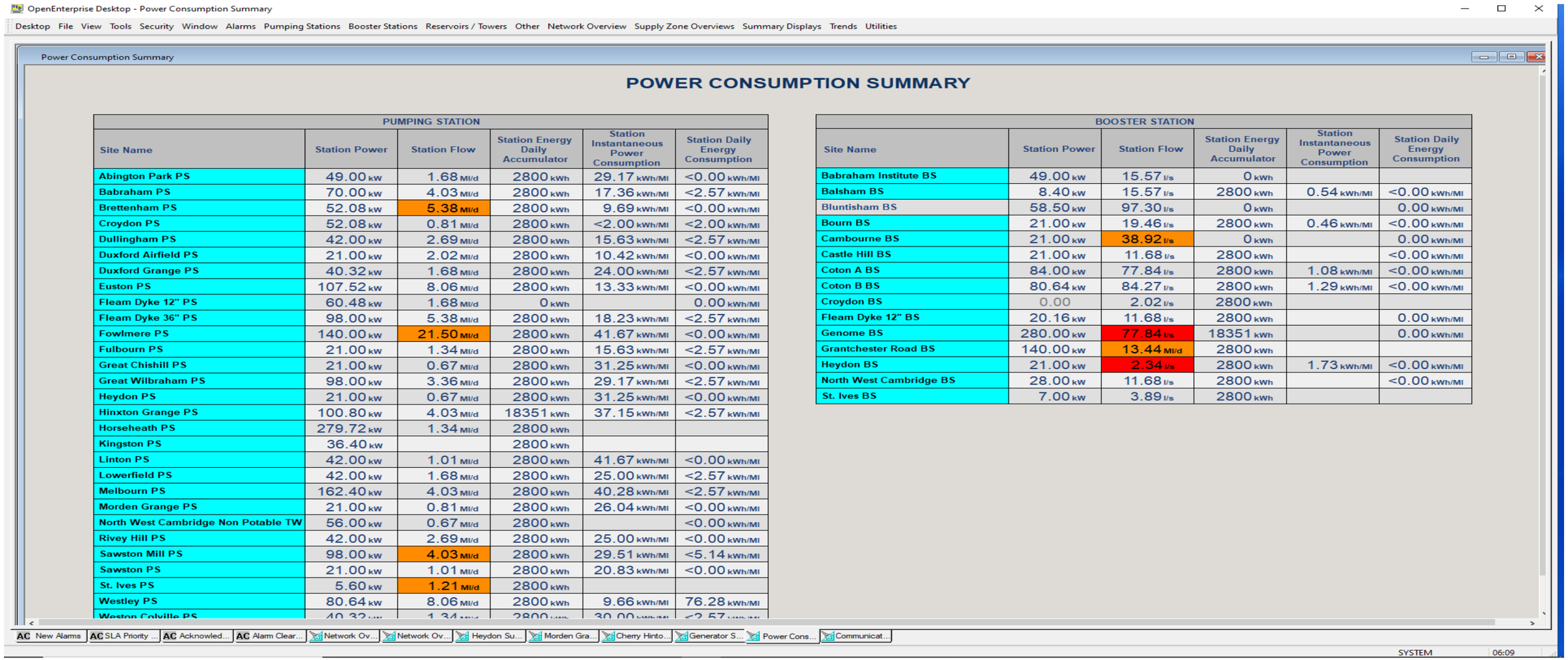
Water Storage Summary

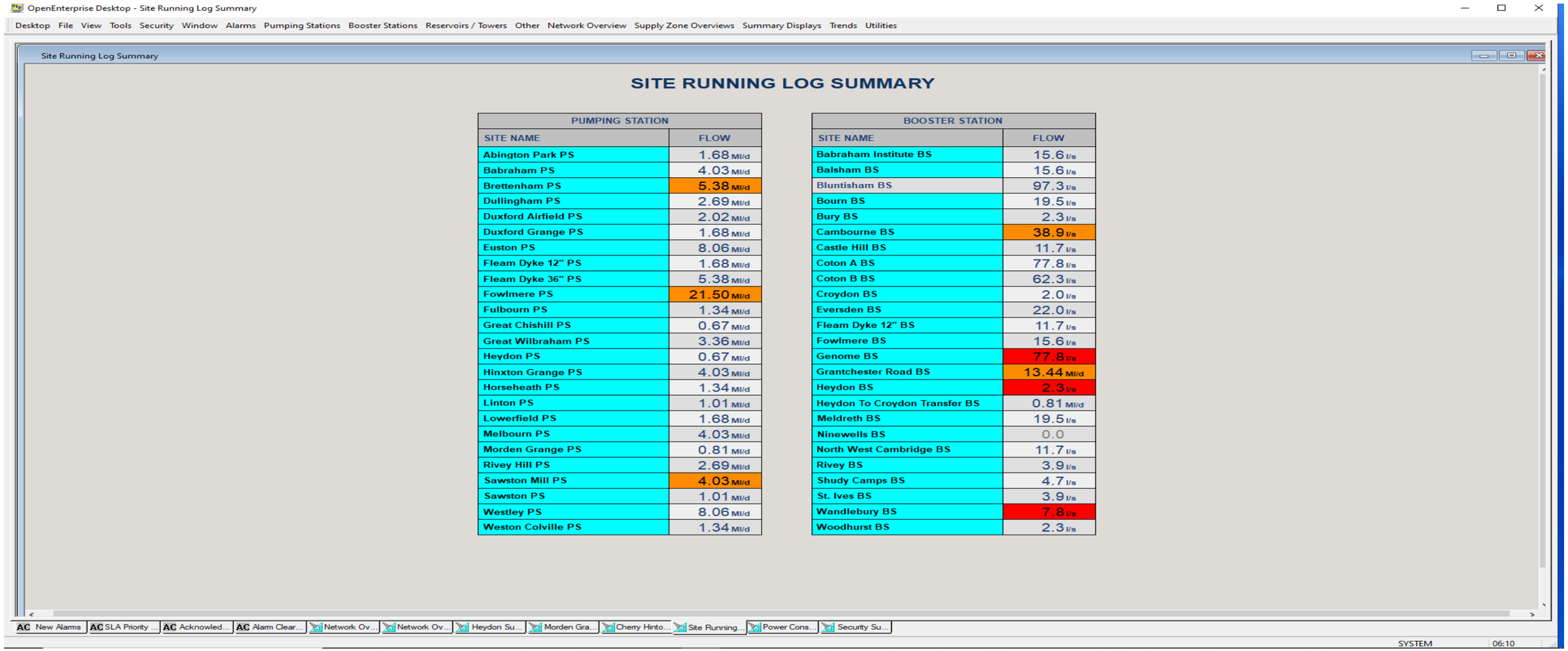


SITE NAME	LEVEL	VOLUME	CAPACITY	INLET FLOW	OUTLET FLOW	AVAILABILITY	CONTROL
Balsham Tower	27.54 %	0.25 Ml	0.91 Ml	15.57 l/s	0.67 Ml/d	IN SERVICE	SET OUT OF SERVICE
Bluntisham Reservoir 1	87.50 %	6.64 Ml	7.84 Ml	5.71 Ml/d	97.30 l/s	IN SERVICE	SET OUT OF SERVICE
Bluntisham Reservoir 2	43.75 %	3.32 Ml	7.84 Ml			IN SERVICE	SET OUT OF SERVICE
Bluntisham Tower 2	87.50 %	2.74 Ml	3.16 Ml	97.30 l			
Bourn Reservoir 2	29.54 %	0.68 Ml	0.00 Ml	62.27 l/s			
Bourn Reservoir 3	29.32 %	1.32 Ml	23.45 Ml			IN SERVICE	SET OUT OF SERVICE
Bourn Tower	27.54 %	0.25 Ml	4.50 Ml	19.46 l/s	2.35 Ml/d	IN SERVICE	SET OUT OF SERVICE
Cherry Hinton Reservoir 1	30.55 %	6.59 Ml	0.91 Ml			IN SERVICE	SET OUT OF SERVICE
Cherry Hinton Reservoir 2	28.00 %	1.40 Ml	0.00 Ml	25.54 Ml/d	20.16 Ml/d	OUT OF SERVICE	SET IN SERVICE
Cherry Hinton Reservoir 3	30.55 %	2.79 Ml	21.51 Ml			IN SERVICE	SET OUT OF SERVICE
Cherry Hinton Reservoir 4	30.55 %	7.18 Ml	9.10 Ml			IN SERVICE	SET OUT OF SERVICE
Coton Reservoir 1	34.57 %	1.54 Ml	4.46 Ml	26.88 Ml/d	14.01 Ml/d	IN SERVICE	SET OUT OF SERVICE
Coton Reservoir 2	34.57 %	2.52 Ml	7.30 Ml			IN SERVICE	SET OUT OF SERVICE
Eversden Reservoir 1	27.83 %	0.34 Ml	1.10 Ml	22.00 l/s	1.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
Eversden Reservoir 2	27.83 %	0.34 Ml	2.28 Ml			IN SERVICE	SET OUT OF SERVICE
Croydon Reservoir 1	29.63 %	0.32 Ml	4.85 Ml	0.81 Ml/d	2.02 l/s	IN SERVICE	SET OUT OF SERVICE
Croydon Reservoir 2	28.05 %	0.66 Ml	1.22 Ml			IN SERVICE	SET OUT OF SERVICE
Heydon Reservoir 1	38.25 %	1.41 Ml	0.18 Ml	0.67 Ml/d	4.03 Ml/d	IN SERVICE	SET OUT OF SERVICE
Heydon Reservoir 2	38.25 %	1.41 Ml	10.00 Ml			IN SERVICE	SET OUT OF SERVICE
Madingley Reservoir 1	28.00 %	2.82 Ml	1.15 Ml	77.84 l/s	7.39 Ml/d	IN SERVICE	SET OUT OF SERVICE
Madingley Reservoir 2	28.00 %	2.82 Ml	1.15 Ml			IN SERVICE	SET OUT OF SERVICE
Madingley Tower	39.25 %	0.05 Ml	4.85 Ml		0.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
Over Tower	27.54 %	0.25 Ml	10.00 Ml	1.34 Ml/d	0.67 Ml/d	IN SERVICE	SET OUT OF SERVICE
Linton Reservoir 1	27.72 %	0.35 Ml	0.91 Ml		4.44 Ml/d	IN SERVICE	SET OUT OF SERVICE
Linton Reservoir 2	27.72 %	0.34 Ml	0.70 Ml			IN SERVICE	SET OUT OF SERVICE
Ramsey Tower	<21.44 %	0.26 Ml	0.15 Ml	1.34 Ml/d	1.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
Shudy Camps Tower	31.67 %	0.15 Ml	0.47 Ml	4.67 l/s	0.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
St. Ives Reservoir	28.44 %	0.72 Ml	2.51 Ml	1.21 Ml/d	1.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
Warboys Tower	28.75 %	0.20 Ml	0.70 Ml	1.34 Ml/d	1.68 Ml/d	IN SERVICE	SET OUT OF SERVICE
Wistow Reservoir	<00.64 %	0.16 Ml	0.51 Ml	1.34 Ml/d	0.67 Ml/d	IN SERVICE	SET OUT OF SERVICE

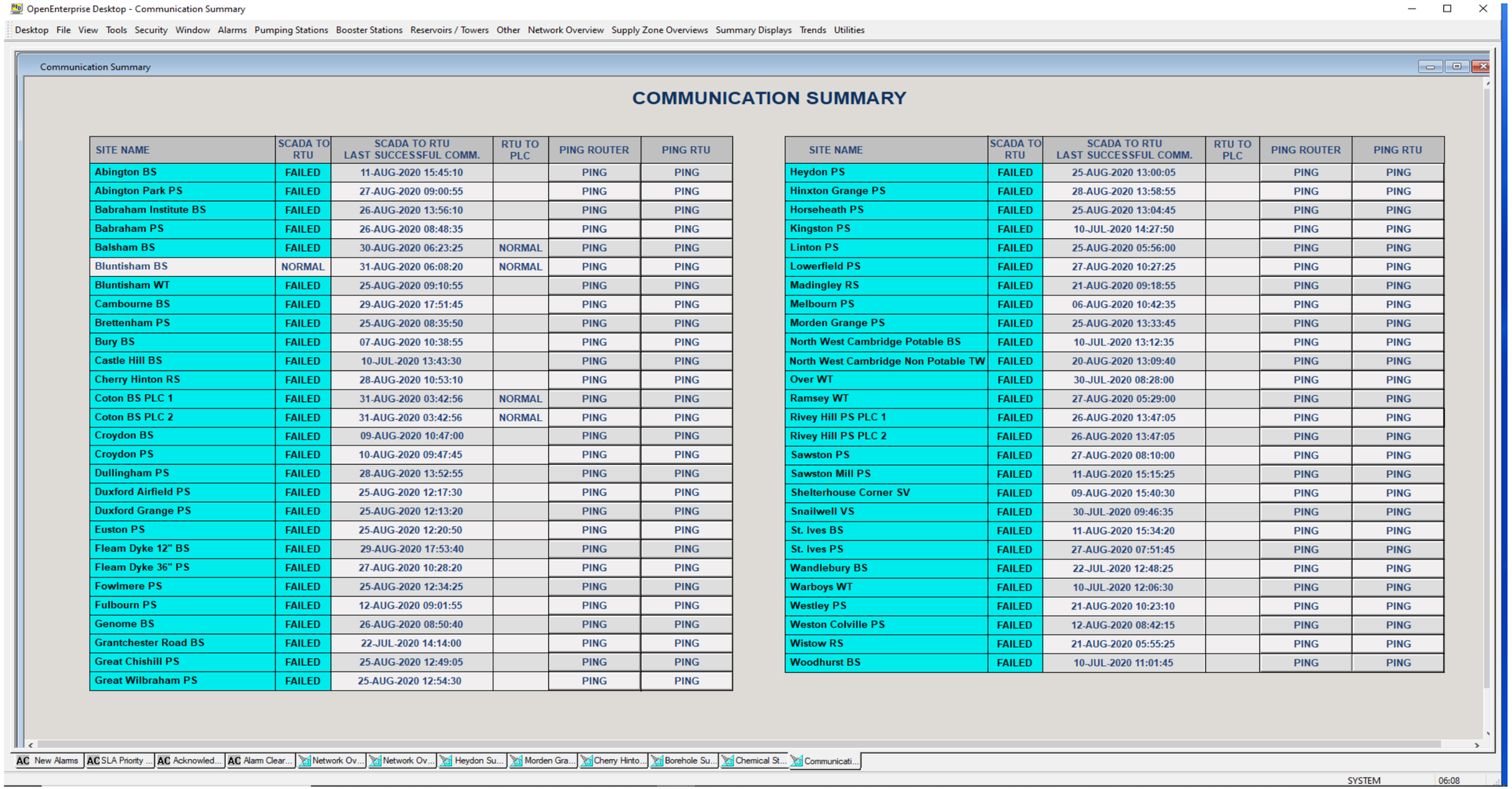
Power Consumption



Log Summary


OpenEnterprise Desktop - Site Running Log Summary
Desktop File View Tools Security Window Alarms Pumping Stations Booster Stations Reservoirs / Towers Other Network Overview Supply Zone Overviews Summary Displays Trends Utilities
Site Running Log Summary
SITE RUNNING LOG SUMMARY
PUMPING STATION
SITE NAME FLOW
Abington Park PS 1.68 Ml/d
Babraham PS 4.03 Ml/d
Brettenham PS 5.38 Ml/d
Dullingham PS 2.69 Ml/d
Duxford Airfield PS 2.02 Ml/d
Duxford Grange PS 1.68 Ml/d
Euston PS 8.06 Ml/d
Fleam Dyke 12" PS 1.68 Ml/d
Fleam Dyke 36" PS 5.38 Ml/d
Fowlmere PS 21.50 Ml/d
Fulbourn PS 1.34 Ml/d
Great Chishill PS 0.67 Ml/d
Great Wilbraham PS 3.36 Ml/d
Heydon PS 0.67 Ml/d
Hinxton Grange PS 4.03 Ml/d
Horseheath PS 1.34 Ml/d
Linton PS 1.01 Ml/d
Lowerfield PS 1.68 Ml/d
Melbourn PS 4.03 Ml/d
Morden Grange PS 0.81 Ml/d
Rivey Hill PS 2.69 Ml/d
Sawston Mill PS 4.03 Ml/d
Sawston PS 1.01 Ml/d
Westley PS 8.06 Ml/d
Weston Colville PS 1.34 Ml/d
BOOSTER STATION
SITE NAME FLOW
Babraham Institute BS 15.6 l/s
Balsham BS 15.6 l/s
Bluntisham BS 97.3 l/s
Bourn BS 19.5 l/s
Bury BS 2.3 l/s
Cambourne BS 38.9 l/s
Castle Hill BS 11.7 l/s
Coton A BS 77.8 l/s
Coton B BS 62.3 l/s
Croydon BS 2.0 l/s
Eversden BS 22.0 l/s
Fleam Dyke 12" BS 11.7 l/s
Fowlmere BS 15.6 l/s
Genome BS 77.8 l/s
Grantchester Road BS 13.44 Ml/d
Heydon BS 2.3 l/s
Heydon To Croydon Transfer BS 0.81 Ml/d
Meldreth BS 19.5 l/s
Ninewells BS 0.0
North West Cambridge BS 11.7 l/s
Rivey BS 3.9 l/s
Shudy Camps BS 4.7 l/s
St. Ives BS 3.9 l/s
Wandlebury BS 7.8 l/s
Woodhurst BS 2.3 l/s
AC New Alarms
AC SLA Priority ...
AC Acknowled...
AC Alarm Clear...
Network Ov...
Network Ov...
Heydon Su...
Morden Gra...
Cherry Hinto...
Site Running...
Power Cons...
Security Su...
SYSTEM
06:10

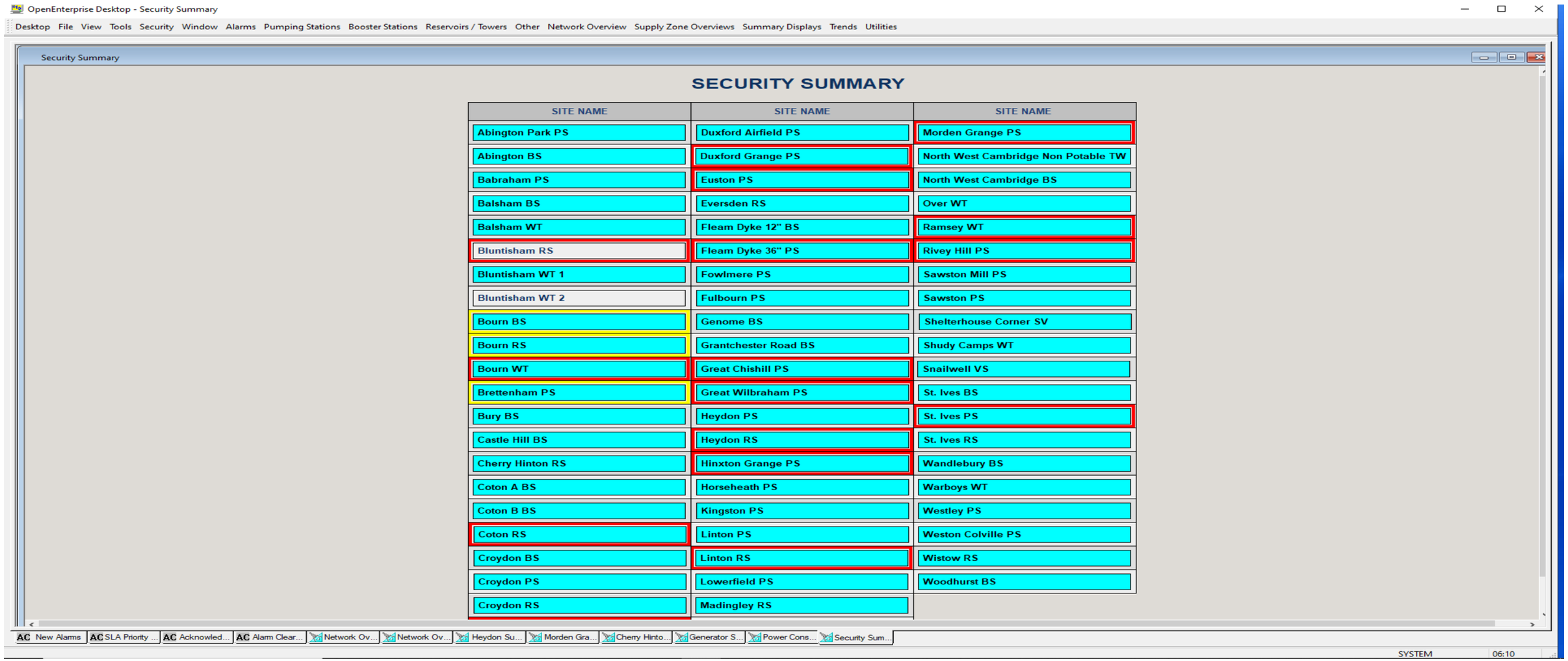
Communications Summary



SITE NAME	SCADA TO RTU	SCADA TO RTU LAST SUCCESSFUL COMM.	RTU TO PLC	PING ROUTER	PING RTU
Abington BS	FAILED	11-AUG-2020 15:45:10		PING	PING
Abington Park PS	FAILED	27-AUG-2020 09:00:55		PING	PING
Babraham Institute BS	FAILED	26-AUG-2020 13:56:10		PING	PING
Babraham PS	FAILED	26-AUG-2020 08:48:35		PING	PING
Balsham BS	FAILED	30-AUG-2020 06:23:25	NORMAL	PING	PING
Bluntisham BS	NORMAL	31-AUG-2020 06:08:20	NORMAL	PING	PING
Bluntisham WT	FAILED	25-AUG-2020 09:10:55		PING	PING
Cambourne BS	FAILED	29-AUG-2020 17:51:45		PING	PING
Brettenham PS	FAILED	25-AUG-2020 08:35:50		PING	PING
Bury BS	FAILED	07-AUG-2020 10:38:55		PING	PING
Castle Hill BS	FAILED	10-JUL-2020 13:43:30		PING	PING
Cherry Hinton RS	FAILED	28-AUG-2020 10:53:10		PING	PING
Coton BS PLC 1	FAILED	31-AUG-2020 03:42:56	NORMAL	PING	PING
Coton BS PLC 2	FAILED	31-AUG-2020 03:42:56	NORMAL	PING	PING
Croydon BS	FAILED	09-AUG-2020 10:47:00		PING	PING
Croydon PS	FAILED	10-AUG-2020 09:47:45		PING	PING
Dullingham PS	FAILED	28-AUG-2020 13:52:55		PING	PING
Duxford Airfield PS	FAILED	25-AUG-2020 12:17:30		PING	PING
Duxford Grange PS	FAILED	25-AUG-2020 12:13:20		PING	PING
Euston PS	FAILED	25-AUG-2020 12:20:50		PING	PING
Fleam Dyke 12" BS	FAILED	29-AUG-2020 17:53:40		PING	PING
Fleam Dyke 36" PS	FAILED	27-AUG-2020 10:28:20		PING	PING
Fowlmere PS	FAILED	25-AUG-2020 12:34:25		PING	PING
Fulbourn PS	FAILED	12-AUG-2020 09:01:55		PING	PING
Genome BS	FAILED	26-AUG-2020 08:50:40		PING	PING
Grantchester Road BS	FAILED	22-JUL-2020 14:14:00		PING	PING
Great Chishill PS	FAILED	25-AUG-2020 12:49:05		PING	PING
Great Wilbraham PS	FAILED	25-AUG-2020 12:54:30		PING	PING

SITE NAME	SCADA TO RTU	SCADA TO RTU LAST SUCCESSFUL COMM.	RTU TO PLC	PING ROUTER	PING RTU
Heydon PS	FAILED	25-AUG-2020 13:00:05		PING	PING
Hinxton Grange PS	FAILED	28-AUG-2020 13:58:55		PING	PING
Horseheath PS	FAILED	25-AUG-2020 13:04:45		PING	PING
Kingston PS	FAILED	10-JUL-2020 14:27:50		PING	PING
Linton PS	FAILED	25-AUG-2020 05:56:00		PING	PING
Lowerfield PS	FAILED	27-AUG-2020 10:27:25		PING	PING
Madingley RS	FAILED	21-AUG-2020 09:18:55		PING	PING
Melbourn PS	FAILED	06-AUG-2020 10:42:35		PING	PING
Morden Grange PS	FAILED	25-AUG-2020 13:33:45		PING	PING
North West Cambridge Potable BS	FAILED	10-JUL-2020 13:12:35		PING	PING
North West Cambridge Non Potable TW	FAILED	20-AUG-2020 13:09:40		PING	PING
Over WT	FAILED	30-JUL-2020 08:28:00		PING	PING
Ramsey WT	FAILED	27-AUG-2020 05:29:00		PING	PING
Rivey Hill PS PLC 1	FAILED	26-AUG-2020 13:47:05		PING	PING
Rivey Hill PS PLC 2	FAILED	26-AUG-2020 13:47:05		PING	PING
Sawston PS	FAILED	27-AUG-2020 08:10:00		PING	PING
Sawston Mill PS	FAILED	11-AUG-2020 15:15:25		PING	PING
Shelterhouse Corner SV	FAILED	09-AUG-2020 15:40:30		PING	PING
Snailwell VS	FAILED	30-JUL-2020 09:46:35		PING	PING
St. Ives BS	FAILED	11-AUG-2020 15:34:20		PING	PING
St. Ives PS	FAILED	27-AUG-2020 07:51:45		PING	PING
Wandlebury BS	FAILED	22-JUL-2020 12:48:25		PING	PING
Warboys WT	FAILED	10-JUL-2020 12:06:30		PING	PING
Westley PS	FAILED	21-AUG-2020 10:23:10		PING	PING
Weston Colville PS	FAILED	12-AUG-2020 08:42:15		PING	PING
Wistow RS	FAILED	21-AUG-2020 05:55:25		PING	PING
Woodhurst BS	FAILED	10-JUL-2020 11:01:45		PING	PING

Security Summary



Daily Report

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Created on		on	26/10/2022 14:25												
2																
3	Date	Flow												Levels (MTHD)		Pressure
4	26/10/2022	Flow 1		Flow 2		Flow 3		Flow 4		Flow 5		Flow 6		Level		Pressure
5		Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Comp I	Comp. II	
6	Time	M7_FT_1	M7_FQ_1	M7_FT_2	M7_FQ_2	M7_FT_3	M7_FQ_3	M7_FT_4	M7_FQ_4	M7_FT_5	M7_FQ_5	M7_FT_6	M7_FQ_6	M7_LT_1	M7_LT_2	M7_PT_5
7	0:00	22.80	52620.34	27.60	345731.66	15.05	621960.94	0.00	356176.25	22.93	311360.66	0.00	789513.81	4.67	4.68	1.17
8	1:00	22.10	52642.76	24.74	345756.59	15.33	621975.94	0.00	356176.25	21.93	311383.06	0.00	789513.81	4.68	4.66	1.22
9	2:00	21.73	52664.55	26.49	345783.00	15.36	621991.25	0.00	356176.25	21.82	311404.88	0.00	789513.81	4.67	4.68	1.27
10	3:00	23.90	52686.35	25.72	345809.16	15.43	622006.69	0.00	356176.25	23.89	311426.72	0.00	789513.81	4.67	4.68	1.28
11	4:00	20.39	52708.94	45.02	345842.09	16.82	622022.56	0.00	356176.25	20.95	311449.31	0.00	789513.81	4.66	4.40	1.35
12	5:00	22.34	52730.39	50.00	345893.28	32.83	622050.94	0.00	356176.25	22.18	311470.75	0.00	789513.81	4.67	3.79	1.29
13	6:00	23.76	52752.94	50.00	345945.63	31.07	622083.06	0.00	356176.25	23.65	311493.28	0.00	789513.81	4.67	2.85	1.19
14	7:00	23.82	52776.82	50.00	345998.13	30.22	622113.75	0.00	356176.25	24.24	311517.16	0.00	789513.81	4.67	1.89	1.14
15	8:00	24.26	52800.87	44.08	346047.25	30.03	622143.81	0.00	356176.25	24.31	311541.22	0.00	789513.81	4.67	0.92	1.08
16	9:00	24.61	52825.49	42.98	346090.09	29.86	622173.31	0.00	356176.25	24.58	311565.84	0.00	789513.81	4.26	0.39	1.05
17	10:00	24.20	52849.80	37.34	346129.75	18.32	622194.06	2.81	356178.03	23.99	311590.19	0.00	789513.81	4.17	0.39	1.04
18	11:00	24.55	52874.10	34.82	346166.34	15.92	622212.00	0.00	356180.25	24.54	311614.47	0.00	789513.81	4.69	0.20	1.05
19	12:00	24.92	52898.68	36.71	346202.31	15.95	622228.00	0.00	356180.25	24.89	311639.09	0.00	789513.81	4.69	0.22	1.05
20	13:00	24.91	52923.30	33.13	346237.84	15.85	622244.00	0.00	356180.25	24.53	311663.75	0.00	789513.88	4.58	0.19	1.06
21	14:00	24.54	52948.00	35.19	346273.03	19.30	622262.94	3.26	356183.19	24.53	311688.47	0.00	789513.88	4.40	0.20	1.08
22	15:00	23.84	52972.15	37.90	346310.41	19.49	622282.13	3.41	356186.50	24.16	311712.66	0.00	789513.88	4.14	0.13	1.08
23	16:00	22.62	52995.44	39.37	346348.50	18.80	622301.19	3.64	356190.03	22.79	311735.94	0.00	789513.88	3.90	0.21	1.09
24	17:00	23.72	53019.21	39.12	346388.06	17.62	622319.44	4.10	356193.88	23.62	311759.69	0.00	789513.88	3.59	0.17	1.07
25	18:00	24.05	53042.88	39.50	346427.84	17.76	622337.38	4.29	356198.06	23.96	311783.34	25.00	789513.88	3.40	0.21	1.06
26	19:00	24.59	53067.32	44.77	346469.38	18.74	622355.50	4.40	356202.44	24.74	311807.78	0.00	789513.88	3.23	0.22	1.05
27	20:00	24.21	53092.05	42.19	346512.91	18.05	622373.81	4.33	356206.78	24.29	311832.50	0.00	789513.88	3.08	0.23	1.04
28	21:00	23.89	53116.29	36.52	346552.97	17.75	622391.94	4.38	356211.13	23.95	311856.72	0.00	789513.88	2.86	0.24	1.03
29	22:00	24.59	53140.43	31.67	346586.69	18.76	622410.13	4.60	356215.56	24.75	311880.91	0.00	789513.88	2.77	0.21	1.04
30	23:00	24.05	53164.74	30.72	346618.66	18.05	622428.69	4.06	356220.06	24.70	311905.22	0.00	789513.88	3.52	0.22	1.05
31	24:00	24.51	53176.90	31.36	346634.53	17.75	622437.56	3.44	356221.94	24.56	311917.38	0.00	789513.88	4.19	0.18	1.06
32	Total input		556.56		902.88		476.63		45.69		556.72		0.06			
33																

Thank you

Emerson Contact Details :

1. Mr. Swanand Deshpande +91-9822398989
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WATER DISTRIBUTION SCADA

Use of SCADA for Water & Wastewater Treatment Plants

Topics

- Water Distribution SCADA
- Typical Architecture
- Highlights
- Benefits
- Example Displays

Water Distribution SCADA

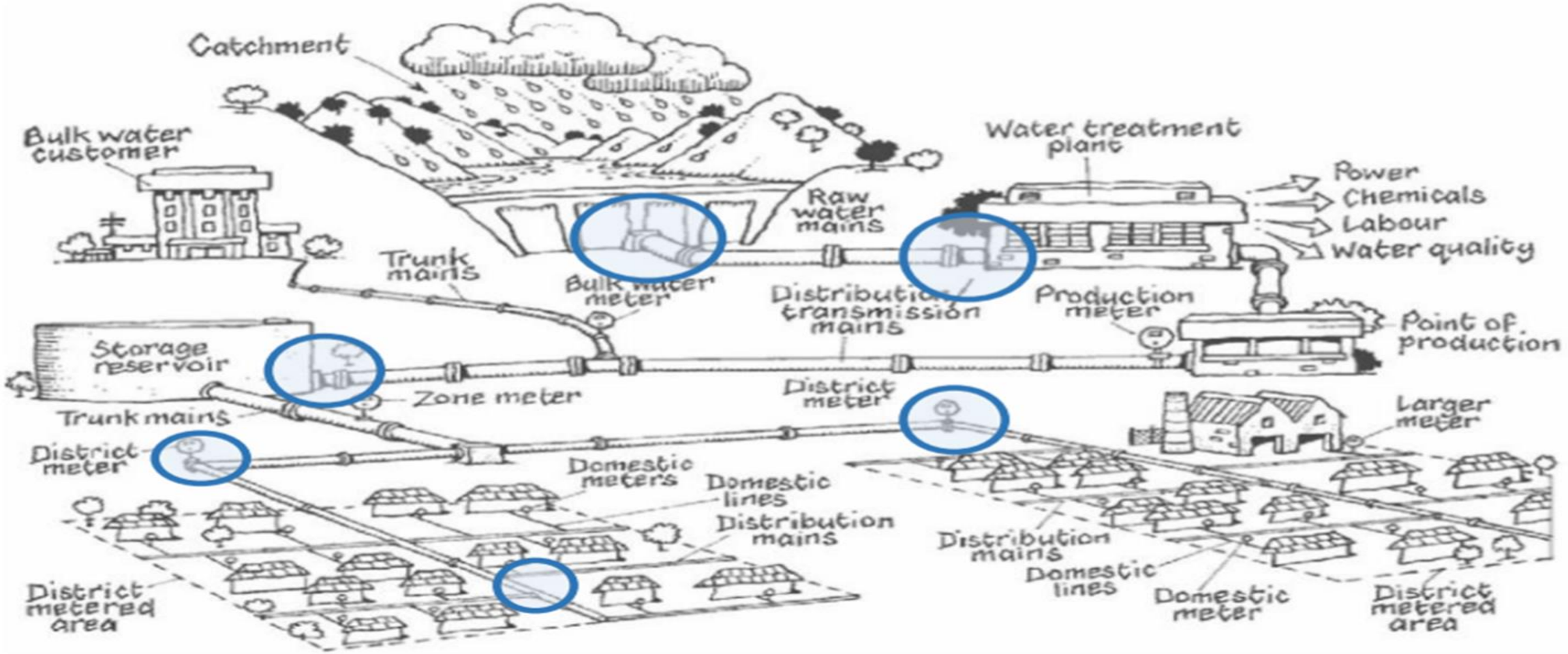
India is investing heavily in making its cities smarter, sustainable and livable for the ever-increasing population.

One of the most important areas is sourcing and supplying clean water to the citizens. Automation and centralized monitoring of the system are changing the approach of municipal bodies towards high efficiency and low wastage.

Monitoring the complete water flow system starting with the intake of water from the water body like river or lake/reservoir to processing the water & make it useable to the distribution up to the consumers is the need of the hour.

To plug all leakages or wastage is equally essential for sustaining the supply today and to plan for the future.

Water Distribution



Major Area in Water Network & Management

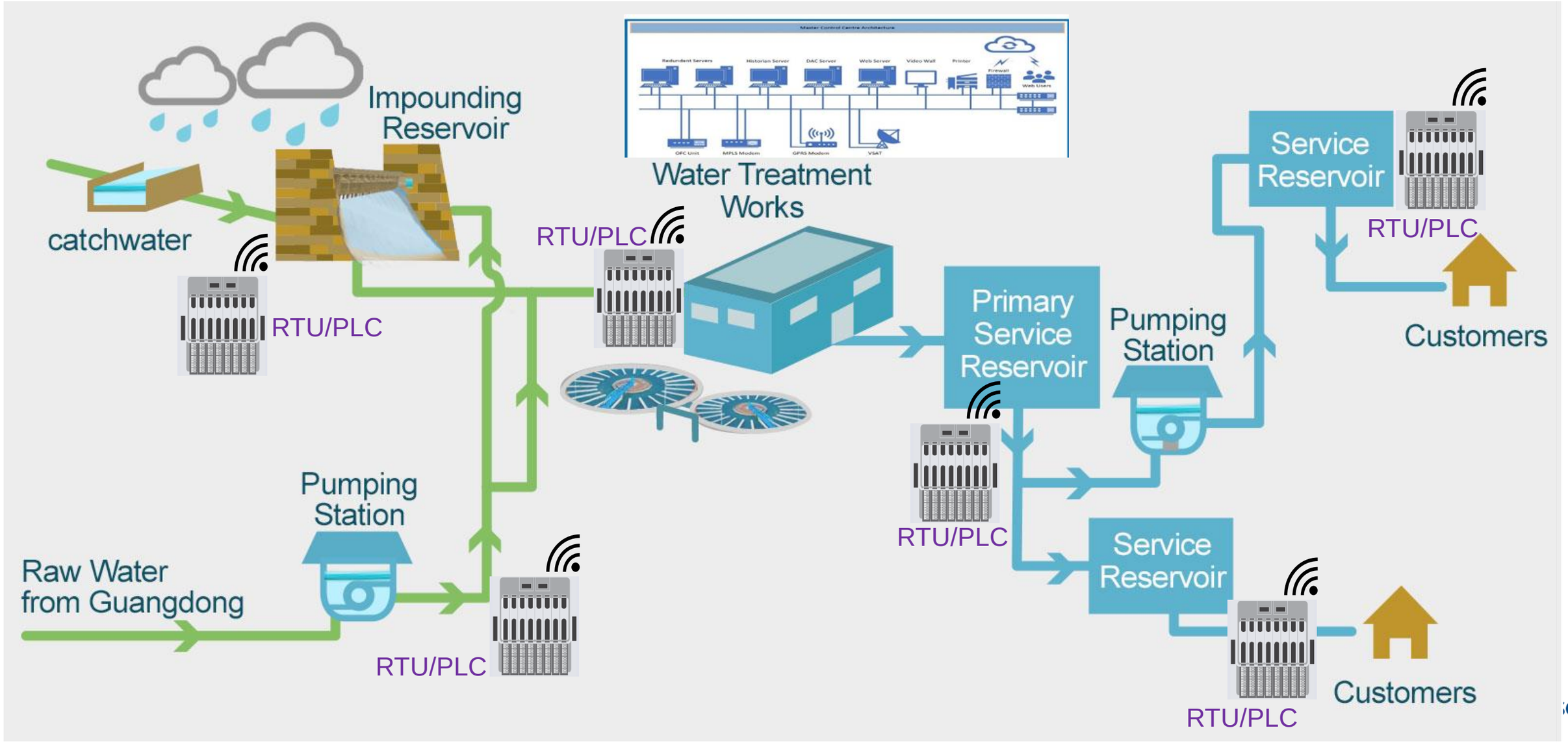
- Dam Automation
- Pipeline Network Operation & Monitoring
- Water Treatment Plant Operation & Monitoring
- Wastewater Treatment Plant Operation & Monitoring
- Pumping Station Automation
- Distribution from WTP to Service Reservoir
- Distribution from Service Reservoir to User

Inlet System

Process

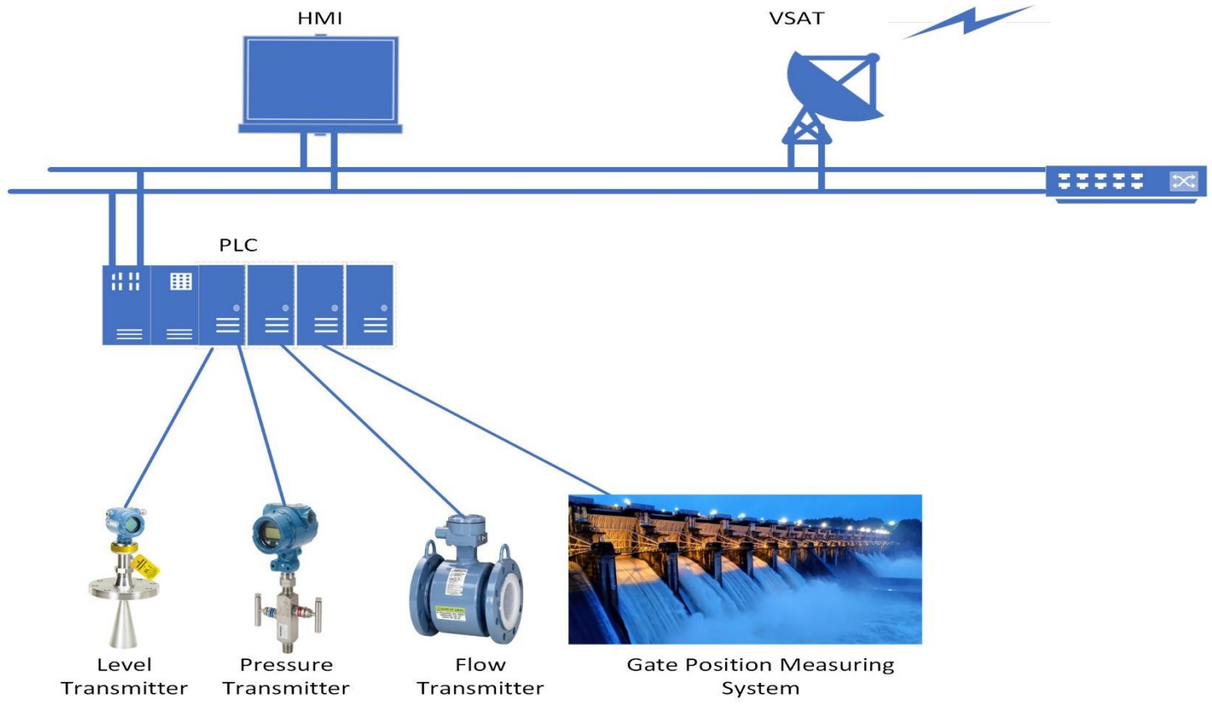
Distribution System

Typical Architecture



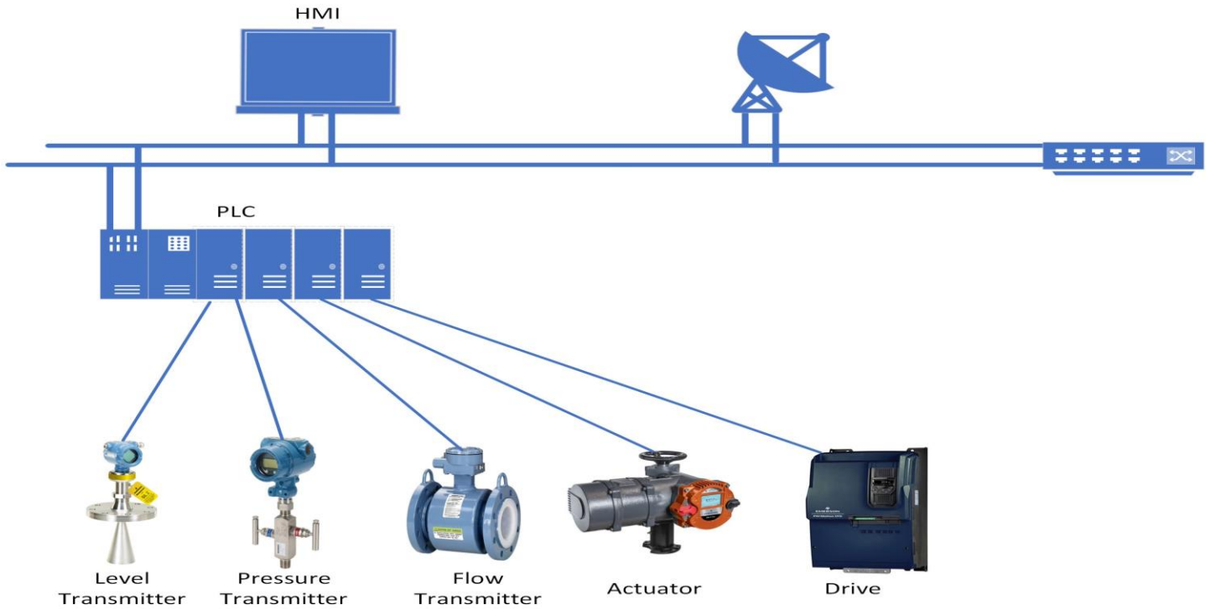
Dam Automation

- The main objective of Dam automation is to regulate the radial gates on the water reservoir by automation system to maintain either a constant level or a constant flow.
- DAM SCADA system collect & process data from instruments installed on Dam for operation & monitoring purpose.
- **Major Components of DAM Automation**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - PLC / RTU Panel
  - Gate Position Measuring System
  - Water Level Sensors
  - Pumps & Actuators
  - IP based cameras and PTZ cameras
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure



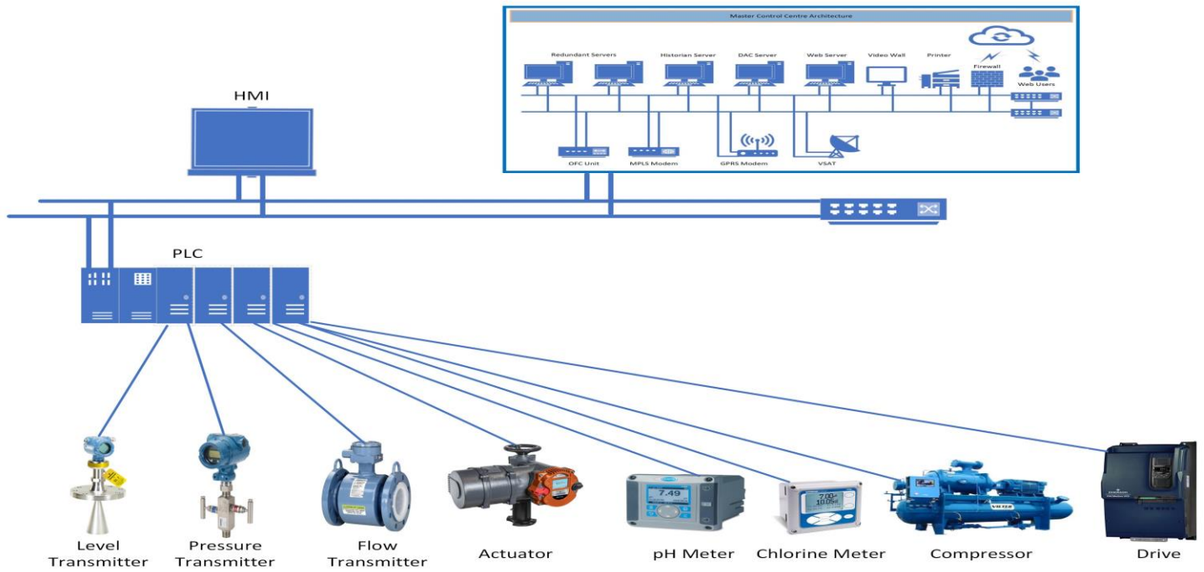
Pipeline Network Operation & Monitoring

- Improved water management by getting accurate data of instruments Cross regulator and headworks.
- Reduction in human intervention minimizes Operational errors.
- Remote monitoring of system will ensure the better supervision from management level.
- **Major Components of Pipeline Network Operation & Monitoring SCADA**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - PLC / RTU Panel
  - Flow & Pressure Meter
  - Pumps & Actuators
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure

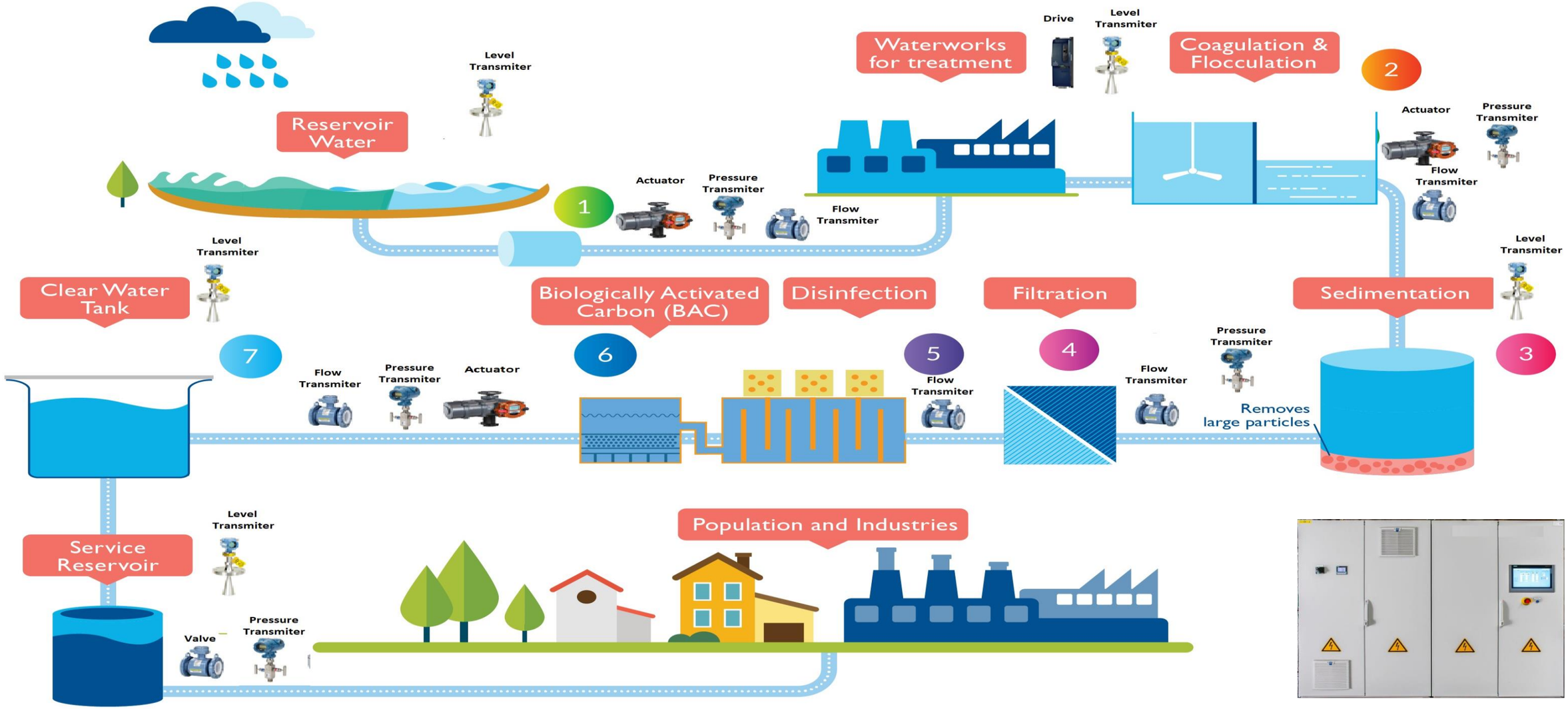


Water Treatment Plant Operation & Monitoring

- Water treatment removes contaminants and undesirable components or reduces their concentration so that the water becomes fit for its desired end-use. This treatment is crucial to human health and allows humans to benefit from both drinking and industrial use.
- The SCADA software is a complete automation solution providing graphical visualization, Data acquisition and Supervisory Control for field instrumentation program.
- **Major components of Water Treatment Plant Operation & Monitoring SCADA**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - Flow, Level & Pressure Meter
  - Ph Meter, Chlorine Meter
  - Compressor
  - Pumps, Actuators & Valves
  - SCADA System
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure

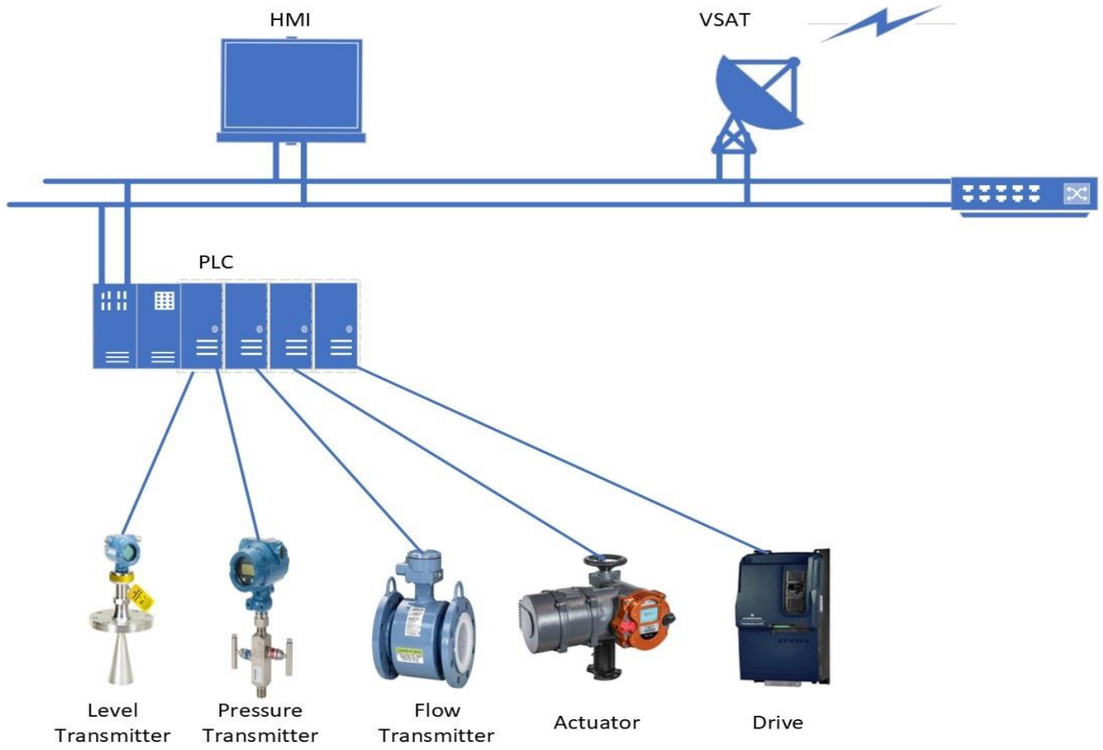


Water Treatment Plant Process



Pumping Station Automation

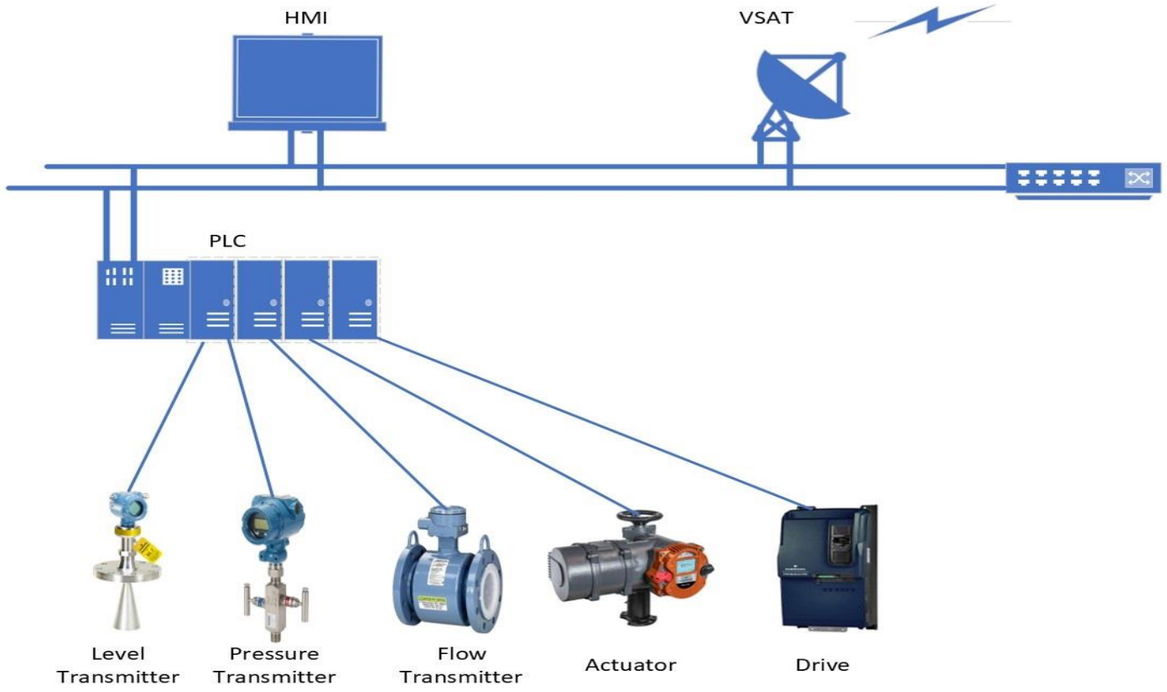
- Pumping stations in a water distribution system are necessary where water is pumped directly into the system or where pressure has to be increased because there is an insufficient difference in water levels in gravity flow distribution systems.
- **Major components of Pumping Station SCADA**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - Electrical Parameters (Voltage, Current, PF, etc..)
  - Pumps, Actuators & Valves
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure



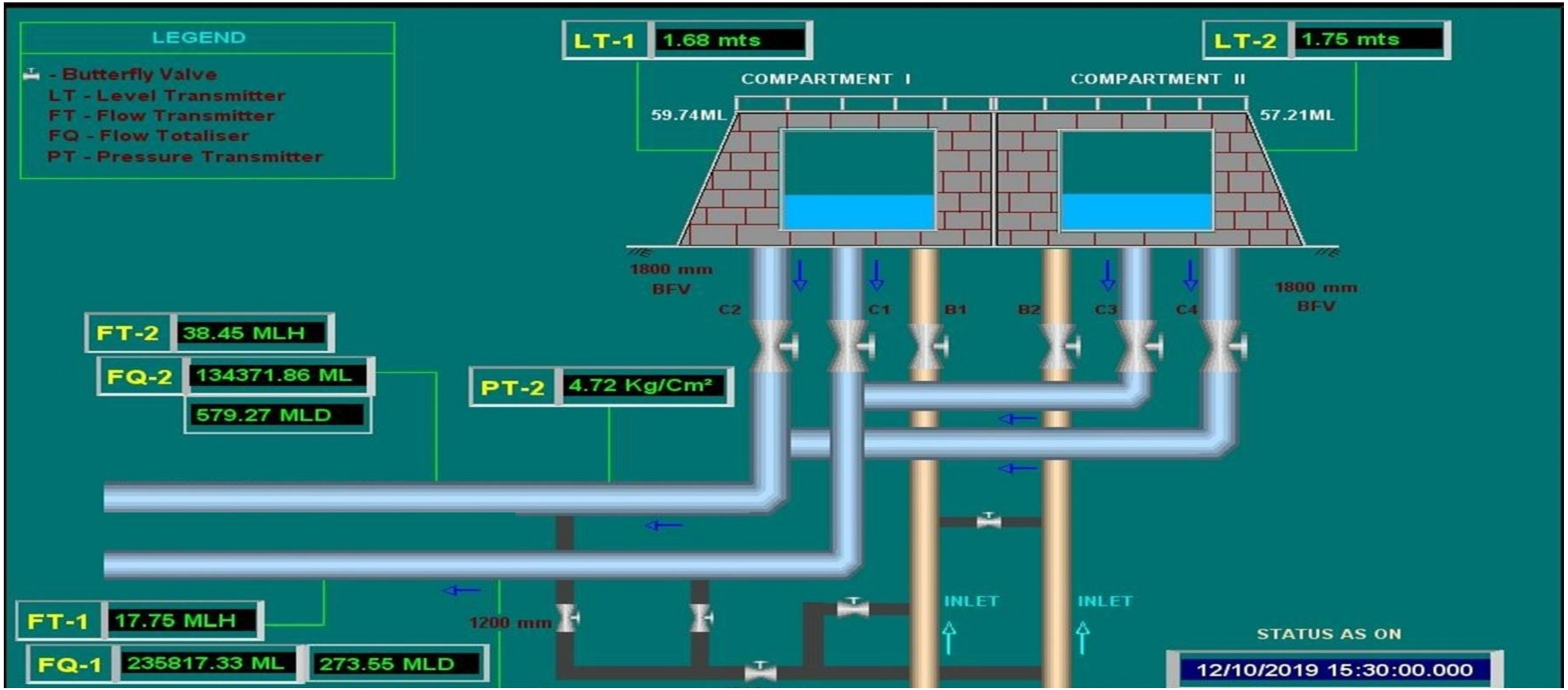
Pumping Station Automation

Distribution from WTP to Service Reservoir

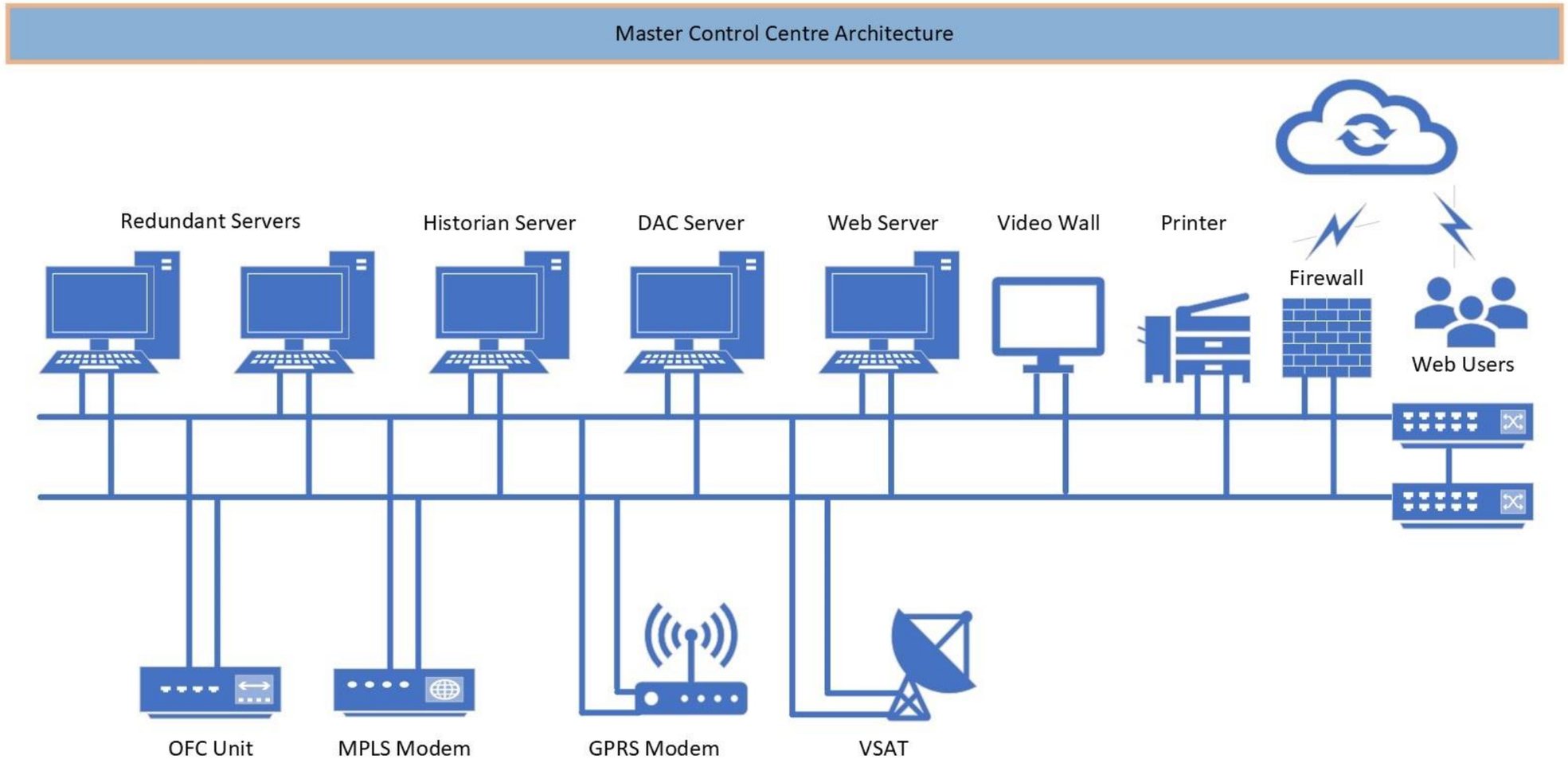
- The objectives of the water distribution system are to supply water equitably to the consumers with sufficient pressure so as to discharge the water at the desired location within the premises. A water distribution system consists of a network of pipelines of various sizes with control valves for carrying water to all streets and supplying water to the consumers through the service connections to the properties.
- **Major components of Distribution SCADA**
  - Programable Logic Controller / Remote Terminal Unit (PLC / RTU)
  - Human Machine Interface (HMI)
  - Pumps, Actuators & Valves
  - Data Communication Medium (Wired & Wireless)
  - UPS/DG Power backup during power failure



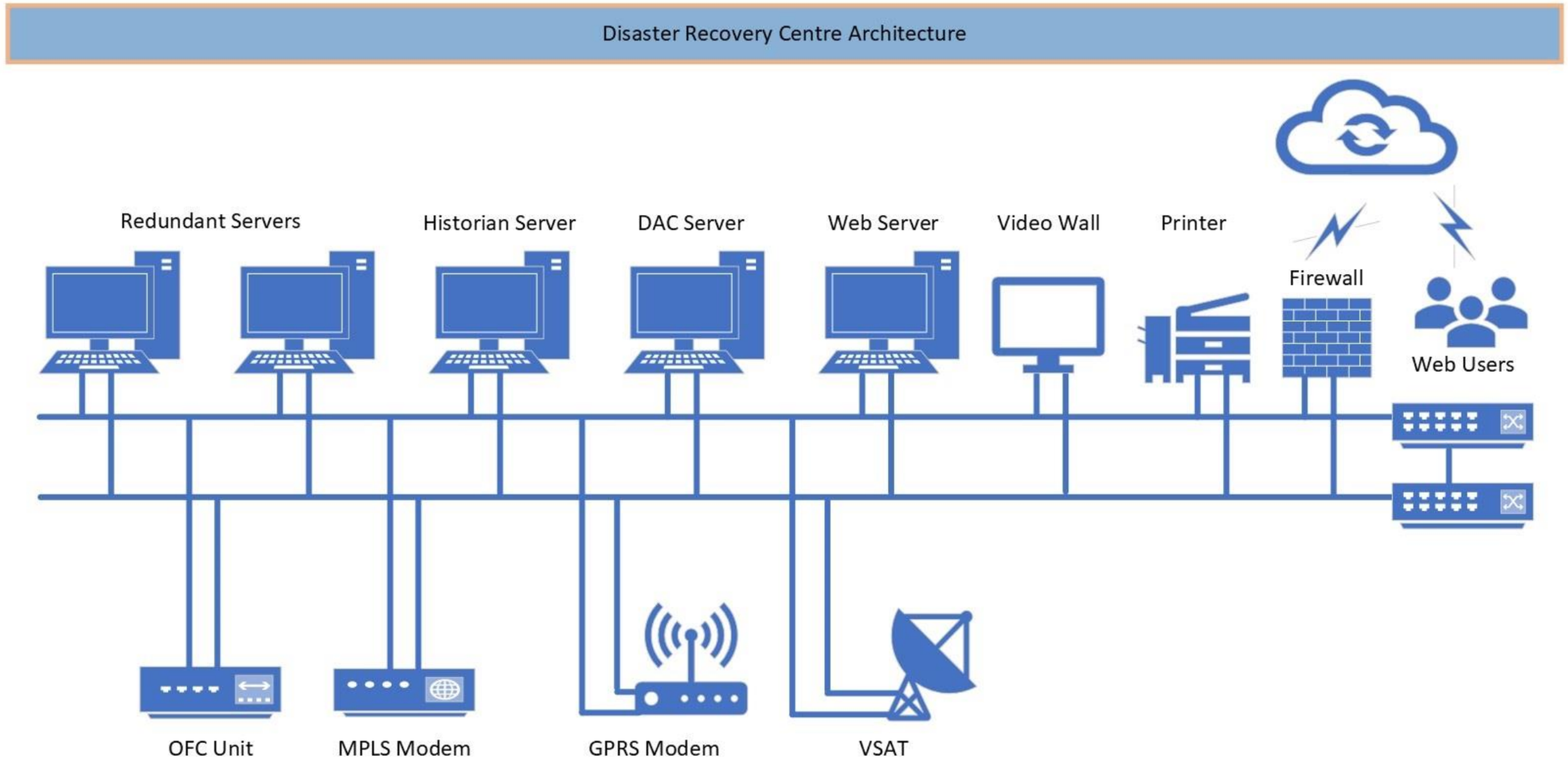
Distribution from WTP to Service Reservoir Display



Master Control Centre Architecture



Disaster Recovery Centre Architecture



SCADA Application in Water Management

- Monitor & Operate Water Network from Centralize Control System
- Get real time data from remotely connected instruments
- Graphical representation
- Control operation
- Store historical data
- Report
- Alarms & Trends
- Web Access to User

Highlights

A composite automation and tracking system - covering the system from the intake side to treatment plants and to the users

Water Quality Parameters can be easily monitored.

Minimize Supply Vs Demand Gaps.

Accurate Forecasting of Supply for Agricultural and Industrial Usage.

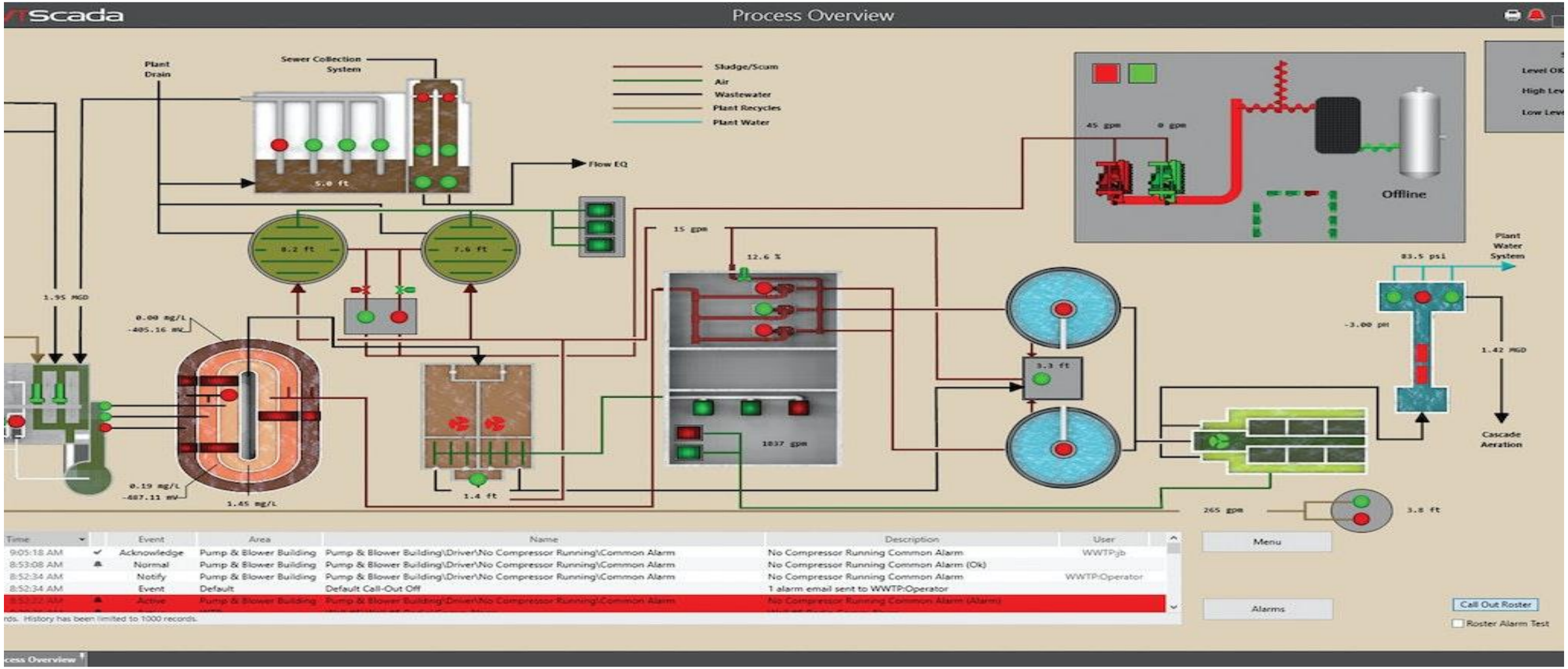
Zonal SCADA for Control Operations and Central Command Centre SCADA for Monitoring.

SMS alerts to be transmitted to the authority in case of any system or usage breach.

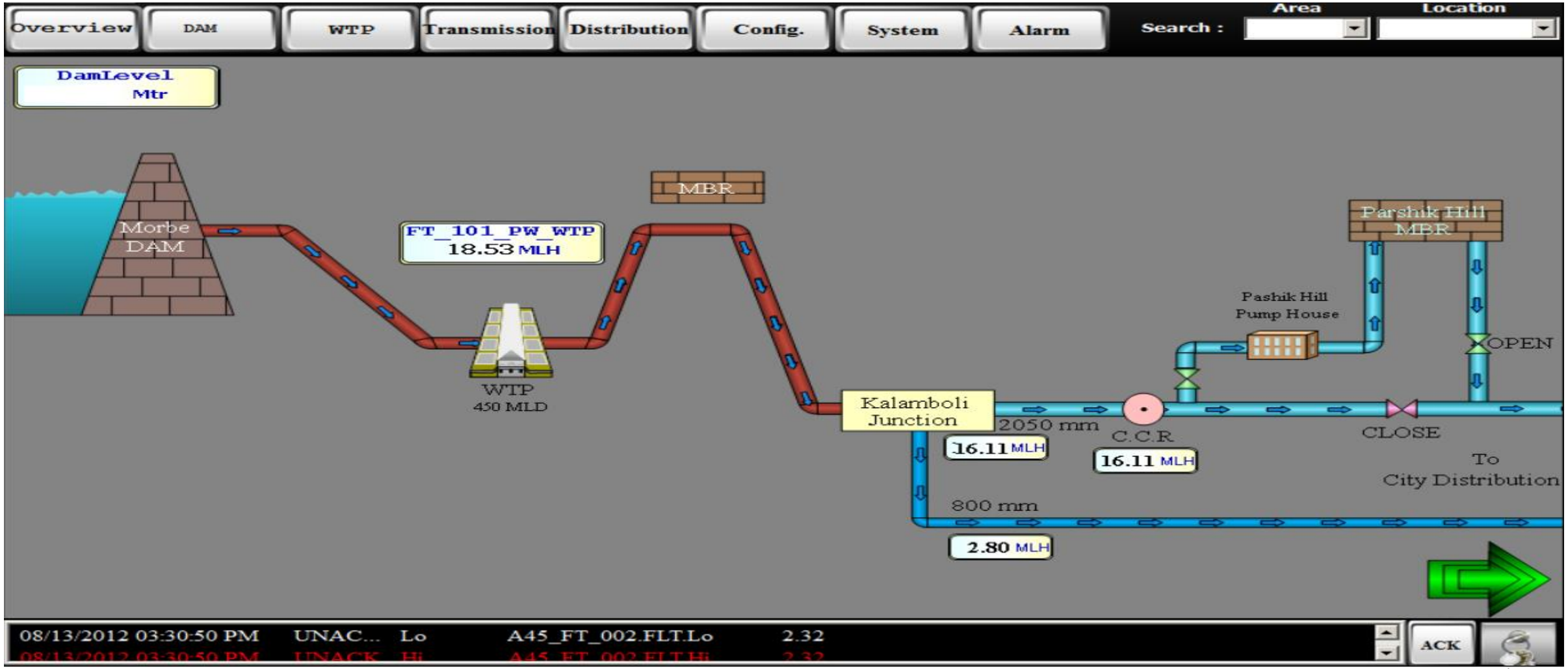
Benefits

- Total transparency in the clean water production and usage data in the city.
- Integrated alarm management will help in fast action and lower downtime
- Centralized data will help the corporation in devising future strategies of water management.
- The distribution network shall be very efficient and wastages shall be controlled.

Water Treatment SCADA Display

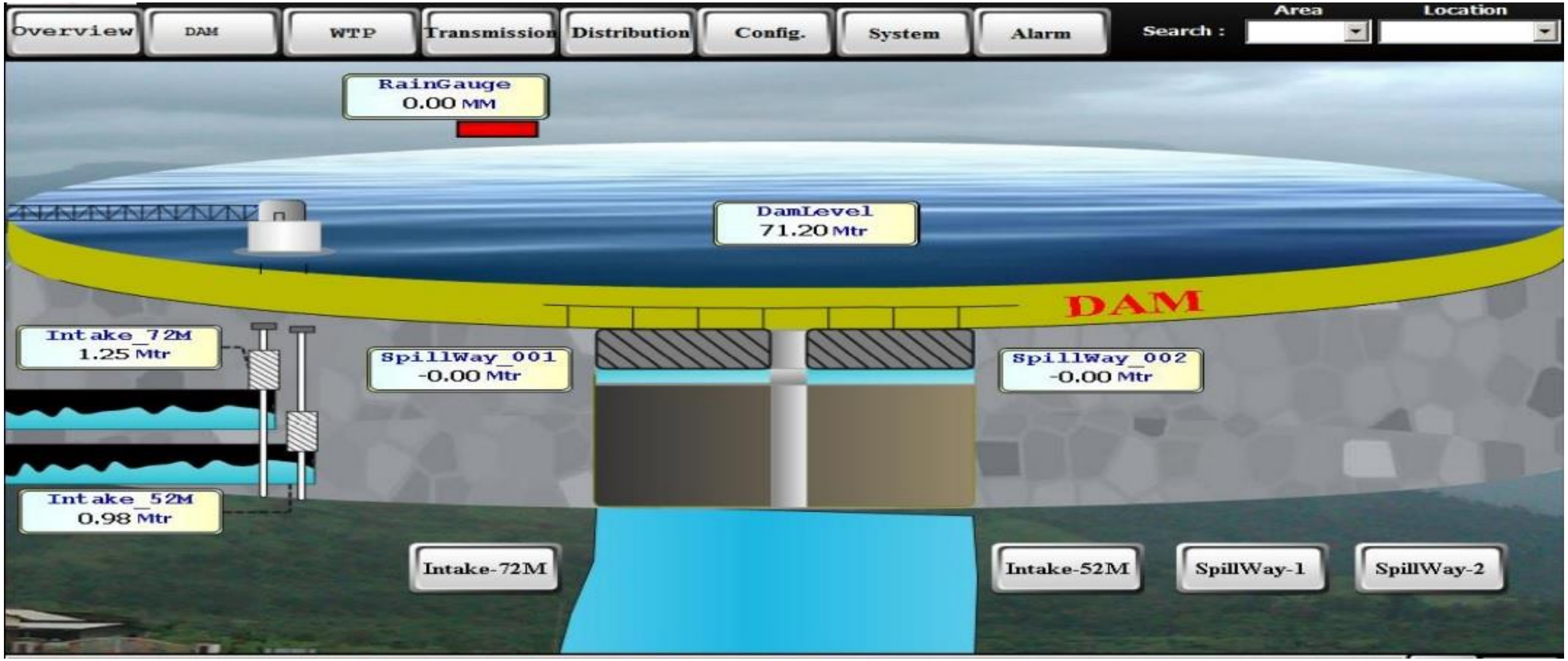


Typical SCADA Display

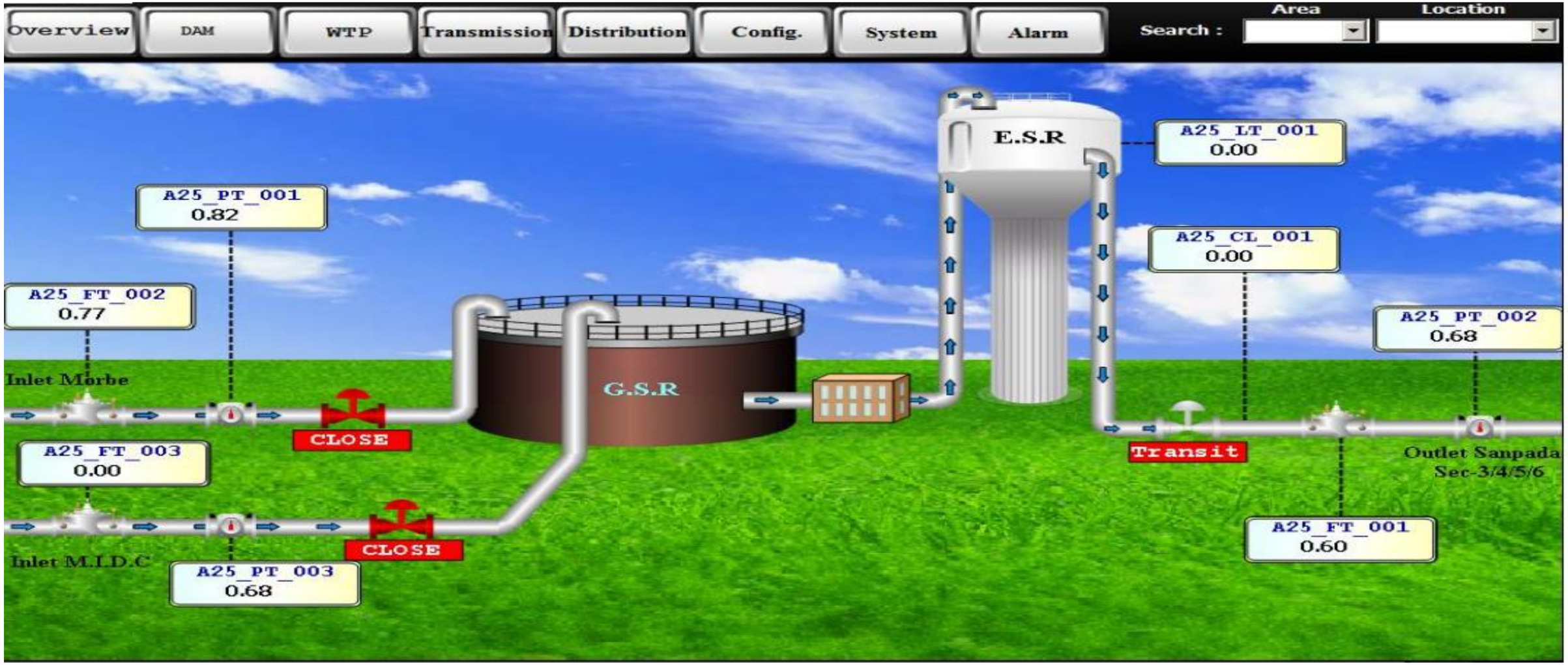


EMERSON

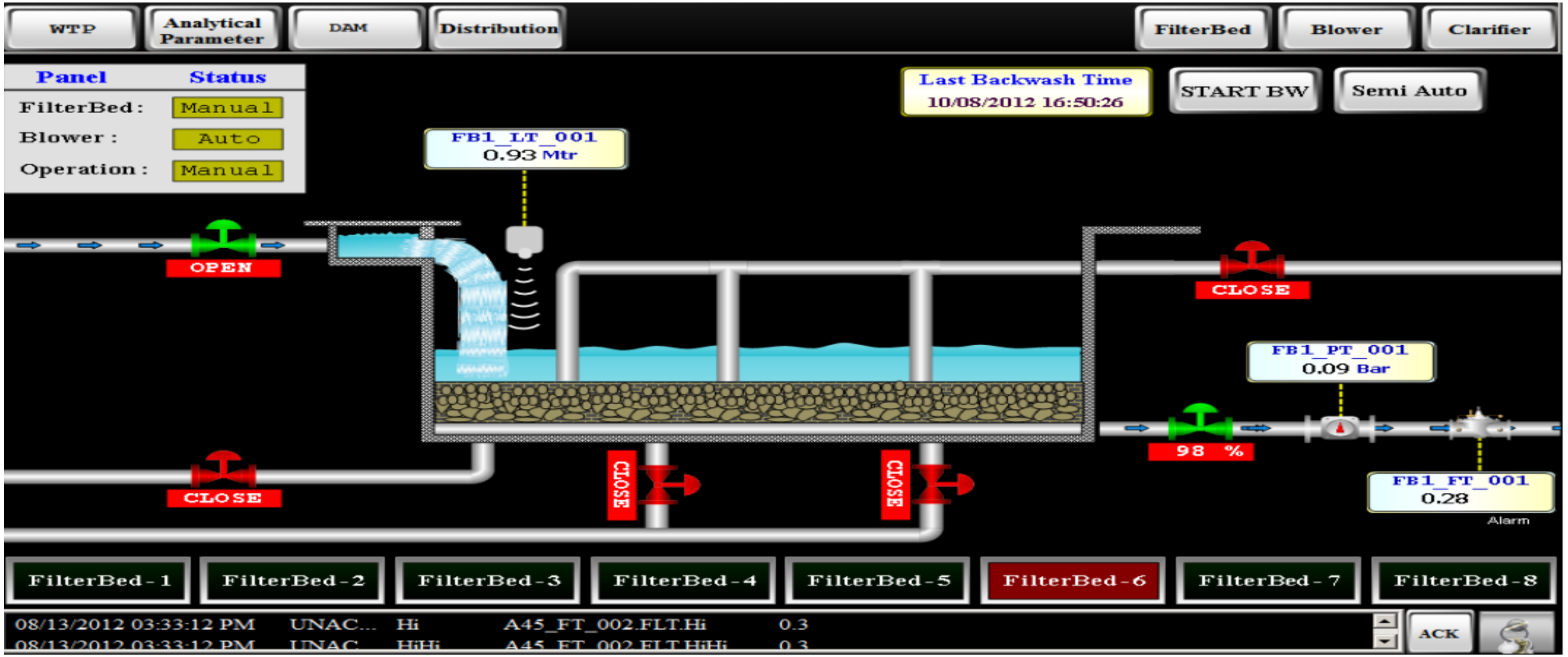
Typical SCADA Display



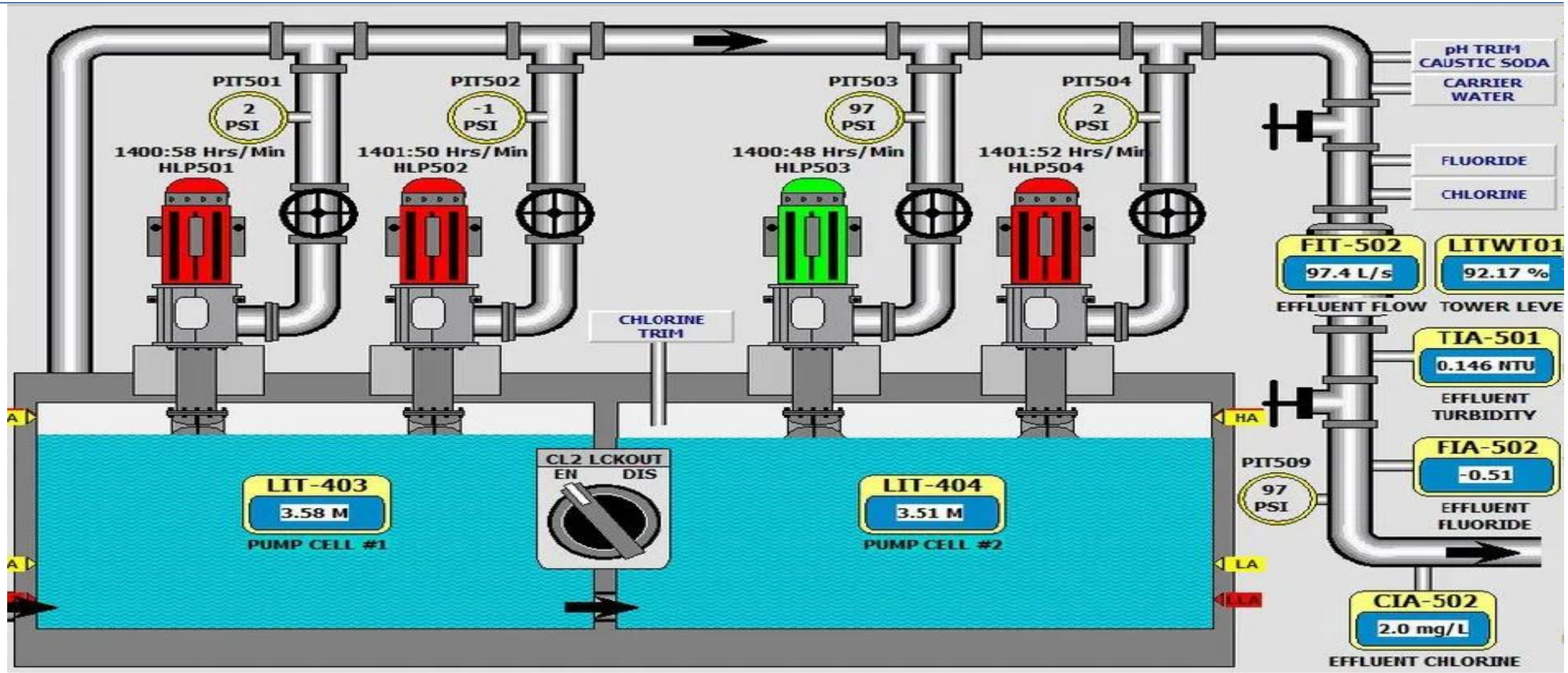
Typical SCADA Display



Typical SCADA Display

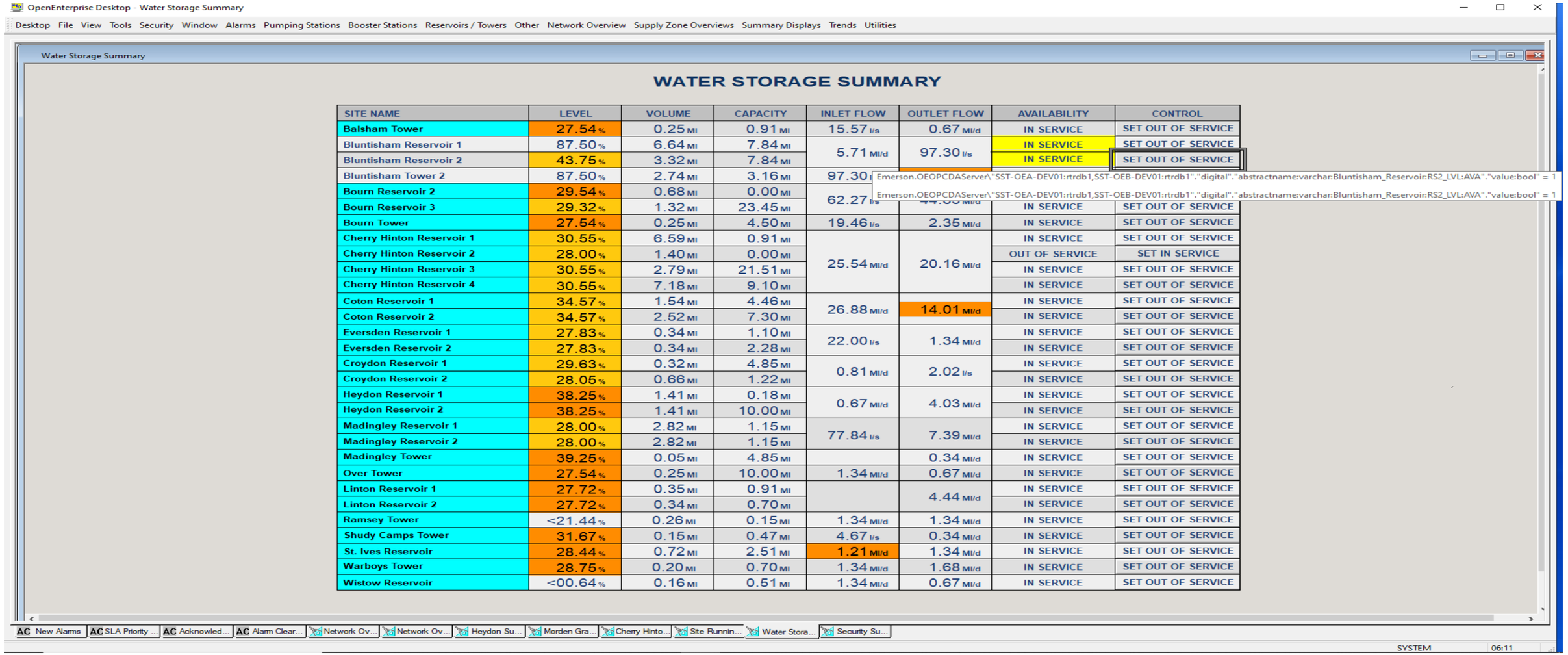


Pumping Station SCADA Display



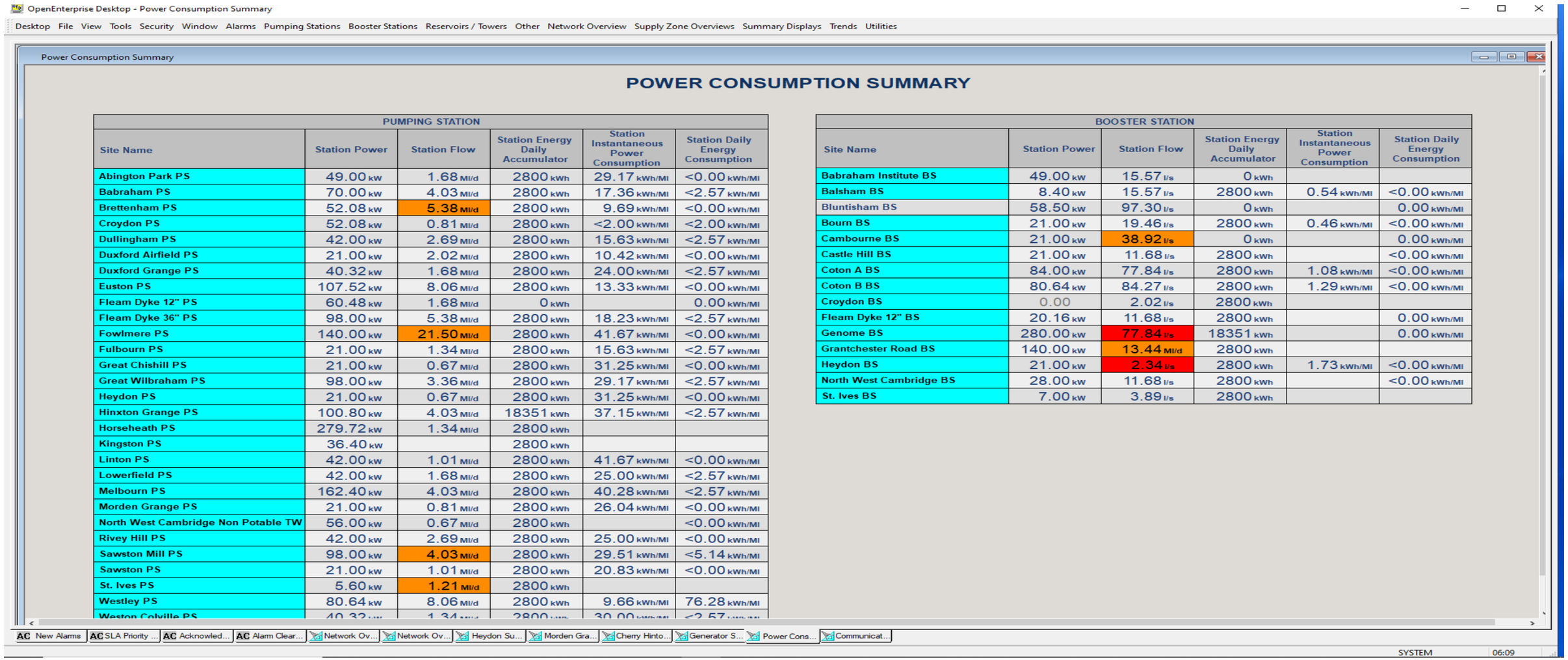
EMERSON

Water Storage Summary

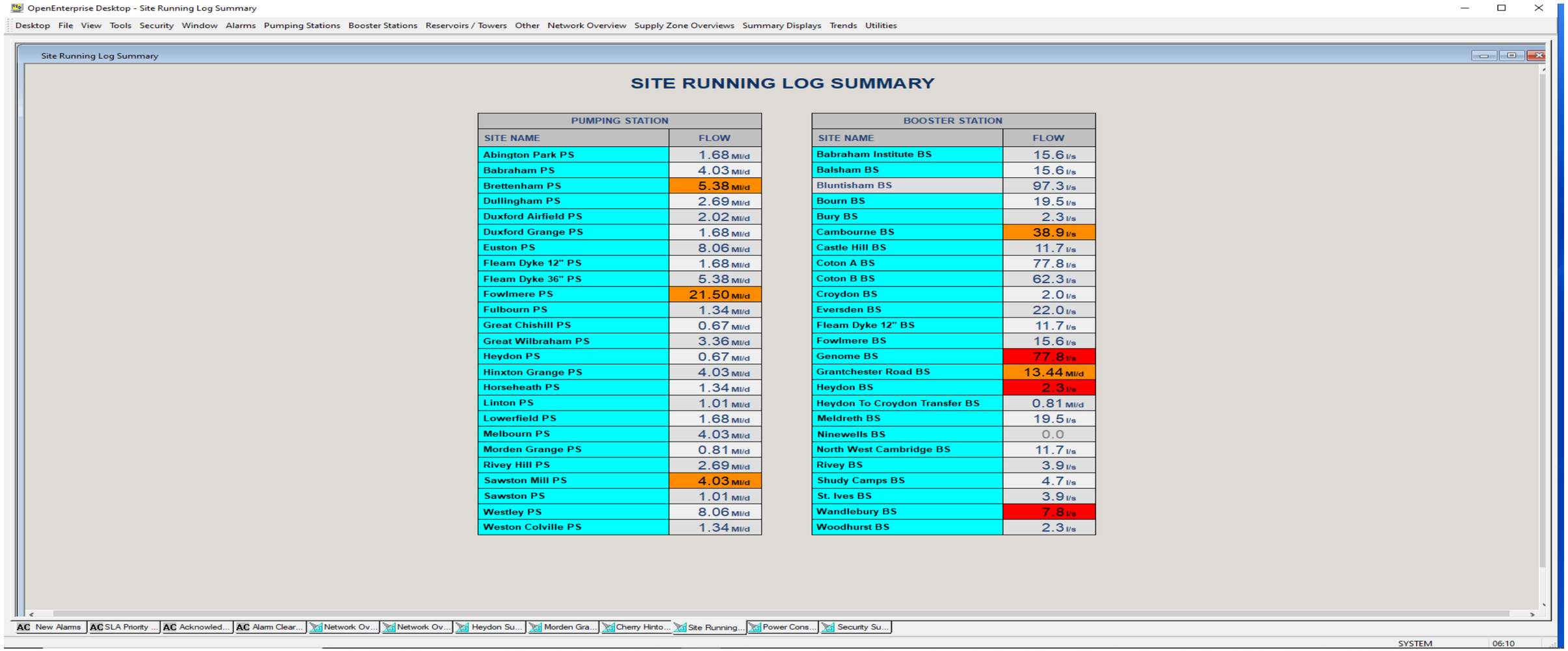


SITE NAME	LEVEL	VOLUME	CAPACITY	INLET FLOW	OUTLET FLOW	AVAILABILITY	CONTROL
Balsham Tower	27.54 %	0.25 Ml	0.91 Ml	15.57 l/s	0.67 Ml/d	IN SERVICE	SET OUT OF SERVICE
Bluntisham Reservoir 1	87.50 %	6.64 Ml	7.84 Ml	5.71 Ml/d	97.30 l/s	IN SERVICE	SET OUT OF SERVICE
Bluntisham Reservoir 2	43.75 %	3.32 Ml	7.84 Ml			IN SERVICE	SET OUT OF SERVICE
Bluntisham Tower 2	87.50 %	2.74 Ml	3.16 Ml	97.30 l			
Bourn Reservoir 2	29.54 %	0.68 Ml	0.00 Ml	62.27 l/s			
Bourn Reservoir 3	29.32 %	1.32 Ml	23.45 Ml			IN SERVICE	SET OUT OF SERVICE
Bourn Tower	27.54 %	0.25 Ml	4.50 Ml	19.46 l/s	2.35 Ml/d	IN SERVICE	SET OUT OF SERVICE
Cherry Hinton Reservoir 1	30.55 %	6.59 Ml	0.91 Ml			IN SERVICE	SET OUT OF SERVICE
Cherry Hinton Reservoir 2	28.00 %	1.40 Ml	0.00 Ml	25.54 Ml/d	20.16 Ml/d	OUT OF SERVICE	SET IN SERVICE
Cherry Hinton Reservoir 3	30.55 %	2.79 Ml	21.51 Ml			IN SERVICE	SET OUT OF SERVICE
Cherry Hinton Reservoir 4	30.55 %	7.18 Ml	9.10 Ml			IN SERVICE	SET OUT OF SERVICE
Coton Reservoir 1	34.57 %	1.54 Ml	4.46 Ml	26.88 Ml/d	14.01 Ml/d	IN SERVICE	SET OUT OF SERVICE
Coton Reservoir 2	34.57 %	2.52 Ml	7.30 Ml			IN SERVICE	SET OUT OF SERVICE
Eversden Reservoir 1	27.83 %	0.34 Ml	1.10 Ml	22.00 l/s	1.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
Eversden Reservoir 2	27.83 %	0.34 Ml	2.28 Ml			IN SERVICE	SET OUT OF SERVICE
Croydon Reservoir 1	29.63 %	0.32 Ml	4.85 Ml	0.81 Ml/d	2.02 l/s	IN SERVICE	SET OUT OF SERVICE
Croydon Reservoir 2	28.05 %	0.66 Ml	1.22 Ml			IN SERVICE	SET OUT OF SERVICE
Heydon Reservoir 1	38.25 %	1.41 Ml	0.18 Ml	0.67 Ml/d	4.03 Ml/d	IN SERVICE	SET OUT OF SERVICE
Heydon Reservoir 2	38.25 %	1.41 Ml	10.00 Ml			IN SERVICE	SET OUT OF SERVICE
Madingley Reservoir 1	28.00 %	2.82 Ml	1.15 Ml	77.84 l/s	7.39 Ml/d	IN SERVICE	SET OUT OF SERVICE
Madingley Reservoir 2	28.00 %	2.82 Ml	1.15 Ml			IN SERVICE	SET OUT OF SERVICE
Madingley Tower	39.25 %	0.05 Ml	4.85 Ml		0.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
Over Tower	27.54 %	0.25 Ml	10.00 Ml	1.34 Ml/d	0.67 Ml/d	IN SERVICE	SET OUT OF SERVICE
Linton Reservoir 1	27.72 %	0.35 Ml	0.91 Ml		4.44 Ml/d	IN SERVICE	SET OUT OF SERVICE
Linton Reservoir 2	27.72 %	0.34 Ml	0.70 Ml			IN SERVICE	SET OUT OF SERVICE
Ramsey Tower	<21.44 %	0.26 Ml	0.15 Ml	1.34 Ml/d	1.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
Shudy Camps Tower	31.67 %	0.15 Ml	0.47 Ml	4.67 l/s	0.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
St. Ives Reservoir	28.44 %	0.72 Ml	2.51 Ml	1.21 Ml/d	1.34 Ml/d	IN SERVICE	SET OUT OF SERVICE
Warboys Tower	28.75 %	0.20 Ml	0.70 Ml	1.34 Ml/d	1.68 Ml/d	IN SERVICE	SET OUT OF SERVICE
Wistow Reservoir	<00.64 %	0.16 Ml	0.51 Ml	1.34 Ml/d	0.67 Ml/d	IN SERVICE	SET OUT OF SERVICE

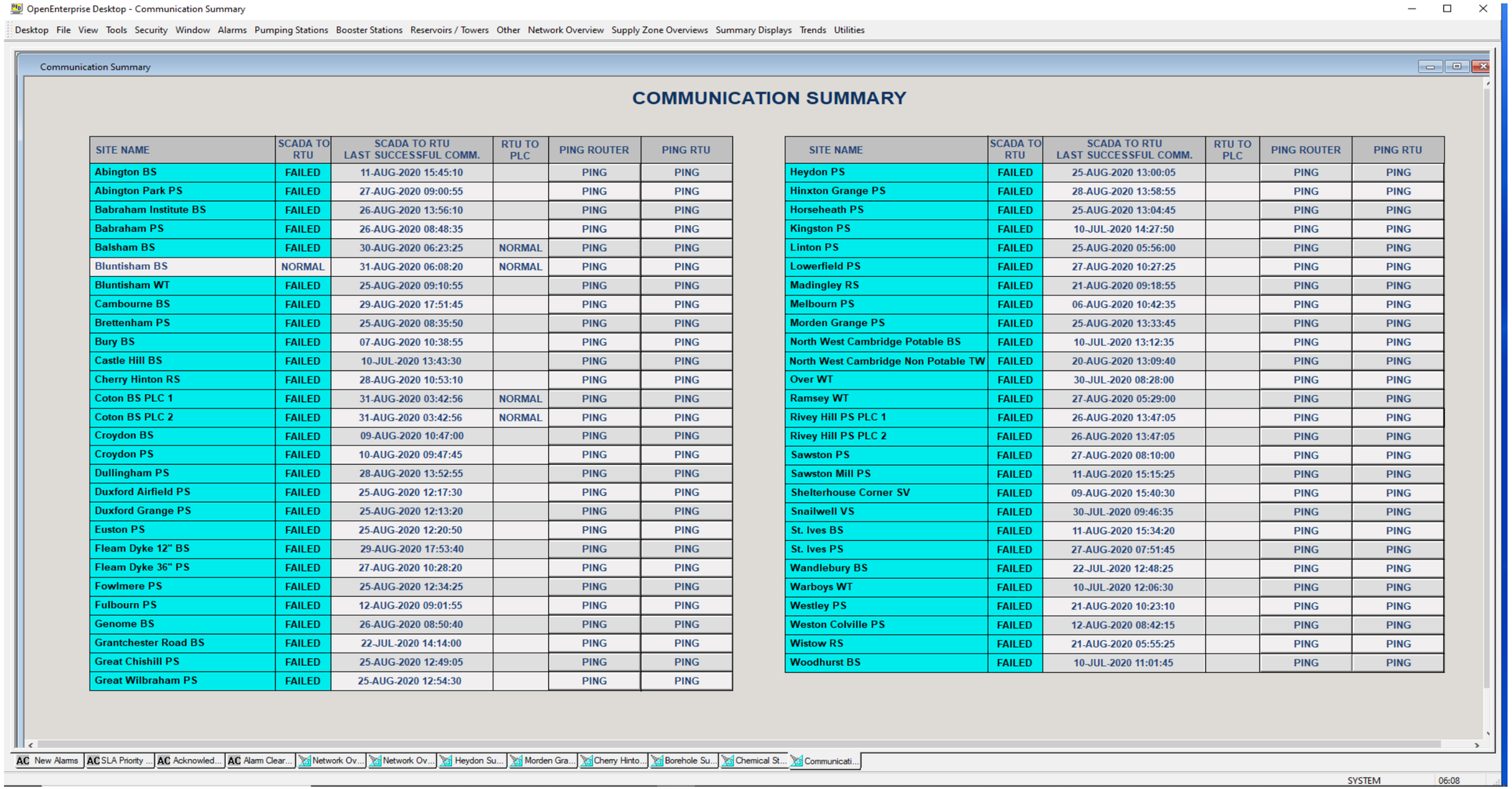
Power Consumption



Log Summary


OpenEnterprise Desktop - Site Running Log Summary
Desktop File View Tools Security Window Alarms Pumping Stations Booster Stations Reservoirs / Towers Other Network Overview Supply Zone Overviews Summary Displays Trends Utilities
Site Running Log Summary
SITE RUNNING LOG SUMMARY
PUMPING STATION
SITE NAME FLOW
Abington Park PS 1.68 Ml/d
Babraham PS 4.03 Ml/d
Brettenham PS 5.38 Ml/d
Dullingham PS 2.69 Ml/d
Duxford Airfield PS 2.02 Ml/d
Duxford Grange PS 1.68 Ml/d
Euston PS 8.06 Ml/d
Fleam Dyke 12" PS 1.68 Ml/d
Fleam Dyke 36" PS 5.38 Ml/d
Fowlmere PS 21.50 Ml/d
Fulbourn PS 1.34 Ml/d
Great Chishill PS 0.67 Ml/d
Great Wilbraham PS 3.36 Ml/d
Heydon PS 0.67 Ml/d
Hinxton Grange PS 4.03 Ml/d
Horseheath PS 1.34 Ml/d
Linton PS 1.01 Ml/d
Lowerfield PS 1.68 Ml/d
Melbourn PS 4.03 Ml/d
Morden Grange PS 0.81 Ml/d
Rivey Hill PS 2.69 Ml/d
Sawston Mill PS 4.03 Ml/d
Sawston PS 1.01 Ml/d
Westley PS 8.06 Ml/d
Weston Colville PS 1.34 Ml/d
BOOSTER STATION
SITE NAME FLOW
Babraham Institute BS 15.6 l/s
Balsham BS 15.6 l/s
Bluntisham BS 97.3 l/s
Bourn BS 19.5 l/s
Bury BS 2.3 l/s
Cambourne BS 38.9 l/s
Castle Hill BS 11.7 l/s
Coton A BS 77.8 l/s
Coton B BS 62.3 l/s
Croydon BS 2.0 l/s
Eversden BS 22.0 l/s
Fleam Dyke 12" BS 11.7 l/s
Fowlmere BS 15.6 l/s
Genome BS 77.8 l/s
Grantchester Road BS 13.44 Ml/d
Heydon BS 2.3 l/s
Heydon To Croydon Transfer BS 0.81 Ml/d
Meldreth BS 19.5 l/s
Ninewells BS 0.0
North West Cambridge BS 11.7 l/s
Rivey BS 3.9 l/s
Shudy Camps BS 4.7 l/s
St. Ives BS 3.9 l/s
Wandlebury BS 7.8 l/s
Woodhurst BS 2.3 l/s
AC New Alarms
AC SLA Priority ...
AC Acknowled...
AC Alarm Clear...
Network Ov...
Network Ov...
Heydon Su...
Morden Gra...
Cherry Hinto...
Site Running...
Power Cons...
Security Su...
SYSTEM
06:10

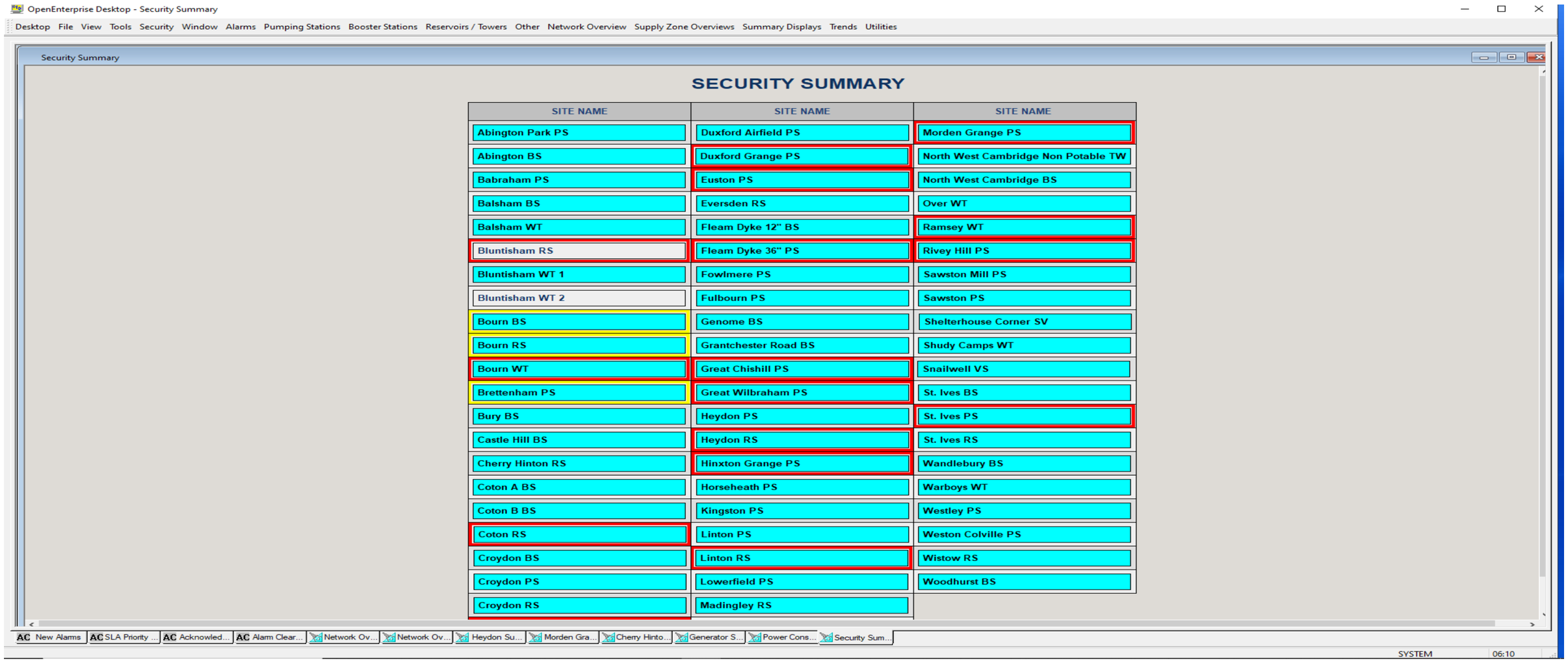
Communications Summary



SITE NAME	SCADA TO RTU	SCADA TO RTU LAST SUCCESSFUL COMM.	RTU TO PLC	PING ROUTER	PING RTU
Abington BS	FAILED	11-AUG-2020 15:45:10		PING	PING
Abington Park PS	FAILED	27-AUG-2020 09:00:55		PING	PING
Babraham Institute BS	FAILED	26-AUG-2020 13:56:10		PING	PING
Babraham PS	FAILED	26-AUG-2020 08:48:35		PING	PING
Balsham BS	FAILED	30-AUG-2020 06:23:25	NORMAL	PING	PING
Bluntisham BS	NORMAL	31-AUG-2020 06:08:20	NORMAL	PING	PING
Bluntisham WT	FAILED	25-AUG-2020 09:10:55		PING	PING
Cambourne BS	FAILED	29-AUG-2020 17:51:45		PING	PING
Brettenham PS	FAILED	25-AUG-2020 08:35:50		PING	PING
Bury BS	FAILED	07-AUG-2020 10:38:55		PING	PING
Castle Hill BS	FAILED	10-JUL-2020 13:43:30		PING	PING
Cherry Hinton RS	FAILED	28-AUG-2020 10:53:10		PING	PING
Coton BS PLC 1	FAILED	31-AUG-2020 03:42:56	NORMAL	PING	PING
Coton BS PLC 2	FAILED	31-AUG-2020 03:42:56	NORMAL	PING	PING
Croydon BS	FAILED	09-AUG-2020 10:47:00		PING	PING
Croydon PS	FAILED	10-AUG-2020 09:47:45		PING	PING
Dullingham PS	FAILED	28-AUG-2020 13:52:55		PING	PING
Duxford Airfield PS	FAILED	25-AUG-2020 12:17:30		PING	PING
Duxford Grange PS	FAILED	25-AUG-2020 12:13:20		PING	PING
Euston PS	FAILED	25-AUG-2020 12:20:50		PING	PING
Fleam Dyke 12" BS	FAILED	29-AUG-2020 17:53:40		PING	PING
Fleam Dyke 36" PS	FAILED	27-AUG-2020 10:28:20		PING	PING
Fowlmere PS	FAILED	25-AUG-2020 12:34:25		PING	PING
Fulbourn PS	FAILED	12-AUG-2020 09:01:55		PING	PING
Genome BS	FAILED	26-AUG-2020 08:50:40		PING	PING
Grantchester Road BS	FAILED	22-JUL-2020 14:14:00		PING	PING
Great Chishill PS	FAILED	25-AUG-2020 12:49:05		PING	PING
Great Wilbraham PS	FAILED	25-AUG-2020 12:54:30		PING	PING

SITE NAME	SCADA TO RTU	SCADA TO RTU LAST SUCCESSFUL COMM.	RTU TO PLC	PING ROUTER	PING RTU
Heydon PS	FAILED	25-AUG-2020 13:00:05		PING	PING
Hinxton Grange PS	FAILED	28-AUG-2020 13:58:55		PING	PING
Horseheath PS	FAILED	25-AUG-2020 13:04:45		PING	PING
Kingston PS	FAILED	10-JUL-2020 14:27:50		PING	PING
Linton PS	FAILED	25-AUG-2020 05:56:00		PING	PING
Lowerfield PS	FAILED	27-AUG-2020 10:27:25		PING	PING
Madingley RS	FAILED	21-AUG-2020 09:18:55		PING	PING
Melbourn PS	FAILED	06-AUG-2020 10:42:35		PING	PING
Morden Grange PS	FAILED	25-AUG-2020 13:33:45		PING	PING
North West Cambridge Potable BS	FAILED	10-JUL-2020 13:12:35		PING	PING
North West Cambridge Non Potable TW	FAILED	20-AUG-2020 13:09:40		PING	PING
Over WT	FAILED	30-JUL-2020 08:28:00		PING	PING
Ramsey WT	FAILED	27-AUG-2020 05:29:00		PING	PING
Rivey Hill PS PLC 1	FAILED	26-AUG-2020 13:47:05		PING	PING
Rivey Hill PS PLC 2	FAILED	26-AUG-2020 13:47:05		PING	PING
Sawston PS	FAILED	27-AUG-2020 08:10:00		PING	PING
Sawston Mill PS	FAILED	11-AUG-2020 15:15:25		PING	PING
Shelterhouse Corner SV	FAILED	09-AUG-2020 15:40:30		PING	PING
Snailwell VS	FAILED	30-JUL-2020 09:46:35		PING	PING
St. Ives BS	FAILED	11-AUG-2020 15:34:20		PING	PING
St. Ives PS	FAILED	27-AUG-2020 07:51:45		PING	PING
Wandlebury BS	FAILED	22-JUL-2020 12:48:25		PING	PING
Warboys WT	FAILED	10-JUL-2020 12:06:30		PING	PING
Westley PS	FAILED	21-AUG-2020 10:23:10		PING	PING
Weston Colville PS	FAILED	12-AUG-2020 08:42:15		PING	PING
Wistow RS	FAILED	21-AUG-2020 05:55:25		PING	PING
Woodhurst BS	FAILED	10-JUL-2020 11:01:45		PING	PING

Security Summary



Daily Report

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Created on		on	26/10/2022 14:25												
2																
3	Date	Flow												Levels (MTHD)		Pressure
4	26/10/2022	Flow 1		Flow 2		Flow 3		Flow 4		Flow 5		Flow 6		Level		Pressure
5		Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Flow(MHL)	Sum(ML)	Comp I	Comp. II	
6	Time	M7_FT_1	M7_FQ_1	M7_FT_2	M7_FQ_2	M7_FT_3	M7_FQ_3	M7_FT_4	M7_FQ_4	M7_FT_5	M7_FQ_5	M7_FT_6	M7_FQ_6	M7_LT_1	M7_LT_2	M7_PT_5
7	0:00	22.80	52620.34	27.60	345731.66	15.05	621960.94	0.00	356176.25	22.93	311360.66	0.00	789513.81	4.67	4.68	1.17
8	1:00	22.10	52642.76	24.74	345756.59	15.33	621975.94	0.00	356176.25	21.93	311383.06	0.00	789513.81	4.68	4.66	1.22
9	2:00	21.73	52664.55	26.49	345783.00	15.36	621991.25	0.00	356176.25	21.82	311404.88	0.00	789513.81	4.67	4.68	1.27
10	3:00	23.90	52686.35	25.72	345809.16	15.43	622006.69	0.00	356176.25	23.89	311426.72	0.00	789513.81	4.67	4.68	1.28
11	4:00	20.39	52708.94	45.02	345842.09	16.82	622022.56	0.00	356176.25	20.95	311449.31	0.00	789513.81	4.66	4.40	1.35
12	5:00	22.34	52730.39	50.00	345893.28	32.83	622050.94	0.00	356176.25	22.18	311470.75	0.00	789513.81	4.67	3.79	1.29
13	6:00	23.76	52752.94	50.00	345945.63	31.07	622083.06	0.00	356176.25	23.65	311493.28	0.00	789513.81	4.67	2.85	1.19
14	7:00	23.82	52776.82	50.00	345998.13	30.22	622113.75	0.00	356176.25	24.24	311517.16	0.00	789513.81	4.67	1.89	1.14
15	8:00	24.26	52800.87	44.08	346047.25	30.03	622143.81	0.00	356176.25	24.31	311541.22	0.00	789513.81	4.67	0.92	1.08
16	9:00	24.61	52825.49	42.98	346090.09	29.86	622173.31	0.00	356176.25	24.58	311565.84	0.00	789513.81	4.26	0.39	1.05
17	10:00	24.20	52849.80	37.34	346129.75	18.32	622194.06	2.81	356178.03	23.99	311590.19	0.00	789513.81	4.17	0.39	1.04
18	11:00	24.55	52874.10	34.82	346166.34	15.92	622212.00	0.00	356180.25	24.54	311614.47	0.00	789513.81	4.69	0.20	1.05
19	12:00	24.92	52898.68	36.71	346202.31	15.95	622228.00	0.00	356180.25	24.89	311639.09	0.00	789513.81	4.69	0.22	1.05
20	13:00	24.91	52923.30	33.13	346237.84	15.85	622244.00	0.00	356180.25	24.53	311663.75	0.00	789513.88	4.58	0.19	1.06
21	14:00	24.54	52948.00	35.19	346273.03	19.30	622262.94	3.26	356183.19	24.53	311688.47	0.00	789513.88	4.40	0.20	1.08
22	15:00	23.84	52972.15	37.90	346310.41	19.49	622282.13	3.41	356186.50	24.16	311712.66	0.00	789513.88	4.14	0.13	1.08
23	16:00	22.62	52995.44	39.37	346348.50	18.80	622301.19	3.64	356190.03	22.79	311735.94	0.00	789513.88	3.90	0.21	1.09
24	17:00	23.72	53019.21	39.12	346388.06	17.62	622319.44	4.10	356193.88	23.62	311759.69	0.00	789513.88	3.59	0.17	1.07
25	18:00	24.05	53042.88	39.50	346427.84	17.76	622337.38	4.29	356198.06	23.96	311783.34	25.00	789513.88	3.40	0.21	1.06
26	19:00	24.59	53067.32	44.77	346469.38	18.74	622355.50	4.40	356202.44	24.74	311807.78	0.00	789513.88	3.23	0.22	1.05
27	20:00	24.21	53092.05	42.19	346512.91	18.05	622373.81	4.33	356206.78	24.29	311832.50	0.00	789513.88	3.08	0.23	1.04
28	21:00	23.89	53116.29	36.52	346552.97	17.75	622391.94	4.38	356211.13	23.95	311856.72	0.00	789513.88	2.86	0.24	1.03
29	22:00	24.59	53140.43	31.67	346586.69	18.76	622410.13	4.60	356215.56	24.75	311880.91	0.00	789513.88	2.77	0.21	1.04
30	23:00	24.05	53164.74	30.72	346618.66	18.05	622428.69	4.06	356220.06	24.70	311905.22	0.00	789513.88	3.52	0.22	1.05
31	24:00	24.51	53176.90	31.36	346634.53	17.75	622437.56	3.44	356221.94	24.56	311917.38	0.00	789513.88	4.19	0.18	1.06
32	Total input		556.56		902.88		476.63		45.69		556.72		0.06			
33																

Thank you

Emerson Contact Details :

1. Mr. Swanand Deshpande +91-9822398989
2. Mr. Ankushkumar Deshmukh +91-9833445182

Reports & Analysis using
Performance Monitoring System (PMS)

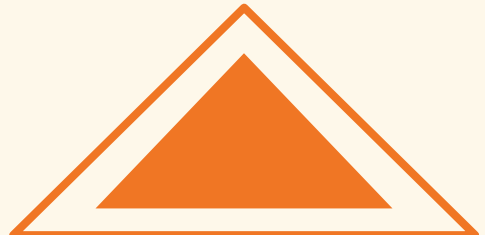
By

Jaideep Wairal

Holistic Data Analytics solution for Water and Waste water treatment

Welcome!!

This Presentation is to provide information about designing and developing a holistic IT solution along with GAP analysis fetching data from various sources/applications for water supply and sewerage and collating into an integrated MIS, Performance Monitoring System (PMS)



SCADA in WSSD

Operations

Utilizing efficient and precise water and wastewater monitoring systems is critical to providing your community with clean, affordable water.

Treatment facility

Supervisory control and data acquisition (SCADA) is the standard term for these digital networks and computer systems that gather and analyze real-time data.

Transport

Older wastewater and water monitoring systems required a lot of staff, time and resources to keep operations running.

Analytics

For analysis and meeting requirement for city ranking, PAS, MPCB/ CPCB etc.

Hell LOT!! of Data

01 After couple of years of SCADA system usage, we will be having lot of valuable data.

02 The data, collected over time, can be used by analytical technologies for predictive measures.

03 Utility managers can break the information down to answer questions

04 “Where am I using energy or spending my money?”

05 “What am I spending on energy and chemicals in different parts of the facility?”

06 Am I operating my treatment facilities efficiently?

SCADA in WSSD

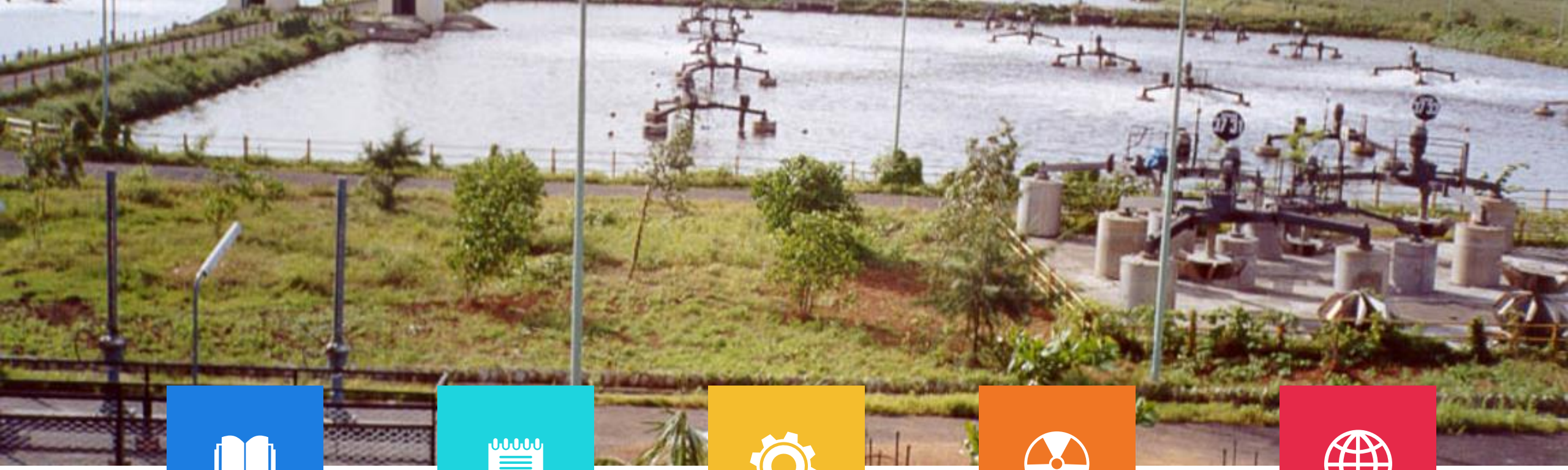
SCADA System

Water Loss Management system

Data gathering from 143 spots

Reservoir	Reservoir	Reservoir	Well Pump	DMA	DMA	DMA
FLOW	FLOW	FLOW	FLOW	FLOW	FLOW	FLOW
LEVEL	LEVEL	LEVEL	PRESSURE	PRESSURE	PRESSURE	PRESSURE

PMS for DSS



Operational data

Years of raw historical data available for analysis at fingertips.

Compliance

MPCB/ RTI compliance data from records whenever required and audit trails

Trend analysis

Wet weather/ Dry weather data across months/ years for planning and informed decisions

Maintenance records

Health status of plant and machinery along with planned maintenance activities

Machine learning

ML techniques for informed operation such as dam/ pumping station operation.

PERFORMANCE MONITORING SYSTEM

Data capture points

SCADA

All SCADA parameters can be captured using industry standard MQTT protocol. Eg. Wetwell level, pump ON/OFF, KVA, Flow, Temperature

Manual

Parameters which are not captured by SCADA, can be entered manually in the system

Asset details

All assets can be created on the fly with as many parameter for each asset

Asset history

Any maintenance carried out on asset along with financial details to ascertain life of asset

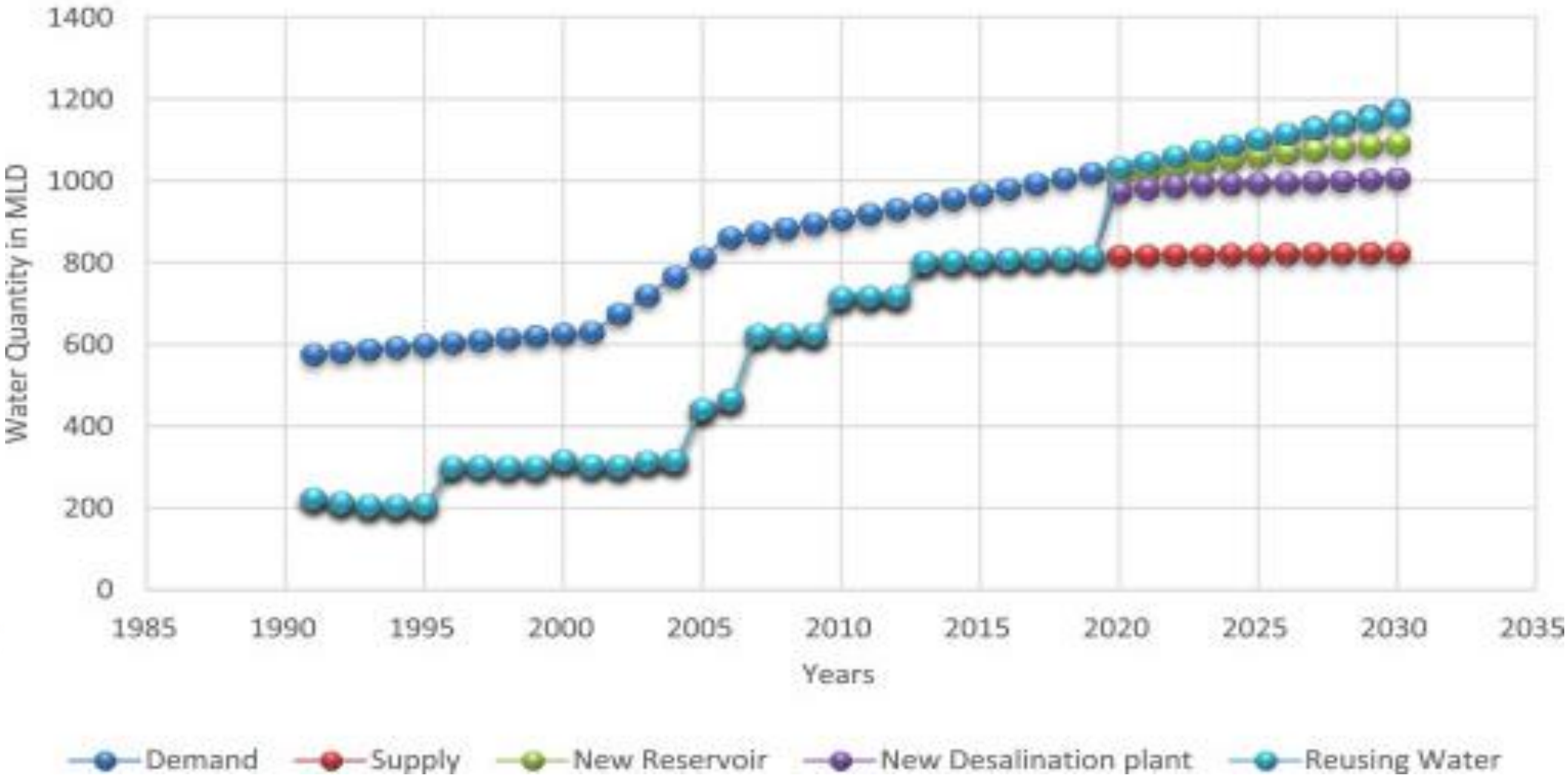
Quality

Sewage/ water sample quality data can be maintained in the system as per standards defined by MPCB/ CPCB

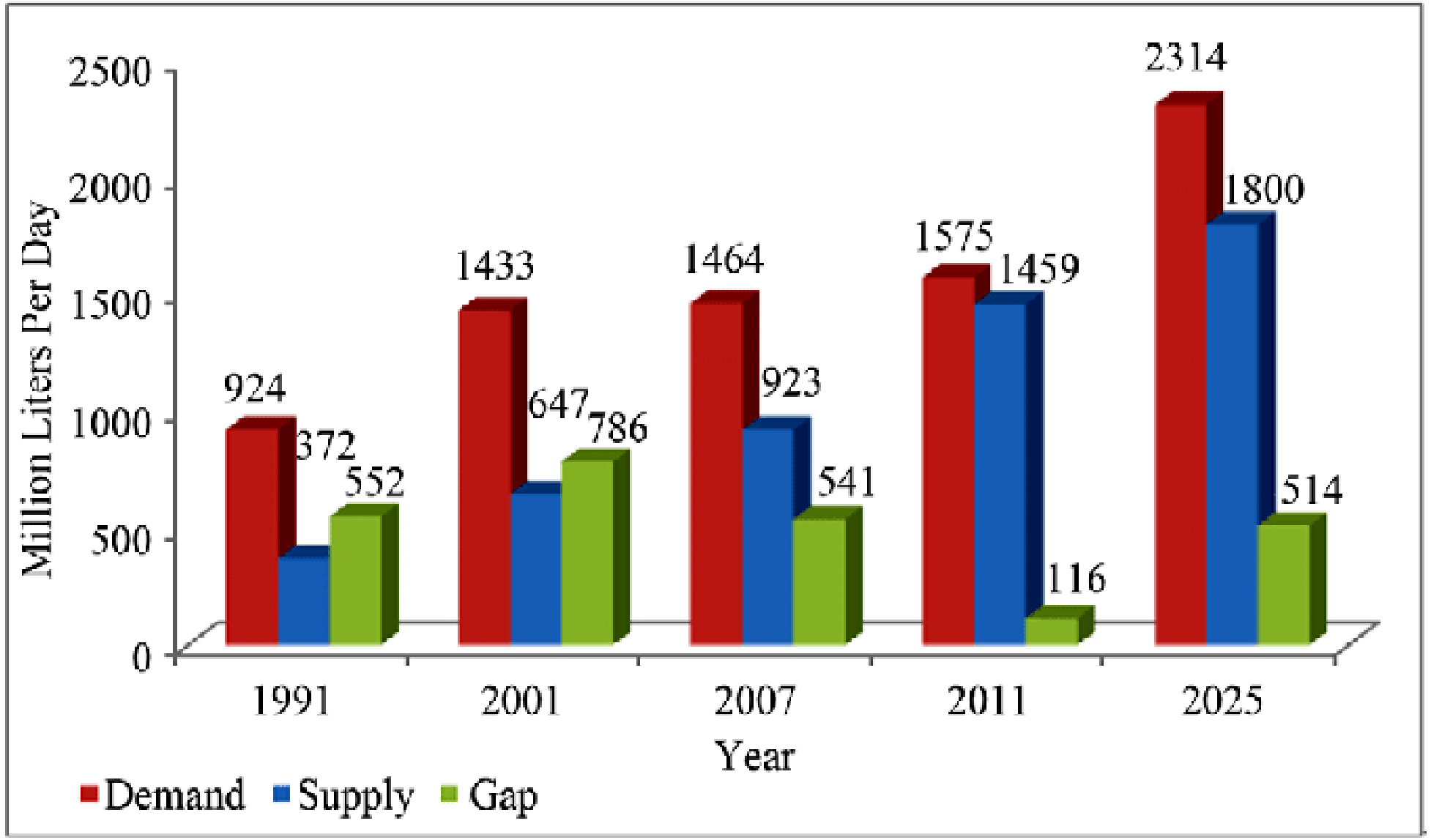
Data Analytics in WSSD

- For Water managers/Engineers, big data is showing big promise in many water related applications such as planning optimum water systems
- Detecting ecosystem changes through big remote sensing and geographical information system
- Forecasting/predicting/detecting natural and manmade calamities
- Scheduling irrigations, mitigating environmental pollution, studying climate change impacts, detect problems and optimize plant resource usage etc.
- Predictive Information System for zone wise water distribution and als o helps further to provide equitable water distribution to zones.

Supply Demand Predictive Analysis



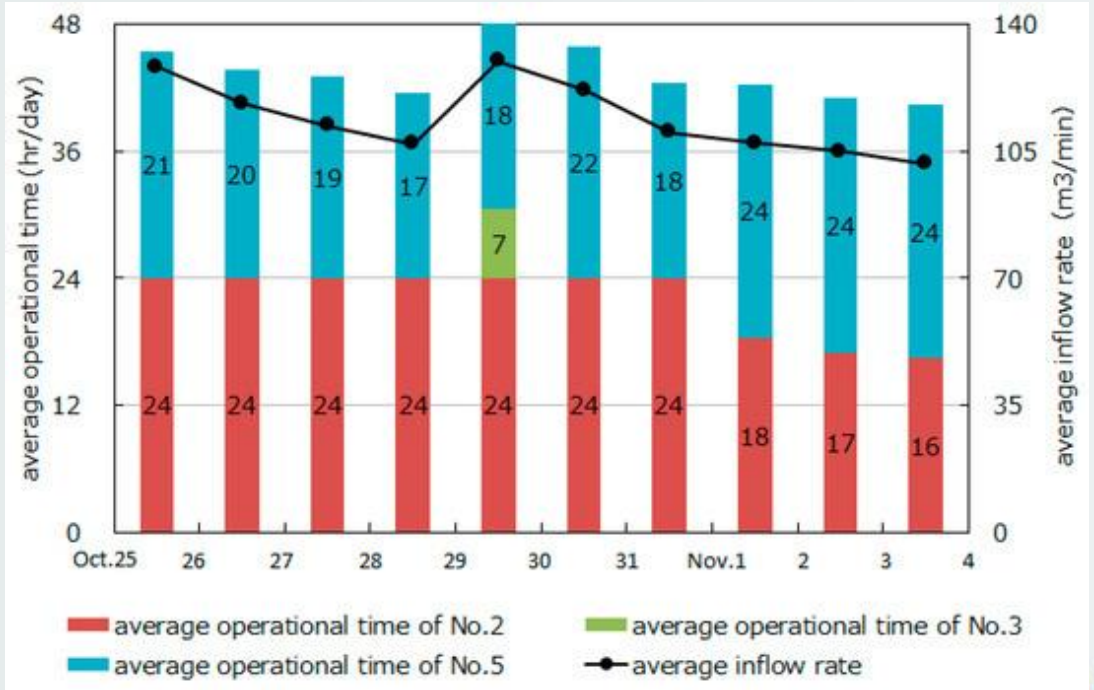
Supply Demand Predictive Analysis



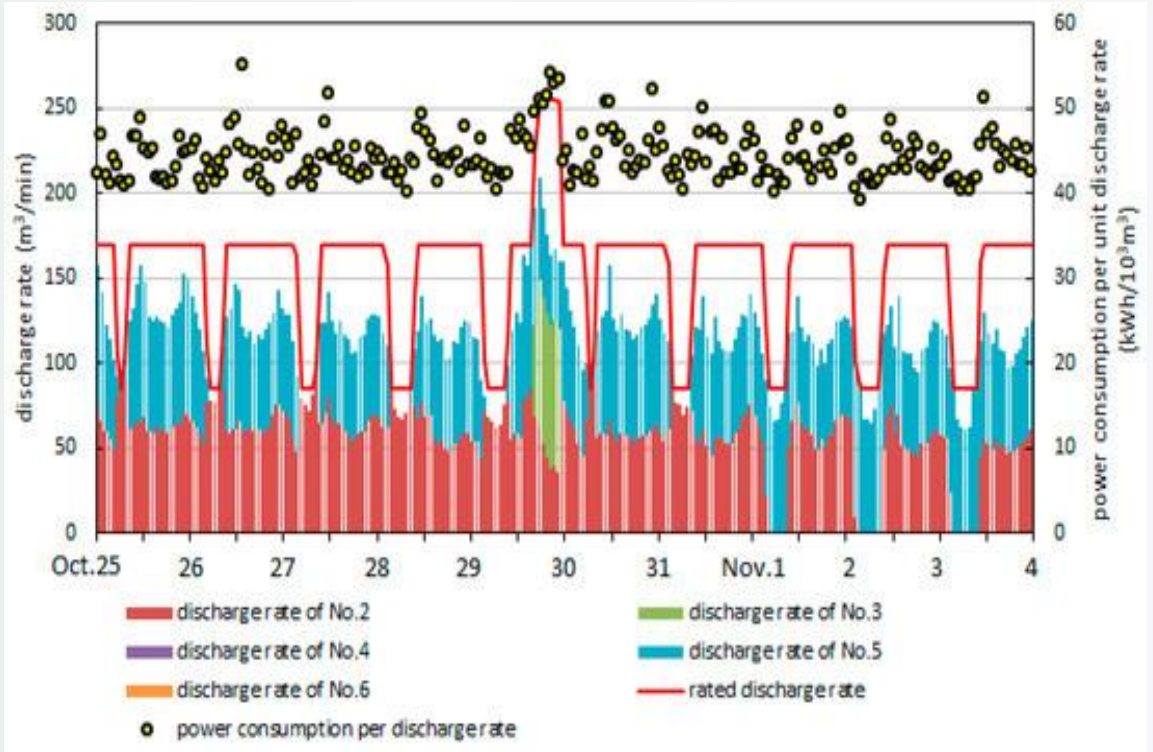
Bangalore City gap Analysis

Power Consumption Analysis

- Fig. 1 Operational hours of the pumps.

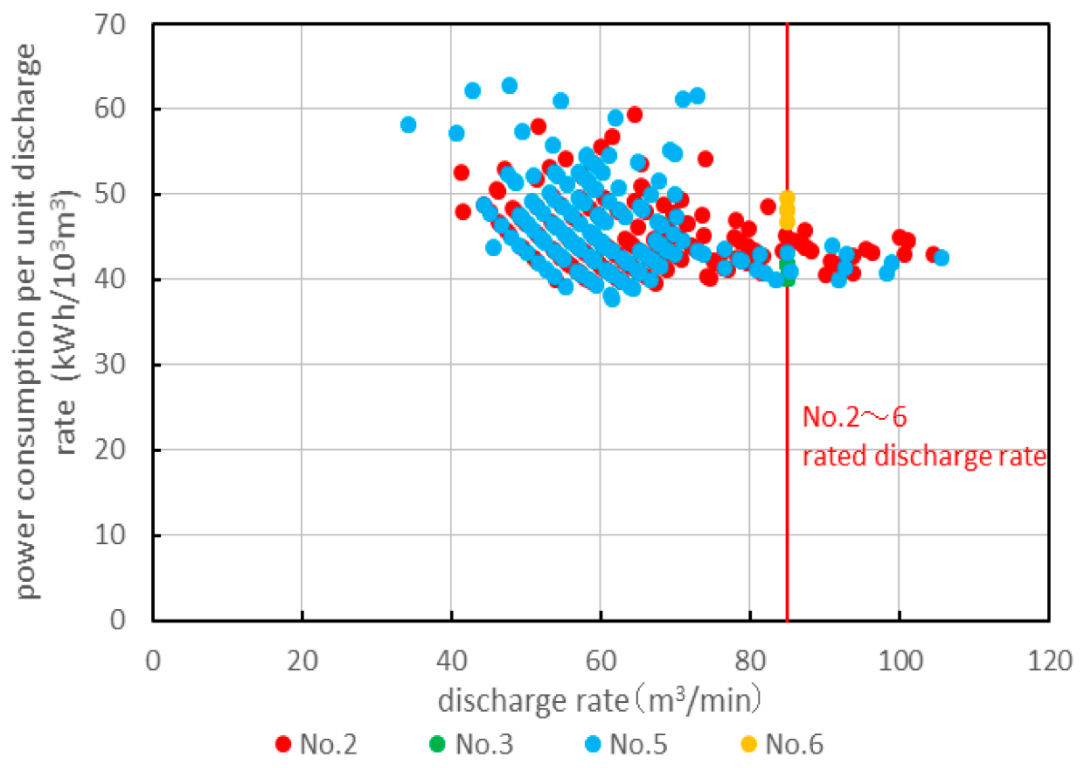


- Fig. 2 Operational condition of the pumps.

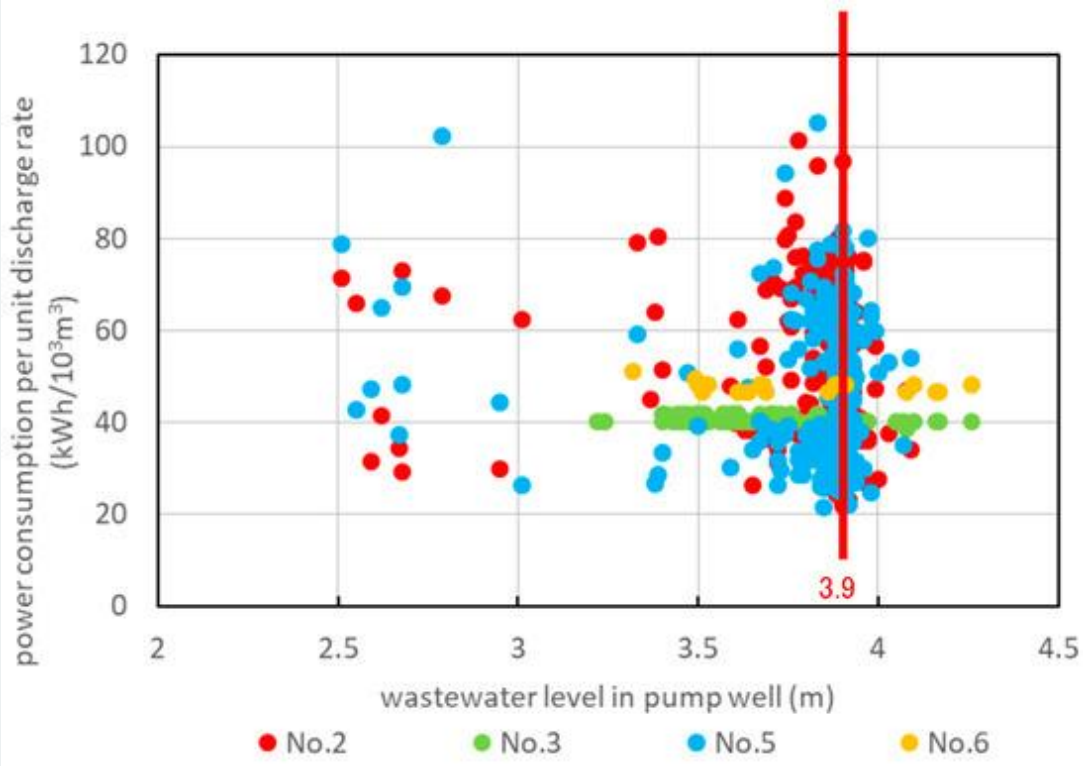


Power Consumption Analysis

- Fig. 3 Distribution of power consumption per unit discharge rate.



- Fig. 4 Wastewater level in the pump well and the power consumption per unit discharge rate.



Power Consumption Analysis: Conclusion

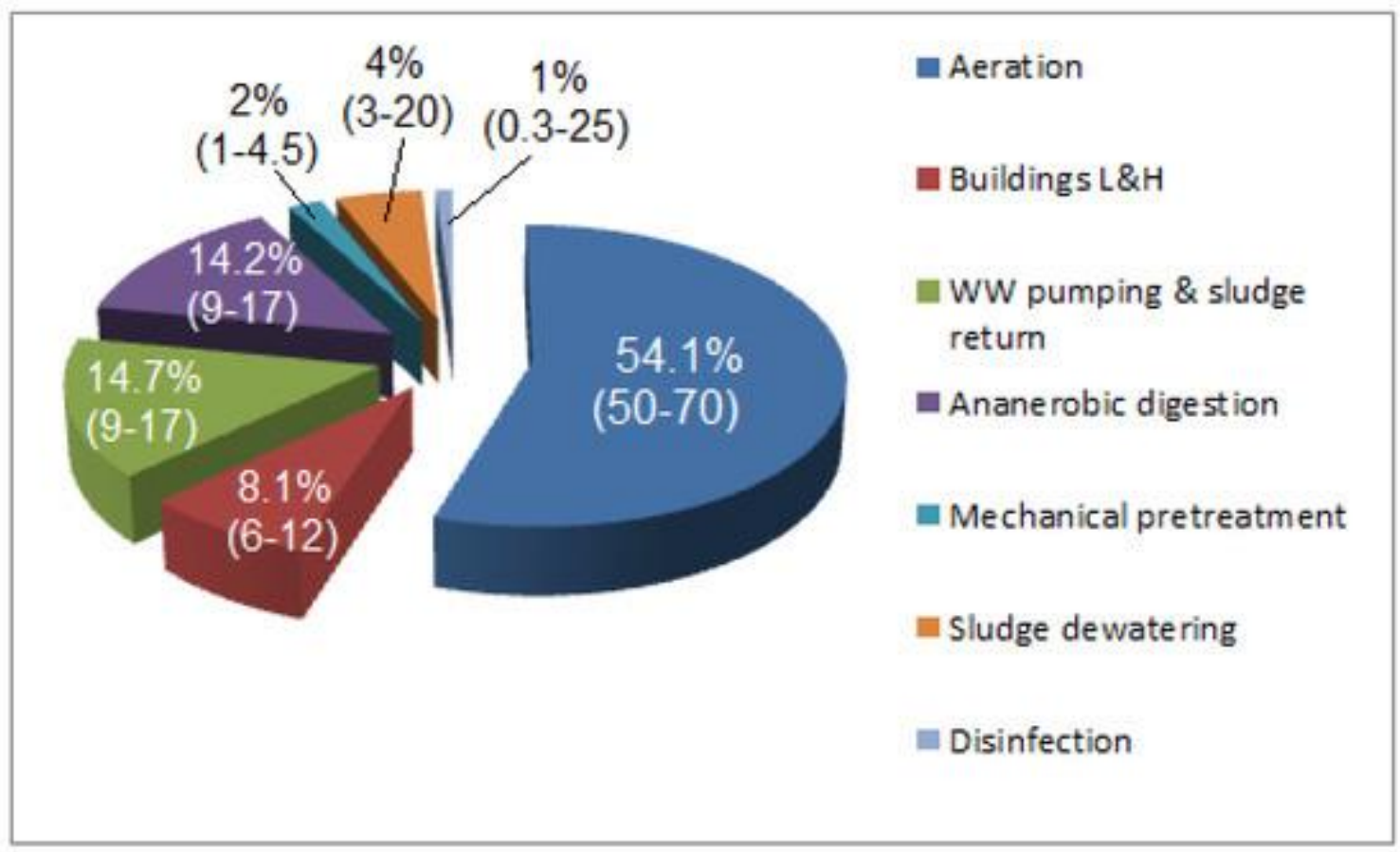
01 Excessive rotational speed control increased the power consumption per unit discharge rate;

02 Since the changing patterns of the operational points were different from the pumps for water supply, VFDs were not effective for pumps in WWTPs;

03 Pump operation to keep wastewater level constantly high in the pump well was not effective for saving energy.

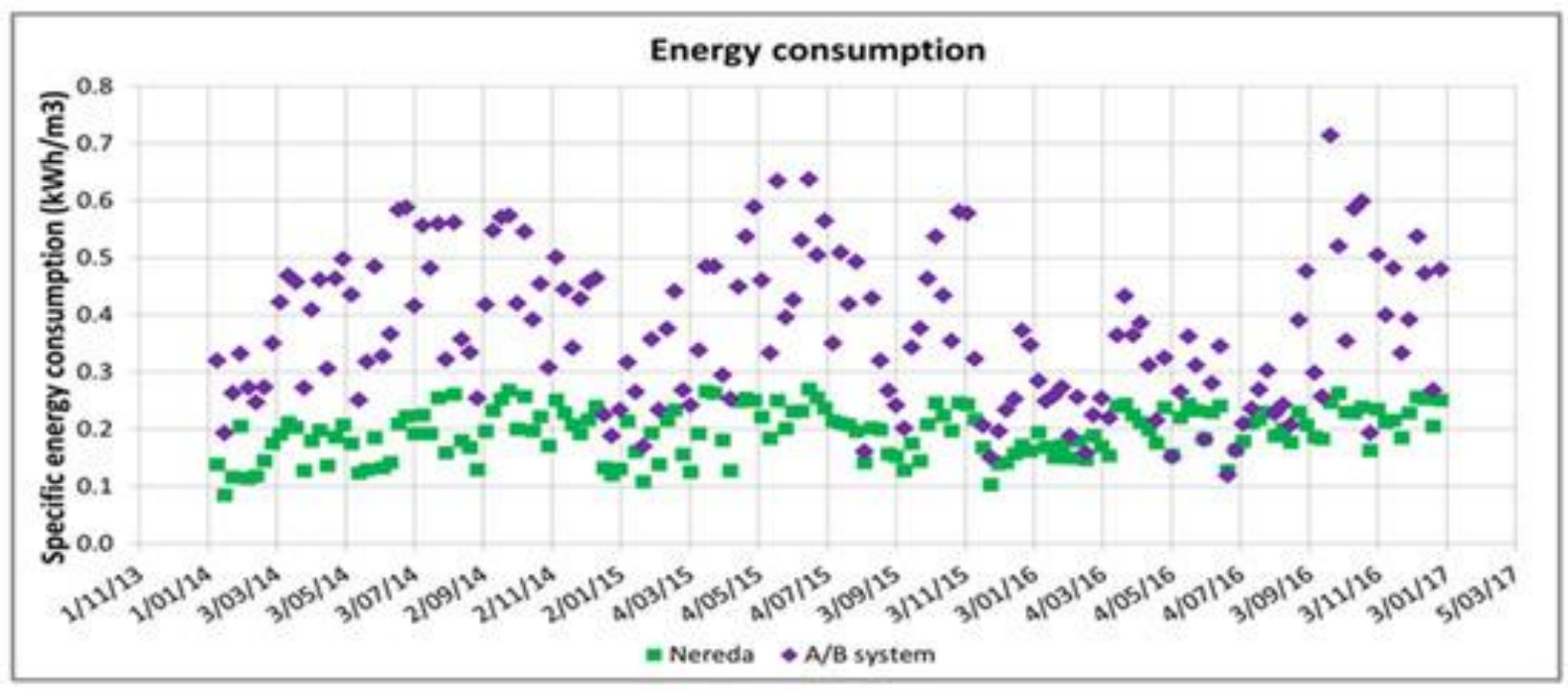
Since 70% of WWTPs in Japan adopt main pumps with VFDs and 30% of WWTPs adopt high water level constant control in the pump well as their pump operational methods, the results of this research will contribute to reducing power consumption in many WWTPs.

Aeration Process Power Consumption Analysis



Aeration Process Power Consumption Analysis

The alternative based on AGS was estimated to have a 40-50 % **smaller foot-print** and 23 % **less electricity** requirement than conventional activated sludge



Asset Management

Asset Management is a systematic process of creating, maintaining, upgrading and disposing of assets

Managing assets and not merely maintaining them has proved to be effective in considerable cost reduction

Asset management helps identify lifecycle trends and provides basis for forecasting.

.

Governing the assets through its entire lifecycle is key to systems working effectively and efficiently

Maintenance History

Maintenance History refers to the chronological list of maintenance activities performed on any asset

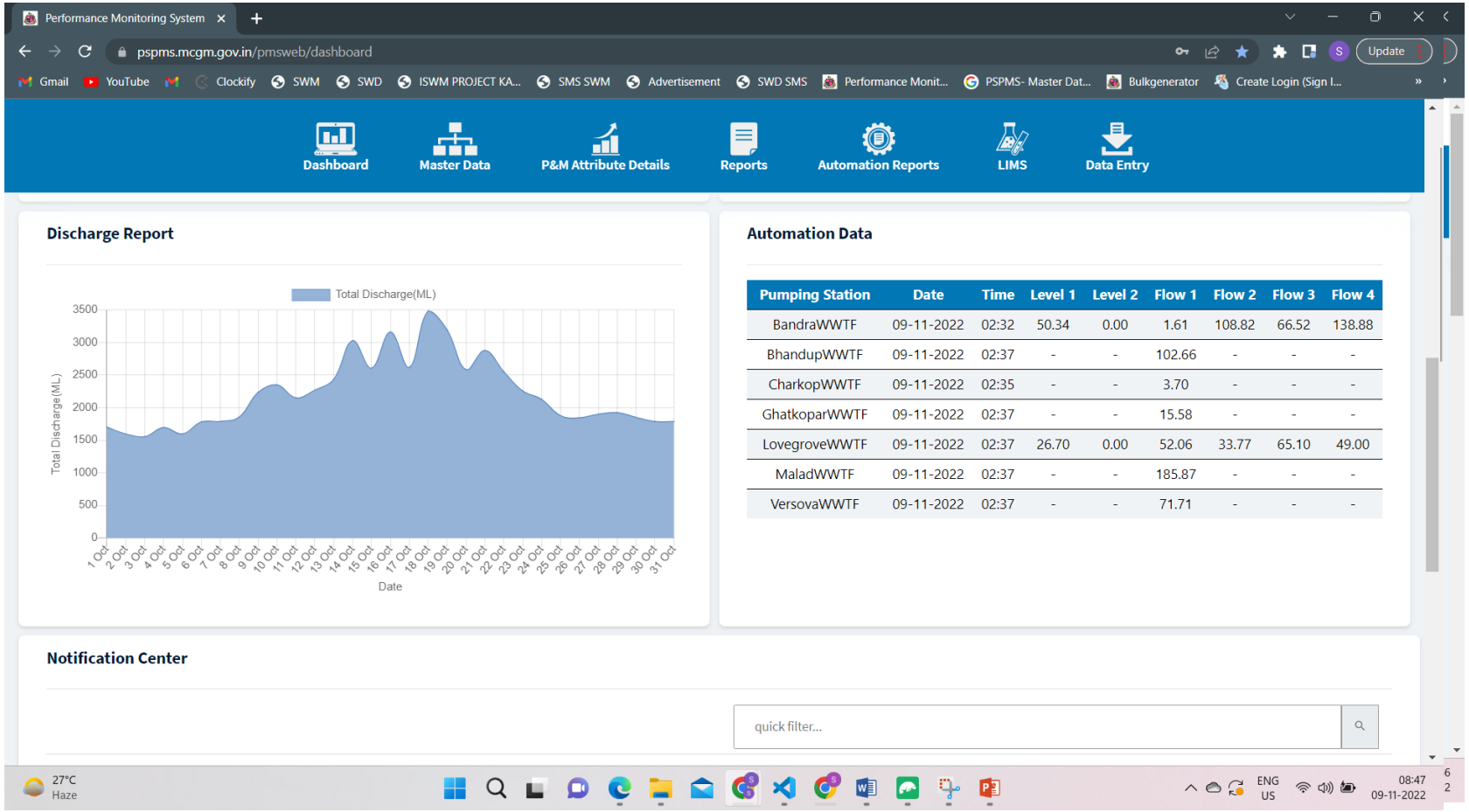
Recording of maintenance history helps in easy and smooth work transition between teams

Helps in preventing failures by way of ‘preventive maintenance’

Plays an effective role in decision making for investment in new assets

Reports and Case Study

Dashboard



The dashboard provides a snapshot of all the important parameters related to the monitoring system .

Live report

Provides live report on levels and flow at each WWTF for stakeholders

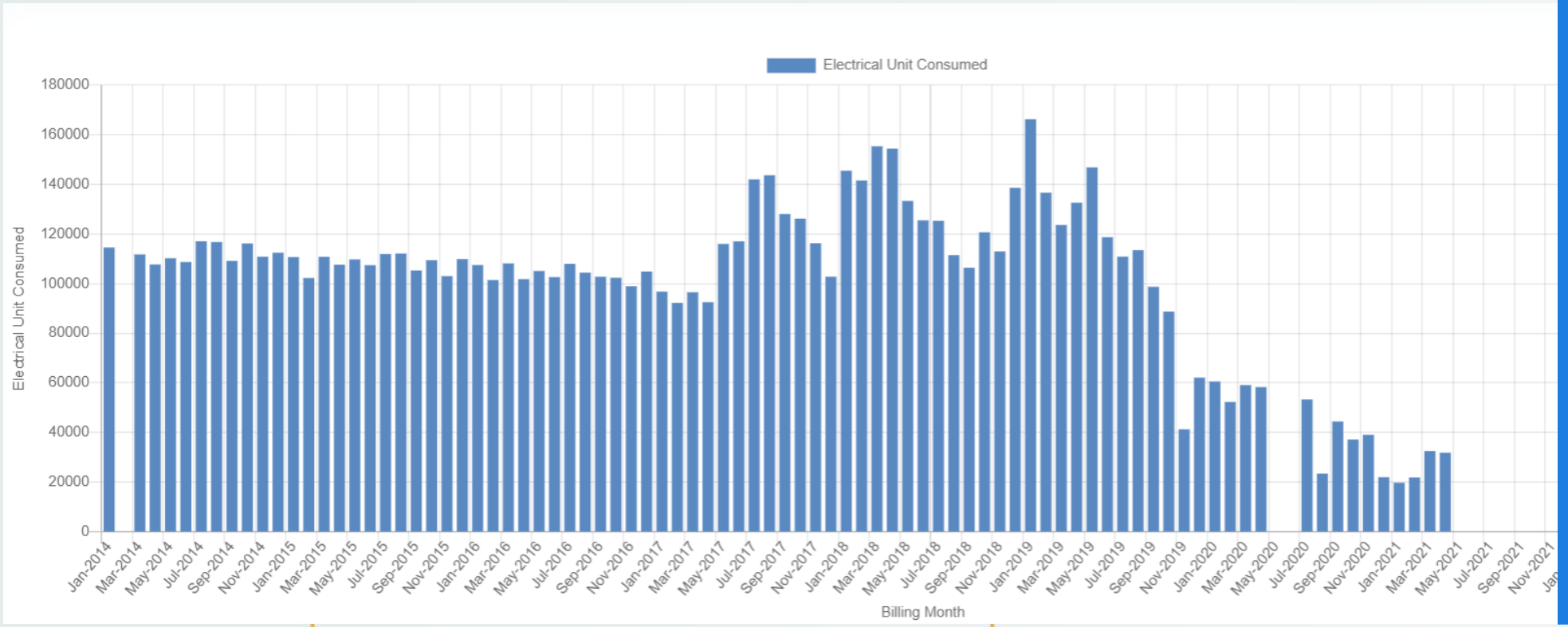
Total sewage discharged

Snapshot information on total sewage discharged/ treated in last one month

Installations

Installations of pumping stations and their details at a glance

Power Consumption

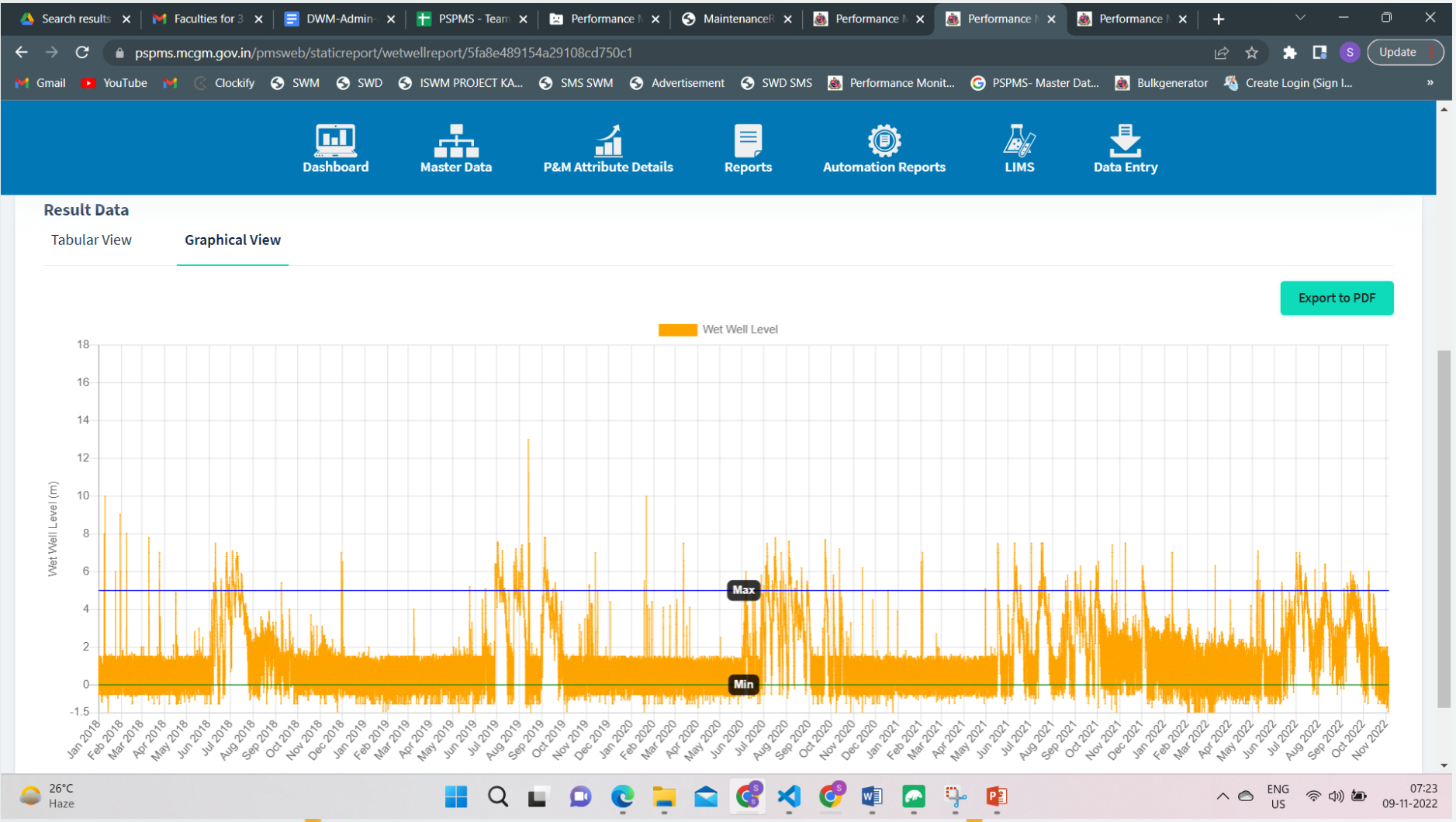


Power Reports

This report provides data of electricity units

- Data captured on an monthly basis

Wet Well Reports

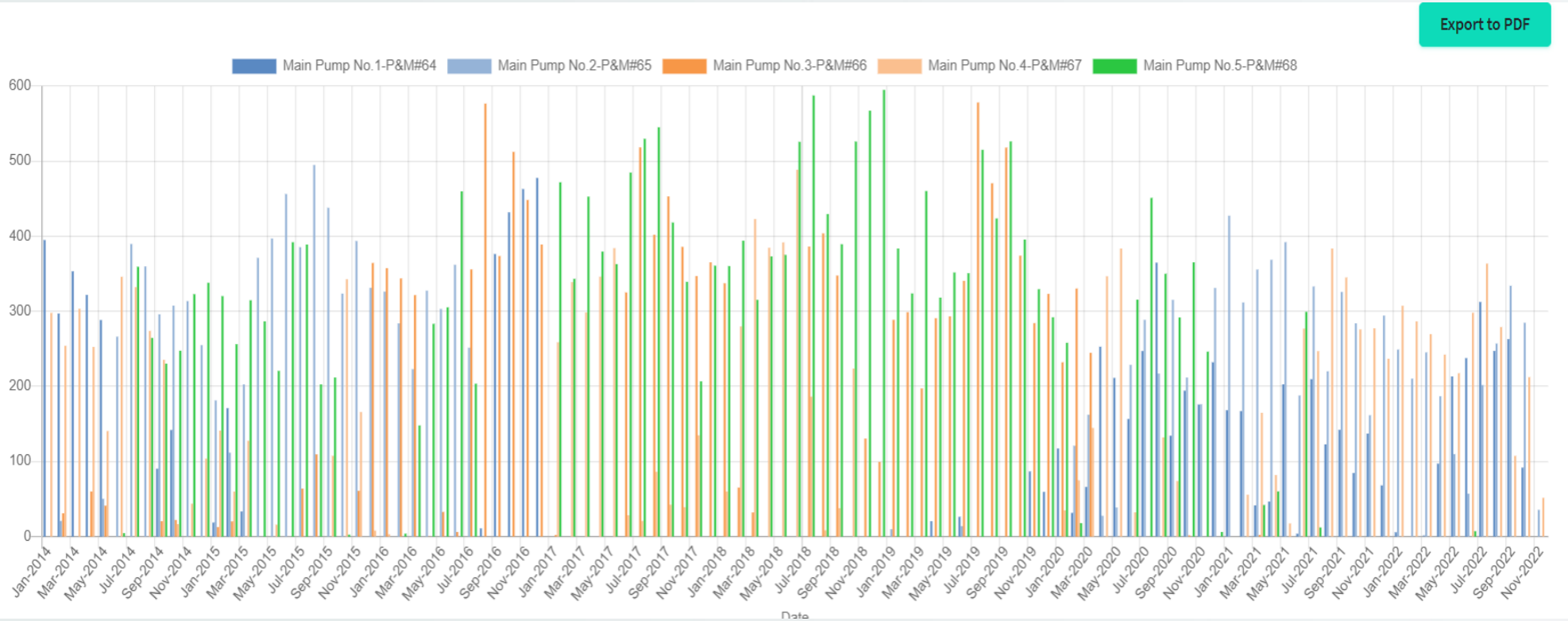


Wet Well Reports

This report provides hourly data of the wet well levels

- Data captured on an hourly basis with operating band and instances when band overshot

Pump running hours

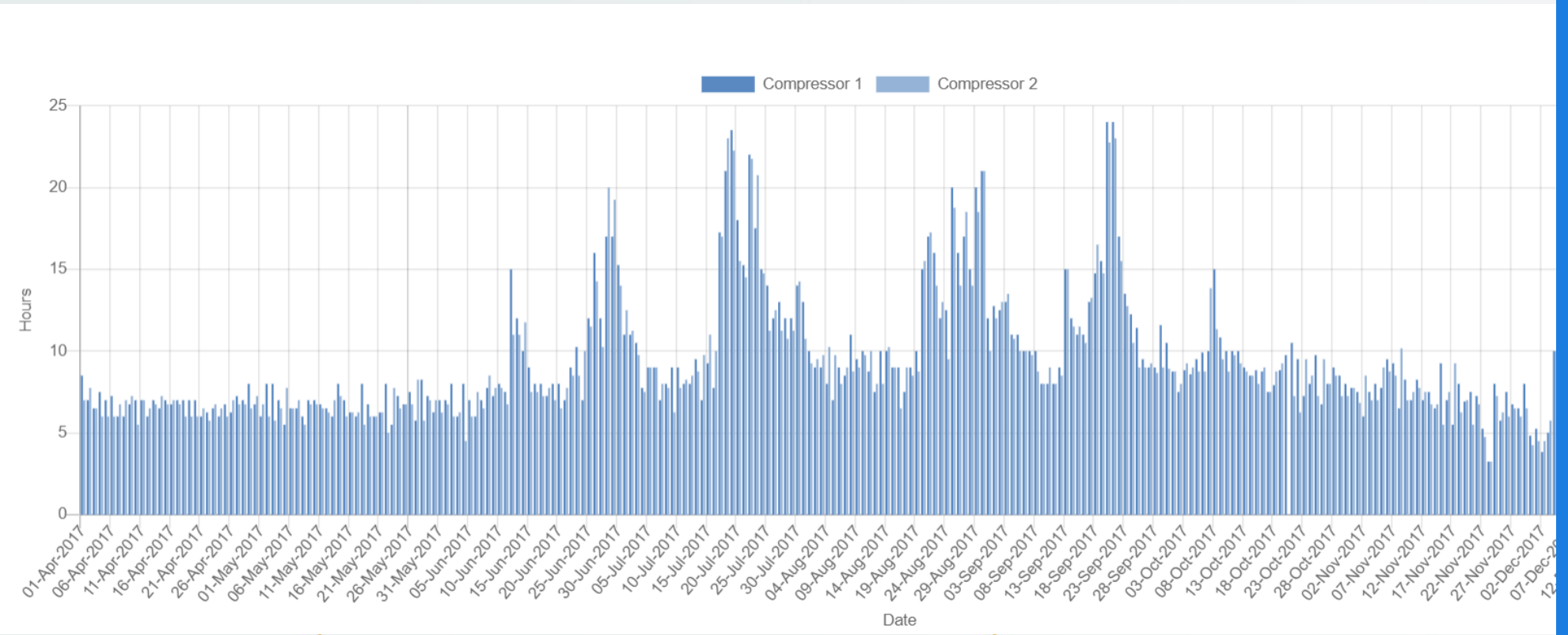


Pump running hrs

Daily/ monthly data

This report provides details of each pump running hours for a given duration

Compressor Running

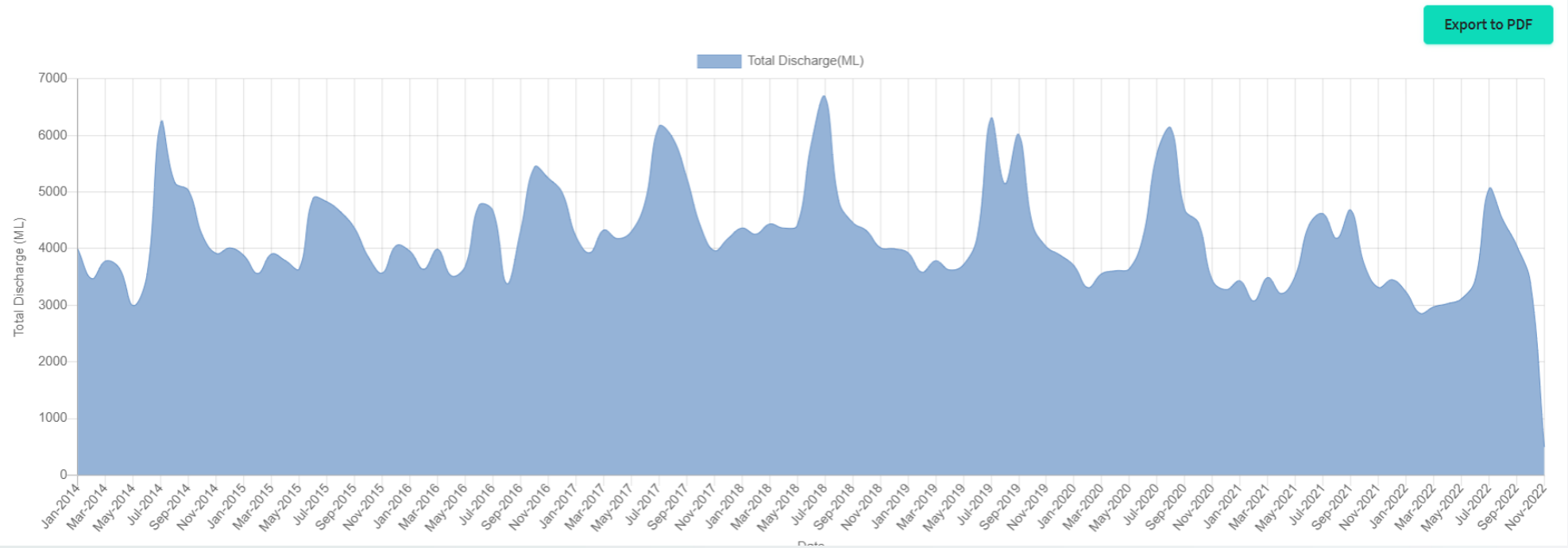


Compressor Reports

This report provides data of Compressor working hours

- Data captured on an monthly basis

Total Discharge



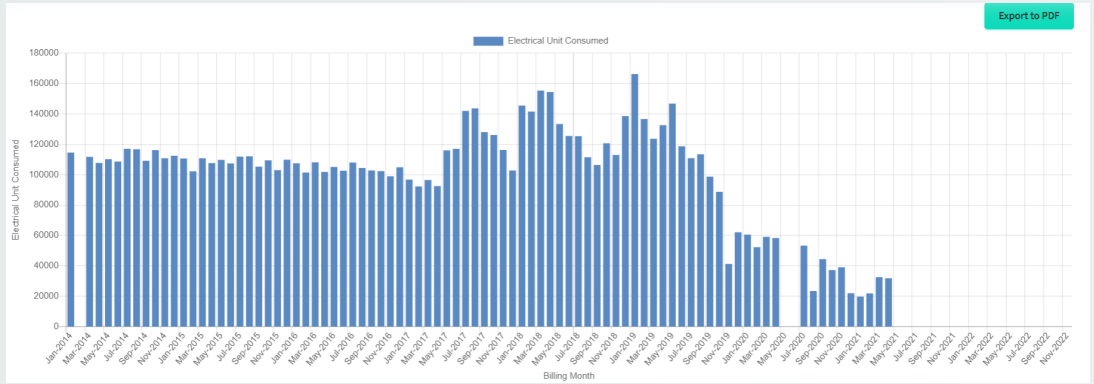
Total discharge

Daily/ monthly data

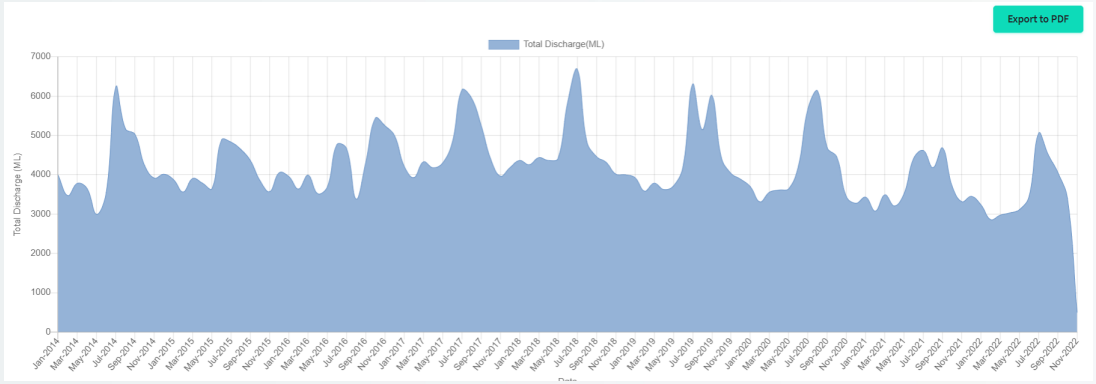
This report give details of total sewage discharged/ treated from a location

Comparison Chart

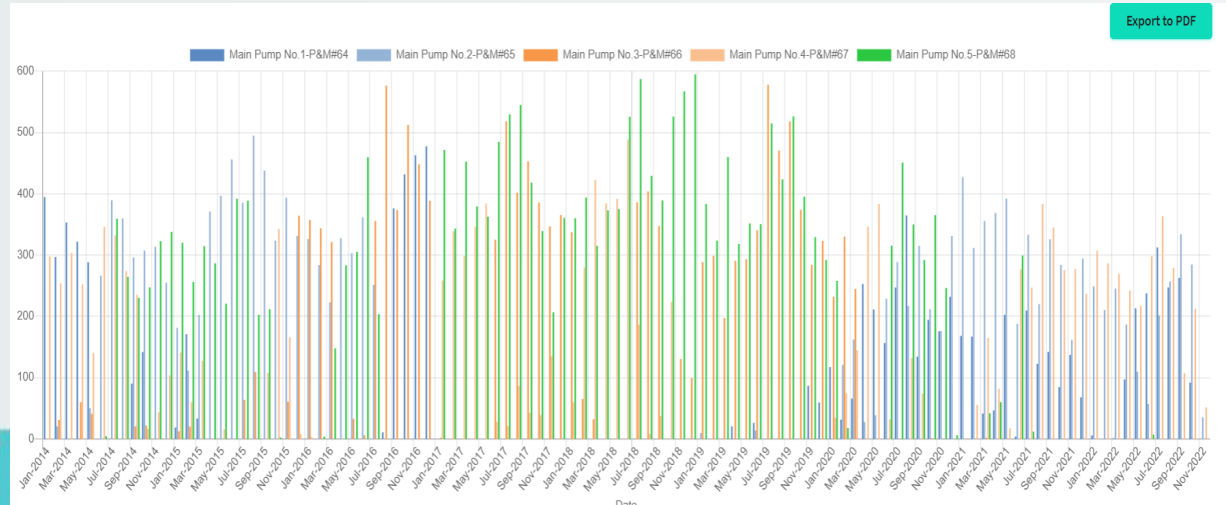
Power Consumption



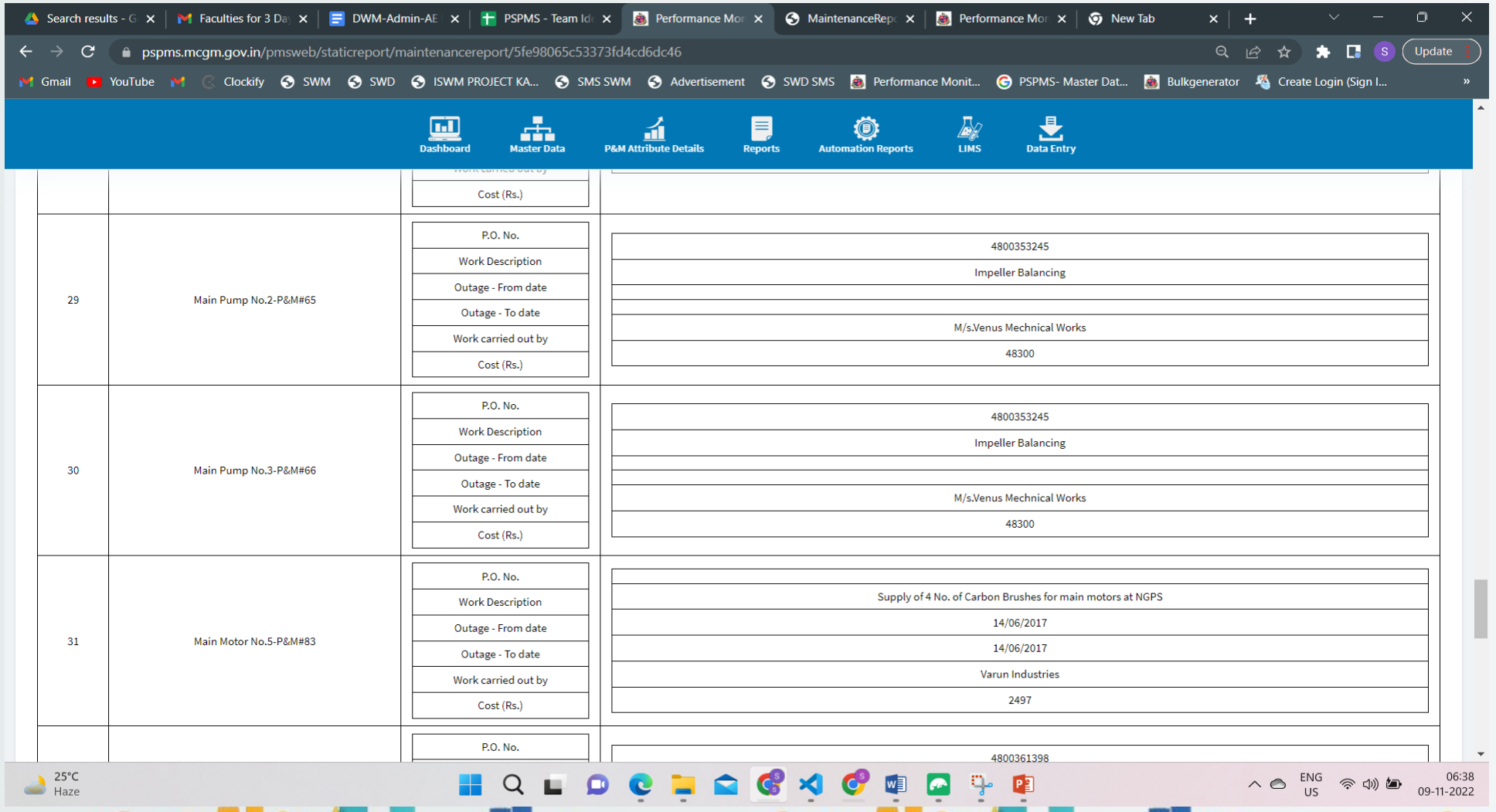
Total Discharge



Pump Running Hour



Maintenance Report

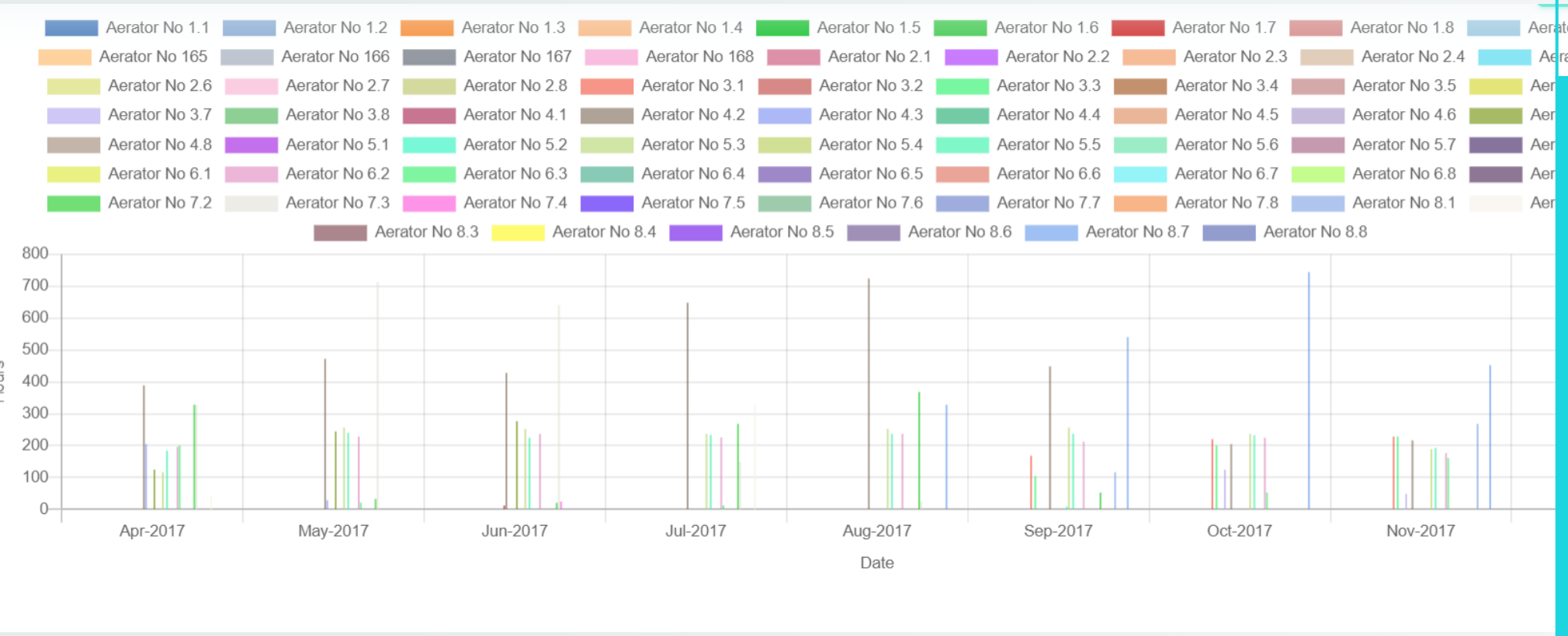


Asset Maintenance Report

Aerator

This report gives daily aerator operation

Aeration Report

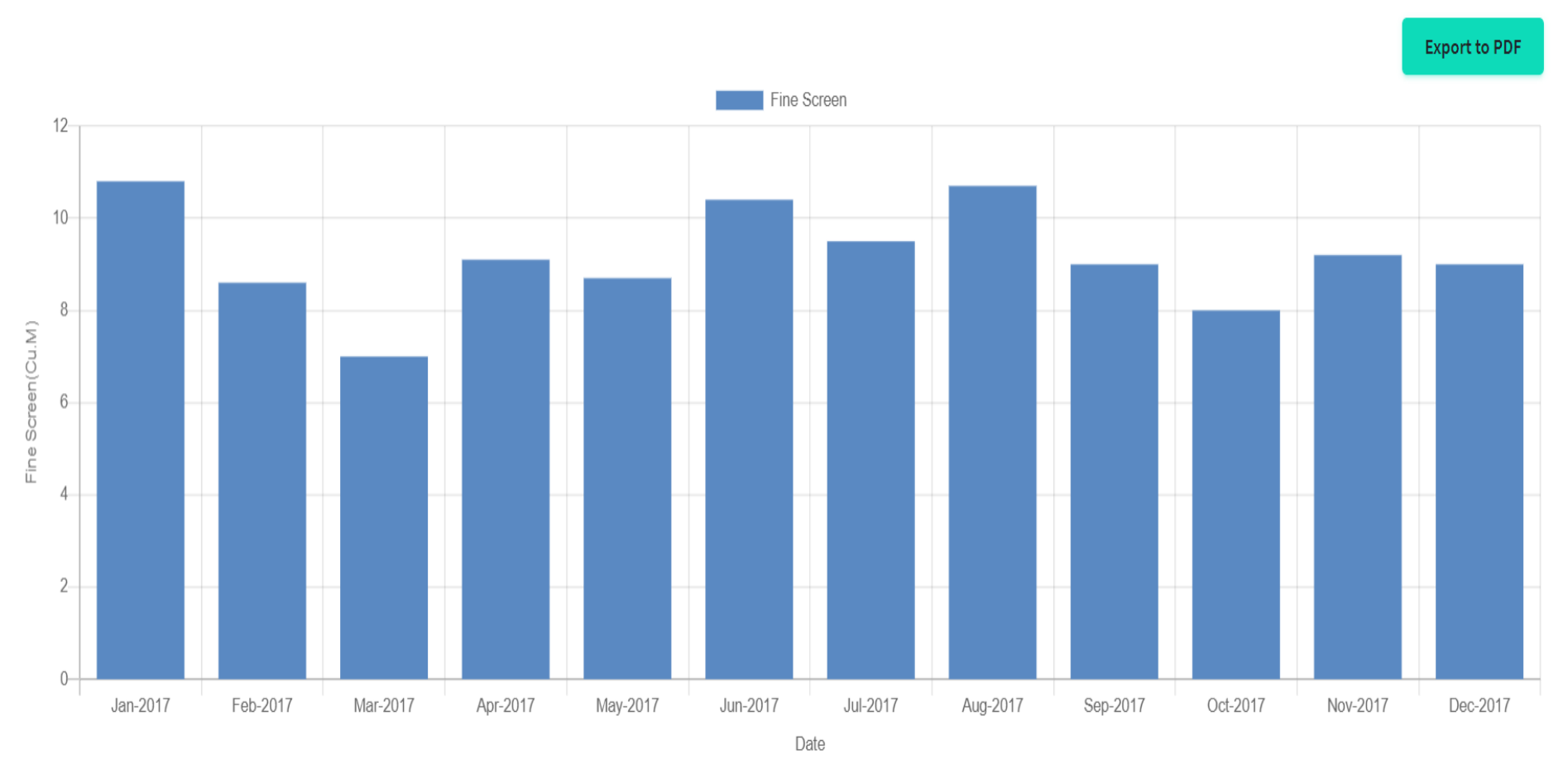


Aeration

Aerator

This report gives daily aerator operation

Grit removed Report



Grit removed

Grit

This report gives daily and monthly quantity of Grid removed

Live SCADA Monitoring

Export to PDF

MUNICIPAL CORPORATION OF GREATER MUMBAI
Sewerage Operations Department

Live Data Report (from SCADA)
Report by : admin
Printed on :09/11/2022

PMS

Ghatkopar WWTF New | 09-Nov-2022 | 09-Nov-2022

Date & Time		LOCAL_TIMESTAMP	Flow1	TodayFlow1	TotalFlow1	YestFlow1
09/11/2022	00:00	2022-11-09 00:00	127.936416625977	1.53125	191118.859375	102
09/11/2022	00:01	2022-11-09 00:01	126.700256347656	1.609375	191118.9375	102
09/11/2022	00:02	2022-11-09 00:02	125.810577392578	1.703125	191119.03125	102
09/11/2022	00:03	2022-11-09 00:03	124.256820678711	1.78125	191119.109375	102
09/11/2022	00:04	2022-11-09 00:04	125.067001342773	1.875	191119.203125	102
09/11/2022	00:05	2022-11-09 00:05	122.240028381348	1.953125	191119.28125	102
09/11/2022	00:06	2022-11-09 00:06	125.161903381348	2.046875	191119.375	102
09/11/2022	00:07	2022-11-09 00:07	124.828979492188	2.125	191119.453125	102
09/11/2022	00:08	2022-11-09 00:08	120.03352355957	2.21875	191119.546875	102
09/11/2022	00:09	2022-11-09 00:09	117.298377990723	2.296875	191119.625	102
09/11/2022	00:10	2022-11-09 00:10	121.918731689453	2.390625	191119.71875	102
09/11/2022	00:11	2022-11-09 00:11	121.209266662598	2.46875	191119.796875	102
09/11/2022	00:12	2022-11-09 00:12	124.635482788086	2.5625	191119.890625	102
09/11/2022	00:13	2022-11-09 00:13	119.041786193848	2.640625	191119.96875	102

Live monitoring

LIVE

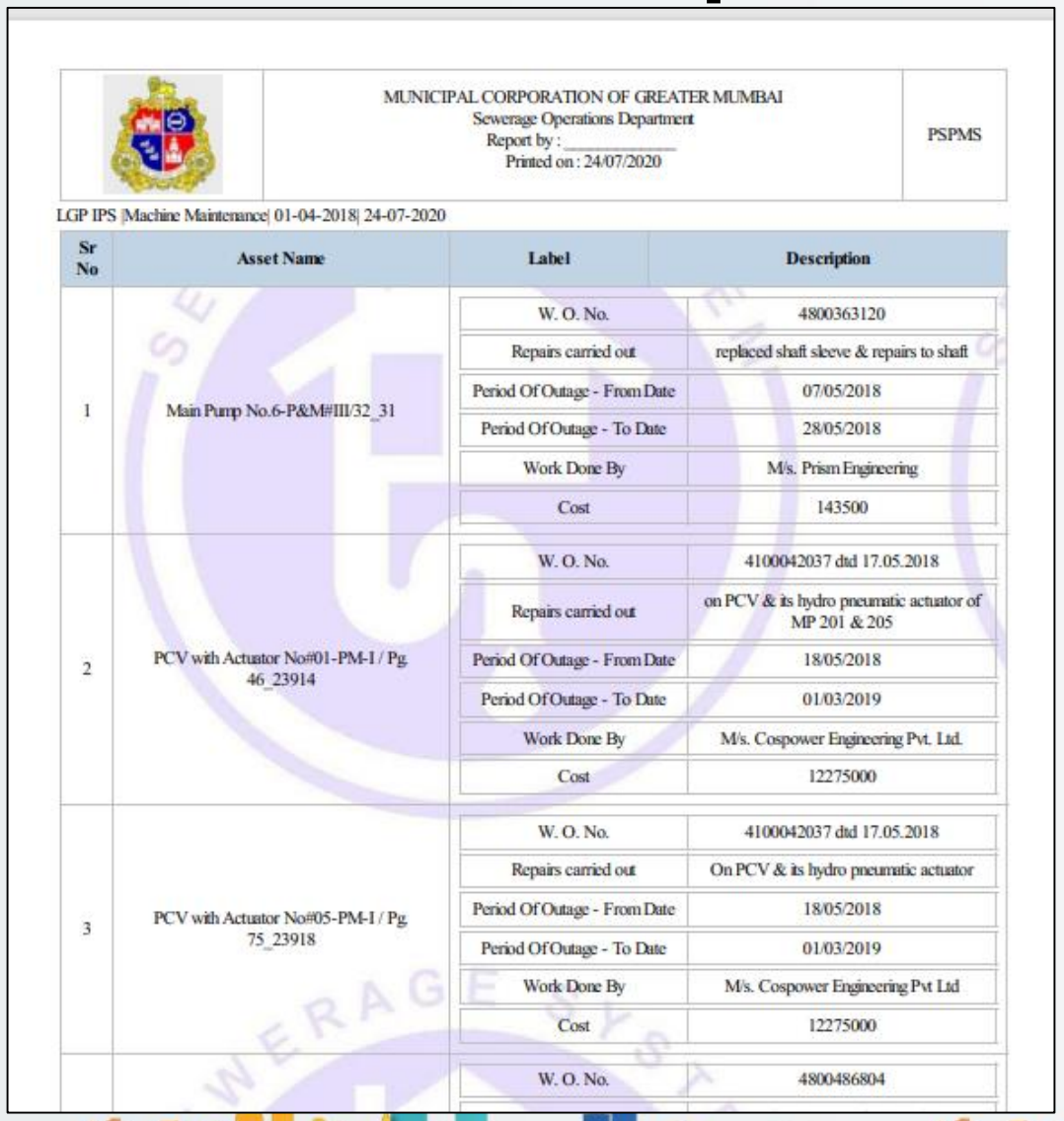
This report give status of wet well and pump ON/OFF status directly from SCADA, any other live parameters too can be tracked

Maintenance Reports

Maintenance Reports

This report provides maintenance history of the assets

- Information related to date and duration of repairs carried out
- Cost details
- Vendor details



MUNICIPAL CORPORATION OF GREATER MUMBAI
Sewerage Operations Department
Report by : _____
Printed on : 24/07/2020

PSPMS

LGP IPS |Machine Maintenance| 01-04-2018| 24-07-2020

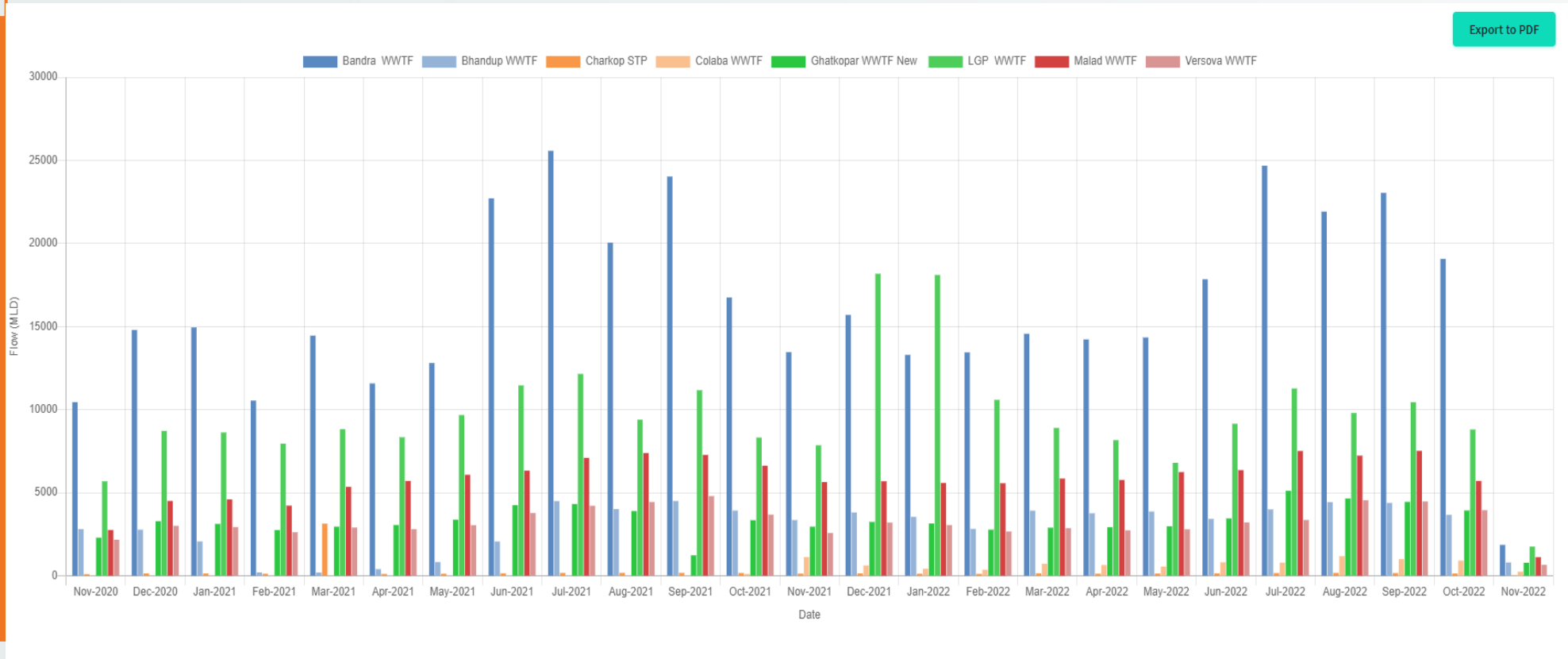
Sr No	Asset Name	Label	Description
1	Main Pump No.6-P&M#III/32_31	W. O. No.	4800363120
		Repairs carried out	replaced shaft sleeve & repairs to shaft
		Period Of Outage - From Date	07/05/2018
		Period Of Outage - To Date	28/05/2018
		Work Done By	M/s. Prism Engineering
		Cost	143500
2	PCV with Actuator No#01-PM-I / Pg 46_23914	W. O. No.	4100042037 dtd 17.05.2018
		Repairs carried out	on PCV & its hydro pneumatic actuator of MP 201 & 205
		Period Of Outage - From Date	18/05/2018
		Period Of Outage - To Date	01/03/2019
		Work Done By	M/s. Cospower Engineering Pvt. Ltd.
		Cost	12275000
3	PCV with Actuator No#05-PM-I / Pg 75_23918	W. O. No.	4100042037 dtd 17.05.2018
		Repairs carried out	On PCV & its hydro pneumatic actuator
		Period Of Outage - From Date	18/05/2018
		Period Of Outage - To Date	01/03/2019
		Work Done By	M/s. Cospower Engineering Pvt Ltd
		Cost	12275000
		W. O. No.	4800486804

WWTF flow Reports

WWTF Reports

Sewage quantity

- Location wise sewage discharged/ treated



Lab Reports

Export to PDF

MUNICIPAL CORPORATION OF GREATER MUMBAI

Sewerage Operations Department

Laboratory Report
Report by : admin
Printed on :09-Nov-2022

PMS

LGP WWTF | 01-Jan-2020 | 09-Nov-2022

Sr No	Date	pH(Inlet) / pH(Outlet)	Oil & grease(Inlet) / Oil & grease(Outlet)	B.O.D. (Inlet) / B.O.D. (Outlet)	T.S.S.(Inlet) / T.S.S.(Outlet)	Temperature Ambient(Inlet) / Temperature Ambient(Outlet)	Temperature Sample(Inlet) / Temperature Sample(Outlet)	Free Ammonia(NH3) (Inlet) / Free Ammonia(NH3) (Outlet)	D.O. (Inlet) / D.O. (Outlet)	C.O.D. (Inlet) / C.O.D. (Outlet)	Chlorides(Inlet) / Chlorides(Outlet)	Col / Colo
1	06-Jan-2020	7.22	30	130	174	30	29	15	-	248	241	Nc
2	23-Jan-2020	7.21	28	153	207	30	29	16.8	-	303	653	Nc
3	05-Feb-2020	7.24	32	138	226	28	27	16.8	-	348	320	Nc
4	13-Feb-2020	7.25	30	103	160	29	28	14.28	-	247	511	Nc
5	07-Mar-2020	7.22	28	134	224	30	29	14.56	-	265	632	Nc

Abel
Software & Consultants Pvt. Ltd

Thank you