GLOBAL LEADERSHIP THROUGH TECHNOLOGY INNOVATION

Water SCADA System

Presented By :- Mr. Rajnish Dashottar (M) +91 9023707373

Overview & Architecture of SCADA System

What is SCADA ?

SCADA stands for …….

Supervisory
Control
And
Data
Acquisition

SCADA System Enables **Central Control** of Remotely Located Field Stations and **Monitoring** of Important Process Parameters.

Wireless Water SCADA System - Concept

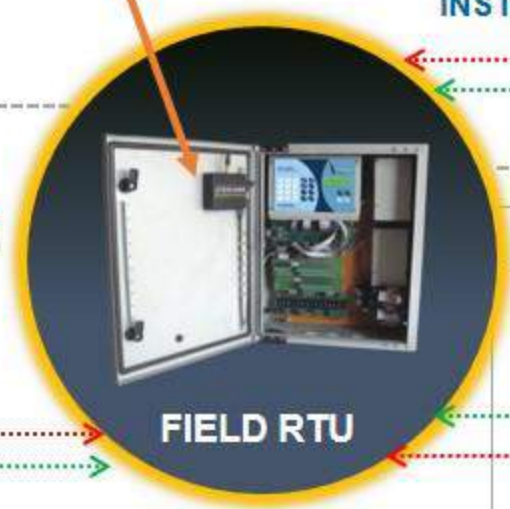
RTU AND MCS WILL COMMUNICATED WITH EACH OTHER ON GPRS/GPRS MODBUS PROTOCOL.
(AS PER WHITE LIST IP CONFIGURE IN M2M SIM)

NETWORK PROVIDER

M2M SIM CARD IN RTU MODEM

485 MODBUS COMMUNICATION
TWO WIRE ELECTRICAL CONNECTION.
INSTRUMNET CONNECT WITH RTU'S 485 PORT

ENERGY METER



ULT

PRESSURE TRANSMITTER

FLOW METER

ANALOG FIELD INSTRUMENTS

ALL ANALOG FIELD INSTRUMENTS WILL BE CONNECTED WITH RTU'S ANALOG T.B.
USING STANDARD INSTRUMENT CABLES.

TW STATUS (ON/OFF/FAULT) FROM TW STATER PANEL
USING POTENTIAL FREE ELECTRICAL CONNECTION.
INSTRUMNET CONNECT WITH RTU'S
DIGITAL INPUT T.B

TUBEWELL
DIGITAL FIELD INSTRUMENTS

Products

iRTU1000 Mini RTU

- In-Built Energy Meter
- In-Built cellular IoT Modem
- 6 DI / 2DO & 2 AI In-built

iRTU3000 Compact RTU

- 16 DI / 8 DO / 6 AI In-built
- Multiple communication
- Large memory for data logging

32- bit ARM7 Processor

Flow Chart based Programming

iRTU6000 Package RTU

- CPU & PS Redundancy
- PLC Functionality
- Multiple communication

iRTU9000 RTU system

- CPU & PS Redundancy
- High Density IO capability
- 19” Rack Mounted design
- Multiple communication

Online Process Instruments

Level

Flow

Pressure

Turbidity

Residual Chlorine

Ground
Water Level

BOD, COD,
TSS Analyzer

pH meter

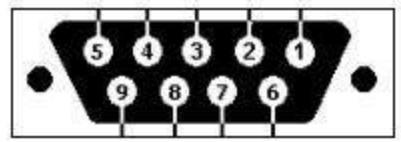
Last Mile Connectivity

Cellular

VSAT(Satellite)

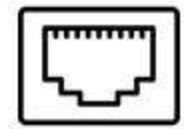
RF (Radio)

Fiber Optic



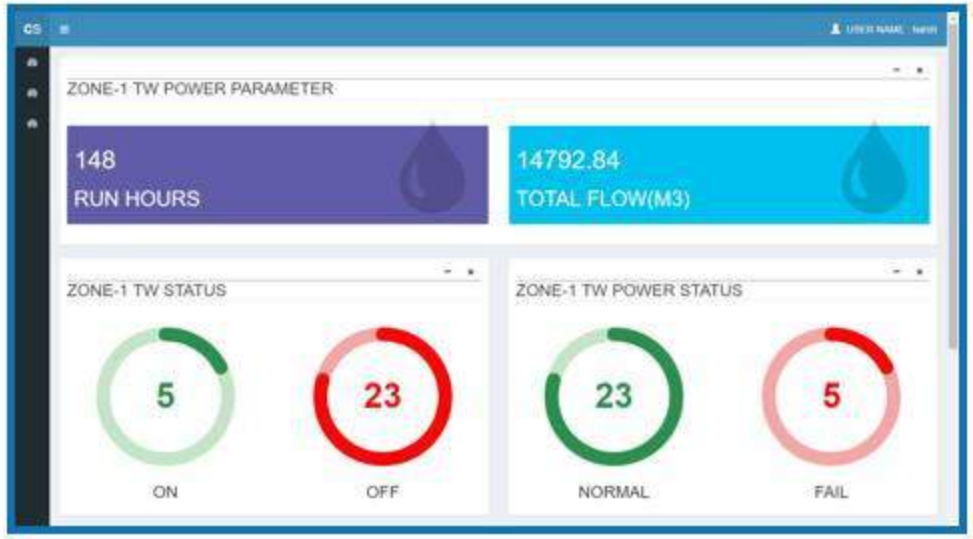
Wired
RS-232 or RS-485

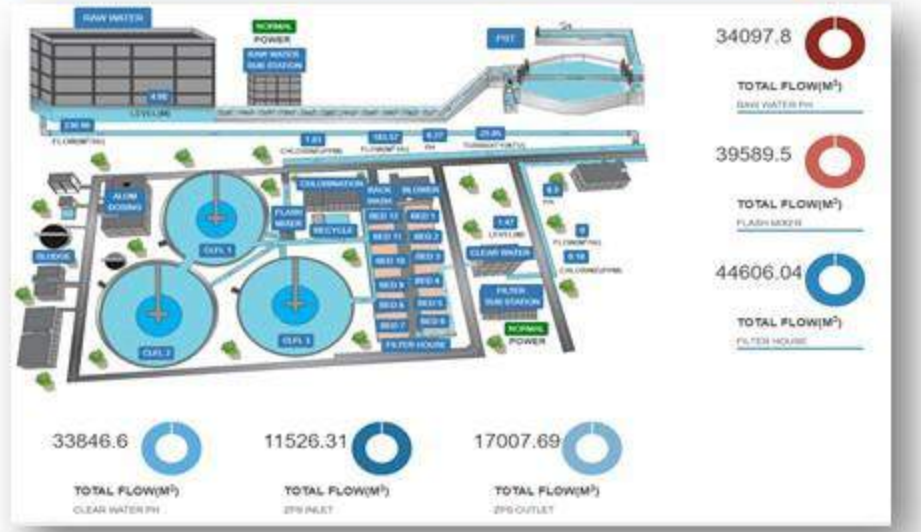
PSTN



Ethernet

Remote Centralized Software





Automation Solutions - Water Utilities

Raw Water Generation

Water Treatment

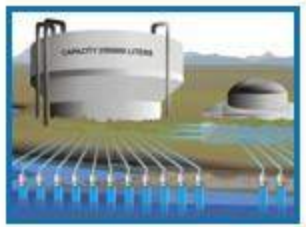
Water Pumping & Distribution

End user Metering

Waste Water Pumping

Waste Water Treatment

Treated Waste Water Monitoring









Benefits

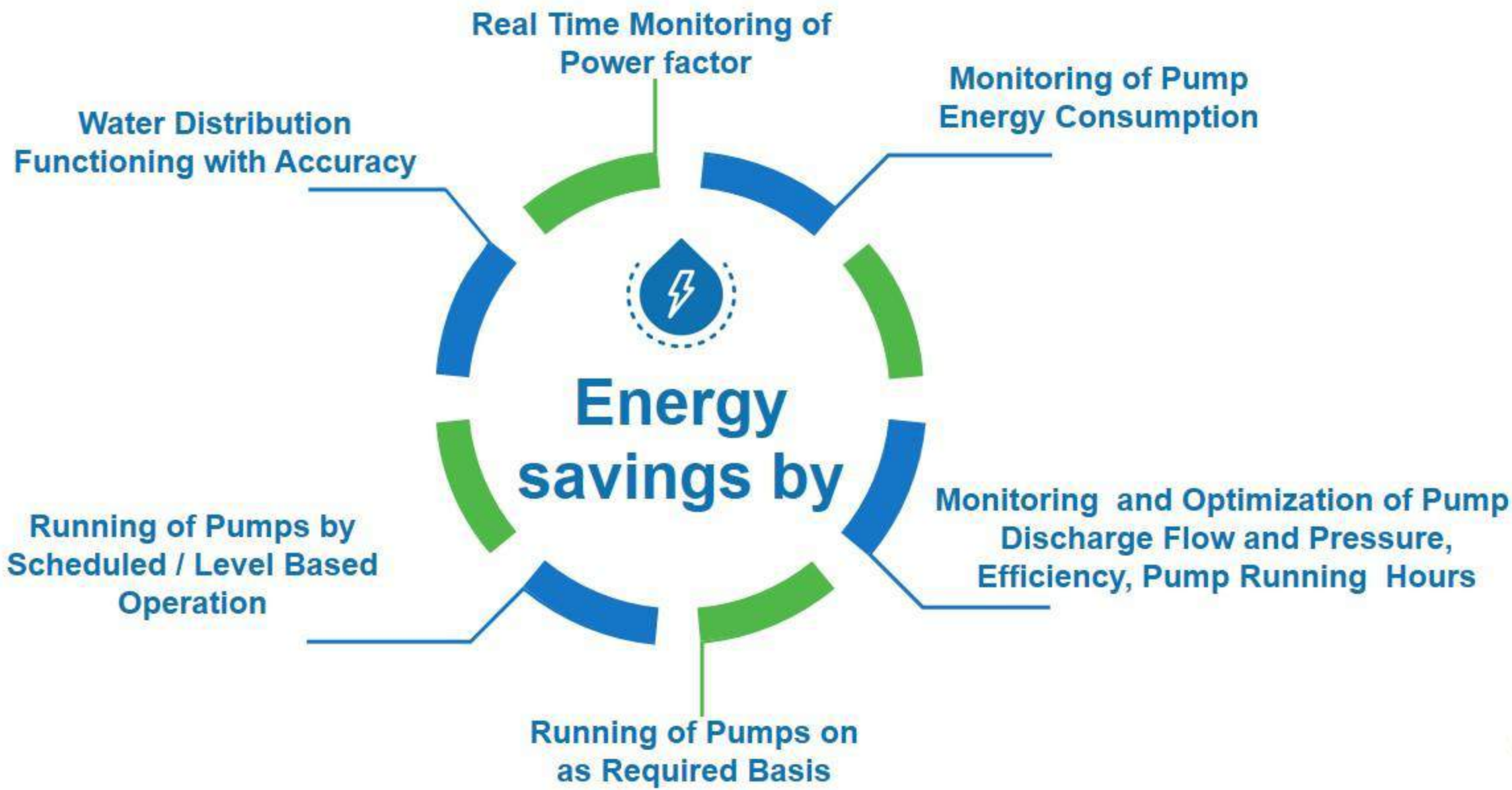
ADVANTAGES

1. Safe and Hassle Free Operation
2. Precise Operation
3. Energy Saving
4. Equipment Life Enhancement
5. Saving of Depleting Natural Resources
6. Eco Friendly

FEATURES

1. Automatic / Man less Operation
2. Central Remote Monitoring and Control
3. Schedule Based Operation
4. Set Point Based Operation
5. Alerts on Mobile
6. Report Generation and Data Storage
7. All Operations from a PC / Control Station

Advantages - Energy Savings



Advantages - Real Time Monitoring

MIMIC FORM

REPORT FORM

GRAPHICAL FORM

ALARM ON MOBILE

Operational Advantages

Turn on/off from PC

Pump sets can turn on/off from PC itself, dependency on manual labour would be nullified/reduced

Central Monitoring

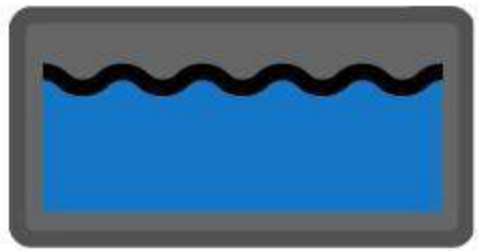
entire generation and distribution system from **one location**

Alarm System

Health Status of Water Supply system is available on **mobiles**.

Inefficiency in pump

Deducted spontaneously as actual discharge of pump is available on central computer.



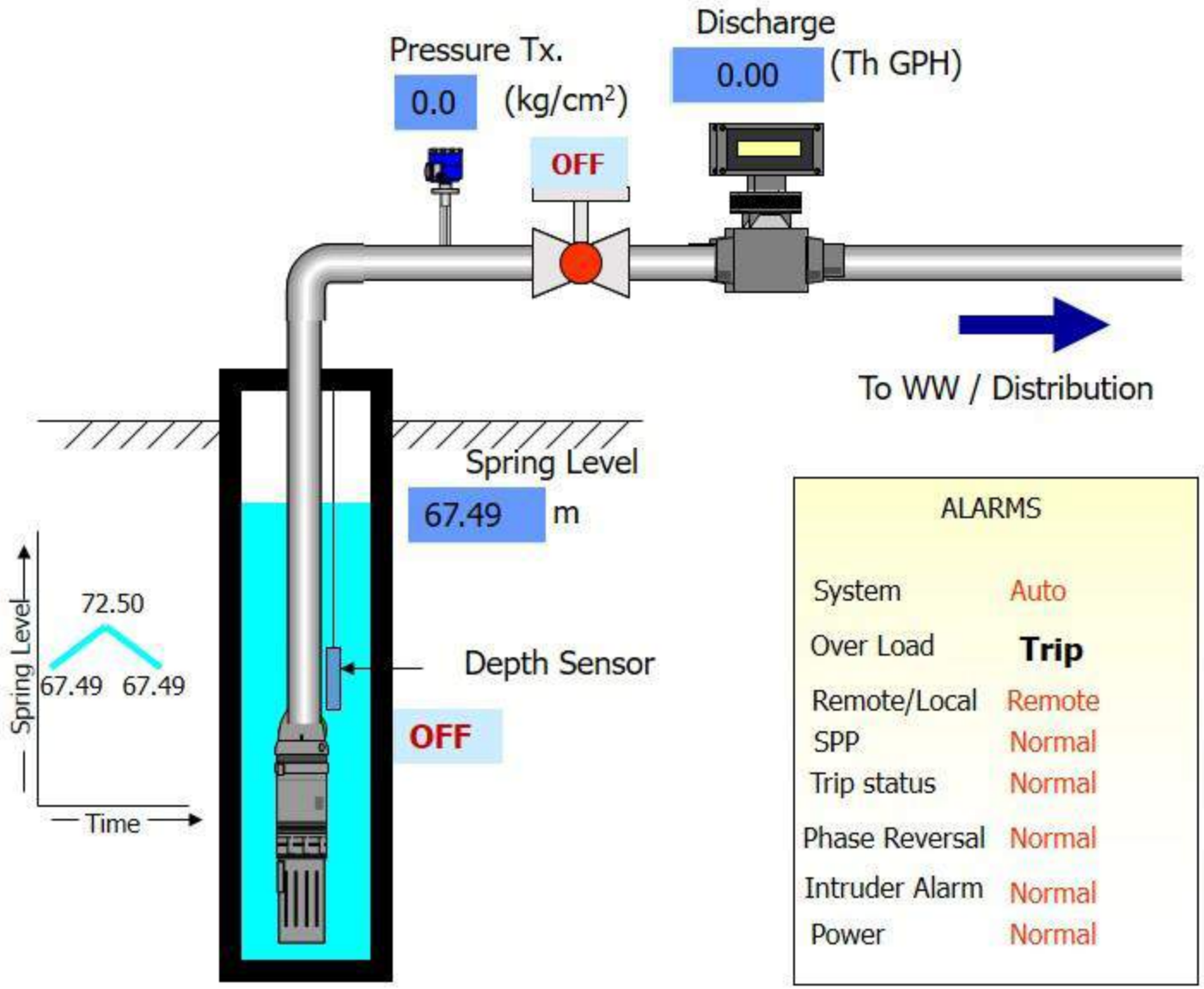
Auto Mode

The Pump will operate automatically when put in auto mode to ensure that sump is always full to required safe level.

Controlling the actuated valve

The flow of a particular pump can be set to desired limit.

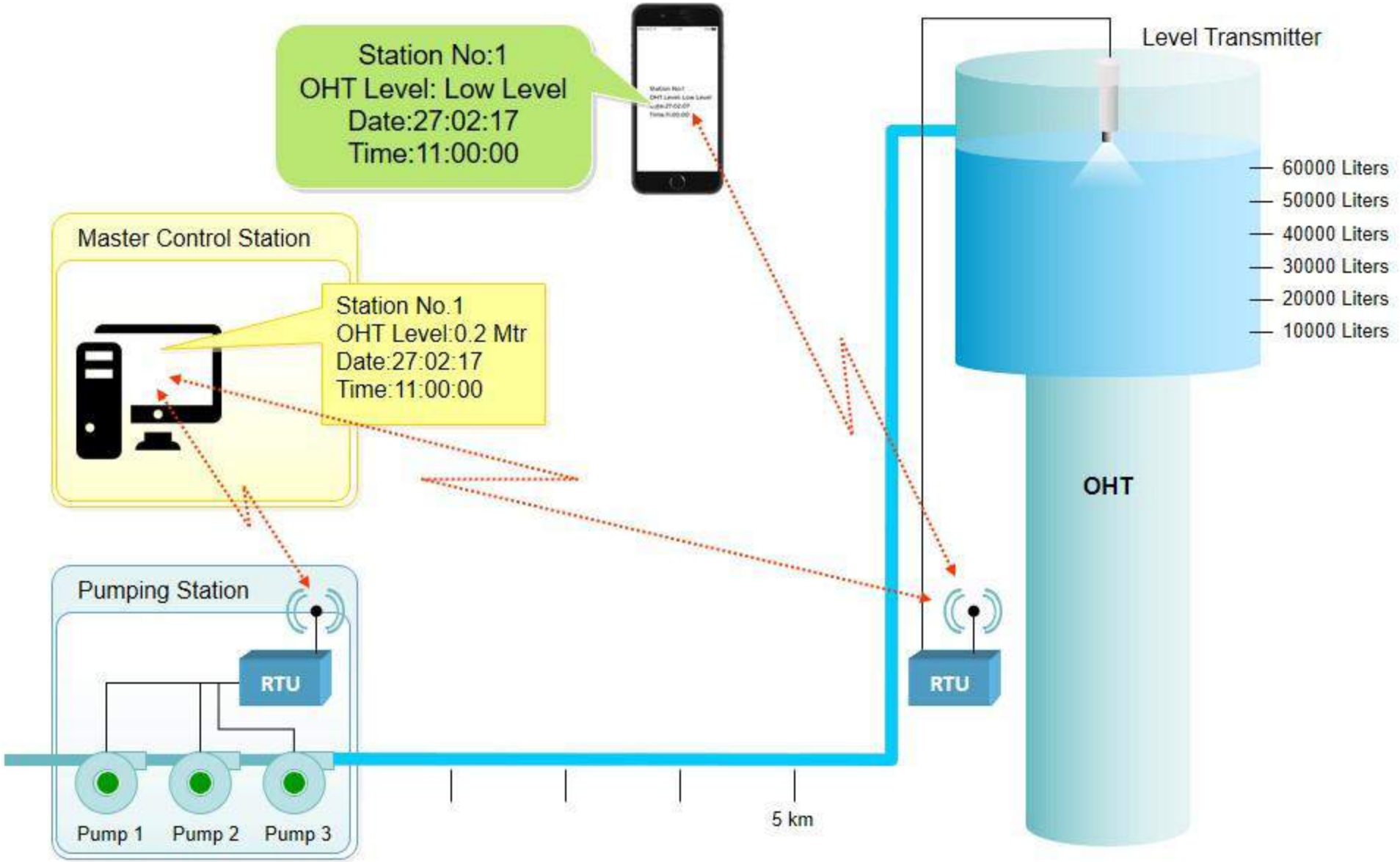
Automation of Water Generation Scheme



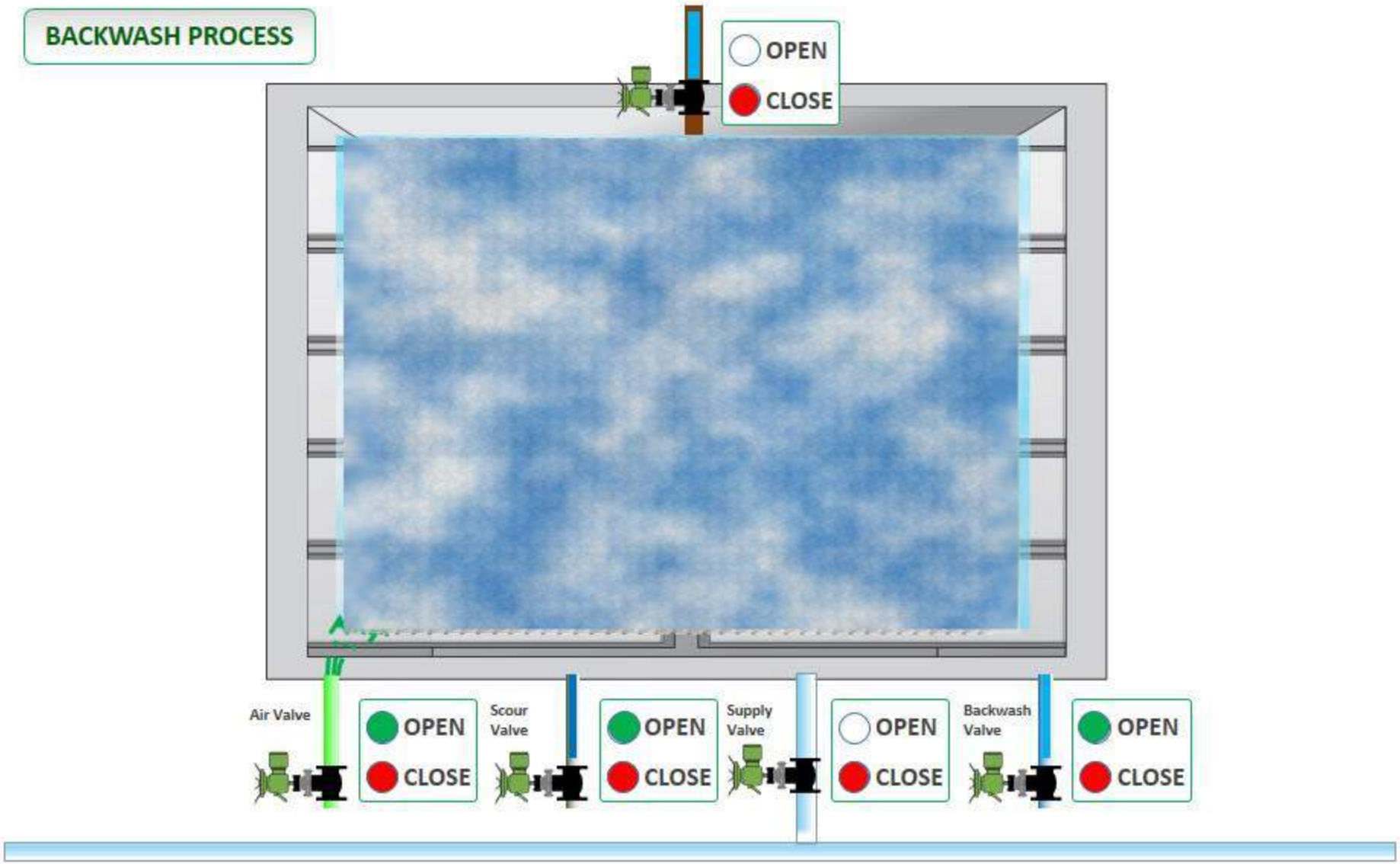
ALARMS	
System	Auto
Over Load	**Trip**
Remote/Local	Remote
SPP	Normal
Trip status	Normal
Phase Reversal	Normal
Intruder Alarm	Normal
Power	Normal

Phase Voltage (v)	
R-Y	408.97
Y-B	415.20
B-R	409.84
Motor Currents (A)	
IR	0.0
IY	0.0
IB	0.0
Freq. (Hz)	49.08
PF	0.0
Power (KW)	0.0
KWH	17860.59
Run hrs.	1.0

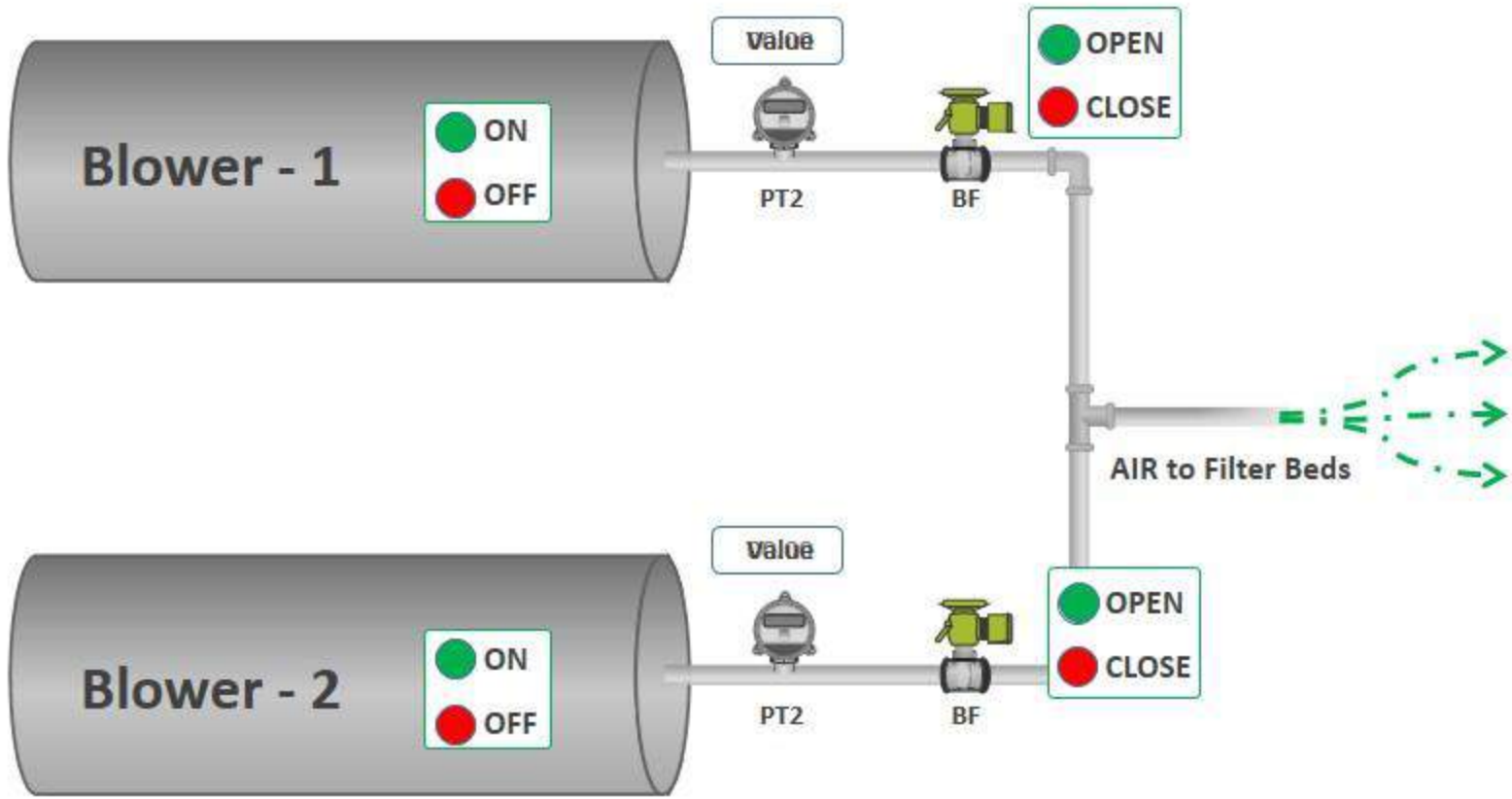
Level Based Operation



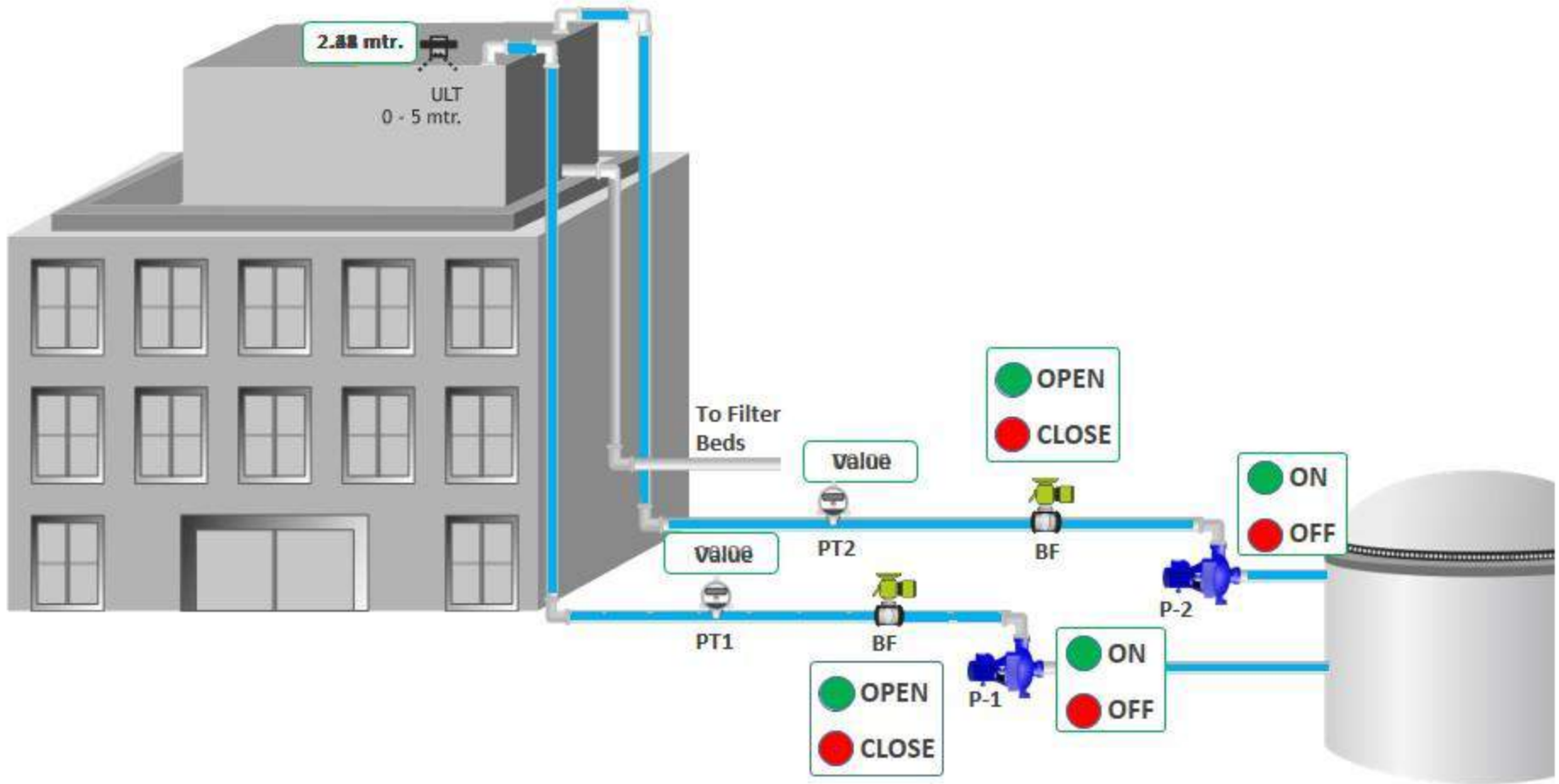
Automation of Filtration Process - WTP



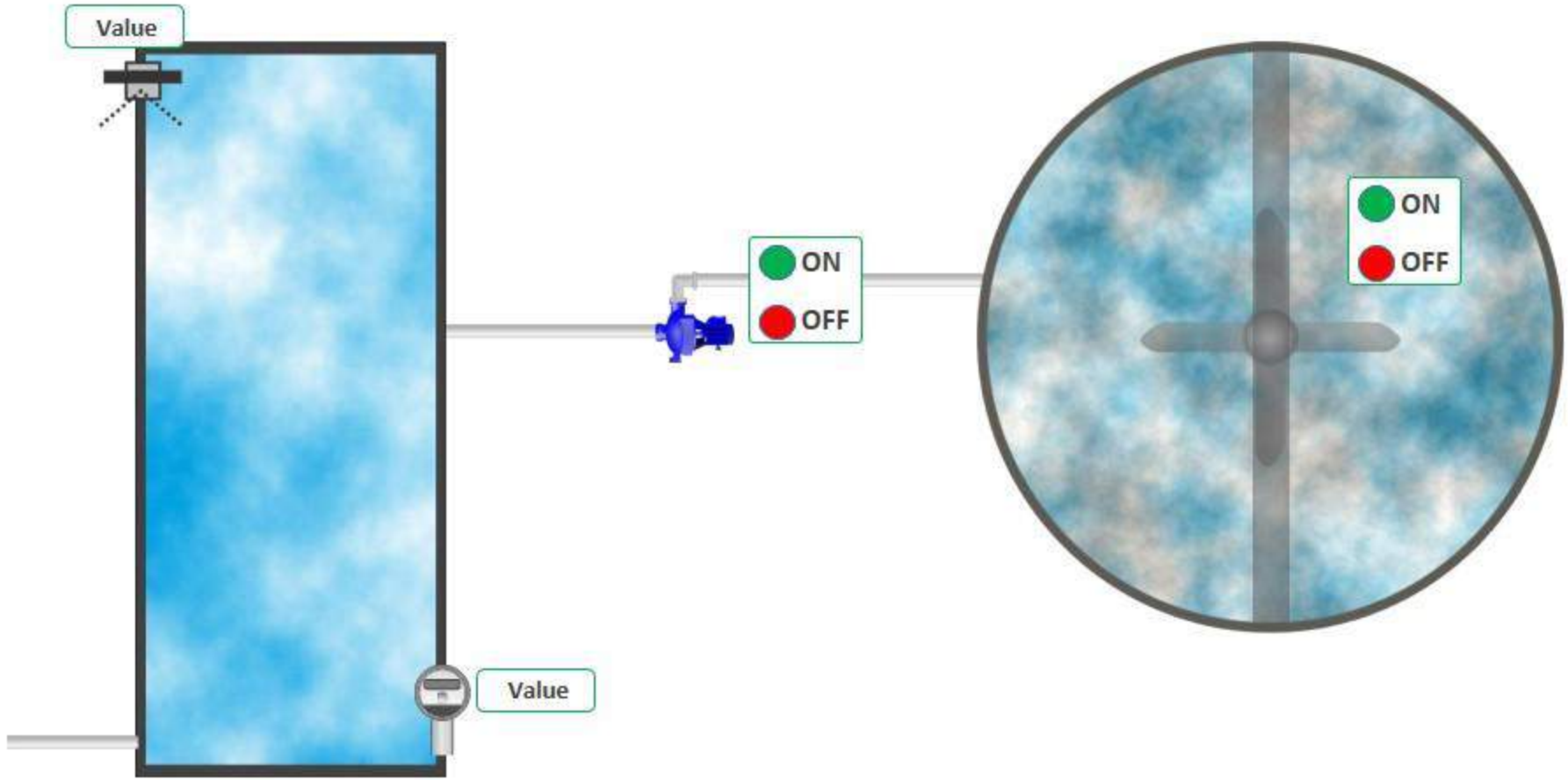
Automation of Blower System



Automation of Backwash System



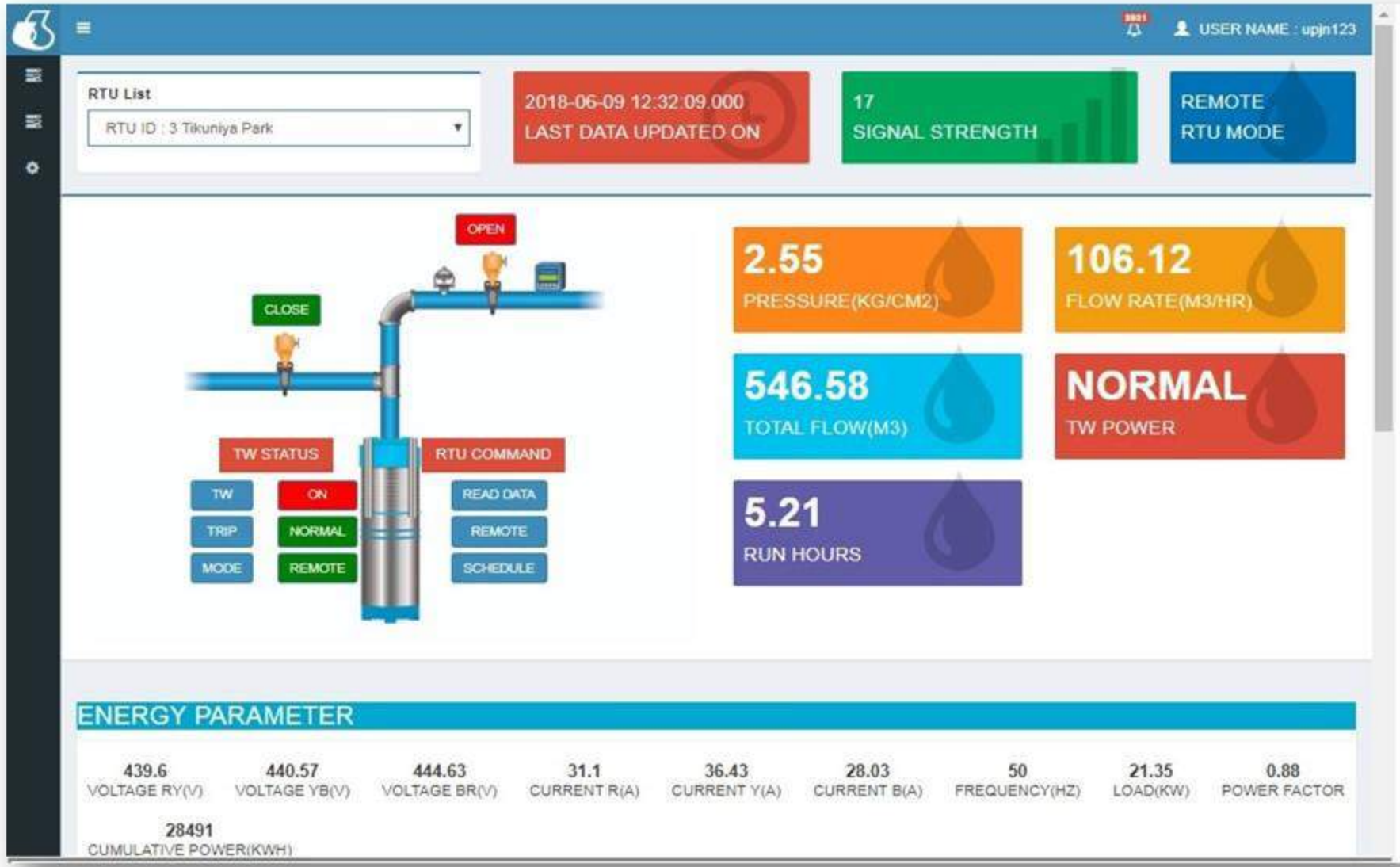
Automation of Inlet Chamber



Latest Initiatives In SCADA & Automation System

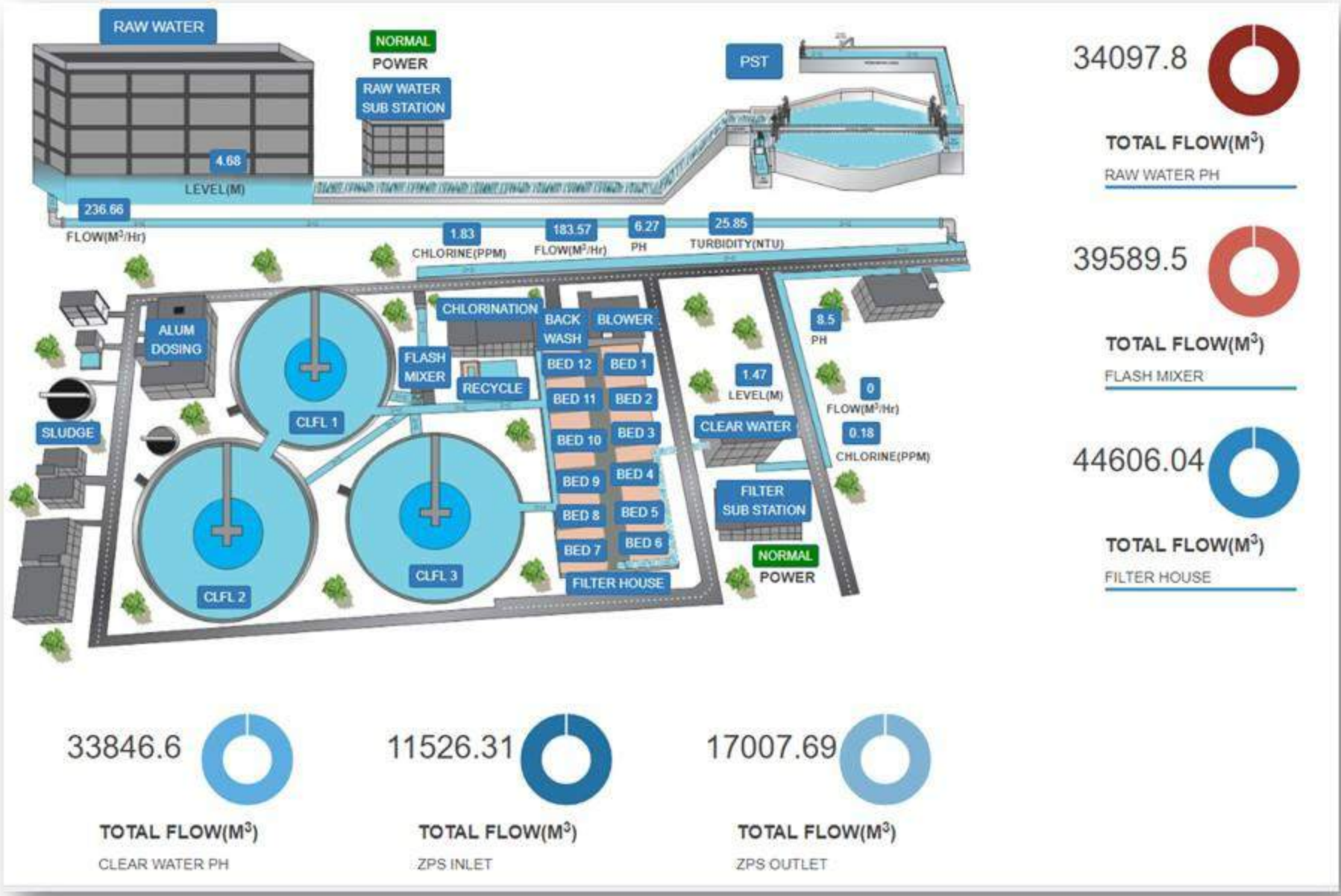
- Web based SCADA
- GSM/GPRS 4G communication
- Mobile monitoring and controlling (android app)
- Touch screen control
- Energy import-export monitoring of solar based tubewells
- Solar based water pressure & sump/OHT level monitoring
- Smart Transmitter Monitoring

Web Based SCADA

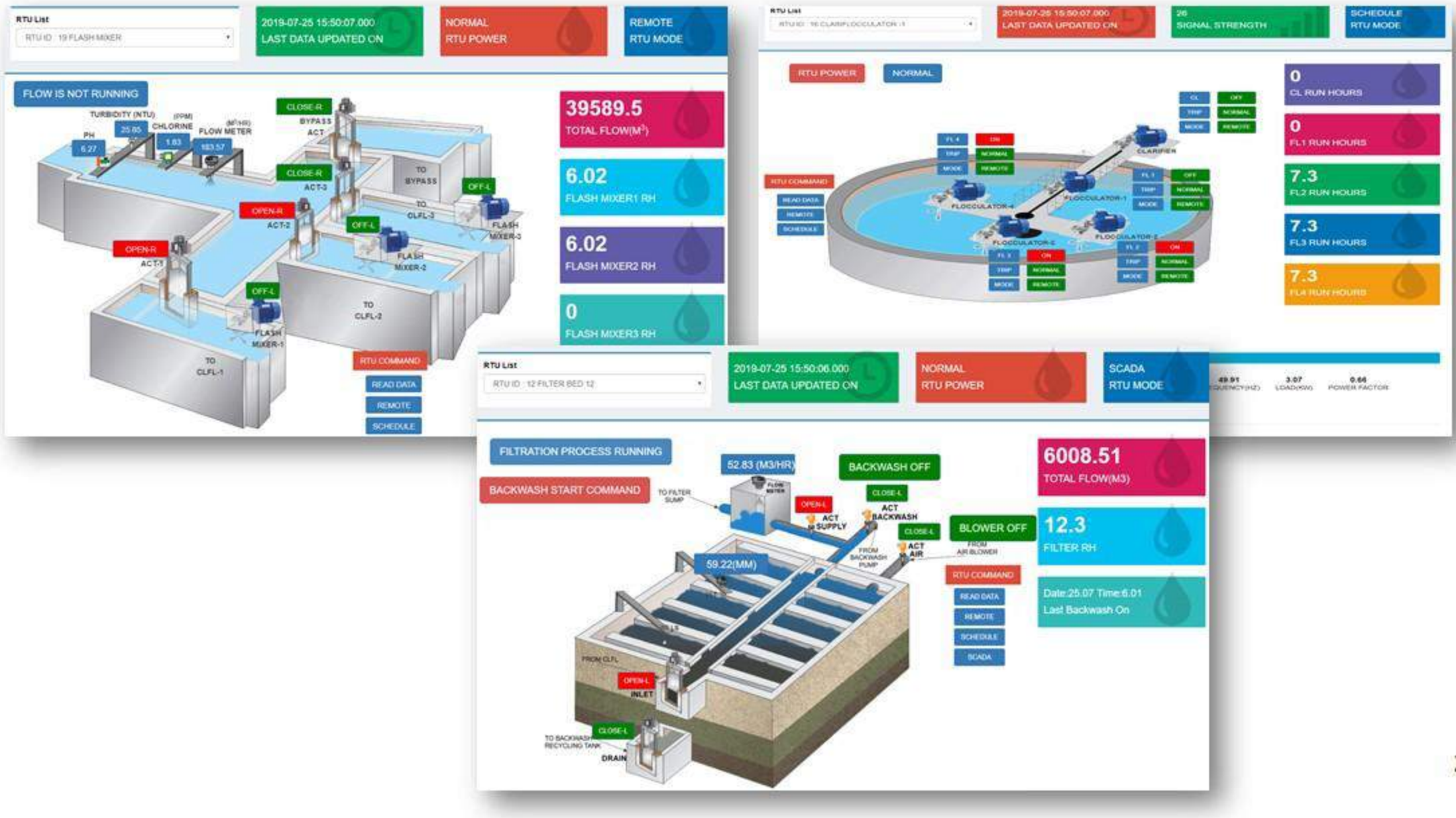


Web based Remote Monitoring of OHT Water Level

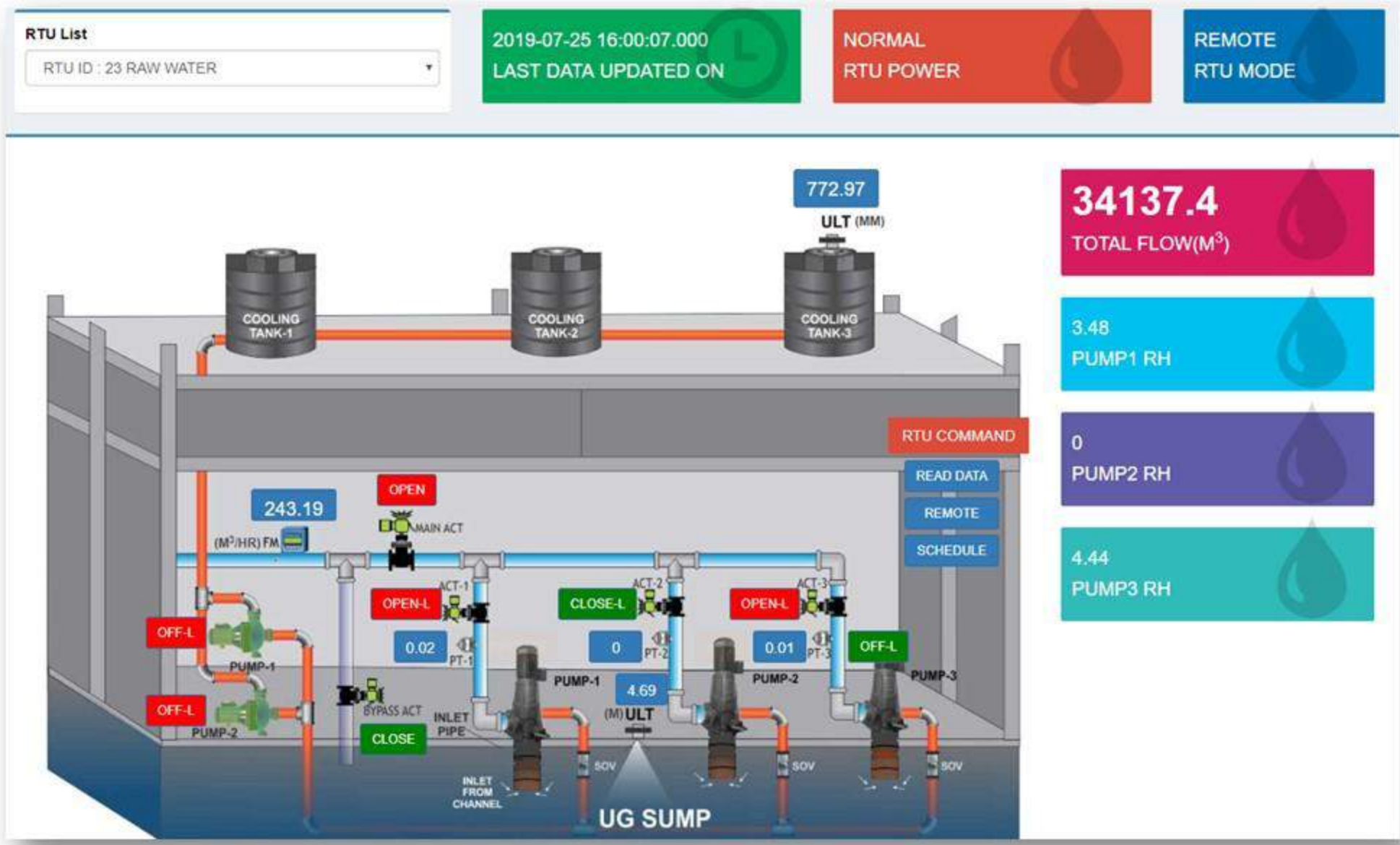
Web based Monitoring of WTP



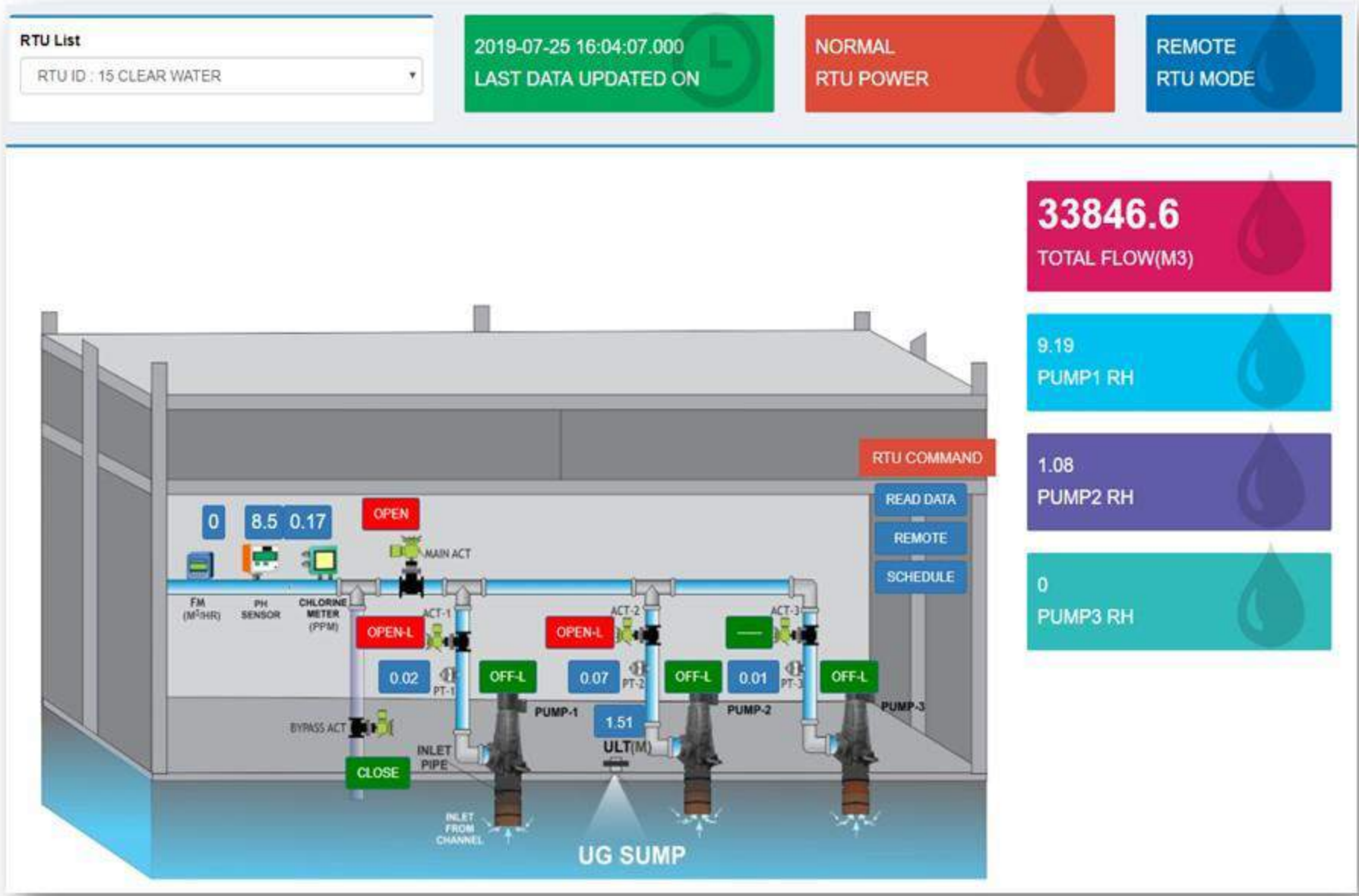
Web based Monitoring of WTP



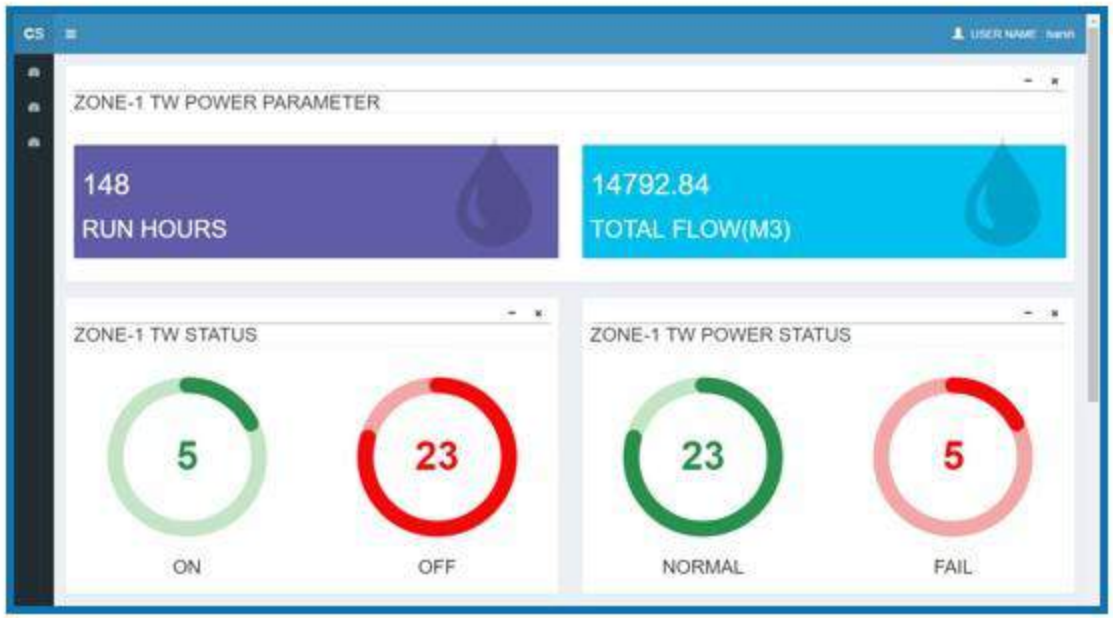
Web based Monitoring of Raw Water Pump House



Web based Monitoring of Clear Water Pump House

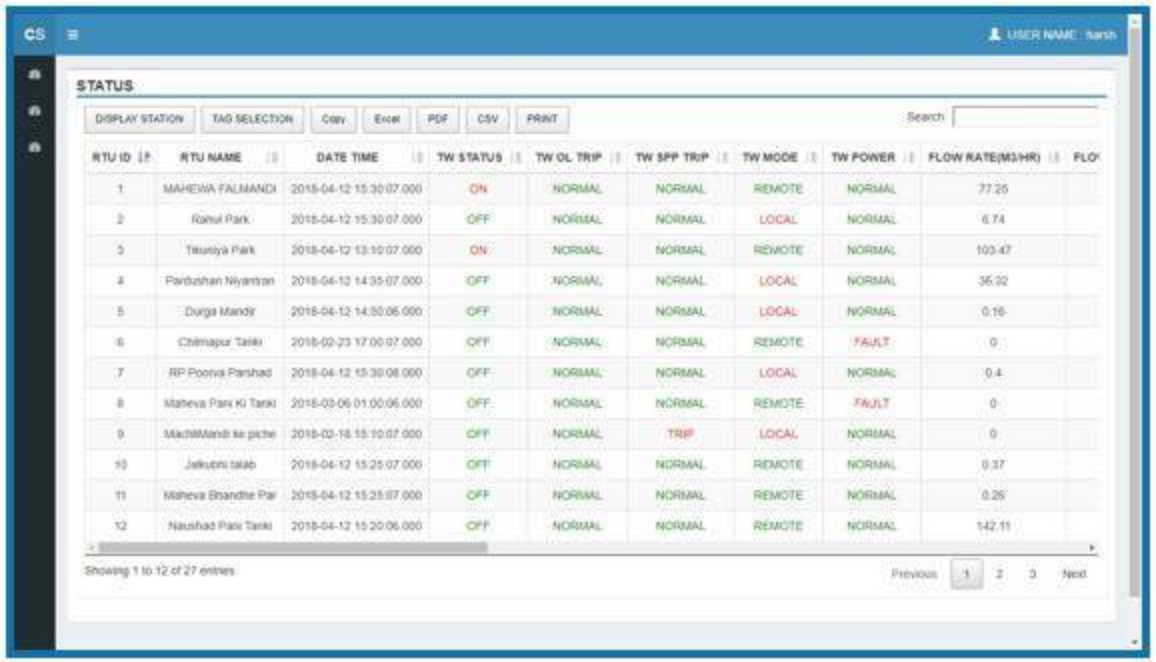


Dashboard

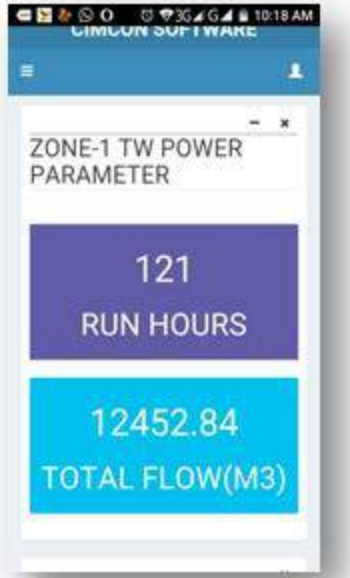

CS
USER NAME
ZONE-1 TW POWER PARAMETER
148
RUN HOURS
14792.84
TOTAL FLOW(M3)
ZONE-1 TW STATUS
5
ON
23
OFF
ZONE-1 TW POWER STATUS
23
NORMAL
5
FAIL


ZONE-1 TW STATUS
5
ON
23
OFF
ZONE-1 TW POWER STATUS
23
NORMAL
5
FAIL
ZONE-1 TW OL TRIP STATUS
28
NORMAL
0
OL TRIP
ZONE-1 TW SPP TRIP STATUS
27
NORMAL
1
SPP TRIP

Report and Trend



Mobile App


ZONE-1 TW POWER PARAMETER
121
RUN HOURS
12452.84
TOTAL FLOW(M3)


STATUS
DISPLAY STATION
TAG SELECTION
Copy
Excel
PDF
CSV
PRINT
Search:
RTU ID
RTU NAME
1 MAHEWA FALMANDI 20
2 Rahul Park 20
3 Tikuniya Park 20
4 Pardushan Niyantran 20
5 Durga Mandir 20
6 Chilmapur Tanki 20
7 RP Poorva Parshad 20

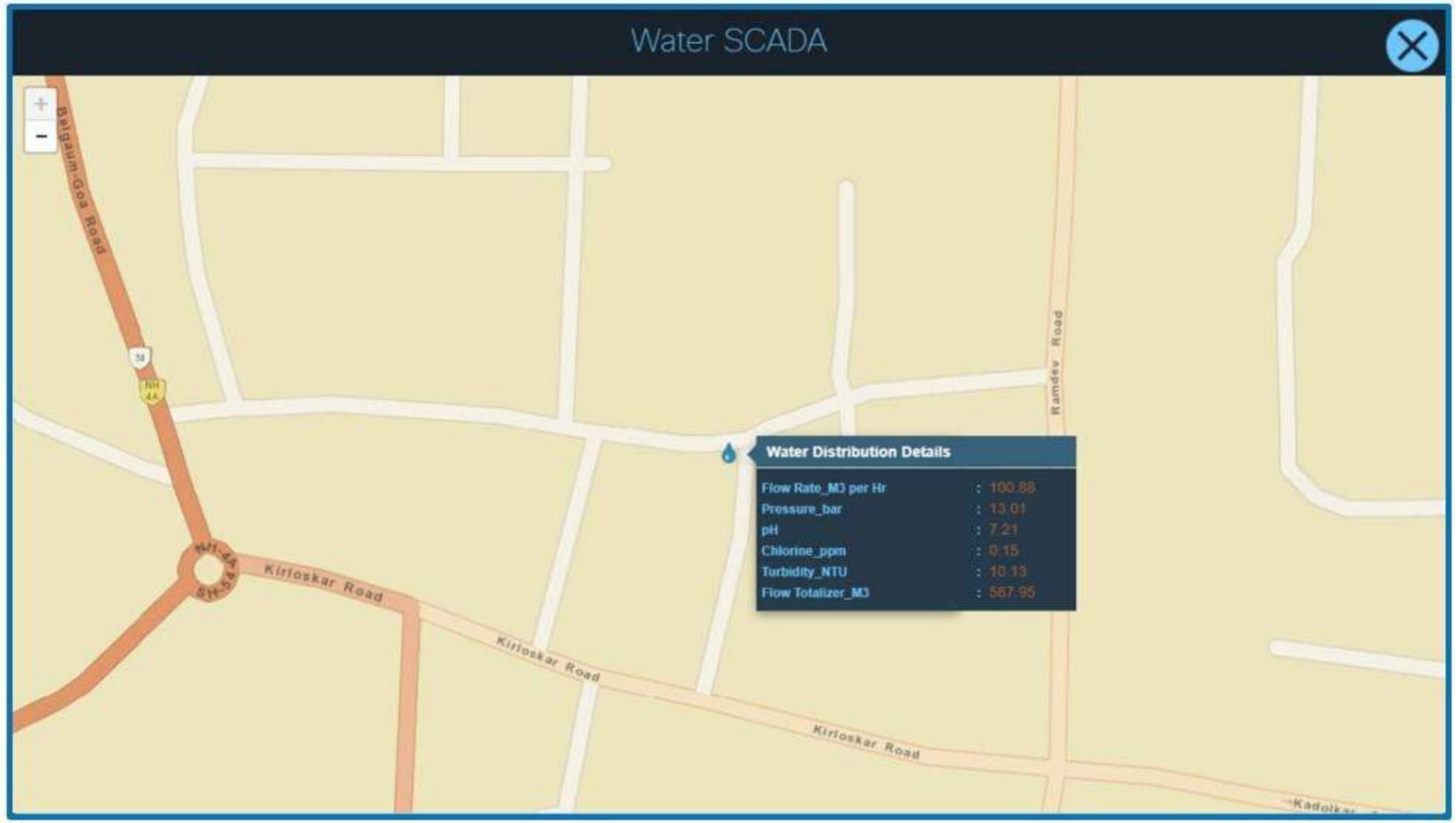

ZONE-1 TW POWER STATUS
21
NORMAL
7


ZONE-1 TW OL TRIP STATUS
28
NORMAL
0
OL TRIP

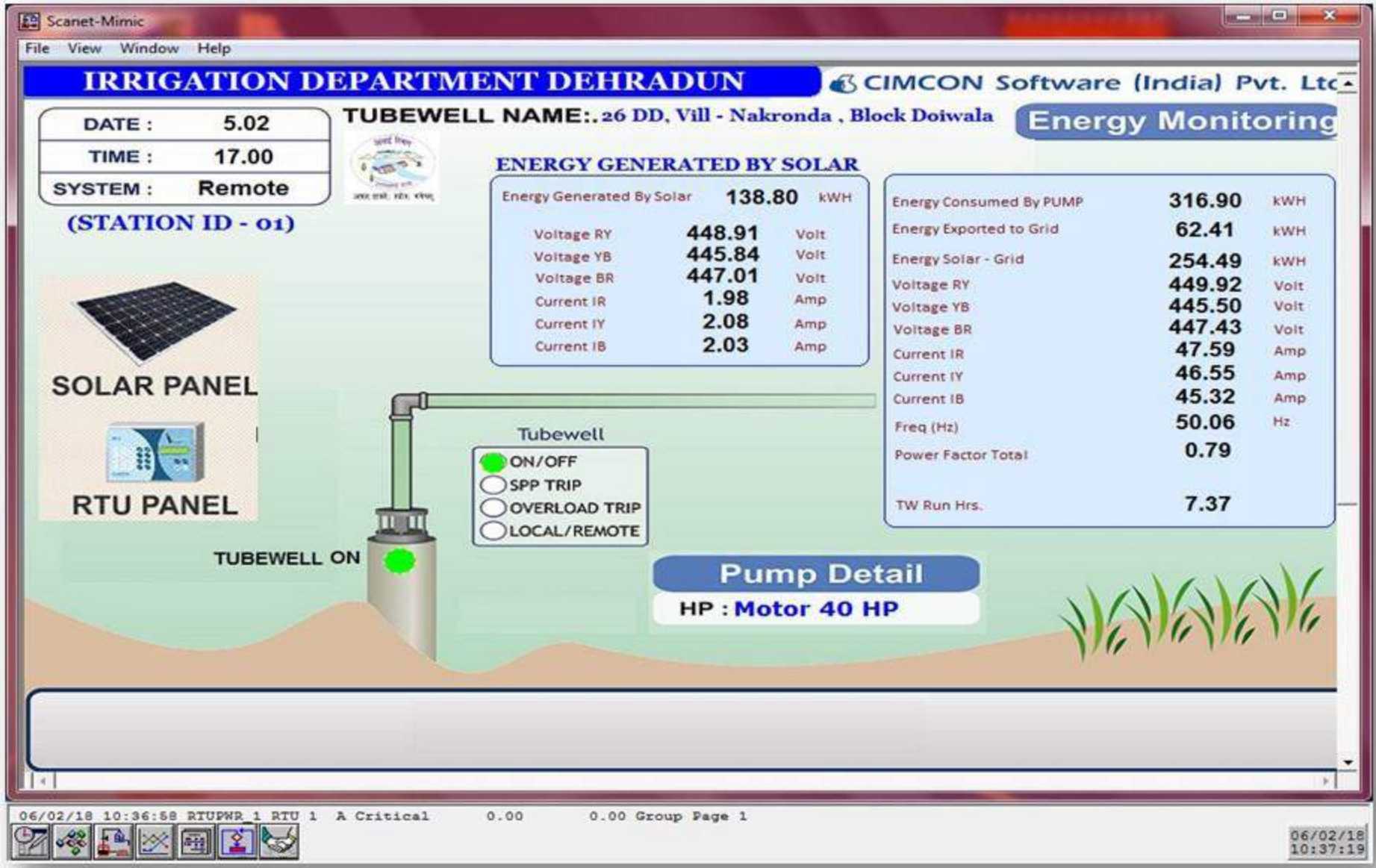

ZONE-1 TW SPP TRIP STATUS
26
NORMAL
2
SPP TRIP


ZONE-1 TW STATUS
6
ON
22
OFF

API (Application programming interface)for Integration with Third Party Systems for Smart City Command Centre



Energy Import-Export Monitoring of Solar Based Tubewells



Case Study

Presented By :- Mr. Rajnish Dashottar (M) +91 9023707373

Case Study # 1 (Since 11 Years)

Client :
Chandigarh Municipal Corporation

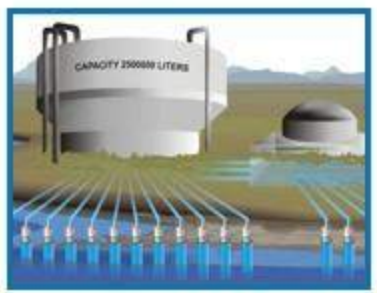
Population: 1.06 million
Area: 44.01 sq. miles

Project Scope :
No. of Tubewells / Pumps : 250 nos.

Application :

This project involves automatic pump On / Off operation for ground water generation and distribution with monitoring and control from a central command center thus saving downtime and enhance maintenance cost saving. Further ground water level management is also carried out with the system. This work is executed by CIMCON Software.

Raw Water Generation



Water Treatment

Water Pumping & Distribution

Waste Water Pumping

Ground Water Level Management

Presented By :- Mr. Rajnish Dashottar (M) +91 9023707373

Overview For Municipal Corporation Chandigarh

Client : Chandigarh Municipal Corporation

Population: 1.06 million

Area: 44.01 sq. miles

Project Scope :

No. of Tube wells	: 204 nos.
Water Works	: 10 Nos
RTU With GSM Modem	: 214nos.
Energy Meter	: 214nos.
Pressure Transmitter	: 214nos.

Application :

This project involves automatic pump On / Off operation for ground water generation and distribution with monitoring and control from a central command center thus saving downtime and enhance maintenance cost saving. Further ground water level management is also carried out with the system.

Year of Installation : 2007

Year of Completion : 2008 – 07 Years AMC

Year of Up-gradation to Web Based : 2018

Current Status : Still working under AMC

Municipal Corporation, Chandigarh (WTP) – 75 MGD

System : RTU Based system is adapted

Year of Installation : 2010

Year of Completion : 2011 – 07 Years AMC

Current Status : Still working

No. of Filter Beds : 31 nos.

RTU With GSM Modem : 07 nos.

Water Quality Meter : 08 nos.

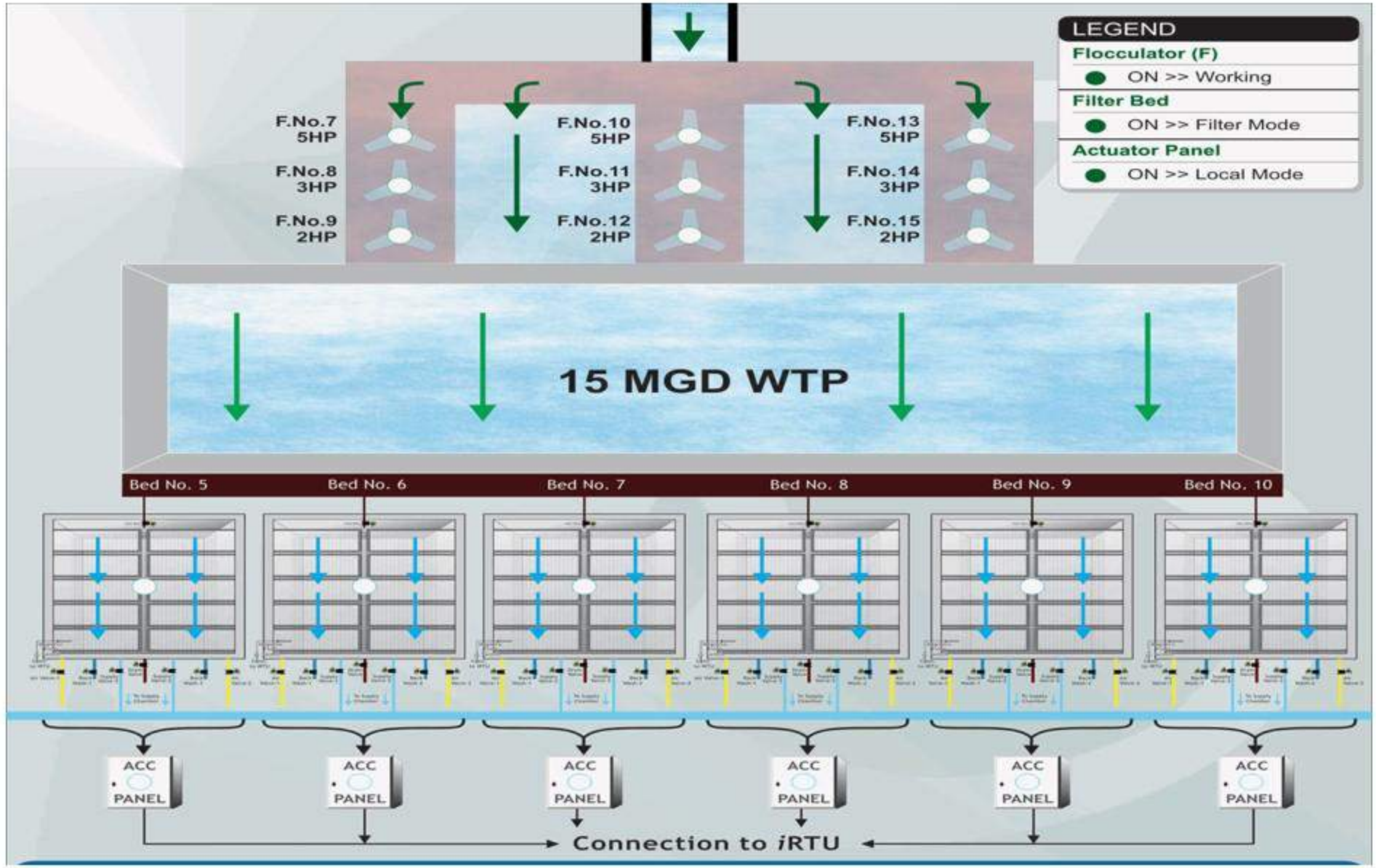
Sluice Valve with actuator : 345 Nos.

Level Switches : 31 nos.

Application :

This project involves auto operation of filter plant with monitoring and control of all the control valves of filter beds from a central command center thus saving downtime and enhance maintenance cost saving. This work is executed by CIMCON Software.

Automation of Filtration Plant - WTP



Case Study # 2

Client : NHP, I & WR Department, Haryana

Project Scope :

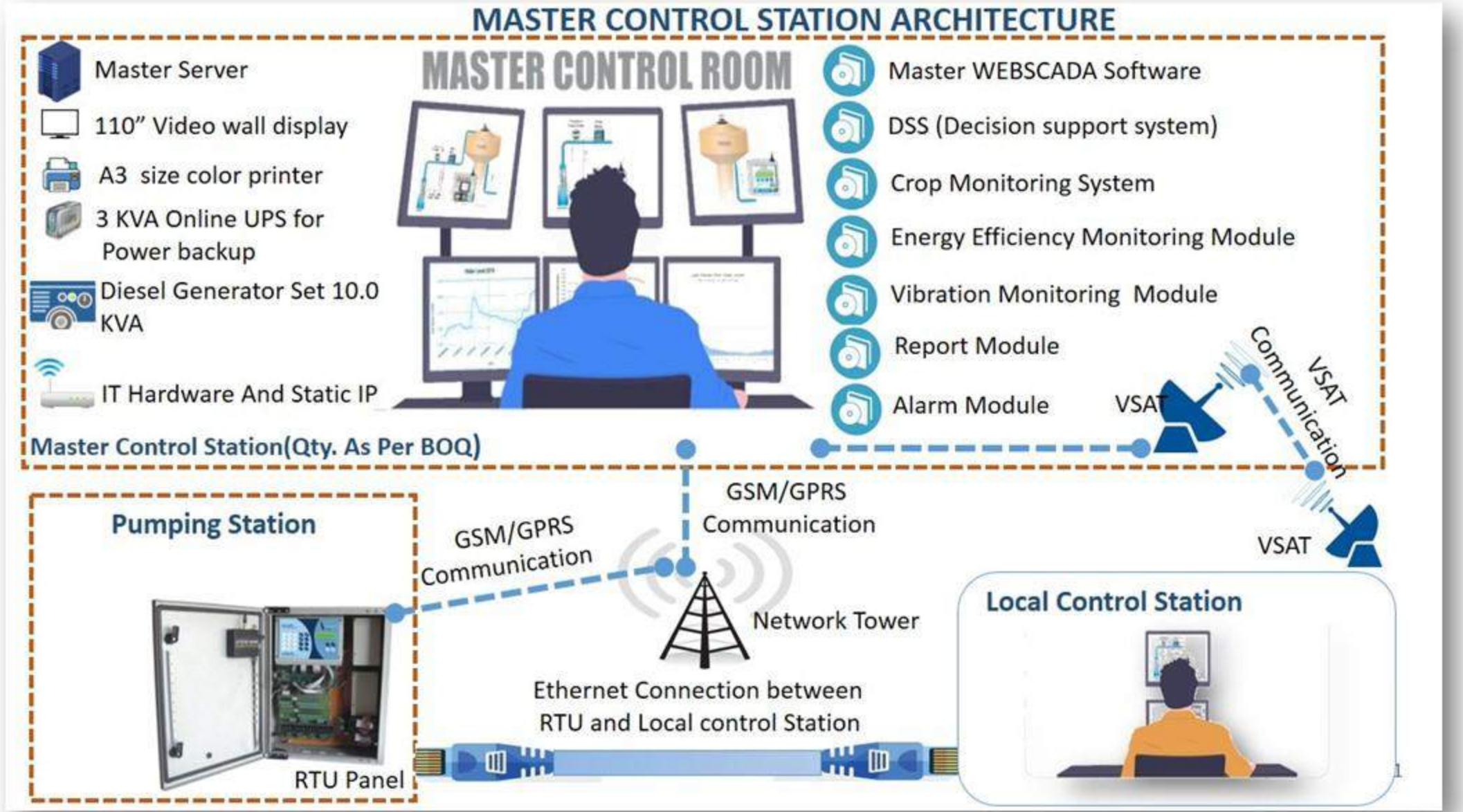
RTU with GSM / GPRS Modem	**: 53 nos.**
Energy Meter	**: 224 nos.**
Pressure Transmitter	**: 224 nos.**
Temperature Sensor	**: 448 nos.**
Vibration Sensor	**: 448 nos.**
ULT	**: 21 nos.**
Open Channel Flow Meter	**: 54 nos.**
ADVM	**: 15 nos.**
Vsat	**: 21 nos.**
Local Control Station	**: 20 nos.**
Master Control Station	**: 01 nos.**

Application :

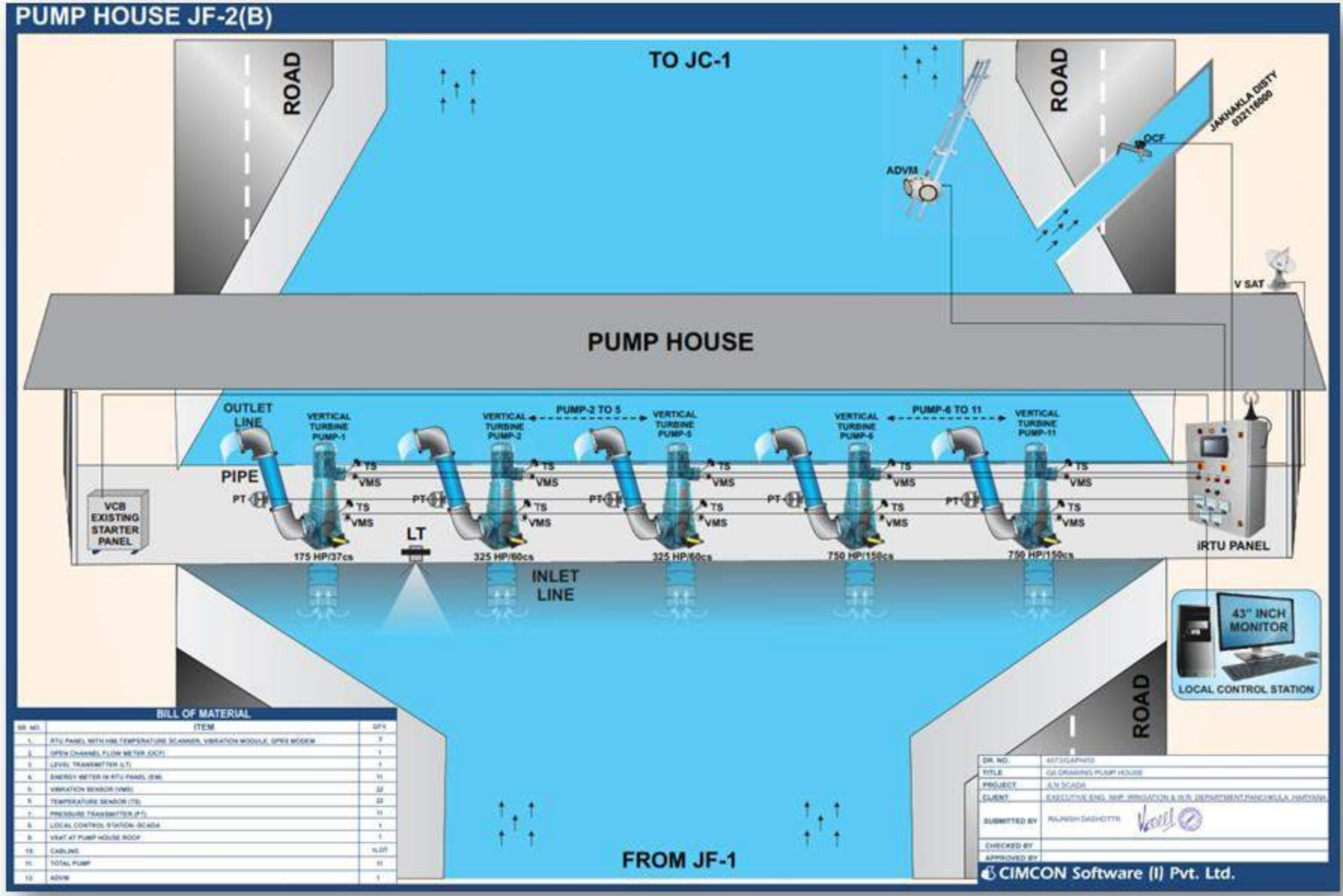
JLN Canal Network water requirements over the command areas will be based on crop area/ crop type monitoring using satellite data, as well as real time monitoring of rainfall measurement and feedback from site-based staff. Demands may be compared with water availability at the respective Source i.e. Upstream of each pumping station. Software shall be developed and used to match demand and supply, prepare water distribution Rosters/ schedules, Energy efficiency monitoring & analysis, vibration monitoring & analysis, including for distribution losses, based on various operating rules that will be agreed in consultation with the WRD. This Decision Support System will be used in conjunction with the SCADA system to control pump operations and discharges along the JLN Canal network for ensuring equitable water distribution. This work is executed by CIMCON Software.

Presented By :- Mr. Rajnish Dashottar (M) +91 9023707373

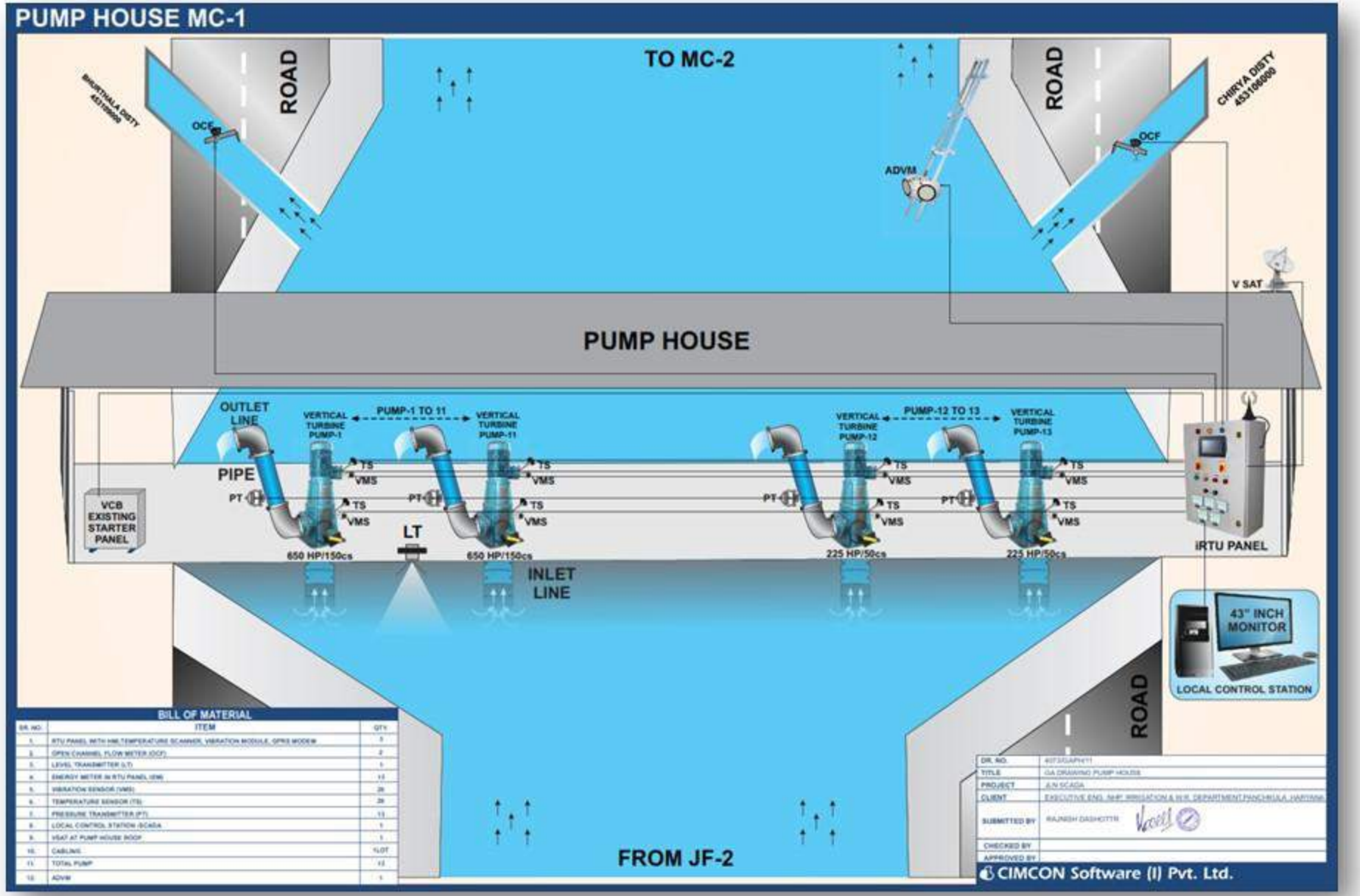
Typical System Architecture



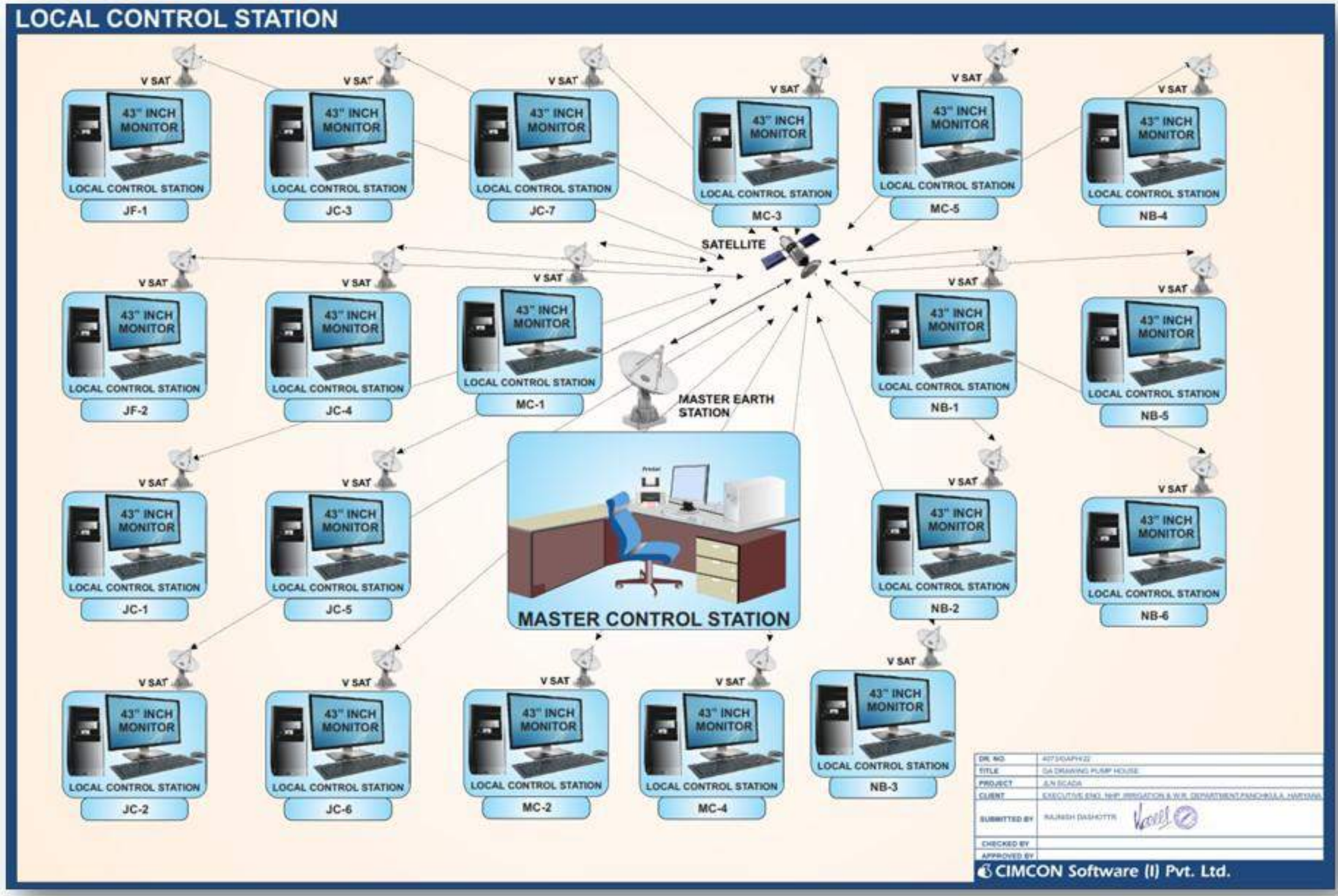
Typical Pump House Architecture (5 PUMPS)



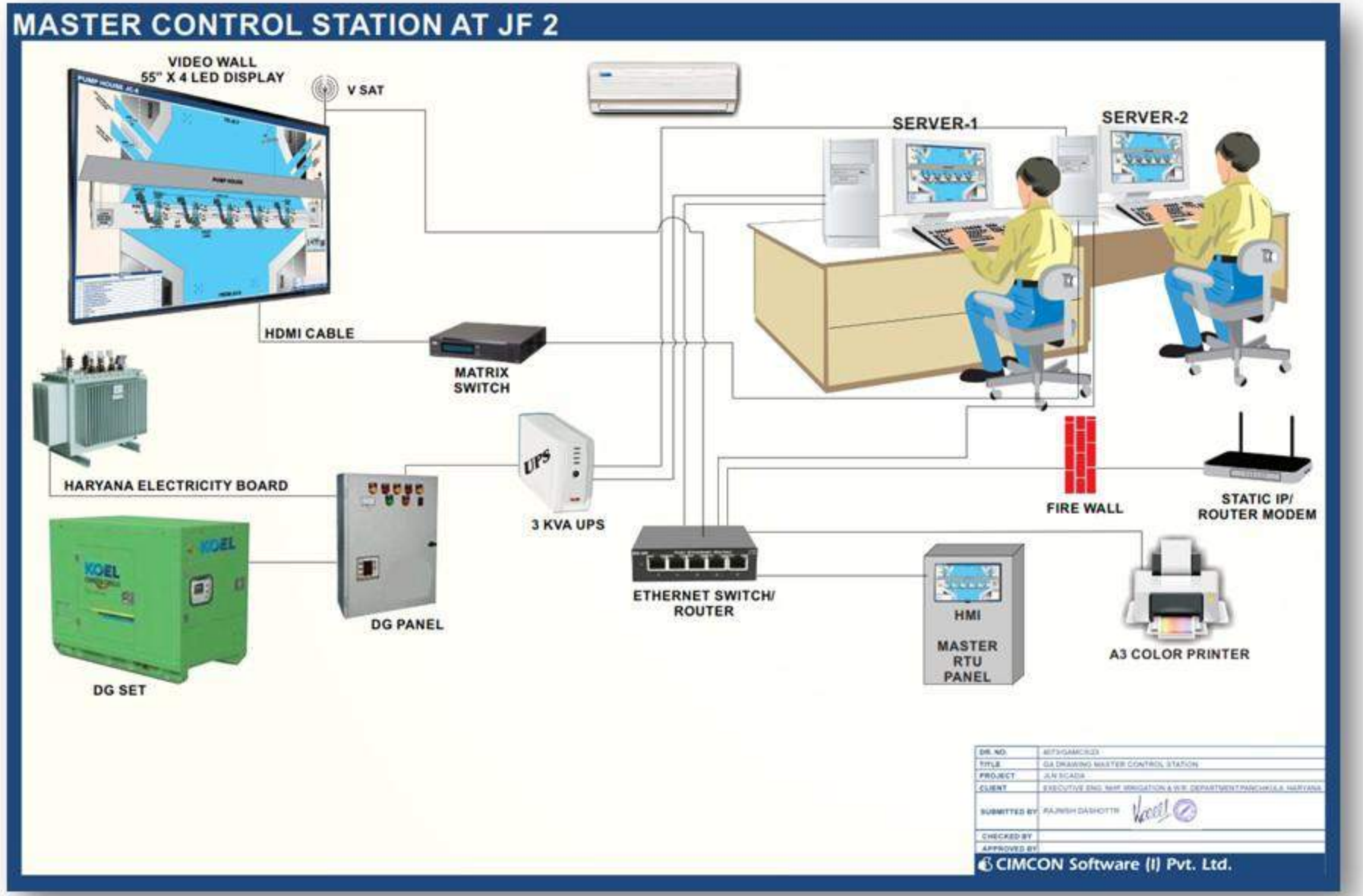
Typical Pump House Architecture (4 PUMPS)



Typical LOCAL CONTROL STATION Architecture



Typical MASTER CONTROL STATION Architecture



Local RTU Panel

RTU Panel

Main Componet of RTU

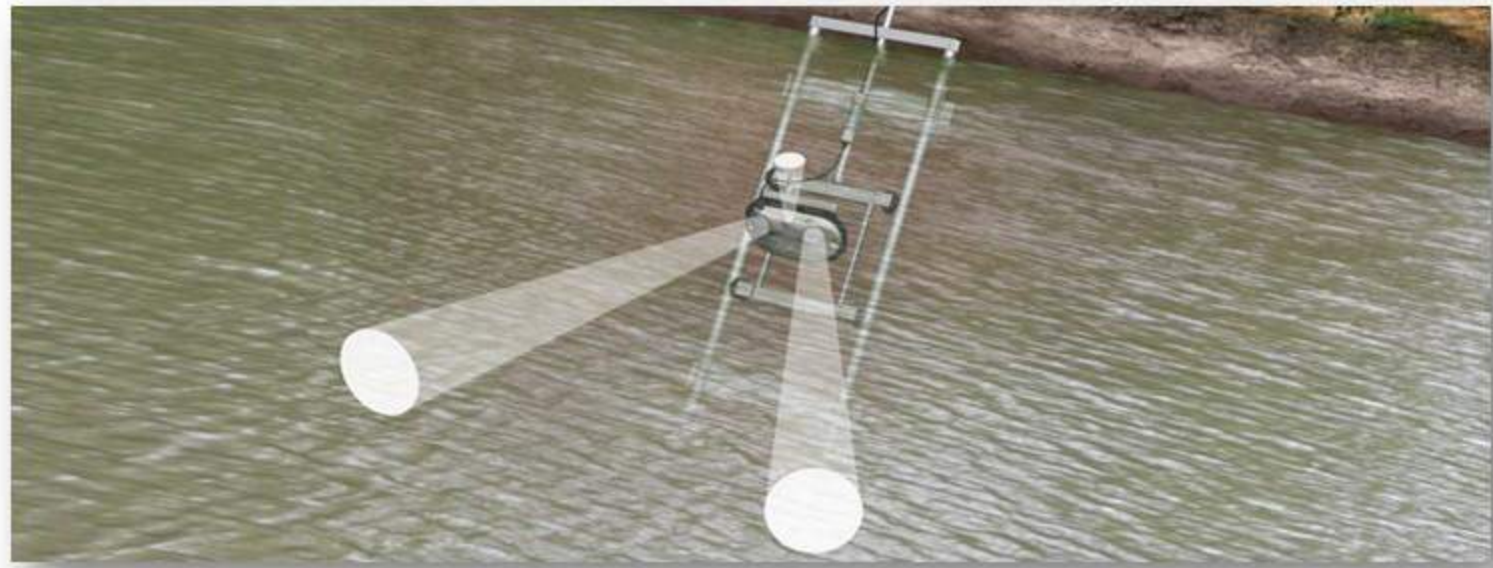
RTU (Remote Terminal UNIT)

HMI (Human Machine Interface)

GPRS Modem

- RTU panel system will be installed at each specified location for data acquisition from various sensors, local control with inbuilt logics, transmission of data to SCADA control station for remote operation and control from Master &Client SCADA (i.e. Local SCADA Control station).

Acoustic Doppler Velocity Meter(ADVM)



- Average velocity over the entire canal and total discharge will be measured / monitored on real time basis with the help of ADVM.ADVM will be connected with RTU on modbus. The Side looking ADVM will be installed in all specified locations with all fittings, steel structure type skid, accessories and cables and conduits to measure discharge within JLN Canal network.

Water Level Sensors (Ultrasonic Level Transmitter)

- Sump Level Measurement
- Open Channel Flow Meter

- The Ultrasonic level sensor installed will measure the level of sump(M) and instantaneous flow in M3/Hour & cumulative flow in terms of MLD. Ultrasonic level sensor is proposed to measure the level and based on the civil structure appropriate flow equation will be incorporated in RTU & SCADA system to evaluate the discharge. Sensor will be connected to RTU on 4 to 20mA.

Energy Meter

- Energy consumed will be continuously measured / monitored on real time basis with the help of Energy Meter respectively.
- The RTU will be connected energy meters via 485 Modbus.
- All parameters from energy meters like individual phase voltages, phase to phase voltages, current, KW, KWH, frequency, power factor etc. will be continuously measured / monitored on real time basis Based at SCADA.

Temperature Monitoring System

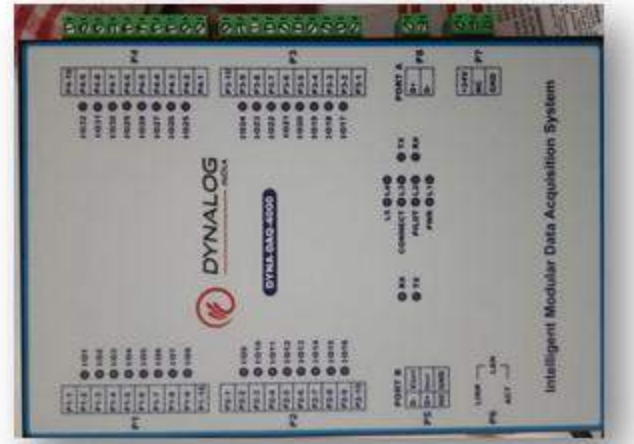
Temperature sensor

Temperature scanner

- Temperature sensor will be installed at motor bearing to monitor the temperature On real time basis. Temperature sensors will be interconnected with 12 channel temperature scanners which in turn will be connected to local RTU systems on RS 485 modbus.
- Advanced RTU logic which function as alarm annunciation and pump tripping when temperature of pumps exceeds a design operating temperature.

Vibration Monitoring System

Vibration sensor



Vibration scanner

- Vibration sensor will be installed at motor to monitor the vibration on real time basis. These Vibration sensors shall be interconnected with the Local RTU through Vibration monitoring modules. Vibration data of each pump the condition monitoring module in SCADA shall be able to analyse the pump health and accordingly the alarm shall be sent to Local PLC/RTU & Master SCADA to decide on the corrective action of the pumps accordingly.

Outcome and Output

- **OUTCOME:** Established State and operational agriculture monitoring system that improves the quality of agricultural information and reporting based on geospatial technologies.
- **Output I:** Innovative, up to date and complementary canal water monitoring systems enabling the integration of satellite remotely-sensed data are developed. The baseline of current approaches, gaps and limitations of current procedures are established.
- **Output II:** Use of latest technology to monitor water requirements, to maximize life of machinery, operating efficiency, to minimize cost of operation, electrical charges, systematic level base operations.

Before SCADA & After SCADA Comparison

Sr.No	Before SCADA	After SCADA
1	Manual Pump Operation	Schedule base real time pump operation so consumers gets un-interrupted water or at least committed Water Supply because it will be monitored around the clock by Engineers.
2	No Audit of power consumption and water generation and distribution	Audit of power consumption and water generation and distribution. This will help the decision markers to identify and nip water wastage
3	No real-time crop data monitoring	Water distribution on real-time crop data

Before SCADA & After SCADA Comparison

Sr.No	Before SCADA	After SCADA
4	No forecasting of water requirement for particular sector/village/colony	Helps in forecasting of water requirement for particular sector/village/colony using crop monitoring and weather data monitoring so as to plan future expansion of hydraulic system and its net work
5	In manual operation users do not have any data for the total system efficiency . so it increase downtime of system	Reports of total electrical consumption data available on real time basis together with the hydraulic data gives the total system efficiency will help the engineers to remove/rectification of faulty non efficient system

Before SCADA & After SCADA Comparison

Sr.No	Before SCADA	After SCADA
6	Manual Fault detection if any fault in system.	During actual emergency, the user can diagnose the location and nature of trouble and take necessary steps to maintain/restore services as quickly as possible since information is available on Mobile app sets as well as from the WEBSCADA.

Advantage

- **Reduction in manpower:-** Boosting Station pump sets can turn ON/OFF from PC itself, dependence on manual labour is nullified.
- **Central Monitoring:-** Central monitoring of entire water distribution system from one location and also facilities in data logging and analysis of data for the desired period.
- **Handy information:-** Health Status of Water Supply system is available on mobiles hand sets through alarm system.
- **Auto Operation:-** The Boosting Stations will operate automatically when put in auto mode. The same can be operated through Operators, when put in Manual Mode. The system is user friendly.
- **Effective Communication:-** Any problem at the pumping station will be immediately communicated to the concerned officer.

Advantage

- **Effective Operation:-** Avoids unnecessary pumping; prevents overflow or empty running condition & Prevents Damages; Offers Protection Against Overload, SPP Etc.

- **Increase in equipment life:-** Improves equipment life & Prevents damages; offers protection against overload, SPP etc., Sequential Operation of Pumps - facilitating equal run time concept Improves Equipment Life; reduces wear & tear.

- **Real time monitoring:-** Offers real time data & single point monitoring of diversely located water schemes. Facilities monitoring of electrical & hydraulic Data like phase current, phase voltage, power factor, discharge, etc.

- **Mtc. Cost:-** Reduces Operation & maintenance cost.

- **Technology:-** Use of latest technology in monitoring the water distribution system, will help department to fight out any problems in future regarding Manpower etc.

Advantage

- **Monitoring of Sump Level:-** The Ultrasonic level sensors installed at the sump will allow department to continuously monitor the sump level and Boosting station will have “Level Based” Operations.

- **Energy Savings:-** Energy saving by:-

- Monitoring of Power factor continuously.
- Optimizing the rating of pump motor set.
- Monitoring of pump discharge, the pump efficiency can be controlled. Also by maintaining continuous check on the pressure and discharge data, pump running hours can be optimized avoiding excess running.
- Running of pumps on as and required basis.
- Running of pumps by scheduled / level based operation.

Case Study # 3

Client :

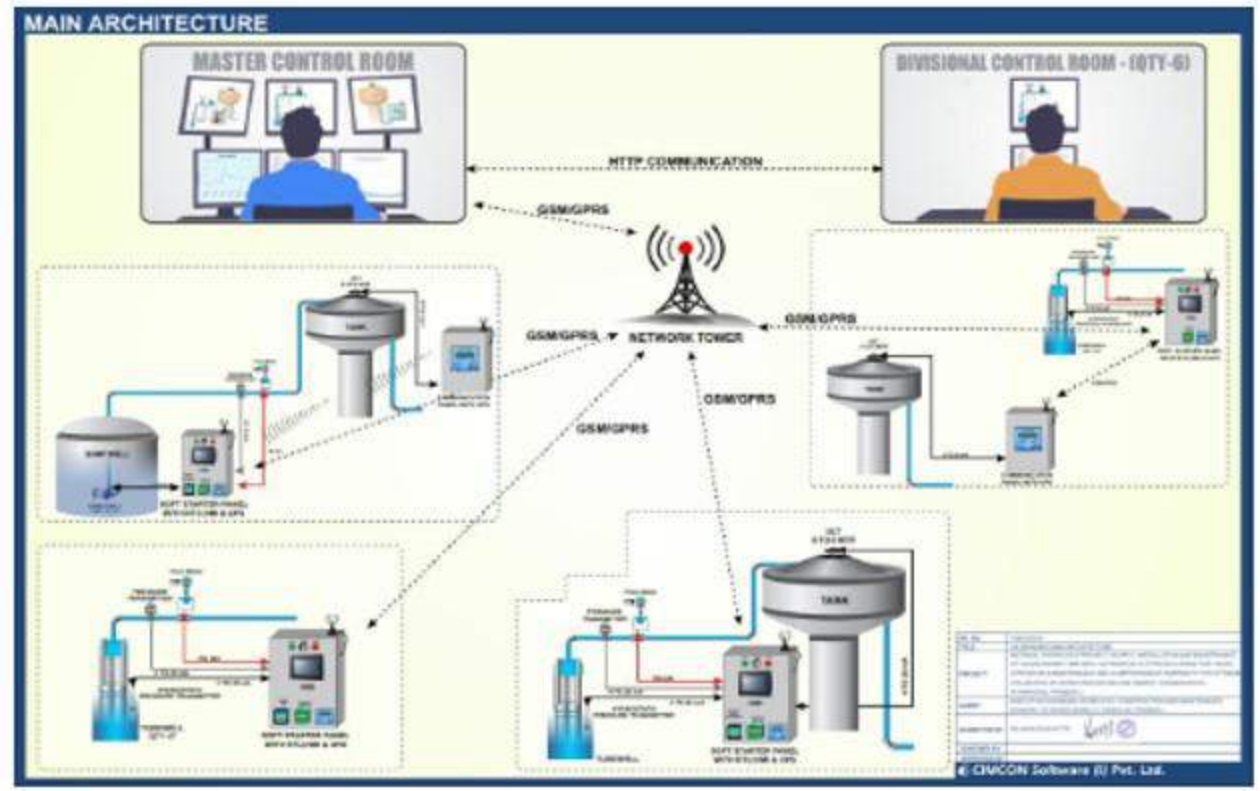
Executive Engineer, Hydrology Construction and Maintenance Division, Shimla. Himachal Pradesh

Project Scope :

RTU	: 101 nos.
Energy Meter	: 60 nos.
Pressure Transmitter	: 60 nos.
Flow Meter	: 60nos.
HPT	: 57 nos.
ULT	: 54 nos.

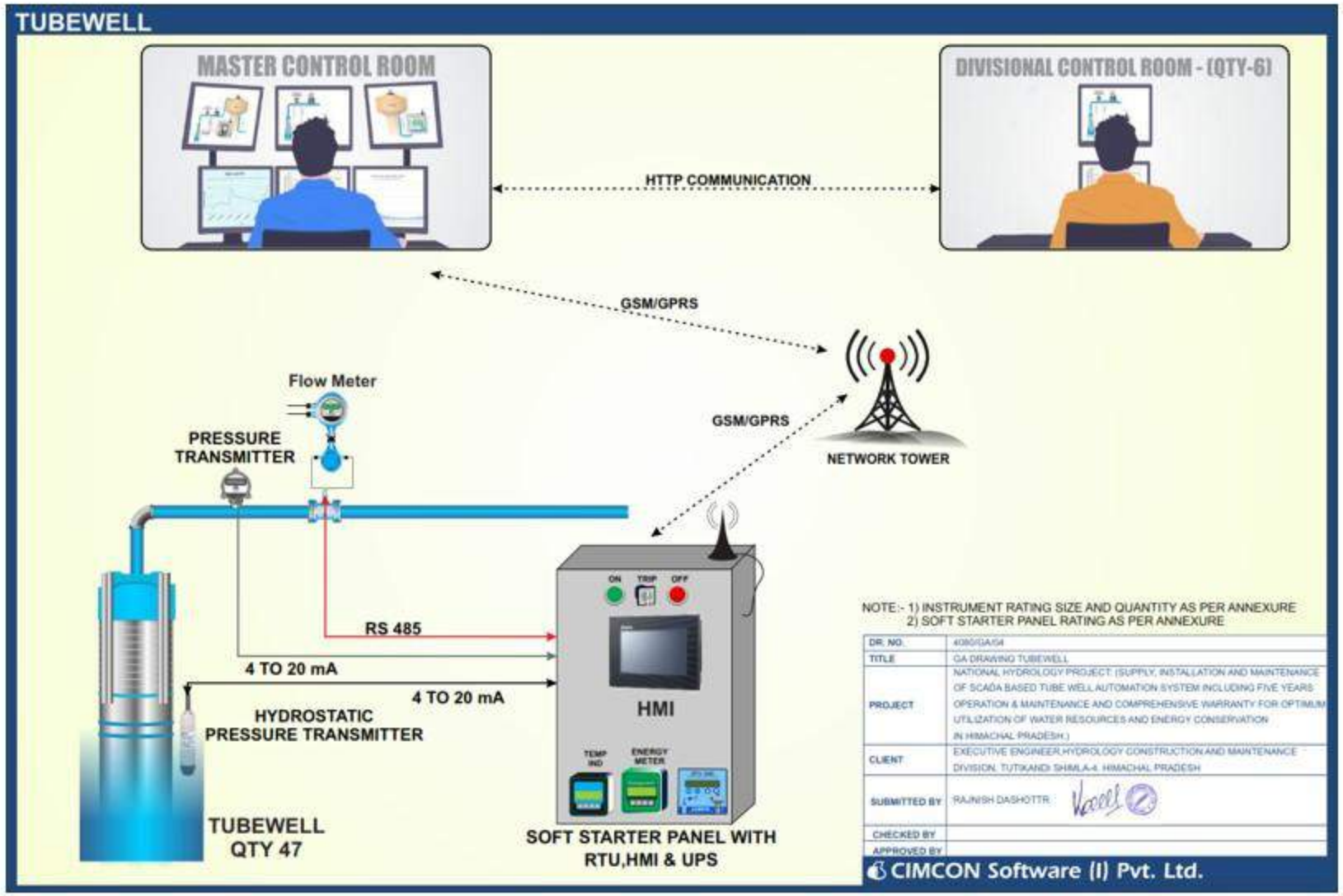
Application :

This project involves automatic pump On / Off operation for ground water generation and distribution with monitoring and control from a central command center thus saving downtime and enhance maintenance cost saving. Further ground water level management is also carried out with the system.

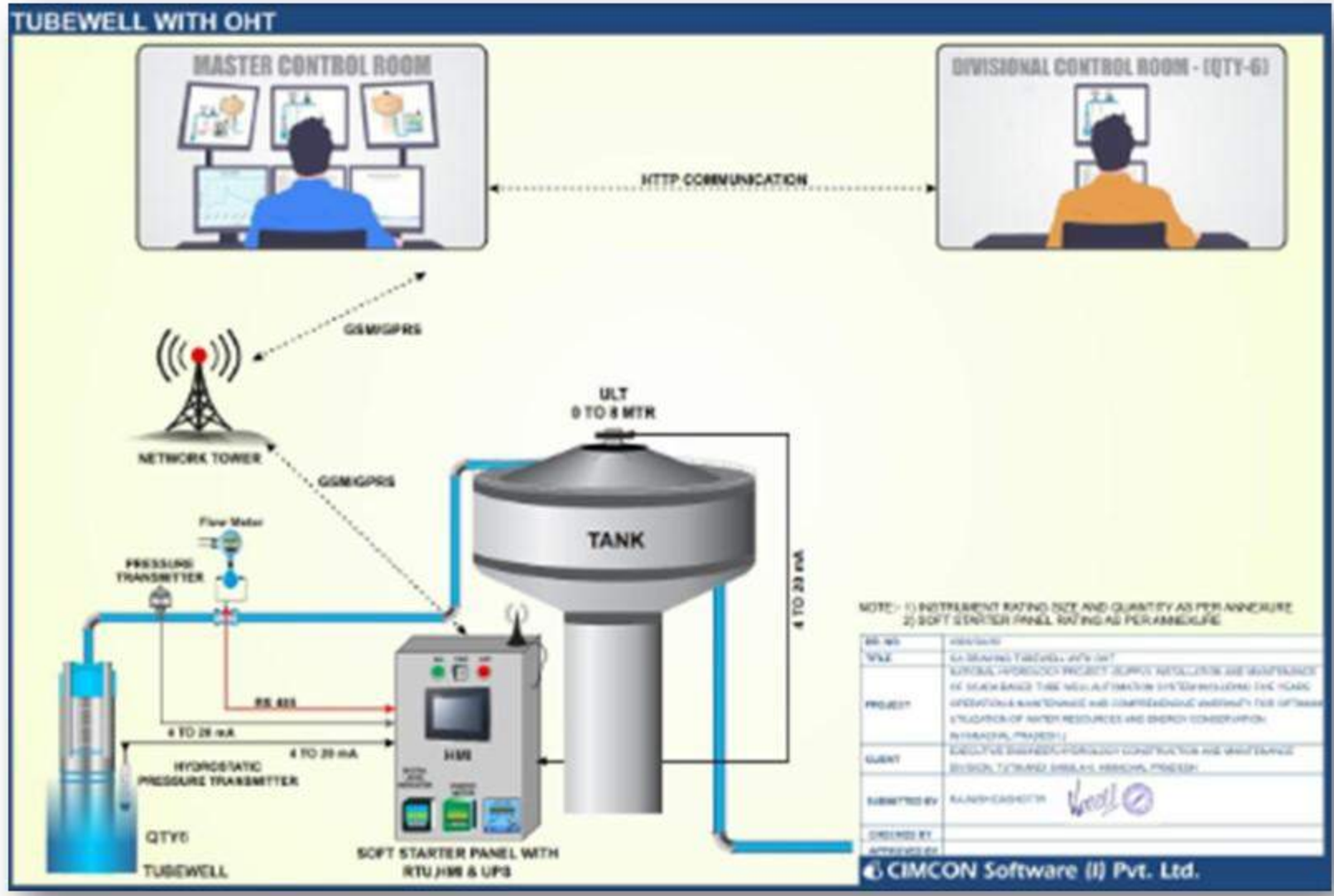


Presented By :- Mr. Rajnish Dashottar (M) +91 9023707373

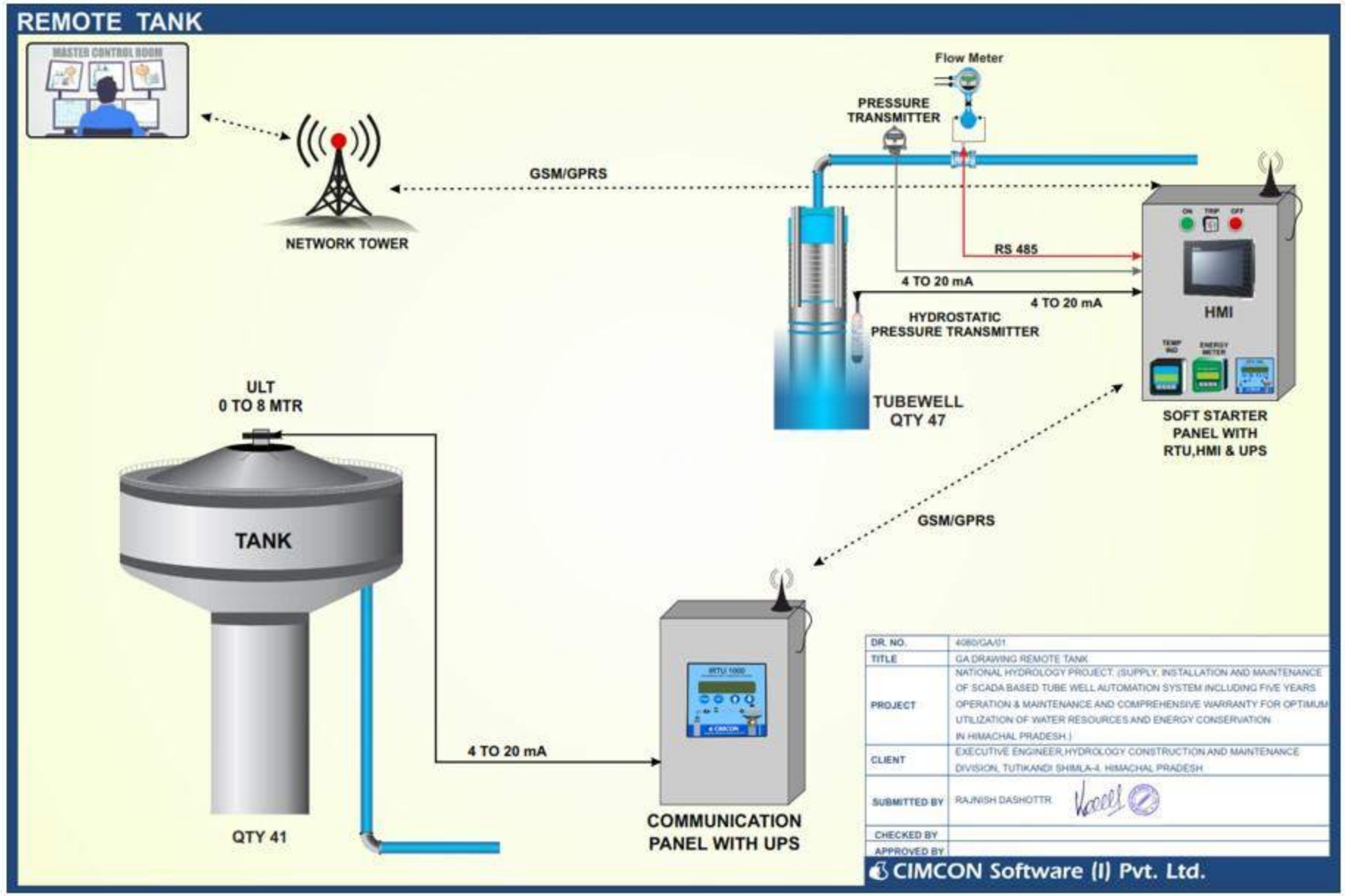
Tubewell


TUBEWELL
MASTER CONTROL ROOM
DIVISIONAL CONTROL ROOM - (QTY-6)
HTTP COMMUNICATION
GSM/GPRS
GSM/GPRS
NETWORK TOWER
Flow Meter
PRESSURE TRANSMITTER
RS 485
4 TO 20 mA
4 TO 20 mA
HYDROSTATIC PRESSURE TRANSMITTER
HMI
ON
TRIP
OFF
TEMP IND
ENERGY METER
TUBEWELL QTY 47
SOFT STARTER PANEL WITH RTU,HMI & UPS
NOTE:- 1) INSTRUMENT RATING SIZE AND QUANTITY AS PER ANNEXURE
2) SOFT STARTER PANEL RATING AS PER ANNEXURE
DR. NO.
4080/GA/04
TITLE
GA DRAWING TUBEWELL
PROJECT
NATIONAL HYDROLOGY PROJECT (SUPPLY, INSTALLATION AND MAINTENANCE OF SCADA BASED TUBE WELL AUTOMATION SYSTEM INCLUDING FIVE YEARS OPERATION & MAINTENANCE AND COMPREHENSIVE WARRANTY FOR OPTIMUM UTILIZATION OF WATER RESOURCES AND ENERGY CONSERVATION IN HIMACHAL PRADESH)
CLIENT
EXECUTIVE ENGINEER,HYDROLOGY CONSTRUCTION AND MAINTENANCE DIVISION, TUTIKANDI SHIMLA-4, HIMACHAL PRADESH
SUBMITTED BY
RAJNISH DASHOTTR
CHECKED BY
APPROVED BY
CIMCON Software (I) Pvt. Ltd.

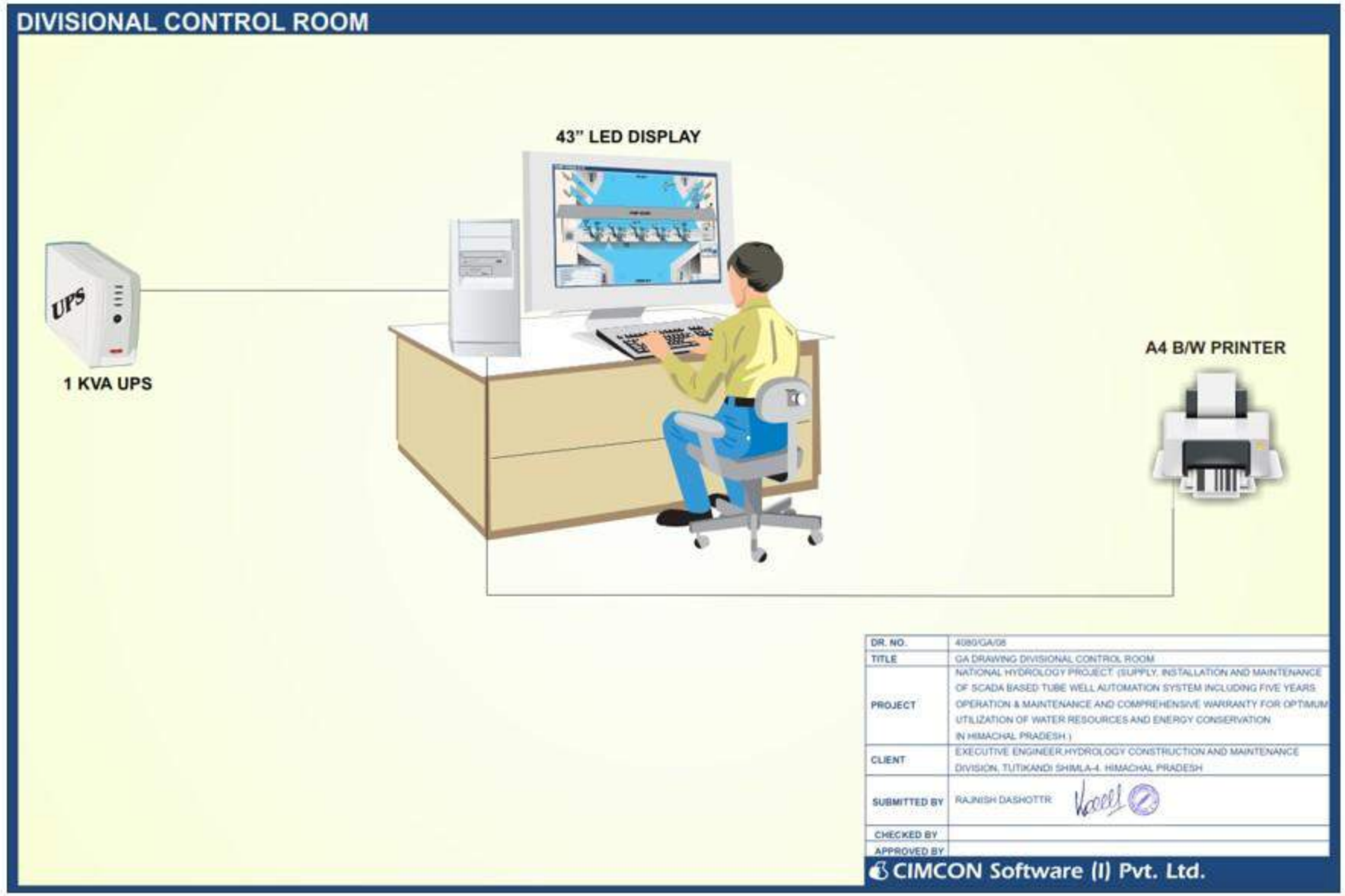
Tubewell With OHT



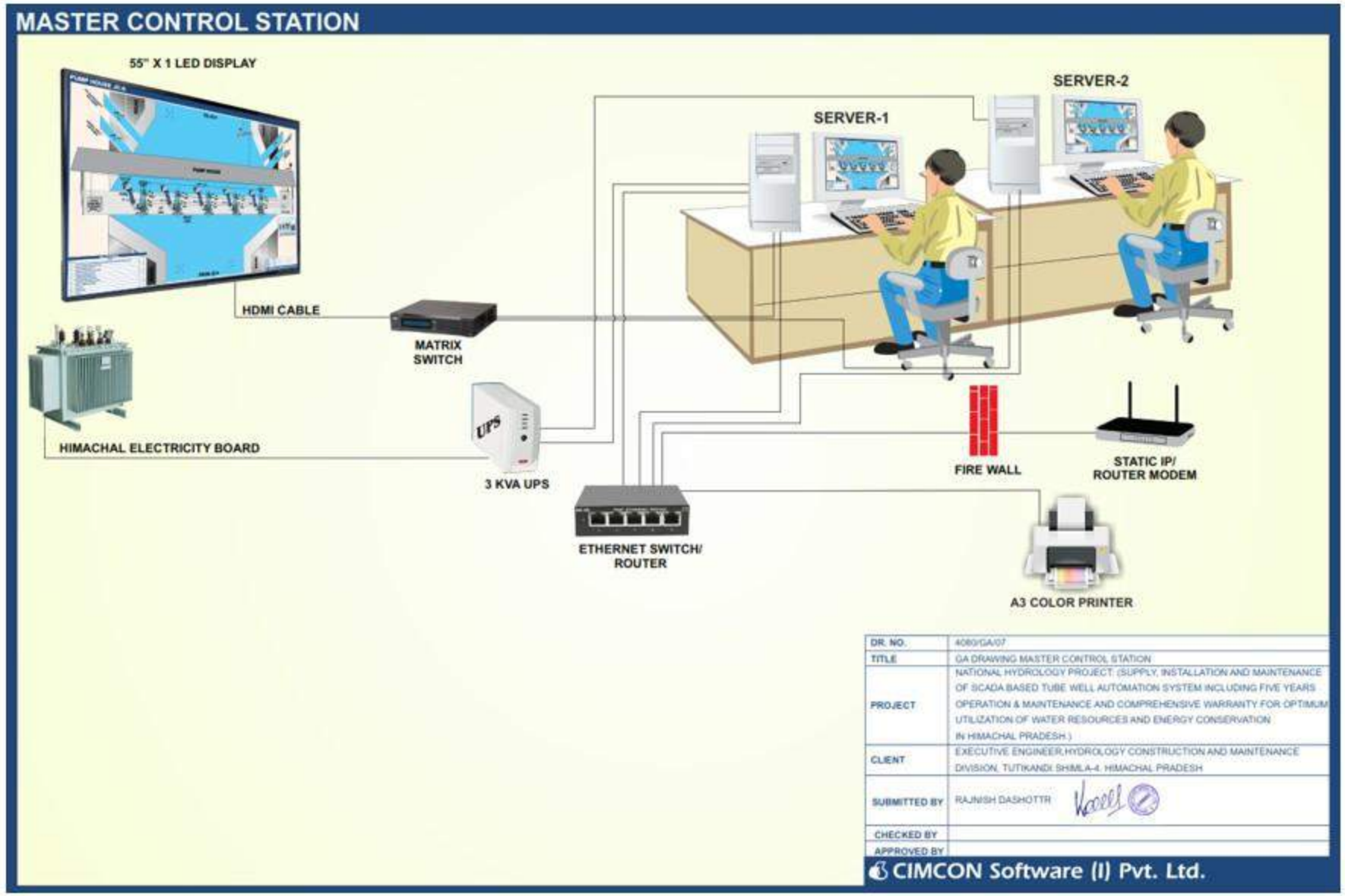
Remote Tank


REMOTE TANK
MASTER CONTROL ROOM
NETWORK TOWER
GSM/GPRS
Flow Meter
PRESSURE TRANSMITTER
RS 485
4 TO 20 mA
4 TO 20 mA
HYDROSTATIC PRESSURE TRANSMITTER
TUBEWELL QTY 47
HMI
SOFT STARTER PANEL WITH RTU,HMI & UPS
ULT 0 TO 8 MTR
TANK
QTY 41
4 TO 20 mA
GSM/GPRS
COMMUNICATION PANEL WITH UPS
DR. NO. 4080/GA/01
TITLE GA DRAWING REMOTE TANK
PROJECT NATIONAL HYDROLOGY PROJECT. (SUPPLY, INSTALLATION AND MAINTENANCE OF SCADA BASED TUBE WELL AUTOMATION SYSTEM INCLUDING FIVE YEARS OPERATION & MAINTENANCE AND COMPREHENSIVE WARRANTY FOR OPTIMUM UTILIZATION OF WATER RESOURCES AND ENERGY CONSERVATION IN HIMACHAL PRADESH.)
CLIENT EXECUTIVE ENGINEER,HYDROLOGY CONSTRUCTION AND MAINTENANCE DIVISION, TUTIKANDI SHIMLA-I. HIMACHAL PRADESH
SUBMITTED BY RAJNISH DASHOTTR
CHECKED BY
APPROVED BY
CIMCON Software (I) Pvt. Ltd.

Divisional Control Room



Master Control Station



Thank You

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