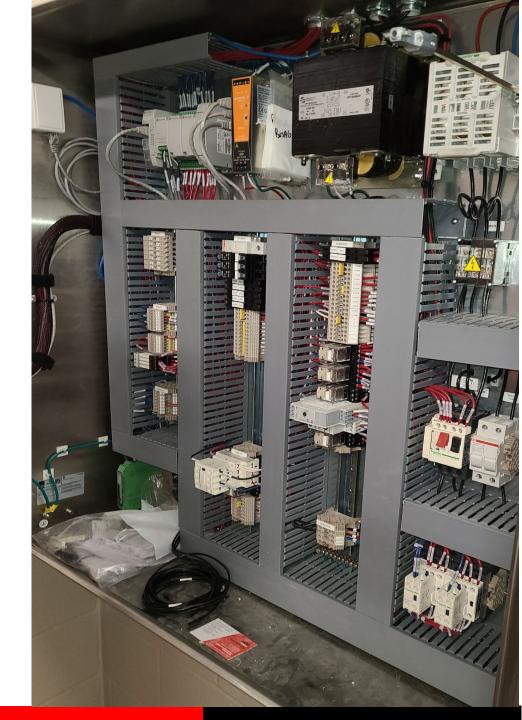# SCADA Master Plan Implementation

Operators Workshop

May 12, 2023

Agenda

- SCADA Master Plan
  - Background
  - RFP and Consultant
  - Current State
  - Desired State
- SCADA Standards Development
- Pre-Purchased Equipment
- SCADA Pilot Projects
- Implementation
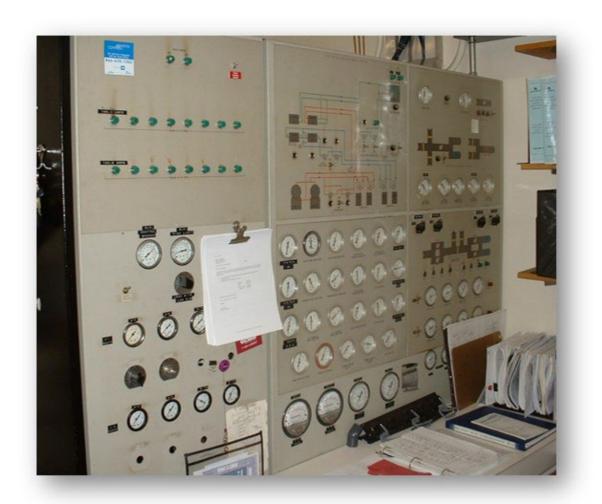- Questions/Discussions

SCADA Master Plan

- What is SCADA? Supervisory Control and Data Acquisition
- Continuously monitoring from a centralized or remote location
- Interface for overseeing/control and automation of a process
- Provides a graphical interface for operators or technical staff
- Allows operational changes and control
- Collect and store process parameters/field instrument readings
- Annunciate alarms and events
- Ensure staff and public safety
- Troubleshoot problems
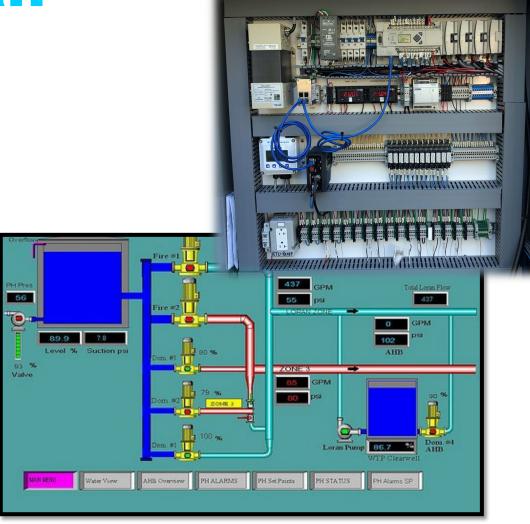
SCADA Master Plan

- In response to RFP, four proposals were received.

- Eramosa Engineering was selected.

- Scope of work included:
  - Development of network/communications architecture
  - Field observation of SCADA sand security/cybersecurity
  - Documentation of Current State
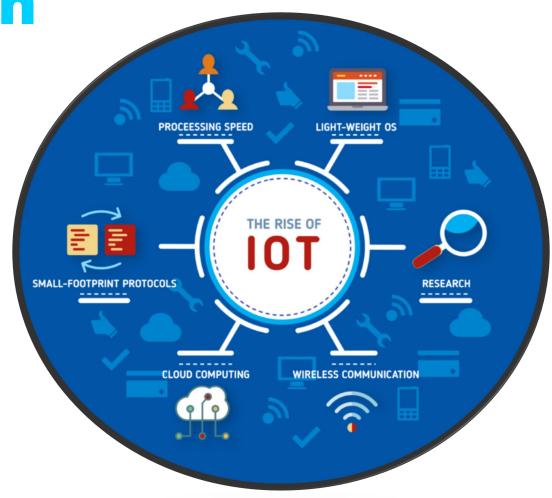 - Analysis of Current State
  - Development of Desired State

SCADA Master Plan

- History
  - Indicator lights
  - Push buttons and selector switches
  - Gauges
  - Knobs for control adjustments
  - Simplified process depiction

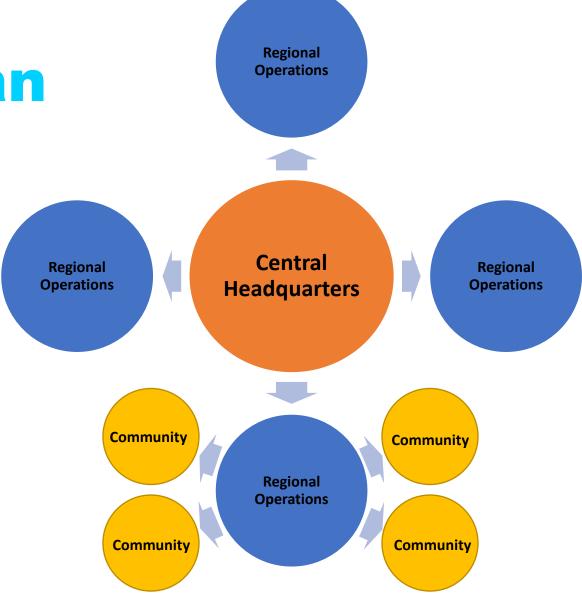# SCADA Master Plan

- Current systems
  - Computer based graphical user interface
  - Mix of hardwired/networked systems
  - Automation systems
  - Communication systems
  - Data storage
  - Remote and mobile access

SCADA Master Plan

- Future technology trends
  - Virtual technology
  - Cloud based systems
  - Internet of Things (industrial)
  - Artificial intelligence
  - Machine learning
  - High performance HMI
  - Interoperability

SCADA Master Plan

- AFNWA operational approach
  - Full Service – Decentralized
  - Reflects Hub and Spoke Model
  - Tiered SCADA systems
    - Shared visibility to communities within a Regional Operations Hub
    - Centralized monitoring of all systems
  - Increased operational coverage

SCADA Master Plan

- Scope of Master Plan
  - Detailed Master Plan with costing for fully coordinated and integrated system
  - Recommendations for:
    - Technology
    - Resources
    - Training
    - Disaster Recover
    - Cybersecurity

SCADA Master Plan

- Objectives
  - Develop communication framework
  - Review current cybersecurity practices & develop plans
  - Optimize for reliability and security
  - Assess SCADA needs
  - Recommend remote terminal unit (RTU) standards and transition plans
  - Improve historian use and alarming systems

Current State

Table 1 - Simplified SCADA System Maturity Model

Component	Level 0	Level I	Level II	Level III	Level IV
Little or No Documentation	X	N/A	N/A	N/A	N/A
No Templates, Standardization or Consistency	X	N/A	N/A	N/A	N/A
Some Facilities/Processes with No SCADA	X	N/A	N/A	N/A	N/A
Some Documentation, Potentially Outdated		X	N/A	N/A	N/A
Common Access Credentials		X	N/A	N/A	N/A
Some Revision Control		X	X	X	X
Basic Network Monitoring			X	X	X
Spare Parts Inventory & Management Systems			X	X	X
Short-Term Capital & Maintenance Plans in Place			X	X	X
Some Cybersecurity Measures			X	X	X
Virtualization				X	X
Disaster Recovery and/or Business Continuity Plans				X	X
Redundant Systems				X	X
Complete Documentation				X	X
Complete SCADA Standards					X
Dashboards, KPIs, Automatic Reporting, Alarm Management					X
No Products Beyond End of Life					X

Current State

Table 2 - SCADA Maturity Assessment

Component	Level 0	Level I	Level II	Level III	Level IV
Community A		W/WW			
Community B	W/WW				
Community C	WW	W			
Community D	W/WW				
Community E	WW		W		
Community F	WW	W			
Community G	W/WW				
Community H			W/WW		
Community I		W/WW			
Community J		W/WW			
Community K	W/WW				
Community L	W/WW				
Community M	WW	W			
Community N		W/WW			
Community O	WW	W			
Community P	WW	W			

Capital Plan

All AFNWA Participating Communities

Sum of Project Budget

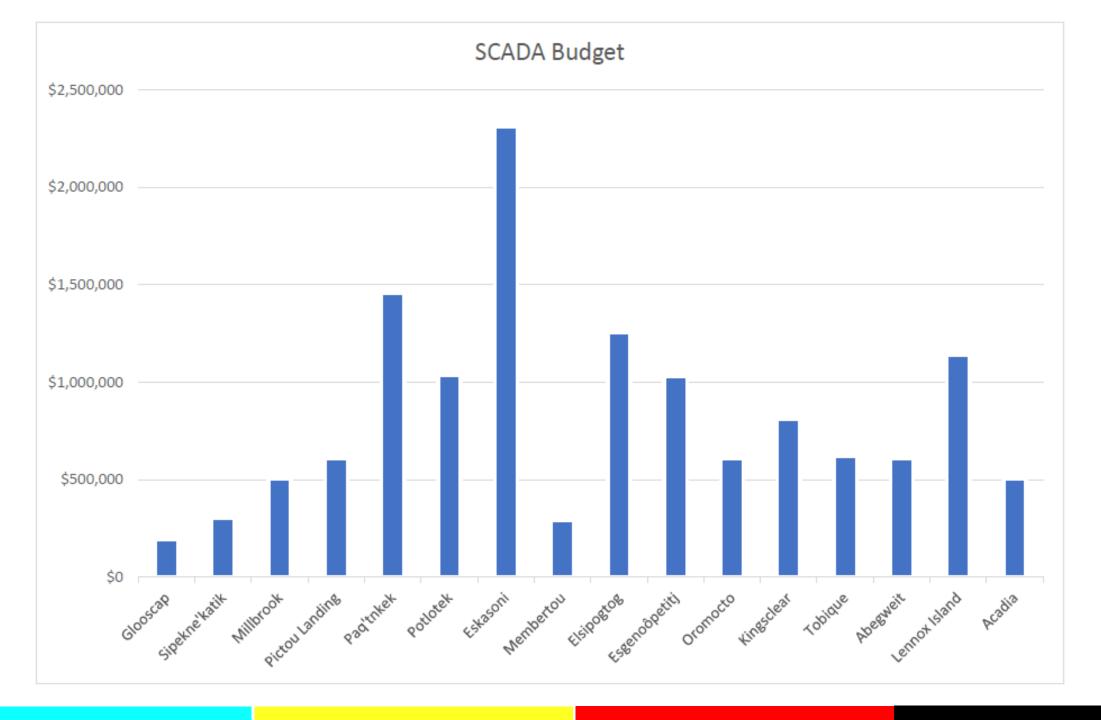AFNWA Capital Projects Budget Including Contingency & Excluding Inflation

Service Category
- Water Supply/Treatment
- Water Distribution
- Wastewater Treatment
- Wastewater Collection
- SCADA

Note 1: The higher budget in 2023 is due to GUDI projects (~6.3 millions) which are regarded as high priority projects, and rescheduling projects from 2022
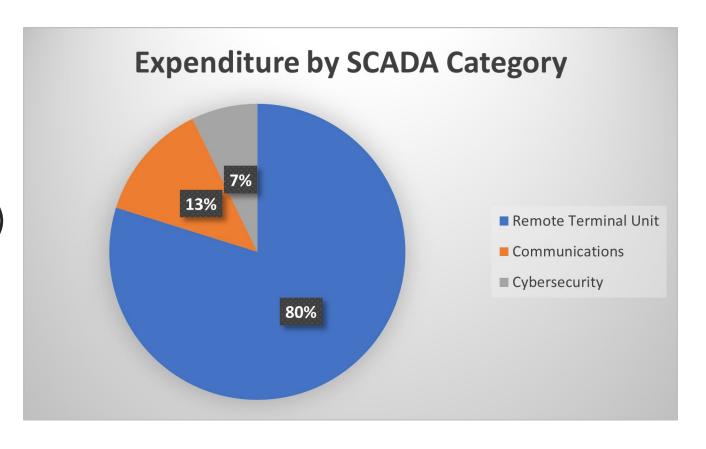
Note 2: From 2027 to 2031, wastewater treatment upgrade projects were introduced to remove nutrients from the effluent stream and meet the Effluent Discharge Objectives (EDOs)

Note 3: The budget was estimated based on the 2021 Dollar Value

SCADA Budget

SCADA Capital Plan

- RTU (80%)
  - Communities: $9.7 M
  - Global: $0.9 M
  - **Total RTU: $10.6 M**

- Communications (13%)
  - Communities: $0.89 M
  - Global: $0.83 M
  - **Total Comms: $1.72 M**

- Cybersecurity (7%)
  - Communities: $0.40 M
  - Global: $0.56 M
  - **Total Cyber: $0.96 M**

Expenditure by SCADA Category

- Remote Terminal Unit (80%)
- Communications (13%)
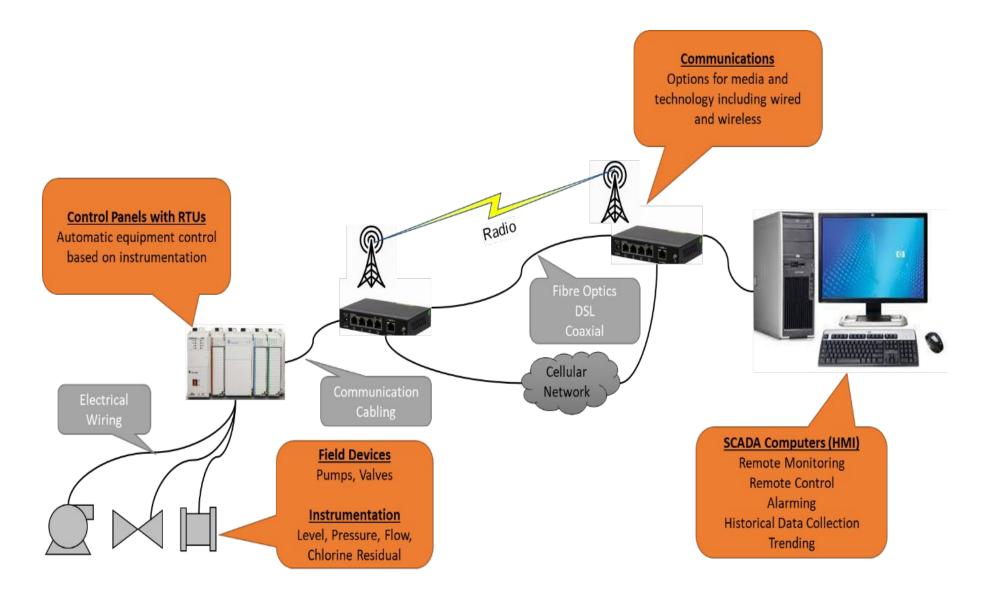- Cybersecurity (7%)

Desired State

- Components addressed by the standards:
  - RTU programming
  - RTU hardware
  - HMI programming
  - Tagging/coding
  - Alarming
  - Process control narrative
  - FAT/SAT
  - Process & Instrumentation Diagrams
  - Network hardware

SubmersSump   WellPump001Left   WellPump002Left

PumpMotorVert02   PumpVert01   PumpLarge01

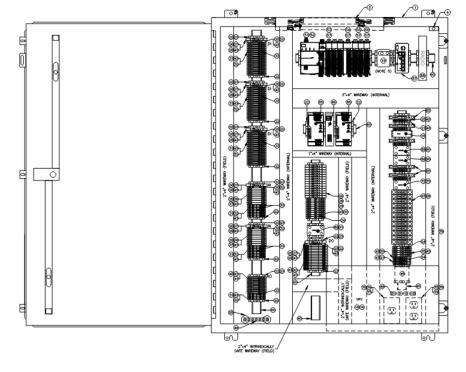# SCADA System Components

Pre-purchased Equipment

- Long delivery items were pre-purchased
  - Components were for pilot projects
  - Graybar (vendor)
  - RTU hardware
    - CompactLogix Controller (x21)
    - DC input Module (x71)
    - Relay output module (x25)
    - Analog input module (x46)
    - Analog output module (x25)
  - Total cost: $257,000
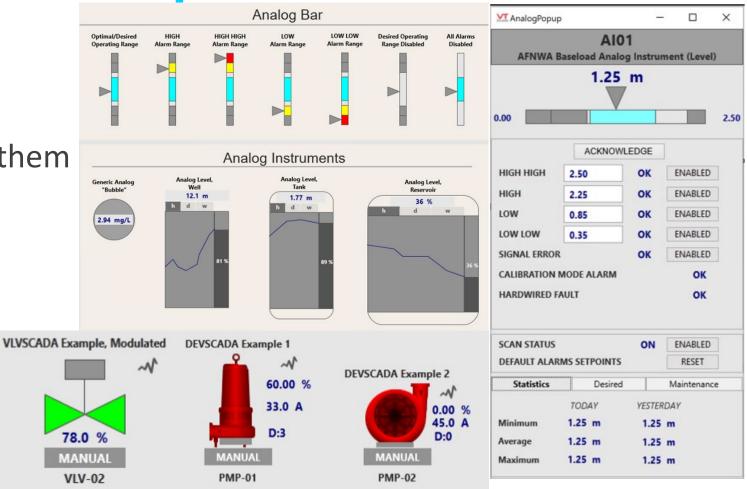
SCADA Standards Details

- RTU hardware
  - Allen Bradley
  - 5069-L320ER
  - Compactlogix Controller
- RTU Software
  - Studio 5000 Logix Designer
- RTU Panel Standard Design
  - Standardized Hardware
  - Layout
  - Wire Colours & Types
  - Reserved Space
  - Spare(s)

SCADA Standards HMI Examples

- SCADA platform
  - VTSCADA by Trihedral
- When you can expect to see them used
- Colours Used
  - Motors
  - Valves
  - Analog Bars

Transition Projects

- What about ongoing projects that are in the design stage already?

- Design documents were reviewed and comments provided by staff and Eramosa.

- Changes were requested to adhere to hardware and software standards, if possible.

- Most projects were able to make this adjustment.

- It was too late for some projects.

Pilot Projects

- Scope of work included pilot projects.
- Factors:
  - Community readiness
  - System condition
- Two pilot projects were identified:
  - Pictou Landing (Design-Bid-Build project)
    - Replacement of 7 RTU Panels
  - Lennox Island (Design-Build project)
    - Replacement of 10 RTU Panels

Wela'lin!

Woliwon!

Questions?

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