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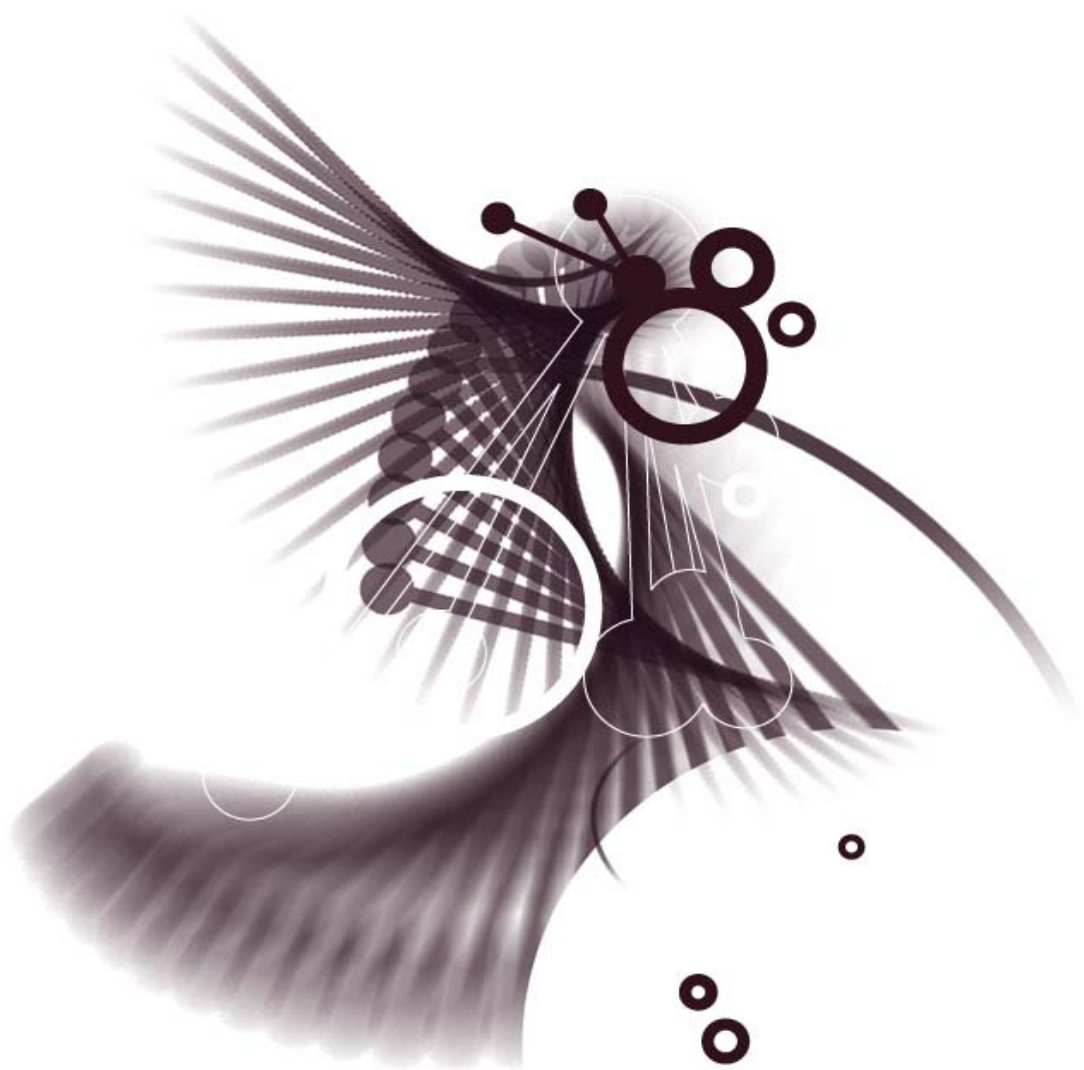
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HOPE VALE

WATER SUPPLY

REMOTE
WATER SYSTEM
MANAGEMENT





Application:

- (Water Treatment & Supply System

Process Control:

- (Automated Bore Site & Treatment Process
- (Control & Monitoring and Pipeline/Reservoir Rupture detection

Technology Applied:

- (Specialised RTU Hardware, Leading HMI Software,
- (Narrow Band Radio Communications & Alarm Paging System

Engineered Solution:

- (Bore Flow Control
- (Storage Rupture Detection
- (Water Quality Data Calculations
- (Triple Pump-Set Control

Project Summary

- (SKM Consultants - Lead Consultants (Civil & Mechanical)
- (MGF Consultants (Electrical)
- (JM Switchboards - Responsible for the Design & Construction of Bore Site, Treatment Plant & Reservoir Electricals
- (ParasyN Controls - Process Control, RTU 's, SCADA and HMI Design, Construction, Commissioning & Support

The Project

Hope Vale is an Aboriginal community located 45 km north of Cooktown in Far North Queensland, Australia.

The Hope Vale Water Supply system was upgraded to provide an increase in the amount of water available, a more reliable source of water and improved quality for the Hope Vale community. The upgrade included the construction of 6 new bore sites, pipelines, the water treatment plant, the Clear Water Pump Station and 4ML storage facilities. Integration to the existing 3 bore sites was also included in this project.

The Challenge

The automation for this project included flow and pump control for each bore site as selected for operation by the water officers. Our challenge was to provide a unique interface for the operator selection of bores to meet specific water quality standards.

WATER QUALITY CALCULATION TABLE													
PRODUCTION BORE	PB1	PB2	PB3	PB6	GA1	GA2	B4	B6	B8	WEIGHTED AVERAGE			
PARAMETER	Select	Select	Select	Select	Select	Select	Select	Select	Select	Estimate	Actual	Target Range	Chg
pH	7.0	8.0	8.0	7.5	8.0	0.0	0.0	0.0	0.0	5.9	5.9	6.5 to 8.5	
Conductivity (µS/cm)	1	1	1	1	1	1	0	0	0	1	1	< 300	
Turbidity (NTU)	0	1	2	2	2	3	0	0	0	2	2	< 5.0	
Iron (mg/L)	2	1	0	2	2	0	0	0	0	1	1	< 0.6	
Manganese (mg/L)	3	0	0	1	3	0	0	0	0	1	1	< 0.1	
Aluminium (mg/L)	1	0	0	0	0	0	0	0	0	0	0	< 0.2	
Average Flow (L/s)	10.0	7.0	7.0	16.0	16.0	5.0	0.0	0.0	0.0	55.0			
Actual Flow (L/s)	10.4	7.2	7.0	16.2	16.0	5.0	10.0	10.0	10.0		55.8		
Pump Status													
Flow Trend													

Figure 1. Water Quality Calculation with Access to real-time data

The Solution

The new Hope Vale Water System is fully automated by sophisticated Remote Terminal Units (RTU). These RTU's are linked by RF Data Modules and a multi-point repeater system. The HMI (Human Machine Interface) provides operator's with a view to each active device as well as remote control of these devices.

Water Officers enter the water quality data and according to the selected bore sites, the actual combined water quality is shown against the quality target. The operator can access the typical flow rates for the week via historical trends to predict bore usage for more accurate quality estimates. Pump and Flow Statistics are provided to allow remote management for long term maintenance. This is critical in remote areas where engineering resources are scarce. The High lift pumping has a time of use component to take advantage of the low rate power tariff.

To ensure that water loss is minimised, rupture detection was provided on the main storage units. Rate of Change in these reservoirs greater than normal under filling or static conditions, produces an alarm via a voice paging system to the water officer on-call.

The Control System

Control is defined in 3 levels:

- (System Auto
- (Remote Manual
- (Local Control

The SCADA System provides automatic unattended control of the Production Bore, Treatment Plant, and the High Lift Reservoir equipment.

Although each bore site uses the same logic and configuration coding (increases maintainability), each site receives specific instructions from the master station on how the site operates. This distributed intelligence ensures the control levels work together seamlessly, reducing the cost of ownership.

Prime Operating Criterion

The primary design principal is continuity of supply to the 2 x 2ML Reservoir via the Treatment Plant.

Reservoir float switch levels are reported by exception to the Clear Water RTU. The Clear Water Pumping Station RTU makes decisions on which pumps to run and consequently fills the reservoir until the Reservoir signals that the required level is reached.

Level switches are used to signal control points to the RTU. Level transducers are used for animation, additional alarms and historical trend analysis.

A sensor selector switch determines which level sensor is used for control, i.e. to signal when water is required at the Reservoir. Both sets of float switches are animated to the SCADA to allow an operator to verify that float switch settings match the level condition measured using the level probes.

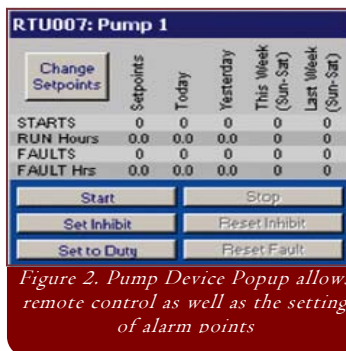


Figure 2. Pump Device Popup allows remote control as well as the setting of alarm points

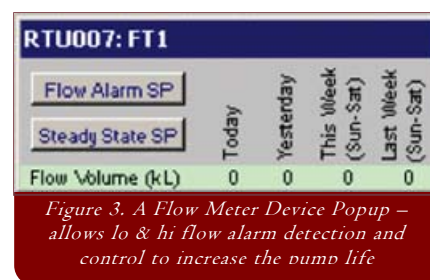


Figure 3. A Flow Meter Device Popup – allows lo & hi flow alarm detection and control to increase the pump life

The Outcomes

Hope Vale Community now has an automated water supply system that provides a reliable source of clean drinking water. With the application of structured HMI configuration including templates, code and documentation, the system can be maintained with ease.

Remote access to plant statistics provide external engineering resources with data to make long-term management decisions.



Figure 4. Hopevale Community

Parasyn - Process Information & Intelligence

Quality Design is required to implement complex communications and control systems. To understand further how the above system design could be used to control and monitor your plant, including the application of interactive voice response systems, historian databases and web access tools, call Parasyn Controls.