

Automation IT is the primary choice for Cassowary Coast Regional Council's \$33M Innisfail WWTP



Innisfail is Cassowary Coast Regional Council's (CCRC) largest town that has a population of approximately 10,000 and is situated at the junction of the north and south Johnstone rivers, approximately 5km from the coast and 90km south of Cairns.

THE PROBLEM

The CCRC's current Innisfail Sewerage Treatment Plant (STP) underwent an upgrade to meet revised discharge license requirements. To resolve this, Automation IT in conjunction with contractors WDS / York-JV and PSG, were engaged by the CCRC to design and install an entire control solution for a brand new waste water treatment plant.

THE CHALLENGE

Commissioning and working to a tight deadline to meet the severe inclement weather conditions during the wet season that was integral to the 12 months delay in construction.

These delays placed further pressure on the CCRC to ensure the plant is completed and delivered on time to reduce load on the sewerage grid.

PLC and SCADA site programming standards also had to be revised and approved by all stakeholders to ensure the final solution will allow plant operators and other technical personnel to not only monitor the plant's real time operation effectively but to also gain a better understanding of the entire process.

THE SOLUTION

The solution required a hardware platform that would be cohesive with CCRC's preference of Allen Bradley that is used extensively throughout their operations. The Allen Bradley ControlLogix L61 CPU based PLC and CitectSCADA v7.2 interface was chosen to meet the connectivity requirements between third party variable speed drives, other vendor control package systems and SCADA servers.



The ControlLogix L61 PLC has 2MB of user memory, 128MB of NVS RAM and 478KB of IO memory thereby making it capable of addressing a large amount of I/O of up to 128,000 points!

CONTROL SYSTEM OVERVIEW

The primary control system consists of 1x L61 PLC processor with 64MB compact flash expansion memory, 4x redundant power supplies, 360 I/O and approximately 4100 SCADA points controlling pumps, valves, blowers and conveyor systems.

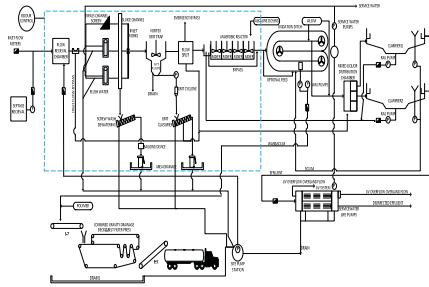
This treatment system is designed to process the wastewater collected from the pump stations within the Innisfail catchment area. In addition to the pumped waste, additional flows are also received from the site drainage system and imported septage.

Once the combined raw incoming flows enter the inlet works, screening and grit removal are provided as the first stage of processing. From there, the sewage continues to the Anaerobic Reactor and Oxidation Ditch for biological nutrient removal.

After this stage, the resultant mixed liquor passes into the final clarifiers and then through the UV disinfection system to produce an effluent that is safe for discharge into Ninds Creek.

The thickened sludge from the Oxidation Ditch is pumped to the sludge handling works where liquid polymer is added before processing. The thickened sludge is then processed by a combination of gravity drainage desk/belt filter press units where the sludge liquors are returned to the inlet works and the solid sludge cakes are stored for offsite disposal.

An overview of the process is shown below.



The PLC and SCADA network layout uses a redundant Ethernet ring configuration to ensure the PLCs, remote input output drops and the SCADA PCs can maintain communication with each other at all times. Multiple paths and network switches connecting each device to the network were factored into the design to ensure communications can be maintained should something fail.

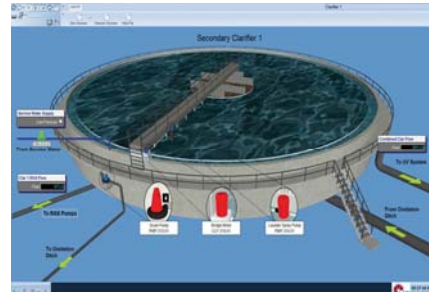
There were numerous improvements to the control aspects of the plant that were implemented and different to previous control philosophies of other plants. One notable feature was the Out Of Service mode that allows for the disabling of any device within the plant without adversely affecting the operation of the plant as a whole.

The SCADA system utilises CitectSCADA 7.2 with a redundant dual server/control-client arrangement to allow the system to continue operating in the event of one server rendering as inoperable.

Both servers have the ability to act as a redundant web server thereby allowing access via an internet browser. In addition, remote site access has also been setup via a VPN server which allow 2 methods of remote site access whether it be via Telstra NextG modem or PSTN modem dialup connection.

Graphics for the SCADA mimics were designed using the latest drawing tools available to create a three dimensional effect as can be seen below.

Secondary Clarifier



Oxidation Ditch



Sludge De-watering



RAS / WAS Pumps



SEQUENCE OF WORKS

The commissioning was performed in numerous ordered stages as a result of the dynamic weather conditions.

- Inlet works
- Bioreactor
- Clarification system
- Sludge handling
- Chemical dosing
- Site service systems

All installation and Site Acceptance Testing (SAT) was conducted with all devices within the plant charged up only with water. Since no cut-over plan was necessary for the transition of decommissioning the old plant and commissioning of the new, all that was required was the addition of activated sludge provided from another working treatment plant into the Bio-reactor and the opening of an isolation valve to allow raw sewerage to enter the inlet works to initiate the process of full operation.

DOCUMENTATION

As with all Automation IT projects, a fully documented control system solution was provided in the form of a Functional Design Specification (FDS), detailed software programming specification, electrical drawing package, full test documentation and operation manuals as well as monthly progress reports. Supplementary to this and at the request of clients, Automation IT drew upon its extensive experience in providing the CCRC with detailed PLC and SCADA site programming standards to ensure plant design consistency for all of the CCRC's future control/SCADA projects.

CONCLUSION

Choosing the Allen Bradley Rockwell Automation ControlLogix L61 control platform coupled with the latest 3D emulated SCADA graphics and the expertise of Automation IT in waste water treatment, has resulted in a Civil Contractors Federation (QLD) award winning and environmentally compliant cutting edge solution for the CCRC.

Since commissioning, the final solution ensures easy understanding of the process for both operators and senior technical personnel and paves way for future extensions and upgrades of the plant.

Both the CCRC, WDS / York-JV and PSG were very pleased with the final outcome amid the difficult conditions.

Automation IT waste water solutions should be the solution for you.