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Automation IT works with Rio Tinto to manage Weipa's water and maintain environmental compliance

Weipa is a town located on the Cape York Peninsula and was originally constructed by Rio Tinto Aluminium in the 1960s to house its mining workforce. Today it has a population of 3,000 people and is the regional hub of the Western Cape hosting many businesses and government services.

Automation IT assisted Rio Tinto to design and install a control system which was able to monitor and control all aspects of the town's water and sewerage systems including additional infrastructure which was to be added in the future.

THE PROBLEM

Before the control system upgrade, the town's telemetry system consisted of obsolete Omnitronics 9000 equipment, with some sewerage pump stations not even connected to the system. This meant they had to be manually restarted every time the town experienced a power failure, an onerous task when there was no monitoring of site failures. This resulted in multiple environmental incidents occurring in the region and the need for a solution to be devised fast.

In addition, switchboards that were located at a number of the town bores did not meet Rio Tinto electrical standards and were considered unsafe.

THE CHALLENGE

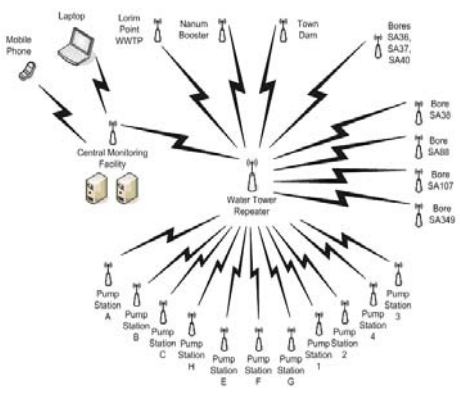
The scope of the project involved designing and implementing a centralised telemetric system that included the town bores, dam and booster pump station as well as incorporating Weipa's sewerage system, specifically, 11 pump stations and a treatment plant.

This included installing new overflow alarms at some of the sewage pump stations and a flow meter at the town dam allowing monitoring and control of these remote stations' operations via the new control system.

Due to the extent of the environmental issues and the high possibility of another incident occurring if nothing was done, parts of the project were given a four month deadline, which not only posed a huge challenge for the engineering team but also raised many logistical issues that would have to be resolved in order for the project to be completed in time.

CONTROL SYSTEM OVERVIEW

The chosen hardware was the Miri AD2000 series products, these were monitored and controlled using the CitectSCADA software package, and were setup in the following network configuration of 19 dispersed RTUs, controlled by the redundant Citect servers via a Trio repeater located at the water tower. The system was also designed to send alerts to operators' mobile phones via SMS and allow them to access the system remotely using a laptop.



THE HARDWARE

The Miri AD2000 Series products are a complete telemetry solution in one unit. It contains a wireless data radio, multiple communication ports such as RS232, RS485 and Ethernet, as well as inbuilt analog and digital I/O connections.

The Miri AD2000 functions as a three-in-one device by each unit being able to perform:

- RTU functions such as data transfer by polled, event or timed methods
- PLC software functions such as local control and monitoring of a remote process, and
- Data-logging of numerical data or text

Hence the Miri AD2000 hardware was selected for its high functionality as well as being a compact and reliable solution.

Miri AD2000 units and additional I/O modules

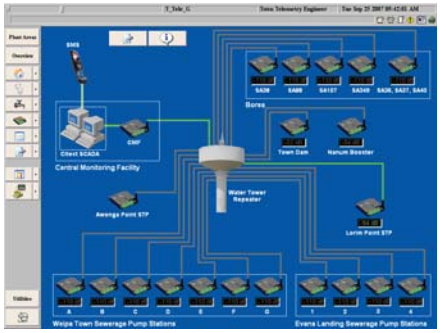
THE SCADA SYSTEM

CitectSCADA is a fully integratable SCADA solution that enables customers to increase return on assets by delivering a flexible, reliable and high performance system. This allowed the operator to monitor and control the whole network via a user-friendly graphical interface.

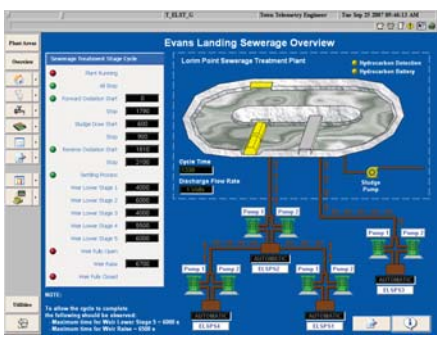
The SCADA system is provided on two Dell desktop PCs allowing full redundancy, so that if the main SCADA PC failed, the second PC would instantly take over. This ensured that the system would be in constant control and no data would be lost in the event of a hardware failure.

The Citect project made it simple to manage the complete water infrastructure by providing:

- A Network Status Page to monitor the comms strength between the CMF and all remote sites



- Five Plant pages for the larger sites, such as for the Lorim Point Sewerage Treatment Plant

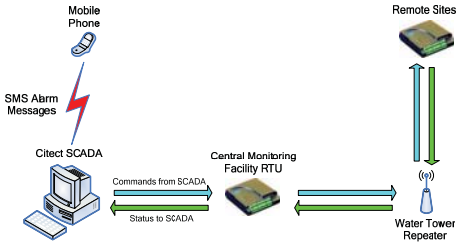


- A Geographic Overview Page to be able to oversee Weipa's complete water infrastructure
- 40 popup windows for equipment specific control

CENTRAL MONITORING FACILITY

The CitectSCADA system is installed in the CMF so that the system communicates via Ethernet to the central RTU. The master RTU sends commands to each remote site such as start up pumps or changes trigger points within pump wells as well as monitoring the activity from each of the sites. A central RTU is also used to send SMS alarm messages to a list of nominated people if an alarm had not been responded to in a given amount of time.

The function of the CMF can be demonstrated in the image below.



COMMISSIONING

With the short time constraints in mind, the project was able to be broken into two stages, where the RTUs for the 11 Sewerage Pump Stations had to be prioritised, installed onsite and connected to the new SCADA system as soon as possible in order to avoid more spills from occurring. The water supply bores that were already on an outdated telemetry system, could wait until the first stage was completed and remain on the original system.

Even with splitting the project in two, it was still imperative that every aspect of the project had been thought of and accounted for to limit any delays that may arise during commissioning. This ensured that all work on the project was extremely efficient and productive. As a result, the switchboard construction and all of the RTU and SCADA programming, which included monitoring and control of 435 I/O distributed among the different sites, was all completed within 2 months.

As the sewerage pump stations were not already connected to the original telemetry network, the new switchboards were to be installed, tested and successfully commissioned before the cut-off date.

Similarly, stage two progressed as planned and the whole project was completely signed off within twelve months of the tender award.

The Geographic Overview Page

CONCLUSION

This project was accomplished within the time constraints due to superior project management, efficient engineering and outstanding support from several suppliers.

Automation IT were able to successfully design, install and commission the system two days before the EPA's imposed deadline on Rio Tinto, and several weeks before AIT's agreed deadline.

This project proved to be a great success for all involved, especially the township of Weipa which could now monitor and control its entire water and sewerage systems from one centralised location and be able to prevent more environmental incidents in the future.

Automation IT using technology to assist with environmental protection