

# Design & Implementation of SCADA control & data acquisition system for Jersey Water

by  
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**A** new SCADA system was required to collect data and/or control equipment at all Jersey Water sites from abstraction to supply. The cost of the project to date is £325,000. Prior to project implementation, all operational data was collected manually and control of plant at remote sites required operational staff to attend site. The Water Treatment Works (WTW) at Augres has now been de-manned overnight with control and monitoring of the works carried out from Handois WTW. Staff no longer need to regularly attend remote sites and this has achieved savings in manpower, with reductions in both weekend overtime and night shift operational staff being made, justifying the expense of the SCADA project.



Jersey Water: Raw Water Overview

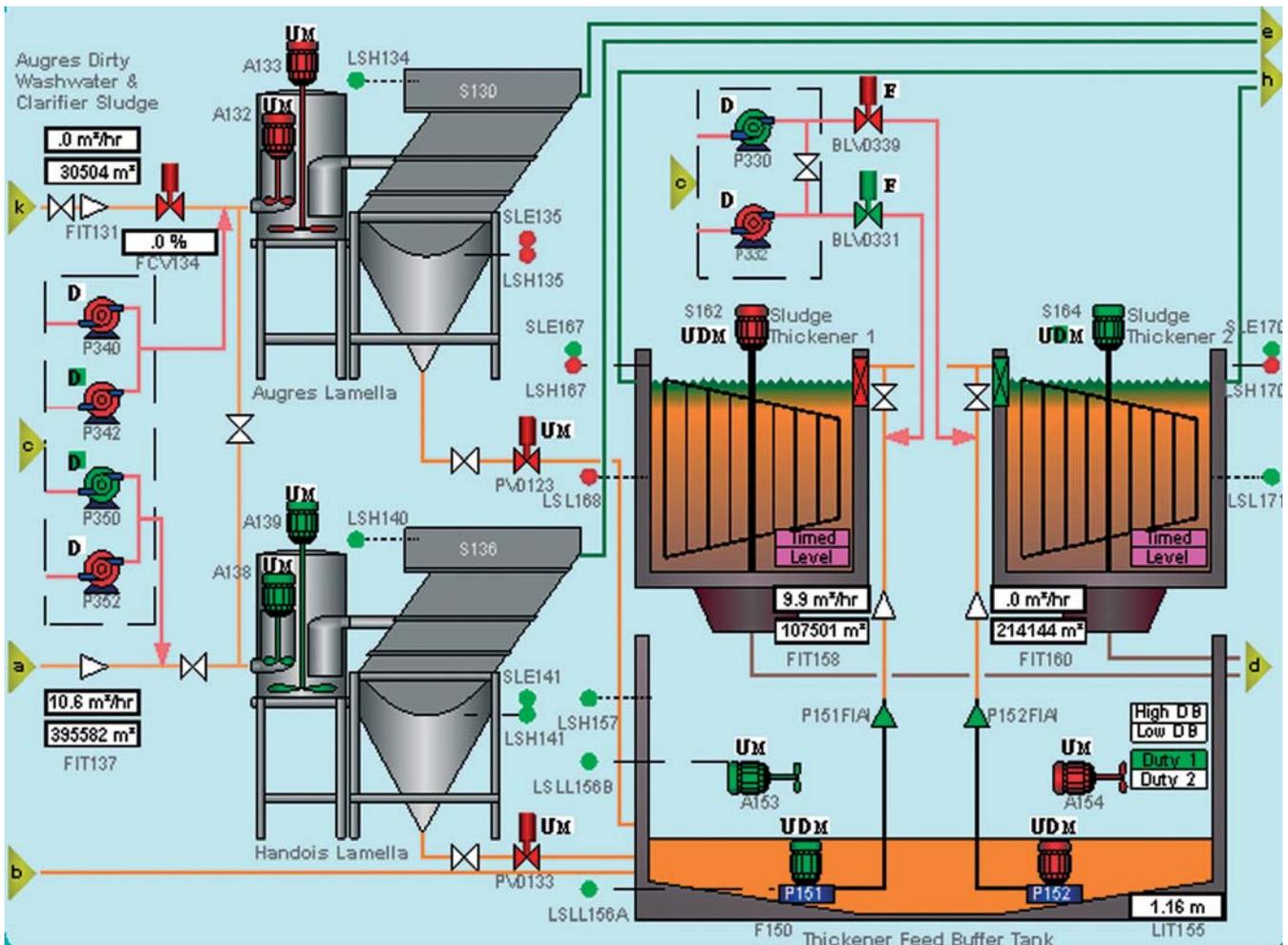
courtesy: Jersey Water

The SCADA system includes communications to eight Raw Water Stream Abstraction Sites, six Raw Water Storage Reservoirs, two Water Treatment Works and five Treated Water Storage Reservoirs, numerous district metering sites, plus a new treated water gravity main that was commissioned in 2004/2005 and replaced a pumped system which reduced Booster Pump Stations from thirteen to four,

Treated water flow readings from these remaining stations, the treated water gravity main and service reservoir levels and flows are now monitored remotely at both Water Treatment Works and on Jersey Water's Corporate Network via SCADA. Additional District Meter Sites are being incorporated onto the system as and when Electron Magnetic Flow Meters are installed.

Remote control of the Augres WTW and the strategic pumping stations throughout both the Raw and Treated Water Networks can be undertaken with the correct security clearance from any connected SCADA client.

*Serck Controls* were chosen to supply the operating system and set up communications to all outstations and also between the two main Water Treatment Works. A *Serck Controls* SCX6 telemetry software system using the Windows 2003 server operating system on a *Hewlett Packard* platform was chosen. Founded on open systems principles, SCX6 provided comprehensive operational and database engineering facilities as well as operational display of mimics, alarms, events and historical lists. An embedded web server provides for web browser



Handois Wash Water Recovery Plant

courtesy: Jersey Water

users in addition to native SCX clients. The system provides monitoring and archiving of real-time and periodic data on equipment status, levels and flows, and water quality data etc.

The SCX6 Main/Standby Master Station operates with either server as the Main machine, holding the 'live' database and managing the telemetry and processing incoming data, while the Standby machine holds a copy of the database which is kept fully up to date {"synchronised"}. In the event of a failure of the Main server, the Standby machine immediately assumes control of the system and takes over the maintenance of the database.

The central system is located at Handois WTW, where one server is located in the works Control Room, while the second is sited in the communications room on the ground floor of the building.

As part of the communications infrastructure 7km of fibre optic cable was installed between the two Water Treatment Works to allow the installation of two more synchronised standby servers.

**This provided Jersey Water with its own resilient, unlimited bandwidth, dual network which added a certain level of redundancy to the system. This allowed full control of Augres WTW to be achieved from Handois WTW. A further connection using a leased 10Mbit/s fibre optic link connecting Handois WTW to Jersey Water's main offices at Mulcaster House allowed the SCADA network to be accessed by the relevant staff based there.**

**Overall**

The overall network architecture has now allowed Jersey Water's corporate network and internal telephone system to be rolled out to

both WTW's and in 2007 it will be extended to its laboratory which is based at another remote site (not shown). Using Simple Network Management Protocol (SNMP) all equipment connected as part of the system architecture is monitored by the SCADA system itself and provides notification of any equipment failure.

**Communications used for the SCADA system include the following:**

**Private Wire/Leased Line Circuits** - Using our own and Jersey Telecoms (local telecommunications company), private wire analogue leased line circuits and modems, are used to provide a transparent link between remote sites and the master station.

**Fibre Optics** - A single mode 12 core fibre optic cable was used to connect and synchronise standby servers at Augres WTW with the main and standby servers at Handois WTW. This provides the bandwidth, reliability and redundancy required to allow full control of Augres WTW.

**Omron Controller Link** - At Handois and Augres WTW's, local plant signal states are retrieved directly from various Omron PLC's using Omron Controller Link Hardware and OPC server software. (Handois Wash Water Recovery Plant is connected to the SCADA system via Omron's Controller Link). This was achieved by installing a twisted pair network from the Controller link host adaptors installed on each server and routing the network to each PLC. The advantage of using Controller Link is that large packets of data could be transferred readily. This was particularly useful in that it allowed whole memory areas to be mapped and transferred with only the relevant words or bytes to be read and updated at the master station. At present 10 Omron PLCs are connected to the SCADA system

# Water Treatment and Supply



CCTV Images Augres WTW

*courtesy: Jersey Water*

**GSM** - At remote sites where information is needed only to be retrieved on a daily basis, communications were established utilising GSM modems and the mobile telephone network. Data from remote sites is retrieved using a daily dial up schedule, activated from the master station. Outstations are configured to automatically dial in any alarm condition.

**Electro Magnetic Flow Meters** were installed on the gravity Distribution Main, to monitor daily consumption and leak detection with alarm points configured to draw attention to any abnormally high night flow readings.

**CCTV** - Using *Cisco* routers and IP routing tables, CCTV cameras have been added to the system to provide security at a number of Jersey Water's remote sites. A dedicated CCTV server has been installed and jpegs are imported into SCADA as remote images and can be viewed from any SCADA client as live data. Recorded images are stored on the CCTV server and initiated by intruder events detected by the cameras themselves.

## Conclusion

Jersey Water has benefited from the installation of their SCADA system in terms of the amount of information now readily available, the quality of the information in terms of leak detection, daily consumption and accurate up to the minute distribution flow rates and service reservoir levels. The SCADA communications architecture has allowed the corporate network and internal telephone system to be expanded beyond its intended audience, which in turn has benefited the organisation's communications. **With the savings made in manpower through reductions in overtime and the removal of the nightshift at Augres WTW the system will have paid for itself within four years.**

The additional benefits of the system are that it is infinitely expandable 'in house' and future sites will include weather stations and stream flow data logging along with additional District Meter Monitoring. ■

**Note:** *The author of this article, Malcolm Berridge, is Mechanical & Electrical Engineer with Jersey Water and would like to thank Serck Control Ltd, Coventry, for their assistance in the publishing of this article.*