



**ENTERPRISE
AUTOMATION**
A TETRA TECH COMPANY

PROJECT PROFILE

CWRF SCADA UPGRADE

CITY OF CARLSBAD VIA ENCINA WASTEWATER AUTHORITY

Customer Background

The Carlsbad Water Recycling Facility (CWRF) is a water reclamation facility that can produce up to 7 million gallons of recycled water daily. CWRF takes the cleaned, sanitized effluent water from the neighboring Encina Wastewater Authority (EWA) treatment plant and runs it through additional treatment processes to meet the standards for recycled water for use in places like golf courses, Legoland, and more. The non-potable water is low cost and saves valuable natural water resources. Enterprise Automation has worked with Encina Wastewater Authority, the facility operator, since 2019.

Project Background

The City of Carlsbad contracts EWA to operate and maintain CWRF, given its close connection and proximity to the city's pollution control facility. Following their decision to replace their legacy control system, EWA asked Enterprise Automation (EA) to review and audit CWRF to determine what improvements were needed to make the plant more reliable. EA completed a control system audit in 2019 and while reviewing all issues with staff, it was determined the most comprehensive and cost-effective solution was to replace and upgrade the entire system instead of fixing many problems individually. When EA shared these findings with the City of Carlsbad, the City agreed and requested a plan for the full control system replacement. EA completed a more detailed investigation and developed a plan to replace all control system hardware, PLCs, and IO panels.

Project Manager:

Matt Avila



Project Technical Lead:

Nicholas Blischak



EA Solutions

During the upgrade, the City of Carlsbad wanted the CWRP offline for no more than one month. This was an aggressive schedule to take the facility offline, replace all the electrical control infrastructure, upgrade networking, commission, test, and validate the new software. EA was able to meet this tight timeline through extensive planning and coordination with the construction manager and electrical contractor.

Seven control panels in the CWRP were in various states of upkeep and required three different upgrade approaches. Two panels were completely rebuilt, one received all new hardware, and the remaining four received partial upgrades for outdated equipment. EA selected the new Schneider Electric PLC equipment from the EWA controls system upgrade project to streamline the hardware and reduce the number of spare parts needed on hand. To simplify the controls, three separate non-redundant PLCs were replaced by a single redundant SE pair. The entire CWRP was redesigned as a single stratified network and connected to the new network EA configured during the EWA Network Construction project. This allowed the PLCs to be placed in environmentally controlled and physically secure locations. The CWRP control panels then function as remote IO. The SCADA system was also upgraded to match EWA and help the operators who worked at both facilities work from standardized screens.



Within CWRP, the ultrafiltration system was the most complex unit process and EA recognized the benefits of bringing in a specialist to ensure it would be right the first time. This would prevent problems in the future and potential rework. EA worked with the manufacturer to ensure the system would function as expected after all the upgrades. The manufacturer helped review the EA functional specification and attended software testing before commissioning to iron out any issues. During commissioning, a field technician was also provided to assist with equipment tuning and validating the system's operation. In the end, the construction manager, electrical contractor, and EA overcame a few unexpected obstacles and finished the project on schedule. With good communication and careful planning, even tight timelines can be met.

Key Insights

- Even with a tight timeline, EA followed their normal planning practices of creating functional specifications and modifying the panel drawings, SCADA specifications, and network drawings to ensure the project's success.
- EA involved the manufacturer's experts to ensure that the PLC and SCADA upgrades would not negatively impact the complex ultrafiltration system.
- EA completed upgrades to all seven control panels that managed 340 IO points throughout the upgrade.

Key Technology

- Schneider Electric Modicon M580 PLC
- Schneider Electric X80 Ethernet Remote IO
- Schneider Electric Ecostruxure Process Expert