

THE CENTROC WATER LOSS MANAGEMENT PROJECT



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*9th Annual WIOA
NSW Water Industry Operations Conference and Exhibition
Orange PCYC,
24 to 26 March, 2015*

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WATER LOSS MANAGEMENT IN NSW - THE WATER DIRECTORATE/LGSA PROJECT

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BACKGROUND

Funding from the Water for Futures Federal funding pool was awarded to the NSW Water Directorate and LGSA in 2004 to build capability in NSW non-metro water utilities in the management of system water loss, as well as to build a methodology for those utilities to demonstrate the magnitude of their losses and directly fund repair projects based on the expected return. Funding was then also used to retrospectively fund the investigation activities that led to the quantified losses such as the installation of bulk meters in networks, the hiring or purchasing of data loggers, communication equipment and software. This investment led most utilities to purchase rather than hire and obtain the additional benefit of permanent installations to provide ongoing system feedback.

1.0 STRENGTHENING BASIN COMMUNITIES

The Strengthening Basin Communities grant funding was made available through the Federal Government as the millennium drought progressed and was targeted at communities within the Murray-Darling Basin catchment.

1.1 Centroc Water Security Study

Funding was secured by the Central West Region of Council's (Centroc) to engage consultants to develop an existing system model for the 16 Council's existing bulk water supplies, including long-term climate corrected yield analysis. This also included interactive modelling with other agencies such as State Water for regulated river supplies, and comprehensive hydrogeological and hydraulic modelling of ground water supplies with the NSW Office of Water.

A suite of options and analyses were produced, based on securing town water supplies by providing redundancy catchment connections and ground water supply networks through region wide pipe networks. Each option was developed to the concept level but with enough rigour to package for any potential future funding to commence onsite investigations and detail designs.

The Study was recognised nationally as a demonstration of best practice for collaboration between utilities and won multiple awards. The Study recommended and the working party of Engineers and General Managers involved in the project agreed, that a more formal mechanism be investigated to build the regional collaborative effort and to share the resourcing of future planning and construction activities. The Centroc Water Utilities Alliance was then formed in 2010 using the existing Centroc structure with an MOU between Council's to develop the more formal Alliance structure.

As well as the major infrastructure options, the Study also recommended further detailed planning at the utility level to prepare for prolonged drought, reduce ongoing user demand and develop long-term capital works plans to address continuity of supply, as well as progress water loss management planning and investment.

1.2 Regional Drought, Demand and IWCM Plans

Surplus funding from the Strengthening Basin Communities grant after the Water Security Study was completed, was used for further planning at the utility level, managed through the Alliance Technical Committee. Funding was leveraged to assist those Council's that required them, to develop Drought Management, Demand Management and Integrated Water Cycle Management Plans. Each plan was then rolled up into a single Regional Plan that identified consistent projects, data gaps or activities that could be managed at a regional level through bulk procurement or panel contracts.

1.3 Centroc Review of Council's WLM Activities

The Alliance developed a rolling 5 year Business Plan to map out regional activities. A regional water loss management plan with an action plan for each utility was a key part of this plan. Each utility was determined to be at varying levels of maturity in relation to water loss management planning, degree of system knowledge and level of monitoring activities. A consistent approach would not be simple.

2.0 CEEP1 GRANT

2.1 High Demand Pump Sites

The Community Energy Efficiency Program was released in 2011 and was aimed at Local Council's and other community groups to invest in energy saving measures at key operational sites to reduce the carbon footprint and reduce the ongoing OPEX for the sites. A number of the Centroc utilities have remote bulk water supplies requiring significant energy to move to treatment facilities due to long distances and high lifts. Investment was able to be made in a number of high demand sites, with additions of VFD's, replacement of ageing motors with high efficiency MEPS4 motors and power factor correction.

2.2 Energy monitoring

With surplus available funding, Centroc procured licensing and software for all Council's to allow for easy aggregation of energy usage data across all sites and the ability to manipulate that data effectively. This utilised the dashboard and visual management approach to allow direct feedback to managers and operators to make informed decisions about energy usage.

3.0 CEEP2 GRANT

3.1 Successful Round 2 Application

Running on the strength of the results from the CEEP1 grant, when a second round was announced, the Councils were well positioned to take advantage of the short turnaround time for the funding application. Based on feedback from Hunter and Sydney Water, as well as research data from the Institute for Sustainable Futures at UTS who were working with a few Council's on energy planning, the idea of the link between water and energy emerged and an application was formulated that would seek to demonstrate the direct link between the management of water loss and the reduction in energy consumption.

The application was successful and \$2.3M was awarded for water and sewer network related activities for reduction in energy consumption.

3.2 Formal Mentoring Plan

Centroc had previously developed a formal mentoring plan out of the Environmental and Sustainability Group which was a template that could be used by each Council to plan and manage a formal mentoring arrangement between staff or between Council's. The mentoring plan had been trialled by some individual's in a pilot set up but no trial had taken place between organisations. The plan was utilised as a tool to allow a formal relationship to be set up between Parkes and Lithgow Council's for the CEEP2 project, as the two had varying degrees of maturity around water loss management. This allowed for demonstration of the mentoring plan at the enterprise level to occur, allowed for a formalised method of knowledge transfer between the two Council's and allowed for a method of capturing the process for the grant funding entity.

3.3 Water Loss Management Toolkit

One of the major components of the grant application was around communication, how could the results be used to benefit other entities and inform industry literature. The idea of a toolkit or a set of documents based on the activities previously and currently undertaken by a small number of the Council's was developed and Centroc went to the market to procure expertise in water loss management as well technical communication.

In order to be a usable product, the toolkit was determined to be a set of documents useful to operational managers of networks as well as the operators themselves. Moreover, in order to develop regional buy in as well as at the utility level, an executive level document would be produced able to be marketed to Councillors, General Managers, Financial Managers and the community. The final component would be a "glove box" guide, A5 in size and robust in design, that would be a ready reckoner on the key operational components that could sit in vehicles and plant to be available when needed.

3.4 System Management and Planning Toolkit

The operational management and planning documentation contains the theory behind the management of water loss in networks, the process and timeline that could be followed and options available for monitoring. The input to this technical document has come from the literary and industry best practice reviews undertaken by the consultants as well as from the knowledge of the consultants themselves and from the managers of the utilities based on a number of workshops specifically to document the process.

3.5 Operational Toolkit

The operator's toolkit elaborates somewhat on the theory but for those that would prefer to find it, it is available in more detail in the managers toolkit. This document and associated tools will be a practical approach to managing the network such as installing meters, setting up data loggers, obtaining data, understanding and using active detection equipment and utilising software.

3.7 Glove Box Guide

The glove box guide distils the major components from the operational toolkit into a smaller, more visual tool that can be used by experienced through to new operators to perform necessary tasks.

4.0 CASE STUDIES

Another major component of the managers toolkit and the executive document is the case studies. These centre around the two main water loss projects currently running as a part of the grant funding, in Parkes and in Lithgow.

4.1 Parkes Project

The Parkes project is a continuation of work began under the original Water Directorate/LGSA project, which set up a pilot District Metered Area in Parkes to determine the night flows to the area as well as pressure fluctuations, and to use this data to determine if further discretisation of the network was required and further investment in investigative works. The analysis of the area indicated that significant levels of Non-revenue water existed and the rest of the network was metered. Active leak detection contractors were brought in to determine the most economical repair areas and the repairs were made, annual savings calculated at 200ML and the funding was received.

A comprehensive Water Loss Management Plan was completed by Parkes after the program finished, to determine the most economical way forward and to build a business case for further internal investment. Subsequent activities included meter audits, thorough analysis of meter data and detailed reservoir inspections to seal major cracking in a number of older, concrete reservoirs.

Emerging technology allowing for permanent, online acoustic detection of network anomalies was investigated and methods of automated data collection via a series of peer to peer data collectors were installed in the Parkes CBD to build a collection network for acoustic loggers. The CEEP2 funding allowed for the purchase and installation of Seba branded loggers on hydrants surrounding the CBD area, selected based on highest risk of damage or injury due to failure and difficulty in accessing mains in the event of a failure. The data is sent to a managed cloud server and available to the operators at the plant to make decisions about interventions.

On top of this, a new demand model was created and verified with in field pressure and flow testing and an economic model was created based on asset management data. This allows for investment decisions based on asset criticality, overlaid with network demand and actual system performance fed back from the acoustic data. All of this information is useful but unwieldy to manage and difficult to actually determine anything meaningful from on a daily basis. The search then turned to a technology solution that could gather each of the discrete data packages into a single interface, as well as any other available corporate data that would add further value.

The Singaporean Government had commissioned such a software solution for very similar reasons and Parkes purchased the software and had consultants perform the background data linkages to allow the final product to be used by managers and operators. This package has only recently been completed and as yet is not operational.

Staff have viewed the current setup with the consultants and it far exceeds initial expectations. The package is able to pull together the data from multiple cloud servers, existing Council servers, the RF telemetry network, input and run the demand and economic model and display information live overlaid on the existing GIS pipe data.

The process of creating this package and the implementation and usage has and will all be captured and fed into the final toolkit as a part of an emerging technology trial.

4.2 Lithgow Project

Lithgow have a newly written Water Loss Management Plan and have installed a trial DMA to determine the application across their network. The formal mentoring arrangement between Parkes and Lithgow has allowed them to progress their project in light of staff turn off and stagnation in the project progress through that loss of corporate knowledge. Many of the issues that have hindered their ability to progress their project have been captured as useful information for the Lessons Learnt section of the management documentation for the toolkit.

5.0 LESSONS LEARNT

The most useful aspect of the toolkit is the Lesson Learnt. Utilising the experiences of both the Parkes and Lithgow projects, as well as injecting some corporate knowledge from Orange City Council, a workshop was run with the management and operational staff from each to pool the collective wisdom that has been created by trying and failing at a number of key activities.

Significant investment can be required to effectively monitor system loss and inform decision makers on the most economical interventions and the mistakes of others can save good money from being invested poorly. The Centroc group of Council's has a number of smaller utilities with large geographical networks such that the income per length is very low. Assisting these utilities to make better informed investment decisions will be a major outcome of this process, with the larger utilities able to bear the cost of any potential mistakes in technology investment, network planning or consultant engagements for example. This process is the entire ethos of the Centroc Water Utilities Alliance.

The project is still in progress with a finalisation of the activities and creation of the final toolkit and documentation due in June 2015. A regional workshop will be held with all the Alliance Council's to introduce the toolkit and workshop the components. When completed, Centroc will look to work with the NSW Water Directorate and the Water Industry Operators Association to expand its reach.