

WUJAL WUJAL ABORIGINAL SHIRE COUNCIL DEMAND MANAGEMENT PROJECT



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ABSTRACT

Wujal Wujal community is located approx 4 hours drive north of Cairns (the final hour on dirt road) and it has a maximum population of 480 (ABS quotes 354) persons and is in a world heritage declared area. It is a small community with no industry and a very small rateable base consisting of state housing, a hospital and a police station.

The community sources its water from the Bloomfield River, a supply with extremely variable water quality and high tannins and turbidity loads. In 2006, to protect public health, the government funded the installation of a micro filtration plant capable of producing 21 L/s. This plant was welcomed by the community, as for the first time they could rely on the water quality as suitable for all uses.

Around 4 years later, the reticulation mains and house supply lines were also upgraded from asbestos to 150mm poly and meters were added to the system and houses. At the same time, the STP plant was upgraded from septic tanks to an activated sludge BNR.

At no time had a specific onsite investigation been done into actual water consumption/end uses and more importantly, the ongoing cost of maintaining the systems or methods of controlling costs in the future.

1.0 INTRODUCTION

In 2013, due to spiralling R&M, power, and chemical costs, it was decided that Council should investigate ways of reducing and managing costs at a level that surpasses original design specification cost/use forecast. It was found post the study the best way to achieve this was to standardise the tap flows to WELS 3.

As no leak detection had been done post the reticulation and household upgrade:

1. It was decided to carry out a full house and infrastructure leak and use audit
2. Post the audit, identify corrective action and carry out flow reduction works
3. Identify metering shortfalls in the reticulation and raw water data
4. Create a simple and cheap way to capture and log the data so it can be simply monitored by ground staff.

1.1 Water Use Cost Statistics

The 2006 plant design allowed for consumption of 380L per person per day.

Our use in 2013 prior to project completion was 277 L/p/d. The plant can produce 21 litres per second however currently runs at 7 lt per second. Showing an existing over design of plant due to plant design, running costs have very little variance when compared to output i.e. (7 L/sec compared to 21 L/sec). As the price rises are out of council's control, the only way to drop the level of annual costs is to reduce consumption.

Table 1: *ABS NATIONAL 2007 to 2013 cost increases relating to water and sewerage since the installtion of the Micro filtration plant*

Category	% increase / (% decrease)								
	National	Sydney	Melbourne	Brisbane	Adelaide	Perth	Hobart	Darwin	Canberra
Electricity	89.3%	96.2%	109.4%	69.8%	87.8%	75.5%	75.2%	48.1%	45.3%
Water and Sewerage	64.0%	50.7%	84.2%	64.0%	72.4%	44.7%	30.8%	72.1%	48.2%
Insurance	42.6%	45.2%	36.8%	59.1%	34.8%	34.1%	38.0%	47.5%	59.1%

2.0 DISCUSSION

The project was broken down to the following components:

1. **House by house survey** – Council officers designed an information sheet for householders explaining the project this was then distributed to the public. One week later, officers went to every house and measured the tap flows using cup flow equipment. Every tap and outlet was documented along with toilet system size and type. The data was then converted to a graph for bulk interpretation. This also allowed us to quantify any fittings required for physical installation.
2. **Data was collated and graphed** with notable variances seen in some house outlets showing extremely low flows while others had very high flows. Variances were attributed to non-conforming household plumbing works done by various contractors and due to retro fitted water saving fittings which had been added in the course of basic maintenance without regard for existing flow issues.

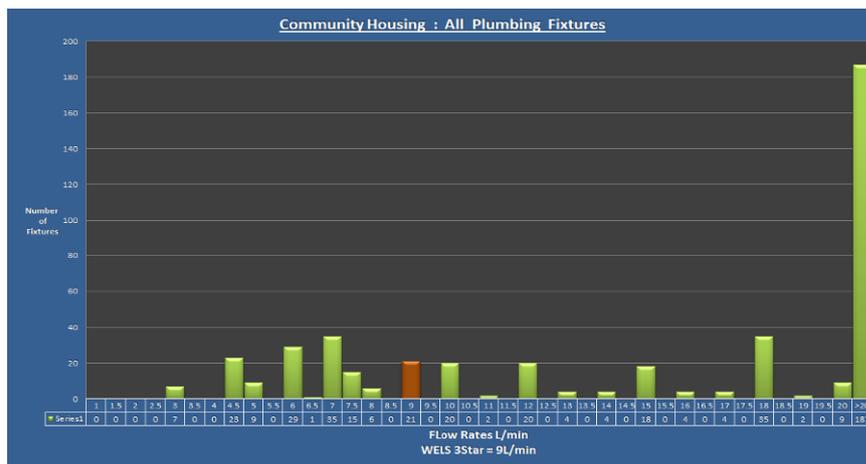


Figure 2: *Example graph comparing use by all fixtures*

To ensure continuity of supply to all houses, this surprising outcome precluded the options of regulating (reducing) pressures to the town system or at a house meter. After looking at many options, it was decided to fit a flow reducer to every fitting which would normalise all house outlets, both low and high flows.

Aqualoc fittings were selected, as they are an internally installed fitting, which replaces the jumper valve and tap washer. They have a pre-determined flow rate, are tamper proof, and unlike other like fittings they do not require specialist equipment to fit.

3. ***Once purchased physical installation was completed*** over a 3 month period by council officers under guidance from a local plumber. Random water saving fittings (i.e. shower heads) were replaced as due to the tap supply flow reduction, they failed to function correctly (they rely on high volume supply at the inlet).
4. ***Ongoing data collection and graphing*** of house water meters by use of android tablets was achieved using an excel spreadsheet broken down into houses by street. The data formulas calculate monthly usage based on meter reading input done by Council employees monthly. Calculations are automatically converted to a graph for instant interpretation. This allows Council to monitor and identify leaks.

2.1 Raw Water Supply and Reticulation

As there had not been any leak detection since the upgrade of the town reticulation and raw water raising main, contractors (Cairns Water) were asked to inspect and assess the condition of pipework. The assessment found no issues with the reticulation and raw water supply pipework, however, it identified there was a lack of metering on branch lines which could skew the monthly data figures and did not allow any monitoring for leaks and raw water usage. Wujal officers were given the opportunity to learn the operation of basic leak (sound detection) detection equipment for future reference.

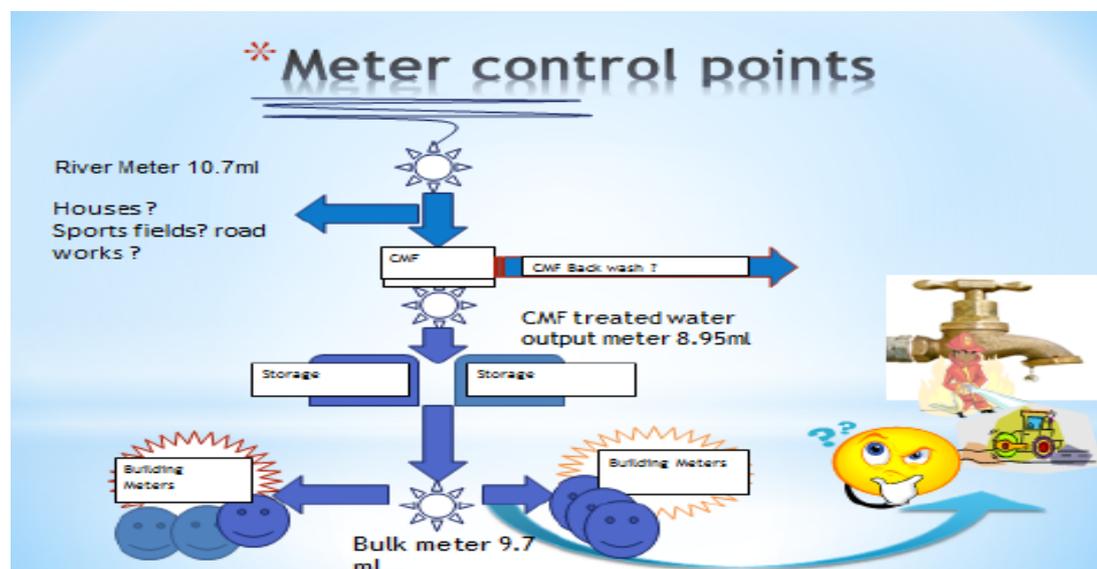


Figure 3: *Representation of missing meter points and lack of end use data*

Bulk smart meters with leak detection function were purchased to allow data to be collected for sports fields, roadworks and Southside houses (houses are fed with raw water and each house has UV and multimedia filters to make the water safe). CMF backwash water is now metered. Security taps were fitted to public areas. Roadworks now use raw water only, rather than treated water from stand pipes.

3.0 CONCLUSION

As Wujal Wujal aboriginal shire Council's main rateable properties are social housing, we were able to carry out full audit and modifications with relative ease. The benefit of the project gives clear savings to Council – prior to the project our use was 277 litres per person per day post the project is 137 litres per person per day. Public understanding for the benefits of water conservation have also been conveyed to the community via the flyers and through information kits supplied to the local school by water wise Qld. Wear and tear on the membranes and equipment has been reduced by lower production demand and savings produced as outlined in the table below.

Areas of Reduction	Per Month	Per Year
Water production (potable)	1532 kL	18384 kL
Chlorine	80 L	960 L
KW saved	3,040 kWh	36,580 kWh
Reduced CMF run time	60.8 hours	729.60 hours

4.0 ACKNOWLEDGEMENTS

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- Anil Gupta- DLGCRR
- Cara Beal- Griffith University
- Sue Larson -Water wise Qld
- Bruce Steadman -Department of energy and water
- Qld housing and public works

5.0 REFERENCES

Table 1-formulated with data from Australian bureau of statistics

Figure 2-excert Wujal Wujal building services demand management project

ABS population-

<http://www.abs.gov.au/AUSSTATS/abs@nsp.nsf/Previousproducts/LGA37570Population/People12006-2010?opendocument&tabname=Summary&prodno=LGA37570&issue=2006-2010>

rateable properties other than public housing

<http://www.abs.gov.au/AUSSTATS/abs@nsp.nsf/Previousproducts/LGA37570Industry12006-2010?opendocument&tabname=Summary&prodno=LGA37570&issue=2006-2010>

Notation.

Cara Beal working with Griffith University has done a very in-depth water use study using smart meters. 5 meters were installed at typical households in Wujal. The study was part of a larger remote study in north Queensland. At time of writing, the resulting study is in draft form so I have not included any reference to Care's work. For more in-depth usage information, I recommend contacting Cara Beal - c.beal@griffith.edu.au