MEMORANDUM TO: DIRECTOR OF INFRASTRUCTURE SERVICES

File:
22 September 2010

WATER SUPPLY

2009/10 REVIEW OF PERFORMANCE INDICATORS FOR WATER LOSS

1.0 PURPOSE

The purpose of this report is to assess water losses for 2009/10 in the Upper Hutt distribution system using the BenchlossNZ method.

2.0 BACKGROUND

As outlined in the draft Upper Hutt City Council LTCCP (2009 - 2019) the benchmark for residential consumption has been set at 220m³ per property per annum. Leak detection and water conservation education programmes aimed at achieving this benchmark have shown a remarkable reduction in the residential consumption and 'Minimum Night Flow' over the past few years.

In 2002 Council began using a water-loss software tool called 'BenchlossNZ' developed by the New Zealand Water and Waste Association (now Water New Zealand). This benchmarking tool allowed Council to:

- Adopt a New Zealand standard terminology for components of the annual water balance calculation;
- Encourage water suppliers to calculate components of 'non-revenue water', 'apparent losses' and 'real losses' using the standard's annual water balance;
- Promote performance indicators suitable for national and international benchmarking of performance in managing water losses from public water supply transmission and distribution systems.

BenchlossNZ was updated in 2008 and the methodology used now draws strongly on recent recommendations of the International Water Association (IWA)[1]

3.0 BENCHLOSSNZ

The BenchlossNZ method recognises the fact that many of the inputs are estimates. The software provides a process to calculate a basic water balance and provides a set of performance indicators.

The system is not deemed to provide reliable results for any system with fewer than 5,000 connections. After some consideration Council decided to run the model for the entire city as we could not find any logical boundaries to divide the City into zones exceeding 5,000 connections.

[1] The IWA is a self governing not for profit organisation which aims to cover all facets of the water cycle. The body is headquartered in London and operates through a board of directors, a strategic council, and various member groups.

Domestic water consumption

For Upper Hutt City we have to estimate the average consumption per connection for more than 80% of our connections. The developers of the BenchlossNZ software warned that the average consumption per property is the one parameter that has the biggest impact on the performance indicators - and as such this should be considered very carefully.

We have estimated our domestic consumption by using the area water meter readings that supply solely for domestic use. To ensure our methodology is consistent with the BenchlossNZ standard we needed to input the per property consumption at the property boundary. Therefore we deducted the system loss from the meter readings. The loss is normally dependant on the condition and the length of the main. To calculate the losses, we used minimum night flow (MNF) recorded using Council's telemetry system where the water meter is connected to the telemetry. This has also enabled us to calculate the losses where the meter is not connected to the telemetry system by comparing the areas[2]. The details are given in the table below:

Area	Sample size	Total volume recorded (m^3)	System loss[2]	Total volume at the property boundaries (m^3)
Pinehaven	1002	245,131	9%	223,069.2
Chatsworth Reserve	67	20,012	5%	19,011.4
Kiwi St	234	61,200	5%	58,140
Gillespies Rd	153	45,278	5%	4,3014.1
3 Indiana Grove	28	4,980	2%	4,880.4
Totara Park Rd	1080	281,460	9%	256,292.4
Emerald Hill Outlet	66	13,160	5%	12,502
	2767	711,866		616,745.7

Total annual water consumption per property (m^3)	235
Total daily water consumption per property (litres)	644
Total daily water consumption per head (litres)*	239

*Assumption: 2.7 persons per property

The 2009/10 BenchlossNZ calculation was carried out by using the domestic consumption (239 l/property/day) calculated by using the area water meters and the result is given in below along with the previous years.

Year	Average MNF l/s	Daily water consumption (litres/Head)	UHCC water use % GWRC production	Total consumption (10^3 m^3)	Extraordinary consumption (10^3 m^3)
2000/01	89.89	267	10.24%	5780.9	823.19
2001/02	93.34	268	10.83%	5781.5	830.45
2002/03	77.00	246	9.80%	5292.6	817.66
2003/04	76.12	244	9.60%	5267.7	918.69
2004/05	73.91	241	9.45%	5302.1	894.75
2005/06	74.21	242	9.36%	5516.5	957.93
2006/07	63.51	227	9.16%	5107.6	983.06
2007/08	61.20	246	9.21%	5158.0	964.33
2008/09	59.13	238	9.24%	5012.0	891.65
2009/10	56.98	239	8.98%	4881.07	902.86

[2] Assumptions were made by considering the MNF recorded against the area or according to the sample size.

We are fortunate to have sufficient means to benchmark our performance and compare our current performance against previous years by analysing our MNF indicators and water consumption, service requests and maintenance work records - which are reported in the annual report.

Table 1A: Benchloss calculations of CARL

Year	Current annual real losses (CARL) (l/Con/day)	Unavoidable Annual Real Losses (UARL) (l/Con/day)	Estimated Maximum Possible Reduction l/Con/day)	Current annual real losses (CARL) %
2000/01	Not available			24.40%
2001/02				23.20%
2002/03				21.50%
2003/04	204	68	136	18.60%
2004/05	158	70	88	16.10%
2005/06	188	71	117	18.60%
2006/07	142	71	71	15.30%
2007/08	125	70	55	13.40%
2008/09	124	69	55	13.80%
2009/10	95	70	25	11.00%

Table 2B: Benchloss calculations of ILI

Year	Infrastructure Leak Index (ILI)		
	Lower	Medium	Upper
2000/01	Not available	4.02	Not available
2001/02		3.83	
2002/03		3.21	
2003/04	2.68	2.98	3.28
2004/05	2.01	2.26	2.51
2005/06	2.14	2.65	3.16
2006/07	1.55	2.01	2.47
2007/08	1.55	1.80	2.04
2008/09	1.55	1.79	2.03
2009/10	1.14	1.37	1.59

When reporting BenchlossNZ uses the Infrastructure Leakage Index (ILI) standard adopted by the World Bank. This standard defines leakage as:

Grade	Explanation
<2	Further loss reduction may be uneconomic unless there are shortages; careful analysis needed to identify cost-effective improvement.
2 - 4	Potential for marked improvements; consider pressure management, better active leakage control, better network maintenance.
4 - 8	Poor leakage record; tolerable only if water plentiful & cheap; even then, analyse level and nature of leakage, intensify reduction efforts.
8 +	Very inefficient use of resources; leakage reduction programs imperative and high priority

The BenchlossNZ report for the period ending 30 June 2009 is appended.

4.0 DISCUSSION

To reduce leakage Council has developed a strategy for preparation of the water supply renewal programme by considering pipe condition, model results, and maintenance records. Although this work should give a more reliable output, we need to continue updating the asset information in our asset registers to improve the reliability.

Council has also implemented a city wide annual leak detection programme, and it is now understood that the leak detection programme contributes to reduction of minimum night flows and city's total water consumption.

The more property meters available the more accurate average consumption will be calculated. Capacity has completed a study in 2009/10 to determine the number of meters and there locations for measuring the domestic consumption more accurately for Upper Hutt City. As a result of the above study 110 domestic meters have been installed in Upper Hutt City. Wellington City and Lower Hutt are in the process of installing domestic survey meters also. The domestic survey meters will enable further and more complete analysis to be undertaken in the future and better benchmarking between the cities.

Even though the Benchloss study shows that further loss reduction is likely to be uneconomical, we recommend continuing the UHCC current leak detection and proposed pressure management programme because of the potential water shortages in the region. The proactive leak detection programme, may assist in Greater Wellington deferring the capital expense of obtaining more water storage for the region.

5.0 CONCLUSION

The results of the 2009/10 BenchlossNZ survey show that the ILI of Upper Hutt City's water supply network has achieved a very good grade with water losses being minimal. While the achieved annual water consumption figure of 235 m^3 per property is short of the long term target we are progressing towards the target well.