

# **Water Demand Management Options & Opportunities for Manawatu District Council**

**Technical report prepared for Horizons Regional Council**

**November 2006**





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**November 2006**

Manawatu District Council assisted AQUAS Consultants in its work for Horizons Regional Council assessing their proposed water-use guidelines for public water supplies. Information on the Feilding water supply system was provided for analysis purposes. This report provides the District Council with some ideas and suggestions for demand management based on that information.

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# Contents

<b>1.0</b>	<b>Background</b> .....	<b>1</b>
1.1	Water Use in Public Water Supply Systems	
<b>2.0</b>	<b>The Current Situation</b> .....	<b>2</b>
2.1	Information/Data Gathering	
2.2	Summary for Feilding	
<b>3.0</b>	<b>Opportunities for Water Savings</b> .....	<b>5</b>
3.1	Observations & Comments	
3.2	Logical Options	
3.3	Additional Opportunities	
	<b>References</b> .....	<b>8</b>
	<b>Appendix A: Feilding – Completed Water Supply Services Worksheet</b> .....	<b>9</b>
	<b>Appendix B: Detailed List of Demand Management Options</b> .....	<b>17</b>
	<b>Appendix C: Sample Options – Water-Use Reductions</b> .....	<b>27</b>



# 1 Background

Horizons Regional Council (HRC) has identified 'increasing water demand' as one of four priority – or keystone – issues for the region. The total volume of permitted water takes has increased dramatically in recent years placing both surface water and groundwater resources under pressure.

The Council is taking a number of steps to address this, including development of water-use guidelines for public water systems – as a way to move towards more efficient use. HRC asked AQUAS Consultants to assess the draft guidelines, taking into account:

- strategies and approaches in *other* regions in the country, and
- current water consumption levels and practices *within* the region.

A further purpose of the work was to identify opportunities for improved water-use efficiency in public water supply schemes in the region and provide this information back to participating District Councils.

## 1.1 Water Use in Public Water Supply Systems

To carry out the second part of the study – assessing current water consumption levels and practices within the region – the Regional Council identified five public water supply systems to be examined. These were Bulls, Hunterville, Eketahuna, Levin and Feilding.

These range from small/rural systems to moderate-size urban schemes and were deemed to provide a *representative* picture of water use in public schemes for the region.

This report provides information on the **Feilding** water supply system. Part 2 summarises the current situation. This is followed by suggested options and opportunities for demand management in Part 3.

## **2 The Current Situation**

A common approach was used to gather and summarise the necessary information for the five water supply systems.

The consultant contacted each Council to outline the purpose and nature of the work and to seek their support. Once this was done, the consultant followed up by e-mail to confirm the work and to ascertain the Council staff member who would serve as liaison and help in data gathering.

### **2.1 Information/Data Gathering**

As a first step, Councils were provided with a Water Supply Services Worksheet – a form used to capture and organise helpful information. Completed Worksheets were returned to the consultant, reviewed, and followed by e-mail back to the Council (as necessary) for clarifications.

A Data Summary sheet was prepared for each system based on the details in the Worksheet.

The consultant then spent time in the region to visit the area served by each water system and meet with each Council staff contact to gather information more easily obtained via discussion.

This allowed the Worksheet and Data Summary to be revised and amended *and* preparation of Additional Information for each system. All of this was subsequently provided to Councils for their review, and the necessary changes made to finalise each item.

Blank Worksheets were provided to Councils in mid-July, with completed copies returned to the consultant in August. All information/data was finalised and put in the form included in this report by the end of September.

### **2.2 Summary for Feilding**

The completed Worksheet for Feilding appears in Appendix A. The table on the next page summarises key data drawn from the Worksheet.

Additional information gained in discussions with the Council's Water Manager follows the table.

### Feilding Water Supply Data Summary

Item	Data*	Calculations/Comments
<b>Consent conditions</b>	24600/day 22600/day during low-flow conditions	Surface take – 9000/day (and 140 l/s max) reducing to 7000/day (85 l/s max) during low-flow conditions Two bores total 15600 (max abstraction rates 280 and 400/hour)
<b>Current use (system)</b>	ADD 5735 PDD 9082	ADD = 23% of regular consent PDD = 37% of regular consent (= 1.58 ADD)
<b>Water storage capacity</b>	13980	6800 reservoir in reticulation system, plus two reservoirs at WTP with capacity of 7180 Storage = 244% of ADD and 154% of PDD
<b>Customer connections and water costs</b>	5,848 343 metered (6%) 5,505 unmetered (94%)	Metered: \$.50 per m <sup>3</sup> + rental charge (connection size) Unmetered: \$350/year
<b>Current population</b>	13,731	2006 estimate
<b>Current use (per capita)</b>	ADD 418 l/p/d PDD 661 l/p/d	From 5735 / 13,731 From 9082 / 13,731
<b>Use by category</b>	Residential – 80% Commercial – 20%	Based on estimate of metered customer use v unmetered. 10 largest water users consumed 9.7% of total in 05/06
<b>Leaks/losses details</b>	Unable to estimate accurately at this time	Overnight low-flow figures available to compare to peak and daily average flows, but uncertain of commercial night use + amount going to refill one reservoir then. Water-loss study a priority over the next two years. Helpful data for future analysis and comparisons: length of pipe network = 140 and number of connections = 5,848, giving 41.8 connections/km
<b>Residential use estimate (net)</b>	ADD 343 l/p/d PDD 543 l/p/d	Say residential is 80% of total as above (so still includes NRW/L&L in the figure) ADD = 5735 x .80 = 4588 / 13,371 = 343 l/p/d PDD = 9082 x .80 = 7266 / 13,371 = 543 l/p/d
<b>Possible future demand (2011 estimate)</b>	ADD 5993 = 24% of regular consent PDD 9490 = 39% of regular consent	No notable new industries expected in the near future. Future demand increases expected to be limited to urban growth. Estimated population in 2011 is 14,350 (4.5% increase from current). So ADD in 2011 = 5735 x 1.045 = 5993 and PDD = 9082 x 1.045 = 9490 <b>Note:</b> Two things that could increase future demand beyond above general projection – (1) Transfer of estimated 1,000 Air Force families to Ohakea and (2) Commercial enterprises shifting to town supply from own bore in search of higher quality water due to more stringent export hygiene requirements.

\* All water volume figures are cubic metres unless noted otherwise

## **Additional Information**

**Total System Supply** – Commissioning of the bores has ensured robust, reliable water supply for the community and eliminates the need for water restrictions during summer months. Nevertheless, the bore water is viewed essentially as supplementary/back-up supply. The intent is to minimise its use, mixing it in when demand requires.

**Leaks & Losses** – Concerted efforts are being made to address unaccounted for water. Night flow figures are available, but it is difficult to determine L&L from that because of commercial night use and one of the reservoirs is refilling at that time. Pressure management/leak detection are priorities over the next two years as identified in the Asset Management Plan. A water loss study of the reticulation system is planned.

**Metered Customers** – While only 343 *connections* are currently metered, it is estimated that about 75% of total commercial *water use* is covered by this metering. Efforts are underway to identify commercial customers (starting in the CBD) currently unmetered and converting them to metered accounts. Metering of extraordinary users is Council policy where there is a likelihood of high water use (including larger sections, those with swimming pools, etc.)

**Mains Water Pressure** – Pressure is generally good in the system, so there could be opportunities to reduce water use via flow restrictors, pressure valves, etc., installed on customer's fixtures/reticulation.

**Summer Outdoor Use** – Garden watering adds considerably to demand for water in the summer season, so there are opportunities to improve efficiencies through an educational campaign.

## **Demand Management Initiatives**

**Current** – Efforts are ongoing to meter commercial customers that are currently not metered. Water conservation pamphlets are available at the customer services desk and readily supplied to customers. 'Peter Pukeko' educational materials well received in schools.

**Planned** – Increased effort to meter extraordinary users (e.g. larger sections, those with swimming pools)

### 3 Opportunities for Water Savings

The information in Part 2 of the report provides a basis for suggesting further demand management (DM) initiatives that could result in water savings for the system.

The first section below makes a few general comments based on the Part 2 summary. Section 3.2 builds on this with a brief outline of DM options that make sense given the current circumstances. Section 3.3 follows with some additional opportunities – ones that may be more challenging to implement, but have strong potential benefits.

Appendices B and C are provided for DM planning purposes. Appendix B provides an extensive list of options for reference when devising specific initiatives. Appendix C notes potential water savings through residential and commercial retrofits and upgrades.

It should be noted that the suggestions included here are based on an analysis of *one* public water supply system. A water demand management plan is best implemented at the district level, however, so a broader assessment of needs would be helpful in order to map out the best approach for a district-wide effort.

#### 3.1 Observations & Comments

The data and information on the Feilding system summarised in Part 2 suggest that:

- The metering effort with commercial customers (currently unmetered) could identify extraordinary use or other problems and unaccounted for water.
- With good pressure throughout the system, there are opportunities to reduce water use via flow restrictors, pressure valves, etc on residential properties.
- There are a number of industries using water in production/processing, providing opportunities to explore water-use efficiencies.
- Given summer outdoor water use, there are opportunities to reduce use via a promotional campaign.

#### 3.2 Logical Options

Here are some key options for water-saving efforts.

**Commercial metering/volume pricing** – Working to get *all* commercial customers metered is a worthwhile step. This will help monitor and charge extraordinary users and motivate customers to use water more efficiently as it will be a direct cost of doing business.

**Industrial/commercial water advisory** – This builds nicely on the previous point. It makes sense to focus water-efficiency efforts on larger commercial customers first, then move on to medium-size and smaller businesses. Water audits and an advisory service for this customer class could play an important role in helping to reduce total demand. This may require special expertise, so it would be worth exploring a cooperative effort with nearby Councils to reduce costs and enhance results.

**Summer water-use campaign** – A campaign targeting residential customers and outdoor/garden watering would address high season use which places extra stress on water resources in the district. This will be challenging given that residential properties do not have meters and, therefore, have no financial incentive to reduce water use. It will, thus, require a well-planned communication/social marketing effort. Summer water use has been identified as an issue in Palmerston North and Levin as well, and it is likely some other urban areas around the region face the same problem. A cooperative effort (even involving the Regional Council) would again maximise benefits.

**On-property leak detection** – The proposed water loss study will help to identify leaks not only in mains but also in customer lines running off the mains. This is especially true where there is no metering which helps to pick up losses via abnormally high readings. A leak detection programme such as this by one District Council on the North Island determined possible leaks on 80 properties. A letter sent to owners resulted in 75% of them doing the necessary repairs (confirmed by follow-up

scanning). Subsequent correspondence and discussion with owners addressed the remaining problems. Cost to the Council is for the detection scan and administration for letter writing, etc., as it is the responsibility of customers to fix leaks on their own property.

**Pressure management** – The water loss study will include pressure management issues. Good pressure in the system may allow install of pressure valves to reduce mains pressure and lessen the likelihood of leaks. Pressure reduction valves on fixtures in properties (or where the water supply enters the building) could be examined as well.

**Public, community, and commercial toilets** – There are significant benefits in retrofitting or upgrading urinals from cyclical flushing to on-demand or even waterless models (and upgrading taps and toilets as needed). This would reduce both water supply requirements and wastewater flows – a double benefit. Leak detection work by one Council in the region, for example, attributed 0.8 m<sup>3</sup>/hr or 19.2 m<sup>3</sup>/day (8% of total use) in one school to continuous flushing of urinals. This goes on all night, on weekends and during school holidays when these facilities are not even in use. Another Council in the region is upgrading public facilities (with manual flushing systems on urinals and dual-flush cisterns in some premises). This has reduced water use to about 15% of previous levels. This sort of work can be done in Council-owned facilities, schools, community and sports clubs, and commercial establishments such as restaurants and pubs. Metered customers will be inclined to upgrade and further motivation could be provided through a variety of financial incentives (e.g. reduction in wastewater charges for those with more efficient systems).

**Residential water advisory** – This can include simple checks for leak repairs and install flow-control devices (such as a cistern weight in old single-flush toilets). It also provides an opportunity to discuss customer water-use practices and promote conservation with customers. This is particularly helpful for older houses that may not have been upgraded to include water-saving fixtures. This is another area where Councils might cooperate to share costs and time for an individual who could serve as a domestic water advisor (and even be coordinated with the industry/commercial water advisory service outlined above).

**Rural customer water use** – Metering extraordinary users and restricted-flow systems can help to manage water use on properties that might include horticulture or stock watering. Educational efforts to help customers achieve 'best practice' levels of water use can bring real benefits as well.

**Education/promotion support** – All of the efforts noted above will require strong communication support – to create interest and awareness, motivate for change, and gain customer commitment and action. There are likely some materials that would have application throughout the region so, again, looking at cooperative efforts makes sense.

### 3.2 Additional Opportunities

A few additional opportunities should be noted.

**Residential metering** – While there is a general reluctance to universal metering by District Councils that don't currently have it, there is no denying its benefits. International comparisons show significantly lower water use in systems with universal metering compared to those on a flat rate structure. District Councils on the North Island with universal metering are among the lowest per capita water users, and one City Council recently installing meters estimates a 20% reduction in water use as a result. Data such as this suggests that metering should always be 'in the mix' when considering options for reducing water use.

**Other financial incentives** – Providing a customer water advisory service – if it is free or subsidised – is a form of financial incentive. Retailer discounts or rebates for purchase/install of water-saving fixtures or appliances is an additional form of financial incentive. These have proven effective in places where they have been employed. Councils can easily manage and budget for an incentives programme by controlling the range and number of items available in any given time period.

**Outdoor water-use practices** – While restrictions in times of shortage are a common approach to water management, innovative jurisdictions are now moving to a general policy covering permitted outdoor water-use activities. This includes both schedules and timing for garden watering and

stipulations for activities such as vehicle washing and the hosing of sidewalks and paved areas. These steps can have significant benefits in reducing water use at the time of year when demand is generally high and river flows are low.

The above points provide just a few examples of the opportunities available – and a sense of the water-reduction benefits that are possible when implemented over a period of time. The key is to successfully integrate *demand management* options into the long-term water supply strategy.

## References

- Aqualinc Research Limited (2004) *Water Allocation Project – Stage 1*. A report prepared for Horizons Regional Council.
- AQUAS Consultants Ltd (2005) *Assessment of Water Services – Customer-Level Demand Management*. A report prepared for Rodney District Council.
- AQUAS Consultants Ltd (2005) *Customer Demand Management: Plan for Hauraki District Council*.
- AQUAS Consultants Ltd (2005) *Customer Demand Management: Plan for Waipa District Council*.
- AQUAS Consultants Ltd (2005) *Promoting Customer Water-Use Efficiency: A Planning Guide for Local Authorities*.
- Berryman, S (2001) *Council Practices in Urban Water Conservation and Demand Management*. A report prepared for Ministry for the Environment.
- Horizons Regional Council (2006) *One Plan: Resource Management Plan for the Manawatu-Wanganui Region*, Working Document Version 4.
- Horizons Regional Council (2006) *One Plan*. Working Document, Version 5, sections of Chapter 6.
- Institute for Sustainable Futures (2003) *Residential Retrofits – Analysis of Water Savings: Progress Report No. 2*. Prepared for Sydney Water Corporation.
- Manawatu District Council (2006) Website information, data provided, and discussions with Water Manager.
- Ministry of Health (2004) *Household Water Supplies: The selection, operation, and maintenance of individual household water supplies*.



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## **Appendix A**

**Horizons Regional Council**

**Public Water Supplies – Water Efficiency Guidelines Project**

# **WATER SUPPLY SERVICES WORKSHEET**

**for**

# **FEILDING**

**Provided to Manawatu District Council 12 July 2006  
Completed Worksheet received 17 August  
Additions 30 August  
Reviewed by MDC, Finalised 25 September**

## **Public Water Supplies – Water Efficiency Guidelines Project**

### **Review of Sample Water Supply Systems in the Region**

Horizons Regional Council has asked AQUAS Consultants to examine the proposed efficiency guidelines for public water supplies. Part of this work involves looking at a few water supply systems in the region as examples to consider appropriateness of the guidelines and to explore opportunities for improved water-use efficiency.

This exercise will:

- help refine the guidelines to assist discussions amongst the Councils
- identify possible opportunities for improved efficiencies (particularly relating to customer water use) and provide this information to the District Councils for their own planning purposes.

This Worksheet provided to participating District Councils is the first step in the process. It is divided into three sections as follows:

- General Statistics & Trends
- Water Supply Services
- Demand Management Activities & Opportunities

The Worksheet is designed to capture and organise a range of helpful information on the water supply systems being examined. It isn't the intention to ask you to do any additional data gathering or tracking. Please just provide information that is readily available.

In completing the Worksheet:

- Data and responses can be inserted directly into this WORD document immediately following each item/question.
- If you are appending data or information to complete the Worksheet, please reference the item/question numbers here (1.1, 1.2, etc).
- If you organise your data in ways different to how it is described in the Worksheet, please enter it in whatever format is easiest for you.
- If data or information is currently unavailable for any items queried, please indicate.
- If any items do not apply to the water system, note 'n/a'.
- If you would prefer to relay any information on the telephone or in a meeting, please indicate and this will be arranged.

When we have reviewed the completed Worksheet, we will come back to you for any clarifications and additional information needed.

If you have any questions or concerns when completing the Worksheet, please call Gord Stewart on 07 577 1565 (or 027 416 5672) or by e-mail to [gord@aquas.co.nz](mailto:gord@aquas.co.nz).

## **SECTION 1: General Statistics & Trends**

### **Population**

#### **1.1 Population at 2001 Census**

2001 13,641

#### **1.2 Estimate of current population (July 2006) or most recent estimate**

2006 estimate 13,731

#### **1.3 Expected resident population in 2011 ... in 2021 (or projected annual change in population)**

2011 14,350 = estimated 4.5% increase in 11 years

2021 15,000 = estimated 9.2% increase in 15 years

### **Industry**

#### **1.4 Industry/commercial activities – what drives the economy of the area**

Industry in Feilding is primarily one of supporting the farming community. There are a number of food processing industries that are high users of water. At present these industries largely source their water from private bores. However with more stringent export hygiene requirements there is a trend for these industries to rely more on the public supply.

#### **1.5 Any anticipated change in industry/commercial activities in next few years (e.g. gain or loss of large businesses)**

There are no notable new industries expected to be developed in the near future. McCains Foods is closing down this year with the loss of about 150 jobs. There is high expectation that this site will be re-established with a replacement similar industry.

### **Other**

#### **1.6 Any data held by Council on typical/average age of the housing stock**

Average age within the district, not specifically Feilding is 40 years

#### **1.7 Number of seniors/public housing units owned or managed by Council (if any)**

Council owns and manages 198 residential retirement units – mainly one-bedroom units and older complexes. Could be up to 20 in one location.

#### **1.8 Any other information that should be noted (i.e. things that might have an impact on demand for water)**

Feilding's proximity to Palmerston North means that it acts as a satellite town providing labour to the larger city. Feilding's growth can closely be attributed to the growth in Palmerston North and in the district as a whole, not solely on its own industrial expansion.

As in section 1.4 above: With the town now providing a higher quality of water there is an increasing requirement from industry to use the public supply as opposed to their traditional bore supplies.

The transfer of an estimated 1,000 Air Force families to Ohakea is expected to increase the population of Feilding to above the predicted figures.

## **SECTION 2: Water Supply Services**

### **Source, system and supply info**

#### **2.1 Resource consent limits (per day, max flow rate, take during low flow, etc.)**

Surface take – Barrows Rd: 9,000 m<sup>3</sup> per day reducing to 7,000 m<sup>3</sup> per day during low river flow conditions. Max rate of abstraction 140 l/s or 85l/s depending on river conditions.

Bore take – Newbury Line: 6,000 m<sup>3</sup> per day at a maximum rate of abstraction of 280m<sup>3</sup>/hour

Bore take – Campbell Rd: 9,600 m<sup>3</sup> per day at a maximum rate of abstraction of 400m<sup>3</sup>/hour

Total take (three above) = 24,600 m<sup>3</sup> (22,600 during low-flow) Deep bores commissioned in 2001

#### **2.2 Total storage/reservoir capacity for the system**

1 reservoir in the reticulation system with a holding capacity of 6,800 m<sup>3</sup>

2 reservoirs at the Almadale WTP with holding capacities of 1,135 m<sup>3</sup> and 6,045 m<sup>3</sup>

Total storage (three reservoirs) = 13,980 m<sup>3</sup>

#### **2.3 Overall demand for water and seasonal variations**

- Total annual production 2,091,866 m<sup>3</sup> annual production in 05/06 year
- Average day demand 5,735 m<sup>3</sup>/day average demand in 05/06 year
- Peak day demand 9,082 m<sup>3</sup>/day peak demand in 05/06 year
- Other (any other data/info tracked on water use) The telemetry system is being upgraded and this will enable real time collection and monitoring of water take and water use information.

#### **2.4 Estimate of water loss/leaks**

An in depth water loss survey has not been undertaken. Some assumptions using the night time low flow only are available. These are inherently inaccurate as the Fraser Drive reservoir fills during the night and the overnight commercial use is not known.

Using the overnight low flow on an average day the following figures are identified

Overnight low flow = 100 m<sup>3</sup>/hour  
Peak daily flow = 375 m<sup>3</sup>/hour  
Average daily flow = 200 m<sup>3</sup>/day Should this be per hour?

- As a percentage of total production
- Location/cause of losses Commercial use and reservoir recharge are both assumed to contribute to the overnight low flow volume in addition to system losses.

#### **2.5 Any seasonal water shortages – time period (months of the year), frequency of occurrence (looking back 10 years say) and severity**

Prior to the installation of the groundwater bores in 2000 water restrictions were an annual event.

However no water shortages are now occurring since the commissioning of the Newbury Line and Campbell Rd bores.

#### **2.6 Key concerns/issues looking ahead 1-2 years ... 5 years ... 10 years**

Replacement of old cast iron pipe is a priority over the next 3 years

Commencement of a study to assess the water loss within the reticulation system is planned to commence in the short term.



## **SECTION 3: Demand Management Activities & Opportunities**

### **Revenue Water – Customer Level**

- 3.1 List/describe any current demand management activities targeting customers
- ❑ Metering/volume pricing (could have covered this in 2.11) **Universal metering of all consumers is an ongoing debate in council. No intention to universally meter at this time.**
  - ❑ Information and education **Water saving pamphlets available at customer services desk and readily supplied to consumers.**
  - ❑ Promotion of water-saving technologies and practices **As above. ‘Peter Pukeko’ educational information available**
  - ❑ Financial Incentives (e.g. rebates for low-flow showerheads) **None**
  - ❑ Regulatory (e.g. water restrictions) **Water restrictions are now not required following recent augmentation of the water supply sources**
  - ❑ Recycling/reuse (stormwater, wastewater) **None**
- 3.2 For any activities noted above, briefly describe the uptake, success, etc., to this point  
**The ‘Peter Pukeko’ educational material has been very well received by schools**
- 3.3 Please list/describe any customer-level demand management activities you are *now* considering or planning  
**Metering of extraordinary users is council policy where there is a likelihood of high water use.**

### **Non-revenue Water – Council use, leaks/losses, etc**

- 3.4 Do you suspect there are any ways to improve water-use efficiency in Council facilities (offices, community halls, public toilets, etc)? If so, please list.  
**Water use in Council facilities is minor. Normal maintenance requirements are implemented to minimise loss through leaking plumbing fittings.**
- 3.5 Please note (briefly) any *current* pressure management and/or leak detection/reduction efforts  
**At this time no. See 3.6**
- 3.6 Please list/describe any pressure management or leak detection efforts you are *now* considering or planning  
**Work in this area is considered a priority over the next 2 years and is identified in the Asset Management plan Development Plan.**
- 3.7 Any other current activities or opportunities to reduce NRW in the system  
**As in 3.6 above. Plan is commence a Water Loss Study of the reticulation system.**

### **In Addition**

Any other information that might be helpful/should be considered and not covered in specific points in Sections 1, 2 and 3 above?

**The recent commissioning of the water supply bores at Newbury Line and Campbell Rd coupled with the current upgrades to the Almadale WTP has advanced Feilding from a community that suffered from variable water quality and that faced severe water restrictions during summer months to a community that now has a robust, reliable water supply of good quality that is able to provide well-being to the community.**

The next progression in the improvement of the water supply system is the evaluation of water losses within the system and the better management of pressure differentials experienced by consumers. There is a strong relationship between these two issues that will be addressed in the proposed Water Loss Study. (See 2.6 and 3.5 – 3.7.)

Length of the pipe in the network = 140 km

Number of connections = 5,848

Connections per km of pipe = 41.8



## **Appendix B**

### **Detailed List of Demand Management Options**

There are many demand management options available to help use water more efficiently and to reduce water loss. Suggested options noted in the body of this report are drawn from the wider list included here. This list is provided for reference purposes and can serve as a guide in devising specific demand management initiatives.

Six lists are included as follows:

**Measures** – specific devices or actions that result in reductions in water use

- Technologies & Practices – Indoor
- Technologies & Practices – Outdoor
- Water Capture, Reuse & Recycling

**Instruments** – supportive elements that encourage the adoption of a technology or a change in habits or practices

- Information & Education
- Regulatory Mechanisms
- Metering, Pricing & Other Financial Incentives

The table on the next page provides a summary list of the *types* of options available. The individual tables for each measure or instrument take it to the practical level by detailing specific actions. Comments are included where appropriate as a guide for implementation.

## Water-Use Efficiency Options ~ At A Glance

### Measures

<b>Technologies &amp; Practices Indoor</b>	<b>Technologies &amp; Practices Outdoor</b>	<b>Water Capture, Reuse &amp; Recycling</b>
Residential <i>Fixtures and devices</i> <i>Appliances</i> <i>Audits and retrofits</i>  Industrial/Commercial/Institutional <i>Fixtures and devices</i> <i>Production processes and practices</i> <i>Audits</i>	Residential <i>Moisture gauges, timers and shut-off devices</i> <i>Irrigation systems</i> <i>Water-saving landscapes</i> <i>Other applications and activities</i> <i>Audits</i> <i>On-property leak detection</i>  Commercial <i>Irrigation</i> <i>Audits</i> <i>Broader management practices</i>	Water Capture/rainwater harvesting  Storm water management  Greywater reuse  Wastewater recycling

### Instruments

<b>Information &amp; Education</b>	<b>Regulatory Mechanisms</b>	<b>Metering, Pricing &amp; Other Financial Incentives</b>
General Communication <i>Information/educational material</i> <i>Media/advertising</i>  Personalised Information <i>Water tax invoice information</i> <i>Interactive tools and calculators</i> <i>Water-use audits</i>  Personal Contact <i>Displays and events</i> <i>Presentations and workshops</i> <i>Interaction in the community</i>  Promotional efforts <i>Demonstration gardens</i> <i>Cooperation with retail plumbing</i> <i>Water conservation awards</i>	Bylaws, regulations and restrictions  Planning control/ building code  Support for legislative reform	Meter Installation  Pricing Strategies <i>Flat rate</i> <i>Uniform (or constant) rate</i> <i>Increasing Block Rate (IBR)</i> <i>Peak load pricing</i> <i>Wastewater charges</i>  Financial Incentives <i>Rebates and subsidies</i> <i>Loans and savings schemes</i> <i>Giveaways</i> <i>Direct Installation</i> <i>Subsidised/free water audits</i> <i>Cash payments</i>

## Measure: Technologies & Practices – Indoor

Option	Comments
<p><b>Residential</b></p> <p>Retrofit flushing-control device in single-flush toilets Install low-flow (dual flush) toilet Install composting or waterless toilet</p> <p>Insert flow regulators on high-volume taps Install low volume/volume control taps</p> <p>Showerhead retrofit/adjustments to reduce flow Install low-flow showerhead</p> <p>Leak repairs on all fixtures above</p> <p>Install pressure-reducing valve at hot water heater</p> <p>Install high efficiency clothes washer Install water efficient dishwasher</p> <p>Ensure efficient water-use practices with all fixtures and appliances above</p> <p>Home assessments/audits to repair leaks, retrofit fixtures as needed, encourage uptake of water-saving fixtures and appliances and promote efficient water use</p>	<p>Retrofits are easy and inexpensive and can lead to significant reductions in water use</p> <p>Promote water efficient fixtures for renovations and new construction</p> <p>Consider water and cost savings (including energy) over the lifetime of the appliance</p> <p>Water-saving practices build on benefits from efficient devices</p> <p>This is a positive 'public relations' vehicle for Council in addition to a way of ensuring water-saving devices are installed, leaks repaired, etc</p>
<p><b>Commercial/Industrial/Institutional</b></p> <p>Retrofits, installs, repairs and audits (as in Residential above) for convenience facilities including toilets, showers and staff lunchrooms</p> <p>Retrofit urinals from cyclical to flushing on use Install waterless urinals</p> <p>Changes to production processes to improve water use efficiency</p>	<p>Comments above apply</p> <p>Significant water savings from action here</p> <p>May require a specialist to analyse operating processes and water use practices</p>

## Measure: Technologies & Practices – Outdoor

Option	Comments
<p><b>Residential</b></p> <p>Install trigger nozzle on hand-held hose            Install tap timers on lawn and garden sprinkler            Include rain/moisture sensor on irrigation system            Adopt water-saving approaches (e.g. drip irrigation) for installed systems</p> <p>Use mulch on gardens to improve moisture retention            Use native plantings and others requiring little water in landscaping            Favour ground covers over lawns that need watering</p> <p>Curtail practices that waste water            Outdoor/garden audits to improve watering practices and promote uptake of water-saving devices</p> <p>Use system-level leak detection work to identify significant leaks on customer properties</p>	<p>Significant benefits possible from small/inexpensive changes</p> <p>Education needed here to promote low water use gardening practices</p> <p>Regulations/bylaws can address wasteful use of water</p> <p>On-property leak detection is a natural by-product of system level analysis</p>
<p><b>Commercial/Industrial/Institutional</b></p> <p>Technologies/practices (as in Residential above) for landscape care</p> <p>Ensure effective water management practices for sports fields, reserves and passive areas</p> <p>Adhere to Irrigation New Zealand's irrigation system design performance standards            Follow Irrigation New Zealand's code of practice for on-farm evaluation of irrigation efficiency</p> <p>Develop/participate in a community-based monitoring service for climate/soil moisture to ensure efficient pasture irrigation</p>	<p>Audit service available from NZ Sports Turf Institute</p> <p>These two INZ resources scheduled available/operational in late 2005</p> <p>Investigation into this already completed for Environment Waikato</p>

## **Measure: Water Capture, Reuse & Recycling**

<b>Option</b>	<b>Comments</b>
<p><b>Rainwater Use &amp; Greywater Reuse</b></p> <p>Collect rainwater for outdoor uses (as/when needed) – garden watering, vehicle washing, etc Collect rainwater for indoor use where potable water is not required (toilet flushing, laundry)</p> <p>Reuse greywater (from shower and laundry) for garden irrigation Reuse greywater for toilet flushing</p> <p>Consider rainwater/greywater use in developments employing a communal system</p>	<p>Simple system can serve outdoor needs and reduce demand for mains water Install costs higher for indoor/plumbing needs</p> <p>Best using drip irrigation Install/plumbing costs to consider</p> <p>Reduces per property cost</p>
<p><b>Stormwater Management &amp; Waste Water Recycling</b></p> <p>Pipe roof water to drip irrigation system of sufficient capacity to keep water on the property Use permeable pavement (bricks, paving stones) Slope impermeable surfaces so run-off goes to lawns/gardens not the stormwater system Reticulate stormwater to a (constructed) wetland Use other water-sensitive urban design techniques in new residential or commercial developments</p> <p>Use self-contained wastewater system in new residential developments. Can reuse grey and black water and eliminate wastewater from leaving the site</p> <p>Use Council treated wastewater to irrigate public gardens; road verges; golf courses; turf, tree, and dairy farms, etc</p>	<p>Triple benefit – environmentally-friendly and cost-effective stormwater management approaches also reduce demand on mains water normally used for lawn and garden irrigation</p> <p>Potential cost savings over traditional systems even where reticulation is available, plus uses treated water as a beneficial resource</p> <p>Can be cost effective. May require education for public acceptance</p>

## Instrument: Information & Education

Option	Comments
<p><b>General Communication</b></p> <p>Awareness campaign on water supply issues Information on water use practices and how to improve – <i>all</i> facets of use indoor and outdoor</p> <p>Public signage in key locations noting pertinent water supply information</p> <p>Print/broadcast media to educate and inform (from water conservation generally through to water restriction announcements)</p> <p><b>Personalised Information</b></p> <p>Dye tables (for leak detection), shower flow gauge and cylinder to measure rainfall Include information on water tax invoice relating to customer consumption levels Online information explaining rates structure, billing procedures, dates, etc Online water-use calculator so customers can estimate household/per person use</p> <p>Self-assessment programme for commercial customers</p> <p>Online planning tool for water/energy efficiency in new construction</p> <p><b>Personal Contact</b></p> <p>Display/booth for public events Presentations to community groups Workshops for residential customers on selection/use of irrigation systems, water practices, etc</p> <p>Roving educator in the summer season to promote conservation and advise/remind about restrictions</p> <p>Sustainable Households Programme</p> <p>Presentations to business groups Training workshops for industrial/commercial customers Education for builders and plumbers</p> <p>Home/business visits/audits</p>	<p>Many print options available, including pamphlets, fact sheets, booklets and newsletters, plus same info online</p> <p>Make good use of community newspapers</p> <p>Include specific tips to improve based on current use profile</p> <p>For example, Water Achiever</p> <p>As per BASIX system in Australia</p> <p>These allow for questions and discussion</p> <p>Could be a student travelling by bike or on foot in designated neighbourhoods</p> <p>Group sessions – part of a national effort</p> <p>Target message to audience</p> <p>Solicit support</p> <p>Detailed in other tables and in the report</p>

<b><i>Information &amp; Education ... cont'd</i></b>	
<b>Promotional Efforts</b>	
Use novelties such as fridge magnets and bumper stickers	These serve as a constant reminder
Deck out Council car with 'roof tap' and slogans	Visible, positive promo/reminder
Promote uptake/install of water-saving devices and technologies	From showerheads to rain tanks to appliances
Institute water conservation awards(s) to recognize significant contributions	Integrate into existing regional awards and/or submit for MfE Blue Ribbon Awards
Establish demonstration garden in high profile location	Provides 'real life' examples of native and water-efficient plantings
Get plumbers on board to spread message during normal work	Like Australian Green Plumber programme
<b>School Education Programmes</b>	
Include special unit on water in curriculum, delivered by a specialist or teachers trained in the issue	For example, adapt from Tauranga's Waterline Programme for Years 5/6
Water education as part of a broader sustainable schools programme	For example, get involved in Enviroschools Programme
Prepare entirely new programme	This would be costly and reinvent the wheel

## Instrument: Regulatory Mechanisms

Option	Comments
<p><b>Bylaws &amp; Restrictions</b></p> <p>Restrict lawn/garden watering to certain times of day            Restrict watering to certain days of the week            Restrict watering to maximum time per day            Progressive restrictions from sprinkler ban to complete hose ban and essential use only</p> <p>Require trigger nozzles for hand-held hose            Require tap timers for sprinkler            Require rain/moisture sensor for installed irrigation system            Require certain types of installed irrigation systems</p> <p>Prohibit certain (wasteful) practices of outdoor water use</p> <p>Ensure repair of significant on-property leaks</p> <p>Require audits for all commercial/community irrigation systems above a certain area or volume of water use</p> <p>Require agricultural irrigation to conform to design and efficiency standards set out by Irrigation New Zealand</p>	<p>First three items could be temporary, precautionary measures or permanent policy</p> <p>Response plan for dry/drought conditions</p> <p>These could lead to efficient use of water outdoors generally and reduce the need for temporary restrictions or bans</p> <p>For example, hosing sidewalks/driveways</p> <p>Partner with NZ Sports Turf Institute</p> <p>Resources scheduled available/operational in late 2005</p>
<p><b>Planning Control/Legislative Reform</b></p> <p>Requirements for indoor water-saving fixtures, etc in areas where water management issues warrant it            Requirements for water capture/stormwater retention in areas where such is warranted</p> <p>Support changes to the new Building Code (due for implementation in early 2008) to ensure efficient, sustainable use of water – a principle embedded in the Building Act 2004</p> <p>Support moves to adopt a National water efficiency standards and labelling scheme (for toilets, taps, showerheads, washing machines, dishwashers and urinals)</p> <p>Support efforts that create more opportunities for effective demand management actions (e.g. possible volumetric charging for wastewater under provisions of the LGA 2002 and LG (Rating) Act 2002)</p>	<p>Could innovate in areas where there are pressing demands and adopt proven practices in broader areas</p> <p>Council submissions/support for desired standards will help in getting them included in the Code</p> <p>Council support will add weight to the efforts and increase likelihood of adoption</p> <p>Similar support here could give Councils additional, effective demand management options</p>

## **Instrument: Metering, Pricing & Other Financial Incentives**

<b>Option</b>	<b>Comments</b>
<p><b>Metering &amp; Pricing</b></p> <p>Install meters in certain areas to assist with leak detection and education            Install meters for particular customer classes            Universal metering</p> <p>Move from a flat rate for water to volume-based pricing at a uniform/constant price per cu m            Institute increasing-block rate pricing to discourage high-end users            Institute peak-load pricing to address seasonal shortage/ high demand for summer outdoor use</p> <p>Institute charges for waste water</p> <p>Institute stormwater charges in instances where warranted</p> <p><b>Other Financial Incentives</b></p> <p>Provide free 'testing' items such as dye tablets (for leak detection), shower flow gauge and cylinder to measure sprinkler volumes            Provide free, inexpensive flow-control devices for retrofitting old toilets, taps and showerheads</p> <p>Subsidise water-saving fixtures such as low-flow showerheads and dual-flush toilets            Subsidise rain tanks            Subsidise rain/moisture sensors            Subsidise low water use garden irrigation systems</p> <p>Arrange for discounts on purchase of water-saving appliances            Arrange for discounts on purchase of mulch and native or low water use plants for landscaping</p> <p>Provide free/subsidised audits</p> <p>Offer low- or no-interest loans and installment payment plans for purchase/install of water-saving technologies</p>	<p>Meters allow pricing structures which can promote conservation</p> <p>If two-part pricing (fixed portion + volume rate), keep fixed portion low so price is volume responsive and encourages conservation</p> <p>See previous chart and <i>Planning Guide</i></p> <p>Price of items can be reduced via direct purchase from the Council (or when installed in an audit), rebate after purchase, or via a discount voucher for presentation to other suppliers</p> <p>For residential and commercial customers</p> <p>Can be dealt with via water invoice (continue regular payment until item paid off then reduce to new rate due to lower consumption)</p>



## **Appendix C**

### **Sample Options – Water-Use Reductions**

Significant benefits can result from repairs and retrofits of water-using fixtures, including showers, toilets, taps and urinals. An audit service can address these issues – reducing the unnecessary use of water and eliminating waste.

The first example notes representative savings from retrofits and repairs – these could be in community or commercial facilities or in homes. For discussion purposes, the example is a household with a family of four.

The second example shows savings by replacing a flushing urinal with a waterless model.

In both cases, total annual water savings are noted. The economic benefits of these savings will vary from district to district, depending on the 'price' of water *or* the cost for delivered supply and wastewater treatment – however the comparison is made. In any case, the benefits can be sizeable when the savings in *one* home or facility are multiplied by the results possible from a comprehensive audit/retrofit programme throughout a district.

## Annual Savings from Retrofits & Repairs Household Example – Assumes Family of Four

*Water reductions and parts costs drawn from Tauranga City Council home visit service and using standard figures for different types of water use and practices*

### **Install one showerhead flow restrictor**

Saves 15 l/min (from 10 l flow restrictor to mains pressure delivering 25 l/min)

Annual savings: 4 people showering 6 min/day each = 24 min x 15 l x 365 days = 131,400 l

Parts cost: \$12.00

### **Install one toilet cistern weight**

Saves 6 l/flush (in old single-flush toilet)

Annual savings: 4 people, 5 flushes/day each = 20 flushes/d x 6 l = 120 l/d x 365 = 43,800 l

Parts cost: \$1.00

### **Install flow restrictor on one tap**

Saves 4 l/min

Annual savings: 4 people, 7 min use each/d = 28 min x 4 l/min = 112 l/d x 365 = 40,800 l

Parts cost: \$8.00

### **Fix one leaky toilet**

Savings (annual estimate) = 34,000 l

Parts cost: \$2.00

### **Fix one leaky tap**

Savings (annual estimate @ drops/sec) 10,200 l

Parts cost: \$ .20

**TOTAL WATER SAVED ANNUALLY** from above actions = 260,200 l = **260 cu m** (rounded)

### **AUDIT/RETOFIT COSTS**

Parts total (from above) \$23.20

Labour (say 1.25 hr @ \$40) \$50.00

**Total** **\$73.20**

### **COST PER CU M SAVED**

Cost/cu m over one year (260 saved) 28 cents

Cost/cu m over two years (520 saved) 14 cents

Cost/cu m over five years (1300 saved) 5.6 cents

## Comparison of Annual Running Costs Flushing vs Waterless Urinals

*Predicted number of uses per annum*

**CASE STUDY:** McDonald's Family Restaurant – Auckland. New Zealand. Information provided by South Pacific Waterless Ltd

Approximately 4700 transactions per week made up of the following groups: (source; McDonalds)

16% groups of 3	752	x 3	2,256	
23% groups of 2	1,081	x 2	2,162	
61% singles	<u>2,867</u>	x 1	<u>2,867</u>	
	4,700		7,285	customers per week
			7,285	divided by 7 days = 1040 customers/per day

**Assumed usage of toilets:**

Say 50% of customers are male	520 / day
Say 60% use the toilet	312 / day
Say 60% of them use the urinal	187 / day
187 x 365 days per annum	68,255 uses / year
Say 2 urinals available	34,127 uses / urinal / year
(Assuming equal usage of both)	

**Running Costs:**

<i>Flushing Urinal</i>	<i>Waterless Urinal</i>
Say 34,000 uses per year	Say 34,000 uses per year
Each flush requires approx. 4.5 litres of water 34,000 uses x 4.5 litres = 153,000 litres 153,000 litres = 153 m3	Sealtrap cartridge replaced on average after approx. 12 - 15000 uses.  Therefore say 3 cartridges required per year
Cost of supply of water taken @ \$1.10 / m3 Cost of waste water taken @ \$2.55 / m3	
153 m3 @ \$3.65 = \$558.45 per annum / urinal	3 Cartridges @ \$59 = \$177.00

**Note:** The comparison assumes the installation of a single urinal.  
 Supply and waste water costs taken as Auckland CBD charges by Metrowater.  
 Seal trap cost taken at recommended retail price.  
 On average 1.5 hours to install flushing urinal, ¾ hour for a Waterless Urinal.  
 All costs exclude GST.