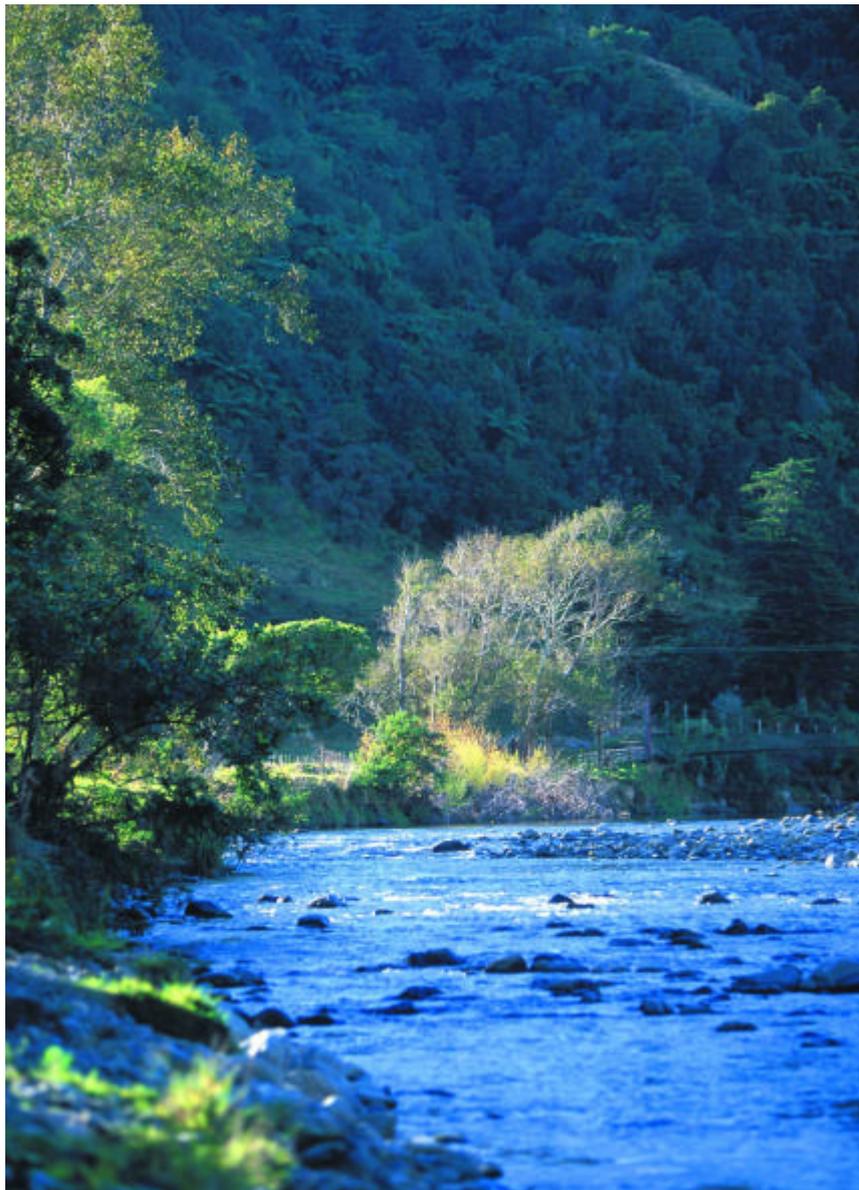


Water Demand Management Options & Opportunities for Horowhenua District Council

Technical report prepared for Horizons Regional Council

November 2006



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Prepared by

Gordon Stewart, MSc

AQUAS Consultants Ltd
PO Box 8216, Tauranga
Tel: (07) 577 1565
Fax: (07) 577 1563
E-mail: info@aquas.co.nz

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Horowhenua 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 Levin 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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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 **Levin** 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 Levin

The completed Worksheet for Levin 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 Utilities Manager follows the table.

**Levin Water Supply
Data Summary**

Item	Data*	Calculations/Comments
Consent conditions	24000/day	10,000 average daily extraction allowed, drawn from Ohau River, consent expires 2011 Peak daily extraction = 24000 from Dec 1996, with five-yearly review of conditions
Current use (system)	ADD 8509 PDD 12656	ADD = 85% of 10000 PDD = 53% of 24000 (PDD = 1.49 ADD)
Water storage capacity	6750	= 79% of ADD and 53% of PDD
Customer connections and water costs	7,785 1,297 predominately ICI metered (17%) 6,488 residential unmetered (83%)	Cost: UAC \$212 (incl. GST) Metered cost: UAC for 1 m ³ /day + \$0.65 per m ³ for consumption above that allowance Unmetered cost: UAC flat rate
Current population	19,706	2006
Current use (per capita)	ADD 432 l/p/d PDD 642 l/p/d	From 8509 / 19,706 From 12656 / 19,706
Approximate use by category	Residential ~ 62% Commercial ~ 15% NRW ~ 23%	This extracts NRW/UFW from estimates in 2.9 in the Worksheet Abattoir uses 10.2% of total; next four largest customers use 3.2% of total combined. Say commercial at 15% portion = 19% of revenue water (this could be a low estimate) NRW = Council use (5%) + UFW (18%)
Leaks/losses details	approx 18% of total	Based on total demand less metered amounts and an assessed average domestic flow taken from a sample of residential properties (50+) that have been metered for monitoring purposes Helpful data for future analysis and comparisons: length of pipe network = 200 and number of connections = 7,785, giving 38.9 connections/km
Residential use estimate (net)	ADD 267 l/p/d PDD 398 l/p/d	23% NRW and 15% ICI, means 62% residential, so ADD = 8509 x .62 = 5276 / 19,706 = 267 l/p/d and PDD = 12656 x .65 = 7846 / 19,706 = 398 l/p/d
Possible future demand (2011 estimate)	ADD 9360 = 94% of 10000 consent equates to 469 l/p/d (gross) PDD 13922 equates to 698 l/p/d (gross)	10% increase in total demand anticipated in the next few years. Expected population increase ~50/year so increase of 250 by 2011. Population in 2011 = 19,956 Estimated ADD in 2011 = 8509 x 1.1 = 9360 Estimated PDD in 2011 = 12656 x 1.1 = 13922

* All water volume figures are cubic metres unless noted otherwise

Additional Information

Mains Water Pressure – Pressure is generally good throughout the system.

Summer Outdoor Use – Garden watering adds considerably to demand for water in the summer season.

Customer Education – Historically there has been a free tap-washer replacement programme for residential properties, but this has not been carried out during the past few years due to reduced interest.

Demand Management Initiatives

Current – Efforts are ongoing to meter commercial customers that are not currently metered. Monitoring rural connections (set for restricted flow provision of water) to detect any interference with these installations and rectifying problems.

Planned – Concerted efforts around pressure management and leak detection. Metering residential properties with swimming pools and charge the same volume rate as commercial.

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 Levin system summarised in Part 2 suggest that:

- Metering effort with commercial customers (currently unmetered) could identify extraordinary use or otherwise undetected losses and lead to greater efficiencies.
- There have been no efforts yet to work with Levin Meats to assess water use so improvements could result here as well.
- Given good mains pressure, there are opportunities to reduce water use via flow restrictors, pressure valves, etc installed on customer's fixtures/reticulation. A controlled study to examine the benefits of this could be done using Council's pensioner flats and other congregate housing (such as Summerset-Levin Retirement Village and Rest Home, Madison Rest Home Hospital & Village, and PSSC housing).
- Given summer outdoor water use, there are opportunities to reduce use via a promotional campaign.
- There may be value in a customer advisory service (as previously run) beyond replacing washers – for general water conservation information and advice. Reinstating this service could be helpful, but it will require good promotional support and even a proactive approach targeting older homes with a higher likelihood of having inefficient fixtures.

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 Feilding

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 – Pressure management/leak detection work will help to identify water loss 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 – 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 – Council has already demonstrated the significant benefit to upgrading public facilities (with manual flushing systems on urinals and dual-flush cisterns in some premises). This effort could be extended beyond Council-owned facilities to 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 obviously help to manage water use on properties that involve horticulture or stock watering. Educational efforts to help customers achieve 'best practice' levels of water use could bring additional benefits.

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. (Information provided by Horowhenua District Council for this study similarly notes the benefits of metering.) Data such as this suggests that metering should always be 'in the mix' when considering options for reducing water use.

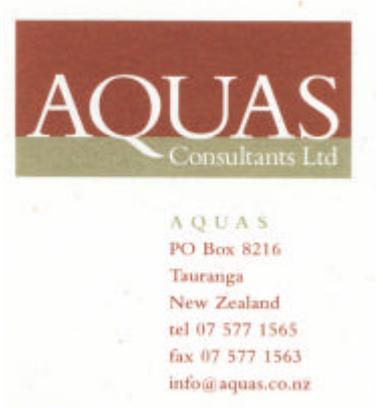
Other financial incentives – Providing a customer water advisory service – if it is free or subsidised – is a form of financial incentive. Retailer discounts or rebates for purchase/install of water-saving fixtures or appliances is an additional form of financial incentive. These have proven effective 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.

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Appendix A

Horizons Regional Council

Public Water Supplies – Water Efficiency Guidelines Project

WATER SUPPLY SERVICES WORKSHEET

for

LEVIN

**Provided to Horowhenua District Council 12 July 2006
Completed Worksheet received 2 August
Additions 30 August
Reviewed by HDC, Finalised 31 August**

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.

SECTION 1: General Statistics & Trends

Population

1.1 Population at 2001 Census

19,527

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

19,706

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

Anticipated growth of around +50 PA.

Industry

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

We have a primary rural servicing focus (with one large meatworks), although there are also a considerable amount in the fabric processing and dyeing area, as well as a large cardboard box factory.

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

We have a number of new industry/commercial enterprises becoming established over a range of activities. A Loaded Hog brewery/bar/restaurant will be locating here and there is demand for industrial land.

Other

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

Levin has a considerable number of older houses with a significant number built in the 60's during a building boom in that era.

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

Total of 100, in groupings, maximum 30-40 in one location.

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

Levin is recognised as an area where a lot of people retire to. The population demographics have a much higher percentage from average number of retired residents. These people tend to have activities with higher water use than normal (such as enthusiastic gardeners).

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.)

- "3. *The average daily abstraction of water from the Ohau River under this permit shall initially be 10,000 cub mtrs with the objective of reducing this to a target average daily extraction of 8,000 cub mtrs by 31 December 1996.*
4. *The peak daily abstraction of water from the Ohau River under this permit shall be 18,500 cub mtrs until 31 December 1996.*
5. *The average daily abstraction of water from the Ohau River under this permit for the period 31 December 1996 until 31 December 2011 shall be determined from the Review of Conditions at 31 December 1996, and thereafter at 5 yearly review of periods.*
6. *The peak daily abstraction of water from the Ohau River under this permit during the period 31 December 1996 to 31 December 2011 shall initially be 24,000 cub mtrs and thereafter shall be determined from the 5 yearly review of conditions."*

2.2 Total storage/reservoir capacity for the system

Currently a nominal 6,750m³ of treated water storage capacity.

2.3 Overall demand for water and seasonal variations

- Total annual production (note period)
Total during 2005 - 3,105,679m³
- Average day demand
During 2005 - 8,509 m³
- Peak day demand
During 2005 - 12,656 m³
- Other (any other data/info tracked on water use)

2.4 Estimate of water loss/leaks

- As a percentage of total production
- Location/cause of losses

It is suspected that a lot of these leaks would be present within the property boundaries, as evidence from new metering installations has found that to be the case at a very high proportion of installations.

Leakage rate in the system estimated at 18% based on total demand less metered amounts and an assessed average domestic flow taken from a sample of residential properties (50+) that have been metered for monitoring purposes.

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

There has been the need to impose Irrigation restrictions most summers for the purposes of (1) minimising excess water demand in an effort to match availability within the river source and (2) to ensure the water use does not exceed Consent limits.

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

Maintaining an adequate availability to meet residential demand particularly as the number of properties and residents increase, as well as retaining adequate capacity to meet industrial and commercial demands as the water use in these areas continues to increase.

Customer information

2.7 Number of customer connections	7,785
<input type="checkbox"/> Number with meters	1,297
<input type="checkbox"/> Number without meters	6,488

Metered customers are predominantly industrial and commercial properties. Council has considered implementing Universal metering, but deferred this following the LTCCP submission process.

2.8 Number of *customers* served by water supply (different to population in 1.2?)
7,785 connections serving population of 19,706

2.9 Customer breakdown (e.g. % of total connections *or* water use by customer class):

<input type="checkbox"/> Residential	Approx. 80%
<input type="checkbox"/> Commercial/industrial (including schools)	Approx 10%
<input type="checkbox"/> Council use (community facilities, public toilets, etc)	Approx 5%
<input type="checkbox"/> Agricultural	Approx 5%
<input type="checkbox"/> Other	

Agricultural use is largely for horticulture and stock (beef, sheep) watering.

2.10 Any further breakdown of commercial/industrial customers (e.g. office/retail, manufacturing, hospitality)

2.11 Water rates (by customer type if it varies) – UAC, targeted rate, fixed annual charge, volume charge, etc.

UAC \$212 (incl. GST) for 2006/07

Volume charge for metered customers is \$0.65/m³ beyond 1m³/day allowance covered by UAC.

Metered customers are billed quarterly – only sent an invoice if consumption is over the allowance for the period (i.e. 91 m³ for 91 days)

Industry water use

2.12 List the 5 to 10 largest water users and their annual use. Is the use seasonal?

Levin Meats (abattoir)	318,000	some seasonal variations (see below)
Levin Eel	27,500	seasonal
Levin WWTP	21,200	regular
Rhodia chemicals	19,300	regular
Masonic Village	14,500	regular
Carter Holt	14,300	regular

Total for 6 above = 414,800 = 13.4% of total annual use in system

Levin Meats takes about 10% of total supply averaged over the year. Use varies from a low of around 700 m³/day in the winter to a high of around 1000 m³/day during summer.

2.13 Anticipated future increased needs from industry/agriculture - expansions, new arrivals, etc. (This may have been covered in 1.5.)

It is anticipated that a further 10% increase in demand will occur through both residential and commercial development during the next few years.

SECTION 3: Demand Management Activities & Opportunities

Revenue Water – Customer Level

3.1 List/describe any current demand management activities targeting customers

- | | |
|---|-----|
| <input type="checkbox"/> Metering/volume pricing (could have covered this in 2.11) | YES |
| <input type="checkbox"/> Information and education | YES |
| <input type="checkbox"/> Promotion of water-saving technologies and practices | YES |
| <input type="checkbox"/> Financial Incentives (e.g. rebates for low-flow showerheads) | |
| <input type="checkbox"/> Regulatory (e.g. water restrictions) | YES |
| <input type="checkbox"/> Recycling/reuse (stormwater, wastewater) | |

3.2 For any activities noted above, briefly describe the uptake, success, etc., to this point;

There is a noticeable difference in water use between residents on an on-demand (metered) charging regime compared with those on UAC rates. We have a number of residential properties throughout Levin that are monitored for water use which we can compare with metered residential properties in Ohau and in the rural areas.

There appears to be a reasonable level of compliance with respect to irrigation restrictions when imposed. Council has also employed inspectors to check on water use and report instances of abuse. A follow up note from Council usually has the desired effect.

3.3 Please list/describe any customer-level demand management activities you are *now* considering or planning

Council has also been undertaking inspections of some rural connections in order to detect any cases of interference with these installations. It is surprising to find a high level of tampering of some restricted flow connections to enable a higher flow rate to be obtained.

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.

Council has metered most of the public facilities and is internally invoicing for this water use. The Managers responsible for those assets now have a financial incentive to minimise water wastage at these premises.

Assistance has also been provided to reduce water use, i.e. manual flushing systems on urinals and fitting dual-flush cisterns in some premises has reduced water use to some 15% of previous levels.

3.5 Please note (briefly) any *current* pressure management and/or leak detection/reduction efforts

Council has set up zones within Levin to enable District metering to be undertaken. The purpose of this has been to identify areas with elevated UFW factors that should be prioritised when undertaking an acoustic survey. Funding has been provided for these activities within the LTCCP. Metering of these areas with greater accuracy meters are planned to be fitted soon. Rural areas are metered separately but, with the equipment used, there could be leaks and losses that remain undetected.

3.6 Please list/describe any pressure management or leak detection efforts you are *now* considering or planning

There are a number of options that are being considered for further evaluation including pressure management.

3.7 Any other current activities or opportunities to reduce NRW in the 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?

Length of the pipe in the network = 200 km

Number of connections = 7,785

Connections per km of pipe = 38.9

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

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

Information & Education	Regulatory Mechanisms	Metering, Pricing & Other Financial Incentives
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>Residential</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>Commercial/Industrial/Institutional</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>Residential</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>Commercial/Industrial/Institutional</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

Option	Comments
<p>Rainwater Use & Greywater Reuse</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>Stormwater Management & Waste Water Recycling</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>General Communication</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>Personalised Information</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>Personal Contact</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>

<i>Information & Education ... cont'd</i>	
Promotional Efforts	
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
School Education Programmes	
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>Bylaws & Restrictions</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>Planning Control/Legislative Reform</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

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

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.