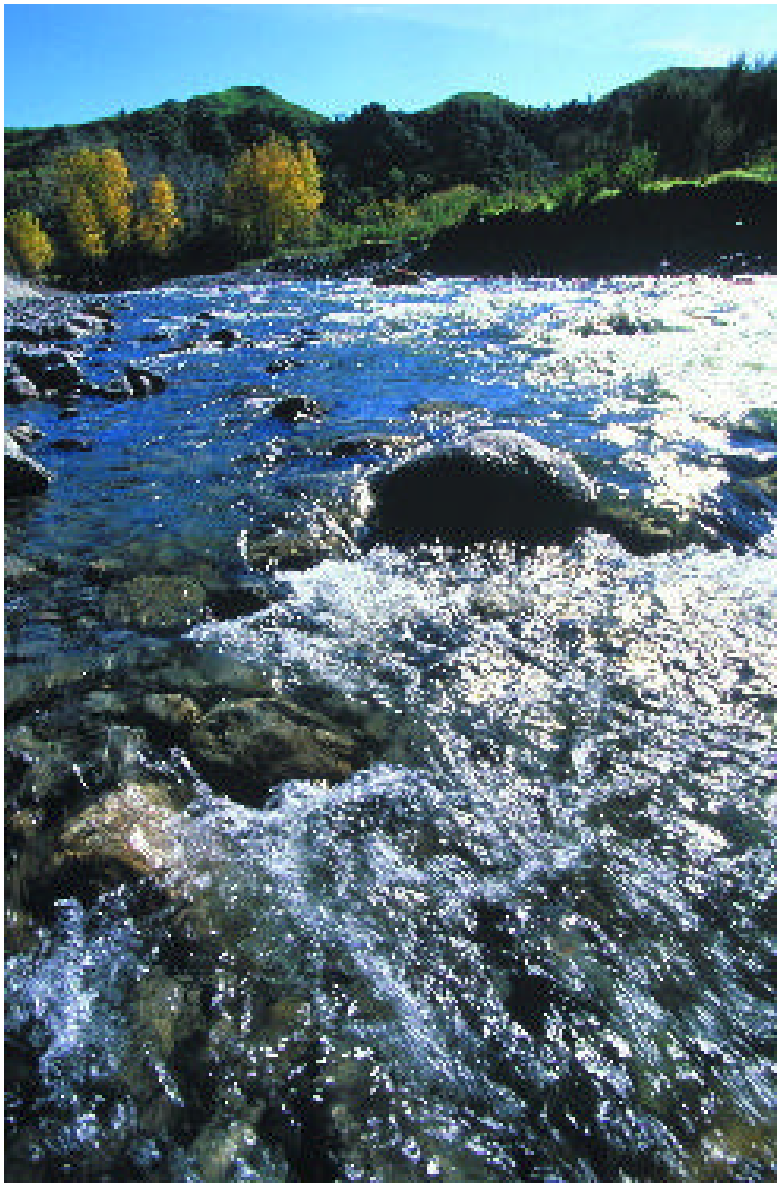
Water Demand Management Options & Opportunities

for Tararua District Council

Technical report prepared for Horizons Regional Council

November 2006



horizons regional council

AQUAS Consultants Ltd

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Technical report prepared for Horizons Regional Council

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Tararua 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 Eketahuna 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.

Contents

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 **Eketahuna** 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 Eketahuna

The completed Worksheet for Eketahuna 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 and Service Engineer follows the table.

Eketahuna Water Supply
Data Summary

Item	Data*	Calculations/Comments
Consent conditions	1600/day	Beginning 13 Dec 2006 – 1424/day; beginning 13 Dec 2014 – 1260/day; max flow rate – 75/hour (21 l/s) Low-flow conditions (until 2009): Up to 750/day at 15 l/s when river flow is between 412 and 325 l/s and 450/day when flow is < 325 l/s. Low-flow conditions (2009-2019): as above plus third condition – Up to 165/day at 5 l/s when flow < 240 l/s Take from Makakahi River, consent expires 2019
Current use (total system)	ADD 929 (Feb) 671 (June) PDD 1138 (Feb) 767 (June)	Feb ADD = 58% of consent, PDD = 71% of consent These totals include use by about 10 dairy farms on the intake line between the source and the water treatment plant for the town
Current use (town)	February ADD 757 February PDD 944	From tables provided. February ADD total system = 929 and for town = 757. So 172 for farms (=18.5% of total)
Water storage capacity	450	= 59% of town Feb ADD and 48% of PDD
Town customer connections and water costs	250 20 meters, 230 no meters	Unmetered: $192.40 (incl GST) annual charge Metered: $0.48/$m^3$ up to 100/quarterly and $0.66/$m^3$ for additional
Current population	440	2006 estimate
Current use (per capita) in town	Feb ADD 1,720 l/p/d Feb PDD 2,145 l/p/d	From 757 / 440 From 944 / 440 No significant industry in township, but use includes unmetered commercial properties and a number of farming operations in or on the edge of town
Use by category (town)	Difficult to determine at this point	Customer breakdown: residential 208; ICI 7; Council 5; agricultural 15; lifestyle blocks 12, other 5 (incl. golf club)
Leaks/losses details	Unsure at this point	See Additional Information for details Helpful data for future analysis and comparisons: length of pipe network = 21.4 and number of connections = 250, giving 11.7 connections/km
Future demand (total system)	ADD and PDD regularly above consent in times of (summer) low flow In 2014 Feb ADD is 74% of unrestricted consent, PDD is 90% of it	Steadily declining population and no increase in commercial use anticipated, so no significant changes expected in demand. If so, (current) Feb ADD as % of consent in 2014 (with no low-flow restrictions) is 929 / 1260 = 74%: of PDD = 1138 / 1260 = 90%

* All water volume figures are cubic metres unless noted otherwise

Additional Information

Type of System – The system serves about 10 dairy farms on the way into town – between the source and the town water treatment plant. Town customers (250 connections) include normal residential on small lots, commercial, and a range of agricultural users including grazing dairy and sheep. This is not a typical rural or urban system, but a bit of a hybrid (given the in-town use of water for agricultural purposes).

Dairy Farms on the Intake Line – Historically, these farms have not paid for water drawn from the system, are not subject to restricted flow delivery of water, and do not have on-site storage. Some are now metered for monitoring purposes, but there is still no water charge in place. Some farms are now providing for on-site storage. These farms take a considerable portion of the system total. In February 2006, for example, their daily average was 172 m^3 or 18.5% of the 929 m^3 for the system as a whole.

Town Water Use – As noted above, this is an unusual system. Inclusion of farming operations skews the per capita water use figures on the Data Summary sheet. One town customer, for example, runs a dairy operation on a 107 ha block. Another town (agricultural) customer has five connections, each one going to a separate trough for stock watering. Some troughs are old bath tubs; other troughs aren't level and are seen to be (regularly) overflowing.

Leaks & Losses – In the last financial year (prior to the consumption figures in the Data Summary), several significant leaks were found in the system. One was on a bridge abutment and draining into the river. Another had water discharging into a culvert, and a third was on private property and losing some 10 m^3 a day. Efforts are now ongoing to reduce losses (see details below).

Mains Water Pressure – Water pressure is generally high in order to ensure adequate pressure in some (distant and higher) areas.

Demand Management Initiatives

Efforts are now underway to assess opportunities and make changes in the interest of water-use efficiency. The approach is to "hit the easy stuff first".

Current efforts include:

- regular checks for leaks and losses in the system pipes
- rationalising extraordinary uses (e.g. reducing number of connections to one property, metering and volume charging, checking for obvious losses and inefficient application methods)
- metering commercial customers currently paying an annual flat rate.

Planned

It is intended that the bulk of the effort noted above would be completed by February 2007. Once this is completed, additional more specialised work such as monitoring night flows and acoustic testing for leaks will be considered. Installation of zone pressure valves is also planned.

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. Sections 3.2 and 3.3 follow with some suggested DM options. Current DM efforts in the Eketahuna system are strongly supported and should lead to significant reductions in water use. Other initiatives as outlined below can follow along after – and be applied in other systems in the district as needed.

Appendices B and C are provided for 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 a water demand management plan is best implemented at the district level. If such a plan were to be pursued, 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 Eketahuna system summarised in Part 2 suggest that:

- The current DM initiatives have real potential for reducing water use in the system.
- Instituting a proper metering and pricing system for the (outer) dairy farms should reduce water use and it would make the provision of water more equitable amongst the various customers.
- Given good pressure throughout the system, there are potential benefits in reducing water on individual properties by installing flow restrictors on fixtures, pressure reducing valves at building intake, etc. (The benefit of this step is relatively small, though, compared to other current and planned activities as noted.)
- Other, more traditional, approaches to DM are best pursued once the overall changes/updating of the system noted in Part 2 above have been realised.

3.2 Logical Options

Here are some key options for water-saving efforts. Some apply specifically to the Eketahuna system, while others may have application in other townships/systems in the district (as determined by a broader assessment).

Metering large water users – Working to get *all* non-residential customers metered is a worthwhile step. This will help monitor and charge extraordinary users, rationalise connections, and motivate customers to use water more efficiently as it will be a direct cost of doing business. Sorting the 10 dairy farms on the Eketahuna supply that currently receive water at no cost would be a helpful early step.

Rural customer water use – To build on the metering, educational efforts to help customers achieve 'best practice' levels of water use can bring real benefits as well. The 'Smart Water Use … in Dairy Farming' programme in the Waikato is an example of the kind of effort could be beneficial in TDC.

Industrial/commercial water advisory – This would have application in other water systems in the district with larger commercial water users (other than agriculture) and builds nicely on metering efforts mentioned above. (It is noted that Eketahuna does not have this sort of customer base.) 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 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.

On-property leak detection – Leak detection efforts 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 lettering writing, etc., as it is the responsibility of customers to fix leaks on their own property.

Public, community, and commercial toilets – There are good 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^3/hr or 19.2 m^3/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).

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 where it isn't currently in place, 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.

Summer water-use campaign – This would apply in any area experiencing high summer water use driven by residential customers and their outdoor/garden watering practices. It can be an effective option to address high season demand when water resources are under their greatest pressure. This will be particularly challenging wherever residential properties are not metered, as there is no financial incentive to reduce water use. It would, thus, require a well-planned communication/social marketing effort. This has been identified as an issue in other districts in the region, so a cooperative effort (even involving the Regional Council) would make sense and help to maximise benefits.

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

EKETAHUNA

Provided to Tararua District Council 12 July 2006
Completed Worksheet received 2 August
Additions 28 August
Reviewed by Council, 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 558

1.2 Estimate of current population (July 2006) *or* most recent estimate 440

1.3 Expected resident population in 2011 … in 2021 (*or* projected annual change in population) Not known

Industry

1.4 Industry/commercial activities – what drives the economy of the area
Farming – mainly dairy and sheep

1.5 Any anticipated change in industry/commercial activities in next few years (e.g. gain or loss of large businesses)
No real large industry operating in Eketahuna and most likely to stay that way.

Other

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

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

1.8 Any other information that should be noted (i.e. things that might have an impact on demand for water)
Public swimming pool
Dairy farmers connected to intake line coming into town

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.)

Current consent is for 1600 m3/day. Beginning 13 Dec 2006 it reduces to 1424/day; beginning 13 Dec 2014 it goes to 1260/day. Maximum flow rate is 75/hour (21 l/s).

Low-flow conditions (until 2009): Up to 750/day at 15 l/s when river flow is between 412 and 325 l/s and 450/day when flow is below 325 l/s.

Low-flow conditions (2009-2019): as above plus third condition – Up to 165/day at 5 l/s when flow below 240 l/s.

2.2 Total storage/reservoir capacity for the system 450 m3 for town supply

2.3 Overall demand for water and seasonal variations – ADD and PDD figures in bullets below are for the total system including the approximately 10 dairy farms on the intake line coming into town as noted in 1.8.

- Total annual production (note period)
- Average day demand Feb 06 929 m3 April 06 842 m3 June 06 671 m3
- Peak day demand Feb 06 1138 m3 April 06 1004 m3 June 06 767 m3
- Other (any other data/info tracked on water use)

For town use (serving 440 population): February ADD 757 and PDD 944

2.4 Estimate of water loss/leaks

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

See Additional Information page for details

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

Low river flows require water restrictions February/March at least every second year.

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

Customer information

2.7 Number of customer connections

- Number with meters 20
- Number without meters 230

Progressively working to meter all commercial customers and those with property > .9 ha

2.8 Number of *customers* served by water supply (different to population in 1.2?)

250 connections as in 2.7 serving a population of 440

(Some properties have more than 1 connection. There could be as many as 400 total connections.)

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

- Residential 208
- Commercial/industrial (including schools) 7
- Council use (community facilities, public toilets, etc) 5
- Agricultural 15
- Other 5 including the golf club
- Small Lifestyle blocks 12

			Cows	Heifers	Calves
T Burrell	9046	111.6945	290	63	50
A D Rasmussen	9050	88.012	229	50	50
L W Smith	9048	78.54	410	90	80
L W Smith	9070	81.93			
PJ & SM King Ltd	9047	126.312	328	70	62
G C Campbell	9038	255.17	473	100	94
Dewes Holdings	10284	164.798	428	94	85
R J Cresswell	9056	65.722	170	37	25
G B Hirst	9034	79.541	206	45	30
Paul Capes	Total	306.91	800	170	145
Paul Capes	8991				
Paul Capes	9043				
	Totals	*1358.63*	*3334*	*719*	*621*

Extra Land area within the town boundary 170 hec 420 acres at approx 4 sheep to acre equivalent of 1680 sheep in total

2.10 Any further breakdown of commercial/industrial customers (e.g. office/retail, manufacturing, hospitality) 2 Pubs and a Club

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

Non-metered pay $192.40 (incl GST) annually
Metered customers are billed quarterly, paying $0.48 per cu m for the first 100 cu m each period and $0.66 per cu m above that

Industry water use

2.12 List the 5 to10 largest water users and their annual use. Is the use seasonal?

Paul Capes 2480 m3
J Monaghan 2342 m3
C Anderson 1920 m3
Eketahuna Golf Club 1296 m3
H Moes 710 m3
Some of the above are farms in or on the edge of town ('inner farms).
This list does not include the farmers on intake line.

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

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)
- ❑ Information and education
- ❑ Promotion of water-saving technologies and practices
- ❑ Financial Incentives (e.g. rebates for low-flow showerheads)
- ❑ Regulatory (e.g. water restrictions) Only when needed
- ❑ Recycling/reuse (stormwater, wastewater)

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

When water restrictions are needed usually hand deliver letters to mail boxes around town to ensure receipt. Restrictions have little effect because of the range of extraordinary uses of water in the system. See Additional Information for details.

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

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.

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

We are on the look out continuously for leaking troughs, pipes, illegal connections or unnecessary dual connections to the same property. See details in Additional Information.

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

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 = 9.18 km into town + 12.2 km around town = 21.38 total
Number of connections = 250 - Could be as many as 400 – See 2.8
Connections per km of pipe (for 250) = 11.7

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 *Fixtures and devices* *Appliances* *Audits and retrofits* Industrial/Commercial/Institutional *Fixtures and devices* *Production processes and practices* *Audits*	Residential *Moisture gauges, timers and shut-off devices* *Irrigation systems* *Water-saving landscapes* *Other applications and activities* *Audits* *On-property leak detection* Commercial *Irrigation* *Audits* *Broader management practices*	Water Capture/rainwater harvesting Storm water management Greywater reuse Wastewater recycling

Instruments

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

Measure: Technologies & Practices – Indoor

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

Measure: Technologies & Practices – Outdoor

Option	Comments
Residential	
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	Significant benefits possible from small/ inexpensive changes
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	Education needed here to promote low water use gardening practices
Curtail practices that waste water Outdoor/garden audits to improve watering practices and promote uptake of water-saving devices	Regulations/bylaws can address wasteful use of water
Use system-level leak detection work to identify significant leaks on customer properties	On-property leak detection is a natural by-product of system level analysis
Commercial/Industrial/Institutional	
Technologies/practices (as in Residential above) for landscape care	
Ensure effective water management practices for sports fields, reserves and passive areas	Audit service available from NZ Sports Turf Institute
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	These two INZ resources scheduled available/operational in late 2005
Develop/participate in a community-based monitoring service for climate/soil moisture to ensure efficient pasture irrigation	Investigation into this already completed for Environment Waikato

Measure: Water Capture, Reuse & Recycling

Option	Comments
Rainwater Use & Greywater Reuse	
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)	Simple system can serve outdoor needs and reduce demand for mains water Install costs higher for indoor/plumbing needs
Reuse greywater (from shower and laundry) for garden irrigation	Best using drip irrigation
Reuse greywater for toilet flushing	Install/plumbing costs to consider
Consider rainwater/greywater use in developments employing a communal system	Reduces per property cost
Stormwater Management & Waste Water Recycling	
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	Triple benefit – environmentally-friendly and cost-effective stormwater management approaches also reduce demand on mains water normally used for lawn and garden irrigation
Use self-contained wastewater system in new residential developments. Can reuse grey and black water and eliminate wastewater from leaving the site	Potential cost savings over traditional systems even where reticulation is available, plus uses treated water as a beneficial resource
Use Council treated wastewater to irrigate public gardens; road verges; golf courses; turf, tree, and dairy farms, etc	Can be cost effective. May require education for public acceptance

Instrument: Information & Education

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

Information & Education … cont'd	
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
Bylaws & Restrictions	
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	First three items could be temporary, precautionary measures *or* permanent policy Response plan for dry/drought conditions
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	These could lead to efficient use of water outdoors generally and reduce the need for temporary restrictions or bans
Prohibit certain (wasteful) practices of outdoor water use	For example, hosing sidewalks/driveways
Ensure repair of significant on-property leaks	
Require audits for all commercial/community irrigation systems above a certain area or volume of water use	Partner with NZ Sports Turf Institute
Require agricultural irrigation to conform to design and efficiency standards set out by Irrigation New Zealand	Resources scheduled available/operational in late 2005
Planning Control/Legislative Reform	
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	Could innovate in areas where there are pressing demands and adopt proven practices in broader areas
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	Council submissions/support for desired standards will help in getting them included in the Code
Support moves to adopt a National water efficiency standards and labelling scheme (for toilets, taps, showerheads, washing machines, dishwashers and urinals)	Council support will add weight to the efforts and increase likelihood of adoption
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)	Similar support here could give Councils additional, effective demand management options

Instrument: Metering, Pricing & Other Financial Incentives

Option	Comments
Metering & Pricing	
Install meters in certain areas to assist with leak detection and education Install meters for particular customer classes Universal metering	Meters allow pricing structures which can promote conservation
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	If two-part pricing (fixed portion + volume rate), keep fixed portion low so price is volume responsive and encourages conservation
Institute charges for waste water	See previous chart and *Planning Guide*
Institute stormwater charges in instances where warranted	
Other Financial Incentives	
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	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
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	
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	
Provide free/subsidised audits	For residential and commercial customers
Offer low- or no-interest loans and installment payment plans for purchase/install of water-saving technologies	Can be dealt with via water invoice (continue regular payment until item paid off then reduce to new rate due to lower consumption)

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	2,867	x 1	2,867	
	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 (Assuming equal usage of both)	34,127 uses / urinal / year

Running Costs:

Flushing Urinal	***Waterless Urinal***
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.