



# WATER CONSERVATION STRATEGY 2009

**ROTORUA DISTRICT COUNCIL**  
**WATER CONSERVATION STRATEGY 2009**

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## **1. INTRODUCTION**

### **1.1. OVERVIEW OF ROTORUA'S WATER SUPPLIES**

Rotorua District Council operates and manages ten public water supplies, together supplying approximately 5,760,000 cubic metres of water annually to 57,500 consumers.

These supplies are:

- Central Urban
- Eastern Urban
- Ngongotaha Urban and Rural
- Mamaku
- Rotoiti
- Rotoma
- Kaharoa
- Reporoa
- Hamurana
- Okareka

Council has responsibilities under the Local Government Act 2002 and the Health (Drinking Water) Amendment Act 2007 to manage these water supplies, and achieves this through documents such as Long Term Council Community Plans, Annual Plans, Asset Management Plans and Water Supply Strategies for various areas.

### **1.2. WHY HAVE A WATER CONSERVATION STRATEGY?**

Although Rotorua District is blessed with abundant natural water sources, water is becoming an increasingly valued commodity. Rotorua District Council has a responsibility to residents to provide adequate supplies of drinking water for the District's needs into the future.

The value attached to water and associated increasing difficulties in obtaining rights for abstraction will combine with an increasing population to place pressure on the ability to provide adequate volumes of water.

It takes energy and costs money to treat and distribute water to meet New Zealand's Drinking Water Standards, and to treat and dispose of wastewater with the minimum of impact on our lakes and wider environment. Unconstrained demand for these services will exacerbate already heavy financial pressure on ratepayers, and unnecessarily consume resources.

There are a number of national, regional and local legislative and planning instruments which are drivers of the need for sustainable management of water supplies, including:

- Water Programme of Action – Ministry for the Environment (2003)
- Resource Management Act 1991
- Local Government Act 2002
- Operative Regional Policy Statements – Environment Waikato and Environment Bay of Plenty
- Environment Bay of Plenty and Environment Waikato Regional Water and Soil Plans
- District Plan
- Annual and Ten Year Plans
- Various Resource Consents

It is essential that Rotorua District Council takes all practicable steps to ensure that efficient use is made of the water it abstracts from the environment. A Water Conservation Strategy will assist in identifying and prioritising appropriate steps to achieve this.

### **1.3. OBJECTIVES**

The objectives of this Water Conservation Strategy are to:

- Build up an accurate knowledge of the current volume of water extracted by Council, and how it is utilised by the community.
- Set achievable targets for the reduction of wastage, losses and community water consumption.
- Identify current initiatives limiting wastage, losses and consumption.
- Identify and assess possible new initiatives or improvements to existing ones in terms of their potential effectiveness.
- Decide upon new or improved initiatives and set priorities and timeframes for these.
- Set timeframes for reviews of the strategy and its effectiveness in achieving its targets.

### **1.4. DOCUMENT STRUCTURE**

This document is set out in the following sections:

- Section 1 introduces the drivers for and objectives of this Water Conservation Strategy.
- Section 2 summarises the main action points of this strategy.
- Section 3 deals with the data gathering and analysis processes required to provide the information needed on which to base sound management decisions relating to water conservation.
- Section 4 covers management of Council's infrastructure and systems to minimise the loss and wastage of water (Supply Management).
- Section 5 describes covers areas that Council can be involved in to inform and influence consumer behaviour with respect to water use and wastage (Demand Management).

Sections 3-5 are set out in a manner which firstly describes current measures and practices, then discusses options for new initiatives and describes the actions to be taken.

## **2. EXECUTIVE SUMMARY**

Rotorua District Council operates and manages ten public water supplies. Various pieces of legislation impose responsibilities to efficiently manage these. For operational, cost, and environmental reasons, Council needs to ensure that efficient use is made of the water which it abstracts from the environment, and that wastage and losses are minimised to the full practical extent.

This document aims to assess current practices which contribute to water conservation, and to identify strategies to improve or enhance these. These practices and strategies have been grouped into three areas.

### **2.1. PRODUCTION**

Council records the amount of water taken from its sources, and as far as possible, measures or assesses how or where it is used. This enables an estimate to be made of losses and wastage.

An important part of a conservation strategy will be accurate measurement of usage and losses, and the setting of realistic and achievable targets for improvements.

The following actions have been identified in this area:

- Review flow metering at each site and upgrade if necessary. This will be done in conjunction with the water treatment upgrade. (2009)
- Review each network to determine the appropriate number and layout of metering zones.(completed)
- Ensure bulk (headworks and zone) meters are recorded in the asset register, and replacement and maintenance schedules are updated and followed. (ongoing)
- In conjunction with the backflow checking and installation programme, ensure that the appropriate consumer metering is in place. (2010-2012)
- Undertake a sample testing programme of domestic meters to assess their accuracy and practical lives. (2009-2010)
- From the testing programme above, develop an ongoing meter replacement programme. (2010)
- Continue with metered consumption trial on urban domestic connections, and review consumption assumptions. (2009)
- Implement a system to record and estimate hydrant and other bulk unmetered use. (2009)
- Implement systems to gather the data required to use the NZWWA Benchmarking Water Losses in NZ methodology, and make a full assessment of losses using this. This will include assessing losses from mains breaks and bursts. (2009)
- Analyse the potential effects of actions arising from this strategy to set and regularly review usage and loss targets. (2009 and onwards)

## **2.2. DISTRIBUTION SYSTEM MANAGEMENT**

Council's water pumping, storage and distribution network provides many opportunities for water losses from leakage, breaks and bursts, and unauthorised use.

Management plans, systems and structures are in place which contribute to an efficient system where losses are minimised, but there are still improvements which can be made. Actions to achieve this are:

- From 4.1.1 Actions. (2010)
- From the results of the "Benchmarking Water Losses in NZ" exercise, review the extent and priorities of the current leak detection programme. (2009-2010)
- Continue with review and updating of the Operations Manual and Asset Management Plan. (ongoing)
- Review mains replacement programme annually to target areas most in need. (ongoing)
- Complete the review of the Utilities – Castlecorp service agreement for Water Supplies. (2009)
- Complete the review of the Water Supplies Operations Manual. (2009/10)
- Carry out a full assessment of metallic corrosion-related network faults, and the cost of these using maintenance data. (2009/10)
- Assess the potential costs and benefits of carrying out pH adjustment to reduce metallic corrosion. (2010)
- Investigate applicability of cathodic protection for use on water assets. (2010)
- Ensure that public education programmes provide for and encourage feedback from the public on breaks, leaks and unauthorised use. (ongoing)

## **2.3. CONSUMER DEMAND MANAGEMENT**

The influencing of consumer water use will contribute greatly to water conservation objectives. Volumetric pricing can be very effective in reducing demand, but the capital infrastructure required to achieve this is at present prohibitive.

An effective public education strategy remains the most practical area in which Rotorua District can reduce consumer demand. Identified actions in this area are:

- Engage assistance in developing a structured annual water conservation advertising programme. (2009)
- Engage a part-time environmental educator to promote water conservation. (2009)
- Ensure that all Council managers and staff are aware of the need for, and the tools available to minimise, water consumption in their areas of responsibility. (ongoing)

- Review expenditure at each Long Term Council Community Plan process to reassess costs/benefits of water metering. (ongoing)
- Assess the viability of undertaking water audits on the largest commercial consumers. This will require assessment of available resources. (2009)



### **3. ANALYSIS OF PRODUCTION, USAGE AND LOSSES**

#### **3.1. PRODUCTION**

##### **3.1.1. Metering at Headworks**

For resource consent compliance and management purposes it is essential to have accurate measurement of water abstracted from sources and supplied to the reticulation systems. All source abstraction points have a bulk meter to measure abstraction, with a method of collecting and storing real-time data, dependent on the size of the supply.

A project is currently underway to install ultraviolet disinfection treatment at all sources except Mamaku. A requirement of this treatment is accurate metering at the treatment plant.

##### **3.1.2. Zone Metering**

For some supplies, particularly the larger ones, it will be appropriate to divide the network into zones which are individually metered. This will assist in identification of areas with abnormal losses.

The extent of subdivision of networks into separately metered zones will depend on the size of the network and its layout.

Each network will be analysed to determine the appropriate number and location of zones and zone meters.

##### **3.1.3. Meter Maintenance/Calibration**

To ensure accuracy of production data, meters should be checked, calibrated and maintained regularly.

The NZWWA Water Meter Code of Practice will be used as a guide to ensure that checking is carried out at appropriate intervals.

All headworks and zone meters will be recorded individually in the asset register to ensure a record is kept of date of installation, age, and maintenance history.

##### **3.1.4. Production Data**

Data from meters at abstraction points and zone entry points is gathered either by weekly manual reading or electronic means, and entered into electronic spreadsheets.

This data is used to produce regular reports for internal use, and for supply to external agencies such as Regional Councils.

In conjunction with other data such as energy use and consumer meter readings, it is used to monitor and improve performance over a number of areas.

### **3.1.5. Actions**

Review flow metering at each site and upgrade if necessary. This will be done in conjunction with the water treatment upgrade. (2009)

Review each network to determine the appropriate number and layout of metering zones.(completed)

Ensure bulk (headworks and zone) meters are recorded in the asset register, and replacement and maintenance schedules are updated and followed. (ongoing)

## **3.2. USAGE**

### **3.2.1. Metered Consumption (Rural and Urban Commercial)**

Current Council policy is that all connections in rural supplies and all non-residential connections in the three urban supplies are to be metered and have charges based on metered consumption. It is also policy that any new water supplies established shall have all connections metered. The effectiveness of metering all domestic urban use is discussed further in Section 5.2.

Meters are read every three months and water bills sent following these readings. This gives accurate data on individual and collective consumption provided that meters are within the required level of accuracy, and there are no illegal or unmetered connections.

#### Connections

It is necessary to monitor the installation of new connections to ensure that where appropriate, meters are installed. A system is in place to ensure this. There are probably a small number of connections that were historically installed without meters. A programme of backflow prevention device installation is being planned, and as part of this, all connections will be reviewed including their status regarding metering.

Areas which will require specific attention are the geothermally active areas of Whakarewarewa and Ohinemutu. There has been a historic practice of using reticulated water for the cooling of natural thermal bathing pools, resulting in excessive unmetered consumption in a number of properties.

#### Meter Accuracy

Meters may lose accuracy over a period of time, and this is one reason that water suppliers may elect to have a full replacement programme for all consumption meters after a set number of years. However, for Rotorua's small rural supplies, this can be a significant fixed cost for consumers which may not be warranted.

The NZWWA Water Meter Code of Practice specifies that meters 32mm and larger should be tested at a minimum of 6 yearly intervals. Most domestic or small commercial meters are 20 or 25mm, and there is no suggested replacement interval for these.

A more appropriate step for the rural supplies will be to test a sample of meters (5-10%) and make an assessment of the accuracy of the remainder from this. This sampling over time will give indication of an appropriate asset life for meters, and assist in determining a replacement programme.

### **3.2.2. Non-metered Consumption**

In areas where individual connections are not metered, it is necessary to make assumptions on the level of domestic consumption, as well as other uses such as hydrants, illegal connections, testing and flushing.

## Domestic

There is information available on appropriate levels of domestic water consumption. This has been gathered from communities which have been metered, and usually expressed in litres per capita per day.

From analysis of this available information, Rotorua District Council has adopted a consumption level for use in design and reconciliation of 225 litres per capita per day. However, all communities are different and it will be prudent to test the accuracy of this assumption.

It is proposed to carry out a trial in the urban area by selecting a number of households in different suburbs, placing a meter on these and monitoring consumption. This data will be used to review and if necessary adjust the existing assumed consumption level per capita.

## Hydrant Use

In addition to fire fighting, water is drawn from hydrants for the purposes of testing, flushing road construction and other uses. There is currently a system for assessing commercial use from hydrants such as construction or on-selling to rural properties which captures this use by metered stand pipes.

For other use such as testing by the NZ Fire Service, flushing by Castlecorp or testing and sterilising for new developments, a system requires setting up which will enable an estimate of the amount used to be recorded. Where possible, metered stand pipes will be used, but in other cases, a record of the time that a hydrant is flowed will be recorded, and an estimated flow rate applied to this to arrive at a volume used.

### **3.2.3. Actions**

In conjunction with the backflow checking and installation programme, ensure that the appropriate consumer metering is in place.	(2010-2012)
Undertake a sample testing programme of domestic meters to assess their accuracy and practical lives.	(2009-2010)
From the testing programme above, develop an ongoing meter replacement programme.	(2010)
Continue with metered consumption trial on urban domestic connections, and review consumption assumptions.	(2009)
Implement a system to record and estimate hydrant and other bulk unmetered use.	(2009)

### **3.3. LOSSES**

#### **3.3.1. Leakage, Unbilled and Unauthorised Consumption**

In any water supply network, there will be ongoing losses from leakage, wastage, unbilled and unauthorised consumption. A component of these losses, including leakage, will be unavoidable.

A methodology of identifying and assessing the extent of these losses is required in order to minimise them.

At present, Council assesses its total losses from reconciliation of bulk meters against actual and estimated consumption, which gives a relatively coarse assessment. As well as a greater degree of accuracy in assessing losses, it is necessary to identify individual loss components which include:

- mains leakage
- service connection leakage
- reservoir leakage and overflows
- customer meter under-registration
- theft (illegal connections, meter tampering)
- hydrant use (authorised and unauthorised)
- flushing operations

The NZ Water and Wastes Association has published the “Benchmarking Water Losses in New Zealand” manual and have conducted training sessions in its use. This document, based on international studies and experience, has a detailed methodology for identifying and assessing various loss components, and reporting them in meaningful terms. It also provides methodologies for establishing target levels of loss, and for benchmarking against water industry performance.

Council staff have been involved in the development of the manual and have taken part in training sessions on its implementation.

Some of the required data gathering is underway and it is proposed to begin implementing this methodology as soon as practicable.

#### **3.3.2. Leak Detection**

Council has a specific programme for assessing and locating leakage from the water networks. This is detailed in the network management area under 4.2 Leak Detection.

#### **3.3.3. Mains Breaks**

In addition to underlying losses from leakage and unknown consumption which may remain undetected for long periods, there are large individual leaks and breaks which occur from time to time, and are reported and repaired. Whilst it will not normally be possible to measure the water lost from these, it is important that where possible, some estimate is made of the loss.

A system will be set up which ensures that for each of these repairs attended by Castlecorp an assessment is made of the volume lost taking into account the estimated flow rates and the duration of the flow. This information can be added to routine reports.

Information from the public reporting such leaks and breaks will be recorded to assist in such assessment.

### **3.3.4. Actions**

Implement systems to gather the data required to use the NZWWA Benchmarking Water Losses in NZ methodology, and make a full assessment of losses using this. This will include assessing losses from mains breaks and bursts. (2009)

### 3.4. TARGETS

#### 3.4.1. Actions

The setting of targets for consumption, losses and conservation is the cornerstone of an effective strategy. However, prior work must be carried out to ensure that any targets set are meaningful, productive, and achievable.

A combination of the Distribution System and Demand Management actions will lead to the achievement of the targets, and an analysis of the potential effect of each of these is required to be carried out, and a priority assigned to these.

Bay of Plenty Regional Council Resource Consent No. 65465 to take water from the Waipa Springs for municipal water supply contains a condition requiring that Rotorua District Council shall submit a water conservation strategy containing specific quantified targets for reduction of domestic water consumption, wastage and loss within three months of the date of the commencement of that consent, which was 14 April 2009.

Work has been underway on gathering and analysing data on the potential of various activities for reduction in consumption, wastage and loss, in order to effectively plan and prioritise these actions. This work is ongoing, and the targets set at present will be reviewed as necessary.

#### 3.4.2. System Losses

The Rotorua Basin Water Supply Strategy 2006 has analysed the potential for reduction in losses over the various supplies in the Rotorua Basin. The approximate industry benchmark for total annual losses using a percentage system of total production is 15%.

The calculated losses for Rotorua's water supplies based on current information range from 13% to 35%, and the first aim is to bring these down to an acceptable level having regard to industry standards. The target for each supply is 15% losses.

All the measures required to achieve such reductions in losses cannot be implemented immediately and a gradual reduction through implementation of measures such as leak detection, pressure management and asset replacement can be planned for. Due to the range of existing loss levels, the practical time to achieve 15% losses will vary and therefore the following time frames are adopted:

Losses at May 2009	Target Annual Reduction in Losses
> 25%	2% p.a. until 25%
15 > 25%	1% p.a. until 15%

Over the next two years, it is possible that targets expressed in different parameters as per the NZWWA Water Losses Manual may be deemed more appropriate. If there is a change in target parameters, the above reduction timetables will be retained, but units converted as appropriate.

#### 3.4.3. Consumption and Wastage

The reduction of consumption and wastage relies almost entirely on public education and information, and how this is received by the consumers of each supply. On supplies without

universal metering, measurement of consumption and wastage and progress towards targets relies heavily on assumptions and estimates.

There is little data available on which to base realistic targets for the reduction of consumption and wastage. However, the Auckland Water Management Plan has a target of a 5% consumption reduction over 20 years in the Auckland region. This is a region which has universal metering already in place and so has the ability to measure progress towards such a target.

In the absence of the ability to separate out and measure any universal reduction in consumption, Council has made an assumption that a 5% target for reduction in consumption will be seen as a 5% reduction in overall production.

It is assumed that those supplies not universally charged on metered use will have greater initial potential to be influenced to conserve water and so the following targets have been set in addition to the loss reduction targets in 3.4.2.

	<b>Method of Measurement</b>	<b>Target Reduction per annum</b>
Universally metered supplies	Total metered consumption per connection.	0.25% (up to 5%)
Unmetered supplies	Total production	0.5% (up to 5%)

#### **3.4.4. Actions**

Continue work to more accurately identify losses and wastage and review the above targets and progress towards achieving them. (ongoing)
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## **4. DISTRIBUTION SYSTEM MANAGEMENT**

### **4.1. PRESSURE MANAGEMENT**

The operating pressures of a water network can have a direct influence on the level of losses from the network and within private property. There is evidence showing that a reduction in operating pressure results in a corresponding decrease in the frequency of bursts and leaks.

The desire to reduce pressures to minimise losses needs to be balanced against the need to provide adequate minimum pressures for domestic uses, supply to elevated buildings, and fire fighting requirements.

The undulating topography of most water networks means that it is not practicable to maintain a specific pressure over the whole network. Rather, there is likely to be a specified range between a maximum and minimum values.

Rotorua District Council's current stated level of service for nearly all its supplies is to provide a minimum pressure at the property boundary of 30 metres head (294 kPa) under normal demand conditions. Because of diurnal and seasonal demand patterns, the pressures will be in excess of this for all but the peak summer demand days.

It is known that existing operating pressures range from 30 to 90 metres head in some areas. There is therefore scope for a reduction in operating pressures without impacting unduly on levels of service to consumers. However, the network changes needed to achieve pressure reductions can be costly and require careful planning to ensure that results are in keeping with expenditure.

A robust study into pressure management will require specialist input to effectively evaluate the costs and benefits of various measures; but given the potential savings, such a project is worthwhile to undertake.

#### **4.1.1. Actions**

<p>Commission a study into pressure management options and potential benefits and costs for Rotorua's supplies. From this, prioritise a programme of pressure management measures by each supply zone.</p> <p style="text-align: right;">(2010)</p>
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## **4.2. LEAK DETECTION PROGRAMME**

### **4.2.1. History**

Council currently operates an annual leak detection programme in the Urban water supplies, and carries out leak investigation as required in all other supplies. Preliminary work in developing the programme was carried out in the late 1980's and early 1990's and involved the collection of essential base information, including:

- Compiling and checking as-built plans
- Mapping household connections
- Minimum use data
- Reservoir drop tests

Following this data collection phase, the networks were prepared, which involved:

- Dividing the networks into appropriate zones for individual night surveys
- Construction of pits and bypass valves

### **4.2.2. Current Practice**

Following quarterly meter-reading, an assessment is made of the Unaccounted-for-Water in each supply. This assessment is used to prioritise individual areas to be targeted.

Three main methods are used to determine the losses or leakage within a specific area. The use of each method is dependent on the network configuration and types of consumers, with each method giving a different level of detail and accuracy.

#### **a) Meter Reconciliation**

Quarterly consumer meter readings are totalised and reconciled against the bulk meter readings. This method is only suited to a fully metered supply, and used as a method to identify if further investigation is required.

#### **b) Nightline / Correlation**

The network is separated into distinct zones which can be isolated to give a single metered point of supply.

Each zone is monitored to record the Minimum Night Flow (MNF). The MNF is compared to the Target Night Flow (TNF) which is calculated from acceptable leakage values.

Noise loggers and correlators are used to identify the specific leaks within the zones which are repaired, before a final nightline is undertaken to ensure the TNF is achieved. This method is used predominantly for Urban supplies which are not fully metered.

#### **c) Bulk Meter Nightline**

This is similar to a Nightline / Correlation but applied to a whole network, and is generally used on smaller or rural supplies.

Until recently, nightline leak detection work has been limited to winter (low demand) periods. Current resourcing has enabled the Urban supplies to be covered every three years. Some new equipment and methodology is being trialled which may improve this.

#### **4.2.3. Existing Targets**

Existing trigger levels are set for action following the calculation of Unaccounted-for-Water. These are:

> 25 litres/connection/hour	Investigate immediately
15-25 litres/connection/hour	Program for nightline/noise logging
< 15 litres/connection/hour	Low priority, investigate other areas first

It is now accepted that expressing losses in litres/connection/hour for the prioritising of work is not necessarily the best method. In Chapter 1.3, details are given of the “Benchmarking Water Losses in NZ” Manual published by the NZ Water and Wastes Association. This contains a much more detailed analysis of water loss evaluation and the methods available.

#### **4.2.4. Actions**

From the results of the “Benchmarking Water Losses in NZ” exercise, review the extent and priorities of the current leak detection programme. <div style="text-align: right;">(2009-2010)</div>
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### **4.3. MAINS/ASSET MAINTENANCE AND REPLACEMENT**

One of the fundamental reasons for carrying out maintenance and regular replacement on water supply assets is the minimisation of leakage and losses from the system.

Rotorua District Council's Asset Management Plan for Water Services is in place, reviewed regularly and has been approved through various audit processes.

Key features of this AMP which contribute to the strategy of water conservation are:

- Pump efficiency assessment
- Routine bulk delivery main inspections
- Reservoir inspections and repairs
- Mains replacement programme (\$1,000,000 per annum until at least 2016)
- Installation of riders to eliminate multiple road crossing connections

Details of the assessment and inspection/repair activities are contained in the Water Supply Operations Manual which is in the process of being updated to reflect current best practice. This will be an ongoing project.

#### **4.3.1. Actions**

Continue with review and updating of the Operations Manual and Asset Management Plan.	(ongoing)
Review mains replacement programme annually to target areas most in need.	(ongoing)

## **4.4. MATERIAL/FITTINGS/CONTRACTORS QUALITY CONTROL**

### **4.4.1. Approved Fittings/Material Register**

Sound, watertight fittings and materials are vital for the minimisation of losses from the water networks. There are a variety of types and qualities of fittings and materials available, and a system is in place to ensure that only those materials which will provide ongoing integrity of the system are installed.

There is currently an approved fittings/materials register maintained by Rotorua District Council. Only fittings and materials on this list are permitted to be installed. Items are only added to this list after a rigorous evaluation process which includes:

- Evaluation against NZ and international standards
- Inspection by Asset Management and field staff
- Field trials
- Corrosion resistance testing
- Communication with other product users

Resistance to corrosion and useful service life in Rotorua's geothermal environment is a key consideration.

### **4.4.2. Maintenance/Construction Quality Control**

The correct installation and maintenance of the network is equally as important as materials quality. The following measures are in place and need to be retained and improved where appropriate into the future.

#### Control of Contractors

Council only has one contractor (Castlecorp) approved to carry out maintenance on water networks. Castlecorp are a business unit of Council with key staff who have been involved in maintenance and operation of the network for many years. Council policy is presently to carry out this work in-house, and there are no other local contractors with suitable resources to carry out this work. Castlecorp have a good ongoing training programme for staff to ensure standards are maintained

#### Approved Contractors

Council allows a small number of contractors to install new water connections onto mains for private clients. These contractors have all undergone an assessment and approval process, and their work is routinely audited.

#### Construction and Development Standards

Council, in conjunction with local civil engineering consultants and contractors has developed the Rotorua Civil Engineering Industry Standard. This contains standards and specification for the construction of new water infrastructure. Council's Resource Engineering section monitors and ensure compliance with this.

#### Maintenance Standards

The utilities asset managers have a service level agreement in place with Castlecorp to ensure maintenance and operation of the network complies with specified standards. These standards are

set out in an Operations Manual which forms part of the service level agreement. The Operations Manual and the service level agreement are in the early stages of a review which will need to be continued and completed.

In addition to management and monitoring of compliance with Service Level Agreement by Utilities, the Resource Engineering section also carries out an auditing role as an additional check on standards.

#### **4.4.3. Actions**

Complete the review of the Utilities – Castlecorp service agreement for Water Supplies.	(2009)
Complete the review of the Water Supplies Operations Manual.	(2009/10)

## **4.5. CORROSION CONTROL**

### **4.5.1. Extent of Corrosion**

The source waters of most of Rotorua's water supplies are relatively aggressive to metals commonly used in water fittings. Corrosion of metallic fittings resulting in leaks and failures is a relatively common maintenance problem. It is necessary to evaluate the role that the aggressiveness of water plays in these maintenance problems, and to consider whether remedial action is warranted.

The HANSEN asset management database holds data on faults and their causes, and an analysis of this data is necessary to confirm the number of faults in metallic fittings. This can be compared to data from other suppliers on their water aggressiveness and level of faults.

An assessment needs to be made of the cost of these faults and also the amount and cost of water lost as a result. The cost can be documented from maintenance records, but the water losses will unfortunately be a relatively coarse assessment based on estimates by maintenance staff.

### **4.5.2. pH Adjustment**

The addition of chemicals to adjust the pH of source waters is a common process to reduce the aggressiveness of the water. If the costs attributable to Rotorua's aggressive waters are significant, consideration needs to be given to implementing pH correction. This process will include an estimate of the cost of implementation, as well as investigation of the effectiveness and possible benefits.

As at January 2008, Council is in the process of implementing Ultraviolet light disinfection at most supplies, and will consider any further treatment processes required on completion of this project. However, in those supplies where alterations are required to physical layout for the UV project, provision is being allowed for space for possible pH correction equipment.

### **4.5.3. Cathodic Protection**

Cathodic corrosion protection is a process used to protect large underground metallic assets from corrosion. At present it is only used on one section of concrete-lined steel pipe between Ngongotaha and Fairy Springs Road.

Investigation should be undertaken into the possible role that this process could play in reducing corrosion on other metallic assets.

### **4.5.4. Actions**

Carry out a full assessment of metallic corrosion-related network faults, and the cost of these using maintenance data. (2009/10)

Assess the potential costs and benefits of carrying out pH adjustment to reduce metallic corrosion. (2010)

Investigate applicability of cathodic protection for use on water assets. (2010)

## **4.6. BREAK AND LEAK REPAIR**

The prompt notification and effective repair of leaks, breaks and/or unauthorised use will contribute to the reduction of water losses. The public have a large role to play in providing information enabling early attendance to faults.

It is important that the public be advised and encouraged to report breaks and leaks promptly, and particularly in rural areas, to report any suspicious or obviously unauthorised hydrant use.

Public education programmes will include provision for this.

### **4.6.1. Actions**

Ensure that public education programmes provide for and encourage feedback from the public on breaks, leaks and unauthorised use. (ongoing)
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## **5. DEMAND MANAGEMENT**

### **5.1. EDUCATION**

#### **5.1.1. General Advertising**

Council currently carries out advertising related to water supply issues, with a particular emphasis on water conservation. Most of the budget is used on media advertising, in particular newspaper features prior to and during summer such as Conservation Week and World Water Day.

From time to time, especially in hot, dry weather, radio advertising has been undertaken for short periods.

Whilst these media have been effective in conveying conservation messages to the public during times of drought or shortage, it has not been determined what is the optimum level of advertising that would have a significant effect on consumption all year round.

In order to ensure that the most effective use is made of advertising budgets, and that they are at the optimum level, some professional input into the advertising strategy should be sought, and a consistent level of advertising planned.

Present budgets should be sufficient to develop and purchase a structured advertising strategy in local media. The effectiveness of this will need to be reviewed annually, and if necessary, budgets and methods adjusted.

Such input needs to consider the benefits of non-media advertising such as billboards, vehicles such as buses, sponsorship advertising and messages on rates bills and other Council correspondence, as well as Council's website.

Council currently has a number of resources such as brochures and booklets which are supplied to the public via correspondence such as rates bills and building consents. This will be continued with, and reviewed alongside the general advertising strategy.

#### **5.1.2. School Programmes**

School education programmes can be an effective way of distributing environmental messages throughout the whole community. Council currently carries out education programmes in several areas, including solid waste reduction and recycling, pollution and water conservation.

An education room has been developed at the Wastewater Treatment Plant as a focal point for environmental resources, and a budget is allocated for a part-time environmental educator who will coordinate the delivery of resources with an emphasis on water conservation and pollution prevention.

#### **5.1.3. Leadership by Example**

Council itself is a consumer of water in its various activities. Two of the more visible of these are Parks irrigation, and the Aquatic Centre.

Council needs to show leadership in all its water consumption areas by putting extra effort into applying appropriate parts of this water strategy.

#### **5.1.4. Alternative Supplies**

The use of alternative supplies for some household requirements can reduce individual household demand on municipal supplies, both for baseload and peak load.

Examples of these alternatives are roof water collection and grey water re-use systems for toilet, flushing, garden watering or outside use.

These systems, whilst having some limitations and being relatively expensive to install, can be promoted by Council along with other conservation measures.

#### **5.1.5. Actions**

Engage assistance in developing a structured annual water conservation advertising programme. (2009)

Engage a part-time environmental educator to promote water conservation. (2009)

Ensure that all Council managers and staff are aware of the need for, and the tools available to minimise water consumption in their areas of responsibility. (ongoing)

## **5.2. PRICING**

### **5.2.1. Metering**

At present only commercial/industrial consumers in the Urban water supplies, plus all consumers in the Rural supplies, are charged for water based on a volume of water consumed as read from individual meters. Domestic users in the Urban supplies are not metered. Council policy is that all consumers on any new water supplies will be metered.

Meters allow volumetric pricing and as such can drive customer water use efficiency. However, there are significant capital/installation, maintenance and administration costs involved. These costs can be reasonably estimated, but the benefits in terms of water saving are harder to predict.

A number of councils in New Zealand have meters installed for all consumers (Universal metering) and some information on their effectiveness as a water conservation measure is available.

Metering allows a number of pricing options to be considered, including increasing rates (where the price per unit increases as the quantity of use rises) or peak load pricing (e.g. higher unit rates in hot summers). Wastewater charges can also be levied based on water meter readings.

An analysis of the costs and potential benefits of universal metering has been carried out using a range of information and results obtained from experiences internationally and in New Zealand. this is summarised below:

#### **a) Costs**

The Rotorua Urban Water Supply area has approximately 19,250 domestic connections, nearly all of which are unmetered. In recent years, all newly-installed connections have been fitted with manifolds which allow easy meter installation. However, most would require excavation, dismantling and reconfiguring of the connection at meter fitting time.

The total cost of installing meters on all domestic connections is estimated to range between \$6.74 million to \$10.1 million, based on data from other already-metered communities. The ongoing annual depreciation charge for replacement of meters only is estimated to be between \$257,000 and \$321,000.

The annual reading and billing costs for these meters is estimated at \$140,000 per annum.

Therefore the total cost of metering is:

- Capital cost of \$6.7 million - \$10.1 million
- Annual operating costs of \$397,000 - \$461,000

#### **b) Potential Benefits**

The possible financial benefits of universal metering are the potential savings in water production and wastewater treatment costs; and the potential deferment of capital expenditure (both water and wastewater) planned to cater for growth in demand for these services.

From experiences of other water suppliers, it is estimated that an overall reduction in annual consumption of 5%-15% could reasonably be estimated for.

The marginal cost (variable cost) of water supply in the Urban area is estimated at 4 cents per cubic metre (m<sup>3</sup>). A 15% reduction in overall consumption is equivalent to 1,628,400m<sup>3</sup> per annum which results in an annual saving of \$65,136.

The marginal cost (variable cost) of wastewater pumping and disposal in the Urban area has been calculated at 12 cents per cubic metre. A 15% reduction in water consumption is expected to produce a reduction of 588,000 cubic metres in sewage volume, resulting in a potential saving of \$70,000 per annum.

An assessment of the Urban water supply capital improvements in the Ten Year Plan has been carried out, to determine to what extent these could be deferred by a 20% reduction in peak demand. It is concluded that there are no currently planned works that could be deferred in this case.

The Rotorua Basin Wastewater Strategic Plan (December 2007) has identified options for future upgrading of the wastewater system to cater for both growth and expansion to include rural communities. The strategy recommends further studies be carried out to determine details of upgrade budgets and timeframes. This work is required to be complete before any assessment can be made of the benefits resulting from deferment of wastewater capital expenditure.

As well as financial benefits, the benefits to the environment should also be considered. Whilst water is a precious resource which should not be wasted, it is naturally relatively abundant in the Rotorua basin and there is not the vigorous competition for the resource that may be found elsewhere in New Zealand. Environmental costs are adequately addressed under the Resource Management Act provisions when Resource Consents for water abstraction are issued.

Given the costs of universal metering, and the potential benefits accruing, there appears no justification for the implementation of volumetric water charges by water metering for Urban residential consumers at this stage.

However, the financial costs and benefits are subject to change over time, and the situation should be reviewed during the next Long Term Council Community Plan (LTCCP) process with respect to wastewater capital expenditure, and at subsequent LTCCP processes if expenditures in these areas are subject to significant change.

### **5.2.2. Non-Metering**

For areas or consumers without meters, financial incentives are limited to subsidies or giveaways to encourage the use of water saving measures.

These can range from financial assistance with the purchase of water-efficient appliances or plumbing fittings, to the giving away of small items designed to raise awareness of the desirability of conserving water.

In establishing the level of such financial support, it needs to be considered that a 20% saving in water for an average household would result in approximately \$3.00 per annum per household reduction in water production costs.

On a financial basis, this precludes all but the lower range of incentives which would most likely be best incorporated in an education programme.

### **5.2.3. Actions**

Review expenditure at each Long Term Council Community Plan process to reassess costs/benefits of water metering. (ongoing)

### **5.3. AUDITING OR OTHER SERVICES**

#### **5.3.1. Identification of Leaks from Bills**

Currently, the water billing software for metered consumers is able to automatically detect abnormal use and if high, print a warning to the consumer that there may be a leak on the property and to have it checked. Subsequently bills can be re-checked and followed up more proactively if the high use remains.

#### **5.3.2. Large User Audits**

Depending on the supply, a small percentage of large commercial users can account for a significant amount of the water used. Although metering provides a financial incentive for these users to conserve water, it may be cost effective to carry out water audits to assist them to reduce unnecessary wastage. To determine the potential effectiveness, an option would be to do a trial audit of a small number of users to assess the viability of wider work and to possibly set a threshold above which this will be effective. More investigation of this is required.

#### **5.3.3. On-property Advice**

At least one other water supplier employs full time staff dedicated to visiting residential premises to provide advice on water-savings and offer to carry out minor leak repairs such as tap washer replacement at no charge. Their highly-visible vehicle provides additional advertising on the roads. This is a significant cost and before further consideration is given to including this in a strategy, more information on the costs and potential benefits for Rotorua is required.

#### **5.3.4. Actions**

Assess the viability of undertaking water audits on the largest commercial consumers. This will require assessment of available resources. (2009)
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## **5.4. REGULATION/RESTRICTION**

### **5.4.1. Routine Restriction Measures**

All but two of Rotorua District Council's supplies are "on demand" supplies, i.e. they can supply peak flow to all consumers without requiring flow restrictors or on-site storage. However, Council imposes maximum sizes of connections allowed for domestic connections which provide some restriction on instantaneous demand.

### **5.4.2. Emergency Restriction Measures**

From time to time, due to drought or operational problems with supplies, it may be necessary to control demand by introducing one or more emergency restrictions for individual or all supplies.

Decisions in the introduction of these will be made on an individual basis, giving consideration to the prevailing circumstances at the time, but they may include:

- Advertising
  - Letter drops warning of possible shortages
  - Sprinkler bans
  - Hose bans
- } Either total or alternative days of the week

## 6. **REFERENCES**

- “Promoting Customer Water-Use Efficiency” – A Planning Guide for Local Authorities  
AQUAS Consulting and Environment Waikato 2005
- The Auckland Water Management Plan: A Region-wide approach to the management of  
Auckland’s reticulated water resources 2004
- Hamilton City Council Water Demand Management Plan (Draft) 2007
- Savings in your H<sub>2</sub>OUSE NZ Water and Wastes Association 2006
- Water Meter Code of Practice NZ Water and Wastes Association 2003
- Rotorua Basin Area Water Supply Strategy Harrison Grierson Consultants 2006
- Rotorua Basin Wastewater Strategic Plan Harrison Grierson Consultants 2007