1. PURPOSE

The purpose of this report is to provide information to members on the costs and benefits of major water demand management projects including universal water metering, and to confirm the direction for major capital expenditure in the Long Term Plan.

2. RECOMMENDATION

2.1 THAT THE REPORT TITLED "WATER DEMAND MANAGEMENT AND UNIVERSAL WATER METERING" BE RECEIVED AND THE CONTENTS NOTED;

2.2 THAT THE COMMITTEE RECOMMEND THAT COUNCIL NOT INCLUDE CAPITAL EXPENDITURE IN THE 2012-2022 LONG TERM PLAN FOR THE INSTALLATION OF UNIVERSAL WATER METERING IN THE URBAN WATER SUPPLY AREAS; AND

2.3 THAT IN ACCORDANCE WITH THE ROTORUA DISTRICT COUNCIL WATER CONSERVATION STRATEGY 2009, THE DECISION IN 2.2 ABOVE BE REVIEWED AS PART OF THE 2015-2025 LONG TERM PLAN PROCESS.

3. BACKGROUND

3.1 Introduction

The issue of charging for water services on a measured volumetric basis via consumer water meters is the subject of much debate within the water industry. Residential water charges based on the amount of water used are an effective tool for reducing consumption, but the cost of installing and maintaining the infrastructure to enable this can be very high.

There are a number of common advantages and disadvantages of, and drivers for universal metering, but there are wide variances in how these apply to individual water suppliers.

In February 2010 the Auditor-General issued a report (1) on a performance audit of local authorities which was carried out to help form a view about how well prepared the country is to meet the likely future demand for drinking water. This audit was carried out on a representative sample of eight local authorities.

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The report contained eight recommendations, of which the following three have relevance to the issue of whether to employ universal metering on a municipal water supply:

"1. We recommend that local authorities use accurate and up-to-date information to prepare drinking water demand forecasts to reduce the risk of under- or over-investing in water supply infrastructure. In particular, this needs to include accurate and up-to-date information on water consumption;

3. We recommend that local authorities improve the efficiency of drinking water supplies by minimising water that is unaccounted for, to reduce the demand on existing water sources and the risk of over-investing in drinking water supply infrastructure;

6. We recommend that local authorities carry out rigorous evaluations of the costs and benefits of supply and demand strategy options, to choose the most cost-effective and sustainable options."

It is clear that local authority water suppliers, if not already doing so, need to demonstrate that in devising their strategies to gather information and minimise water losses, they have evaluated the full range of options to measure and reduce water demand, including a full analysis of costs and benefits.

3.2 Water Conservation Strategy

Rotorua District Council’s Water Conservation Strategy 2009 describes options to analyse production, usage and losses; reduce losses in Council’s network; and influence consumer demand for water. It also describes actions underway or planned to achieve the above aims.

Included is a section (5.2 Pricing) in which the costs and benefits of implementing water metering and volumetric charging are quantified and evaluated as at June 2009. On the basis of that evaluation, the implementation of volumetric water charges by water metering for urban residential consumers was not considered to be justified at that time.

However, the water conservation strategy recognises that the costs and benefits can change over time, and states that the evaluation should be reviewed as part of the long-term plan processes in future.

Such an evaluation should be also carried out against costs and benefits of other demand management options.

3.3 Drivers for Water Demand Strategies

When considering the issue of water metering and volumetric charging for water services, one of the first questions should be – what is required to be achieved? Or what are the primary drivers for such a project?

Common drivers for such a strategy include:

- Cost reductions – both in operating and future capital improvement for water and wastewater assets.
- Environmental – reduce the amount of water abstracted from the environment and requiring to be treated and disposed of following use.
- Reduce the likelihood of temporary water shortages due to demand peaks.
- A philosophical move towards "user-pays".
- Gaining accurate consumption data.
- Easing the path of future resource consent applications for abstraction.
- Being consistent with the view of the Auditor-General on water-supply management.
Individual water supplies and water supply organisations have widely-varying characteristics and so the drivers which are important will differ between supplies and suppliers. A key step in evaluating universal water metering will be to critically examine which of the drivers is in need of addressing, and in what order of importance or priority.

3.4 Demand Management Options

Universal water metering accompanied by volumetric billing is the most effective method of obtaining consumption data and achieving a reduction in consumer demand. There are a number of other management strategies which can achieve good results in these areas, as well as reducing losses in the suppliers distribution system including:

- Bulk metering at source.
- Creation and metering of distribution zones.
- Partial metering e.g. commercial/industrial.
- Sample metering to assess consumption patterns.
- Distribution system pressure management.
- Active leak detection.
- Maintenance and replacement strategies.
- Public and school education programmes.
- Large user audits.
- Routine and emergency restriction measures.

Most of these methods will be already employed to some extent by most water suppliers, but well-planned strategies utilising these in conjunction with each other can produce much improved results.

In keeping with the responsibilities of local authorities to rigorously evaluate costs and benefits of methods of carrying out their activities, all demand management options should be considered for implementation, and their costs compared with potential benefits.

3.5 Current Demand Management Strategies

The Water Conservation Strategy contains full details of existing and proposed actions to manage demand on water sources downwards. Rotorua District Council carries out all of these to some extent, but since the last revision of the Strategy, several areas have received closer analysis and action plans have been developed. Some of these plans have been implemented, and the remainder will be proposed for implementation in the Long Term Plan.

These action plans include:

a) Review of water balance
   - Bulk supply meters have been individually appraised and maintenance work or improvements made.
   - Improvements in consumption monitoring have been made, both in assumptions and in installation of more appropriate meters for large consumers.
   - These improvements will provide much better data with which to assess and monitor water losses and consumer use.

b) Sectorisation of Networks
   - Review of existing layouts.
   - Design of modifications to enable the networks to be divided into smaller areas in which consumption can be monitored accurately.
   - Assessment of the potential for pressure management to reduce losses from the system.
This analysis has been carried out by staff in conjunction with Thomas Civil and Environmental Consultants, and has resulted in a report "Water Loss Strategy for Rotorua District Council" which contains a programme of action with timelines and cost estimates. The overall costs are shown in section 4.2, and are included in the draft Asset Management Plan for Water Supplies.

4. **OPTIONS AND ANALYSIS FOR MAJOR CAPITAL WORK**

4.1 **Universal Water Metering**

Currently, all non-urban water supplies (Mamaku, Rotoma, Rotoiti, Kaharoa, Reporoa, Hamurana, and Okareka) are fully metered and charges are based on metered consumption.

An analysis has been carried out of the costs and benefits which may potentially accrue if universal metering was introduced into the three urban water supplies, along with a volume-based targeted rates structure. This analysis has considered the capital and operating costs of meters and a charging structure, the potential operational savings in water supply and wastewater treatment/disposal costs, and the potential savings due to deferred capital expenditure for capacity in both the water supply and wastewater areas.

4.1.1 **Costs**

The Rotorua Urban Water Supply area has approximately 19,570 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 at approximately $7.5 million, based on data from other already-metered communities. The ongoing annual operating cost of meters (including reading, billing and depreciation) is estimated to be $587,000.

Therefore the total cost of metering is:
- Capital cost of $7.5 million
- Annual operating cost $587,000.

4.1.2 **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 residential consumption of 17% could be achieved.

The marginal cost (variable cost) of water supply in the urban area is estimated at 3.8 cents per cubic metre (m³). A 17% reduction in unmetered consumption is equivalent to 863,400m³ per annum which results in an annual saving of $32,500.

The marginal cost (variable cost) of wastewater pumping and disposal in the urban area has been calculated at 9.7 cents per cubic metre. A 17% reduction in water consumption is expected to produce a reduction of 663,000 cubic metres in sewage volume, resulting in a potential saving of $64,500 per annum.

An assessment of the urban water supply capital improvements in the Long Term 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. There are no currently planned works that could be deferred due to a reduction in wastewater volumes.

A further potential benefit which could accrue from a significant saving in water consumption is the ability to reduce the capacity of existing infrastructure when it is due for renewal at the end of its economic life. This only applies to those assets where changes in peak water demand have a direct effect on the size or capacity of an asset, and where it is practically possible to reduce the size of that asset independently of other assets connected to it.

This consideration is only applicable to water assets, as wastewater peaks are influenced by infiltration and inflow rather than water use peaks which tend to be for outdoors use.

Water assets which could potentially be reduced in capacity if a reduction in peak demand was realised include pumps, rising mains, reservoirs and a portion of the distribution network. This potential saving in replacement cost for these assets would not be realised until the end of their lives. With asset lives of 30 years for pumps, 100 years for reservoirs and 90 years for pipelines, a weighted average would give approximately 45 years before savings totalling $2.1 million could potentially be made.

A financial analysis of the present value of a $2.1 million saving in 45 years time gives a net present value of approximately $123,000.

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 concerns are adequately addressed under the Resource Management Act provisions when Resource Consents for water abstraction are issued.

Water efficiency measures are taken into account when applications for water abstraction are considered. Universal metering can contribute to satisfying consenting authorities that adequate efficiency measures have been employed.

Consent conditions typically require water suppliers to minimise network water losses. However, recent resource consent processes have hinged more on cultural concerns than water efficiency measures.

A further important benefit of metering (with or without volumetric price structures) is the ability to accurately measure water losses and identify where they are occurring, including on private properties. Whilst this is probably the most accurate method, there are other water loss analysis methods that may be more cost-effective.

4.1.3 Net Costs and Impacts

The net annual cost of universal metering derived from the figures above is $1,223,000. The required average targeted rate increase per connection to fund this is estimated at $62.50 p.a., which is equivalent to a 36% increase over the current fixed charge.

4.2 Network Sectorisation for Water Loss Reduction

All water networks are subject to water losses from leakage, breaks and unauthorised and/or unrecorded use. Typically, the level of losses is significant and an average municipal network will be likely to have losses of around 25% of water input to the system without a comprehensive loss reduction strategy in place.

A comprehensive loss reduction strategy would involve dividing the network into metered areas (District Metering Areas or DMA’s), monitoring consumption in these areas in real time by telemetry systems, pressure management in these areas, and active leak detection programmes.
It is estimated that a properly planned and implemented loss reduction strategy can realistically reduce losses by 50%.

4.2.1 Costs

A full analysis of the three urban networks has been carried out and a preliminary design and cost estimate has been prepared for the work necessary to create appropriate DMA's and install pressure management systems.

The cost estimate for the work is $1,643,000 which would be expended over a four year period. Annual operating costs are expected to be $10,000 approximately.

4.2.2 Potential Benefits

The main benefits of network sectorisation and pressure management are a reduction in losses from leakage and unrecorded excessive usage. The quantum of this reduction depends on the current level of losses and the difficulty of locating and eliminating these.

A typical level of losses could be 250 litres/connection/day and if this was reduced by 50%, the saving of 125 litres per day multiplied by 22,500 connections results in an annual reduction of 1,026,562 m$^3$ per annum with a value of $41,000.

Other benefits of pressure management include extending the life of assets (with potential reduction in depreciation costs), reducing excessive pressure on private plumbing and reducing the number of watermain faults.

In addition, current leak detection costs can be reduced with network sectorisation as work can be focussed in areas/sectors where high losses are evident.

4.2.3 Net Costs and Impacts

The net annual cost of network sectorisation and pressure management derived from the figures above is $175,000. The required targeted rate increase per connection to fund this is estimated at $7.86p.a. which is equivalent to a 4.6% increase over the current fixed residential charge.

4.3 Summary Table of Costs/Benefits

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<tr>
<th></th>
<th>UNIVERSAL WATER METERING</th>
<th>NETWORK SECTORISATION</th>
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<tbody>
<tr>
<td>Capital Installation Cost</td>
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<tr>
<td>Capital Cost Annualised</td>
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<td>Annual Operating Cost</td>
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<td>Potential Cost Savings</td>
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<tr>
<td>Average annual cost per urban consumer</td>
<td>$62.50</td>
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<tr>
<td>% increase on existing fixed targeted rate</td>
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<td>4.8%</td>
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5. **SUMMARY**

Rotorua District Council has no pressing water supply augmentation needs which would necessitate universal water metering to significantly reduce demand and defer capital works.

Given the costs of such a project compared with 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 regularly during future Long Term Plan processes if expenditures in these areas are subject to significant change.

However, it is important that Council target a reduction in water losses and improved consumption data by implementing network sectorisation and pressure management work outlined above, in conjunction with continued public education regarding water conservation. Such a strategy will in turn address the issues raised and recommendations made by the Auditor-General.