

Queenstown Lakes District Council – Universal Water Metering as a Tool for Water Supply Management

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Introduction

1.1 Background

This report provides a preliminary assessment of universal water metering in the Queenstown Lakes District. This investigation is one component of the wider Water Demand Management (WDM) strategy for Council.

In the context of this report, universal metering is defined as water metering at the property boundary of all (or all that is practicable) residential and commercial properties that are supplied by the public water supply system.

Further studies will include more detailed analysis based on additional network data collected on consumption patterns, the effectiveness of leakage detection, and the effectiveness of existing metering in the district as well as more detailed investigations into meter installation options in difficult locations. It is envisaged that this will include an updated financial cost-benefit analysis and further assessment of metering implementation options.

While comment is made on future options for volumetric pricing; that is, charging customers on a per unit volume of water consumed, it is emphasised that volumetric pricing is not an inevitable outcome of universal metering. Christchurch City Council is an example of a local authority implementing universal metering without volumetric pricing of water.

The wider WDM strategy includes a suite of demand reduction activities including leakage detection, reducing Council water use, revised policies to support water use efficiency, public education and promotions. These activities are covered in this report only where they relate directly to universal metering.

It is noted that there is the potential to implement universal metering on a scheme by scheme basis. By this method, schemes that derive most benefit from demand reductions (for example through deferral of capacity driven projects) can be targeted for metering. This allows staggering of capital costs and the ability to gauge the effectiveness of metering on a smaller scale to better determine benefits from a district wide implementation. This process has already been initiated with the full metering of the Luggate scheme and partial metering of the Lake Hayes scheme. In addition, a number of commercial properties in Queenstown are already metered.

1.2 Study Objectives

The objective of this study is to provide context and background information on universal metering and to assist Council in forming a decision on its implementation. It is envisaged that a financial cost-benefit analysis will be prepared subsequent to this report including up to date data.

The report is set out in the following sections:

1. Introduction
2. QLDC Water Demand Management
3. The advantages and disadvantages of Universal Metering
4. QLDC's Principles for Water Supply Management
5. Metering experiences across New Zealand
6. Rating model options
7. Implementation actions
8. Summary

2 QLDC Water Demand Management

2.1 Background

This section provides a brief outline with regard to Council's overall WDM activities with regard to universal metering and the context on which WDM is relevant to our district. More detailed outlines and findings of these activities are included in other Council WDM reports which are summarised in Section 2.3.

2.2 QLDC water consumption

The Queenstown Lakes District has a very high water use compared to many other districts in New Zealand which is illustrated in Table 2.1.

Table 2.1: Per capita water use in New Zealand

Local authority	Usually Resident Population (2013)	Population growth rate (2012-13)	Average drinking water consumption in litres per person per day (lpd)*
Queenstown Lakes District Council (usually resident pop.)	28,224	22.00%	687
Queenstown Lakes District Council (average day pop.)	46,610	22.00%	416
Tauranga City Council	114,789	10.50%	270
Nelson City Council	46,437	8.30%	500
Tasman District Council	20,160	5.70%	250
Kapiti Coast District Council	49,104	6.30%	458
Opotiki District Council	8433	-6.00%	300
Christchurch City Council	341,472	-2.00%	435
Central Otago District Council	17,895	7.50%	490 (approx)
South Taranaki District Council	26,577	0.40%	888

* From Office of the Auditor General 2010

Some of this high use can be explained by the Queenstown Lakes District's high temporary population, however even when considering this, nothing that the average day population use is 416 litres per person per day. However, it is likely that temporary residents will have a lower demand on water consumption per person particularly with regard to irrigation activities.

Peak day use in the district is very high. For example, in Wanaka, water use on the peak day is 2.5 times the average day use. This is predominantly due to summer irrigation. Future expansions to the water supply network are designed for this peak day and therefore, the network upgrades are oversized for the majority of the year's demand. Reducing this peak day use will result in more cost effective upgrades.

Approximately 30 % of the district’s public water supply is lost to leakage. This is particularly high in Queenstown. Identifying, targeting and stopping the leakage are difficult without detailed knowledge of where water is flowing at any one time.

The comparison between peak day flow, leakage and the average day flow is shown in Figure 2.1.

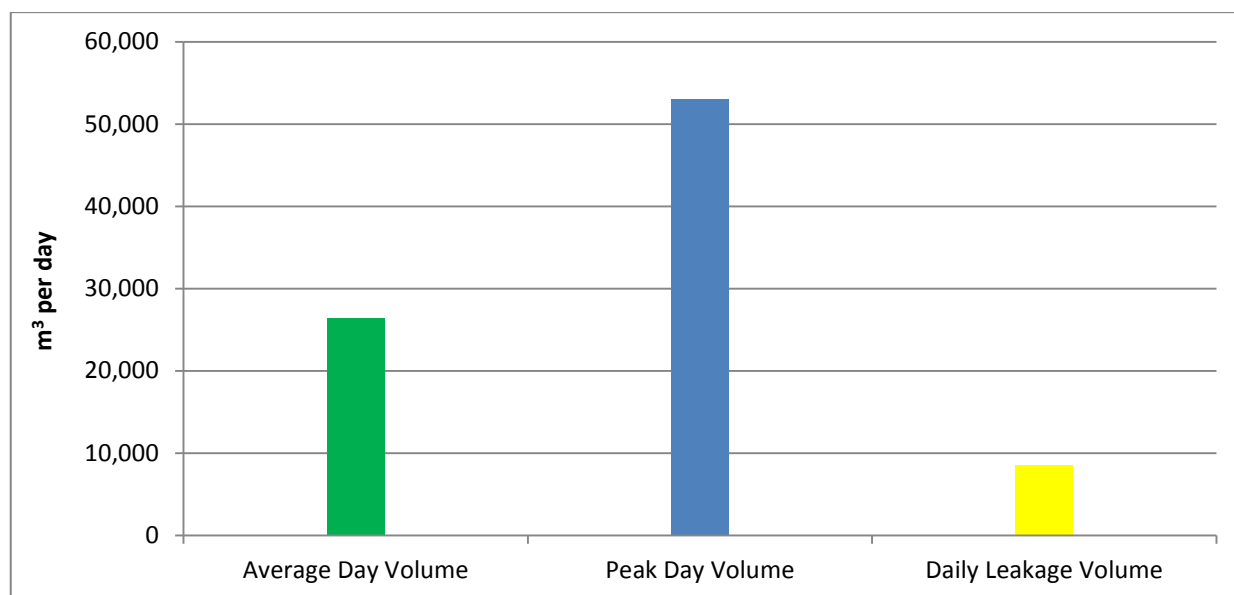


Figure 2.1 Average, peak and leakage daily volumes for the Queenstown Lakes district 2012/13 (exc Lake Hayes)

3 The advantages and disadvantages of Universal Metering

3.1 Advantages

3.1.1 Demand reduction

Universal metering provides many tangible and intangible benefits to a community even without the introduction of volumetric charging. The largest benefit is positive outcomes from a slowing in water demand beyond what could be expected without this demand measure.

One of the greatest uncertainties in assessing the benefits of WDM is quantifying the demand reduction that will occur from various activities. Consumer responses to activities are significantly influenced by the socio-economic factors, demographics, climate (particularly the irrigation component), the ‘health’ of the network (e.g. leakage and maintenance savings) and the method of implementation (education, pricing structures etc.). In practice, the level of reduction cannot be precisely determined until the metering program produces actual volume data.

A useful method is to benchmark against the experience of other local authorities. For example, Tauranga City Council achieved an average demand reduction of 25% and a peak day reduction of 30% with the implementation of universal metering and volumetric pricing (Bahrs, *Water metering -the Tauranga journey*).

It is noted that, without volumetric pricing, water consumption behaviour may gradually resort back to pre-WDM levels once initiatives are imbedded in, in particular where the consumer is not sufficiently incentivised to maintain consumption at low levels.

3.1.2 Environmental benefits

There are environmental benefits to Council and the community at large. These include a reduction in environmental impact through a reduction in the scope and scale of infrastructure projects. The

environmental benefits of WDM can be significant but are difficult to quantify financially. However, because of the District's iconic status as a tourist destination and tourist expectations of environmental stewardship, it is recommended that a more multi criteria approach be considered to include the environmental benefits of reduced water demand in any cost benefit model.

One environmental benefit results from reduced water abstraction from natural water bodies. This may be significant in some areas of New Zealand; however the district has relatively abundant sources of water from lakes and large rivers when compared to other districts. An exception to this is the Lake Hayes scheme where abstraction puts pressures on the spring fed bores.

Approximately 80-85 % of average day household water usage is discharged to the public wastewater system. This has a flow on effect with regard to wastewater treatment requirements and discharge volumes. Therefore a potentially significant environmental benefit of water demand management is the reduction in adverse effects from wastewater handling.

3.1.3 Network management

Through increased collection of data and understanding of consumption patterns, Council is able to better identify leakage (both network and private) to further reduce demand on the network. Forward planning of capital works and operational activities are improved by more accurate data and understanding of the network. Reduced maintenance costs are realised by reduced reactive maintenance resulting from this improvement in forward planning.

The use of consumables (particularly electricity and treatment chemicals) will also reduce as a result of less water being transported in the reticulated network.

3.1.4 Capital project cost savings

The most significant benefit of demand reduction is the deferment of capacity driven projects in the future. Because overall demand is still projected to increase with land use growth over the next 20 years, even with the establishment of WDM measures, the need for additional CAPEX will not be eliminated, it will be deferred. This is demonstrated graphically in Figure 3.1.

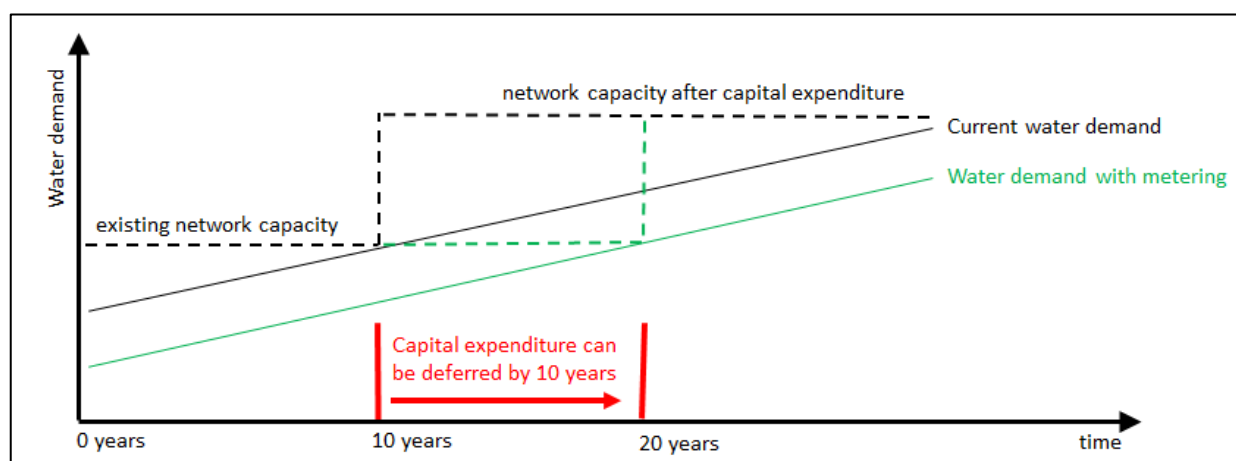


Figure 3.1 Example of capital works deferment through water demand reduction

As stated in the draft 2012 Water Demand Management Plan, there are a number of capacity driven projects that will be able to be postponed if overall demand is kept low. The total value of capacity driven projects in the 2012 LTP is approximately \$10 M. Based on an initial review, a sustained water demand reduction of 20% would result in deferral of capacity driven projects of up to 15 years. However this will be the subject of more detailed study.

It must be noted that many of the major projects are beyond the five year window resulting in a degree of uncertainty over their actual timing. On-going network data capture (SCADA) and

further analyses of the network capacity limits are required to more accurately establish the value of deferred capital works.

In reality, a capacity driven upgrade will be triggered by the specific demands and capacity issues within each scheme. Therefore, water demand reductions and associated capital work deferrals need to be assessed on a scheme by scheme basis.

3.1.5 Consumer Education

Consumers and Council gain knowledge of its water use which encourages attitudinal change to water consumption. In addition, the improved data on consumption patterns can be used for education, incentive and enforcement tools to reduce consumption such as penalising or limiting supply to high users by enforcement via the tools of Council plans and bylaws. Education and promotional activities can also be targeted where the most return will be gained, particularly areas with high summer irrigation.

3.1.6 Fairness and equity

Metering also provides the opportunity to consider volumetric charging of water; although this is not an inevitable step (Christchurch City Council has universal metering but still charges a fixed rate). Volumetric charging will provide further incentive to reduce household use. In addition, the element of fairness and equity is a consideration; i.e. high users pay more for their water. At present, water revenue is obtained by targeted rates which do not account for individual consumption. Volumetric charging with water metering prevents high water users essentially being subsidised by low water users.

3.2 Disadvantages

3.2.1 Capital installation costs

By far the biggest hurdle to installing universal metering is the upfront capital cost. Metering of all connections is a significant investment and must be balanced against the financial benefits summarised above.

Establishing the average cost of installing water meters has many variables. The most significant variable to cost is the level of complexity for the installation of meters, such as:

- Unknown location of laterals requiring service locations
- Commercial buildings, particularly in Queenstown and Wanaka, with multiple tenants resulting in difficult installations to enable individual metering of all occupants.
- Residential properties that are cross-leased or have multiple titles (e.g. apartment blocks) require new laterals to be installed to each individual dwelling.
- Laterals with more than one property on the line require new laterals to be installed to each individual dwelling.
- Old Toby boxes that do not have capacity to readily receive meters resulting in the need for installation of new manifolds (and backflow prevention devices).
- Rider mains and laterals running across private properties with difficult access and potential legal ramifications to installation of individual meters.
- Laterals in difficult locations where property owners that have installed hardstanding driveways over a service requiring Council to reinstate to a similar standard.

Initial estimations for the district indicated a potential capital cost to meter the full district of approximately \$9 M, however this cost requires more detailed assessment. This cost is similar in scale to recent costs borne by Kapiti District Council which has a higher usually resident population (49,000) and therefore the initial cost estimate for our district may be conservative.

In addition to capital costs of installation of the metering network, allowance needs to be made for renewals of meters within the analysis timeframe.

3.2.2 Operational costs

In addition to the capital installation costs there will be an on-going operational cost in reading the meters and managing the increased data. Additional management costs will be incurred if volumetric pricing is implemented through a more complex billing system.

Additional costs will be incurred with volumetric pricing due to the increased resource requirements of billing for water use. It is noted that the cost will vary with the complexity of the metering and billing system (e.g. seasonal rates, increased meter reading frequencies etc.).

3.2.3 Public concerns

A less tangible impact of universal metering is the potential for public opposition to its implementation. Water metering is often a contentious issue, raising public concern in communities across the country. Common misperceptions by members of the public who oppose water metering include that metering is a money-making exercise; that user-pays is the first step towards privatisation; that other water management tools should take priority, such as water tanks and education programmes; and that low income households would struggle to pay for water.

Both Central Otago District Council and Kapiti Coast District Council experienced some public opposition, but have worked with their communities to overcome this and have recently implemented universal metering and volume based pricing (Kapiti is currently in an implementation stage). This highlights the need for a comprehensive public education process before universal metering is implemented.

3.2.4 Revenue volatility

The implementation of volumetric pricing also creates the risk of financial revenue instability, particularly in the short term. Revenue streams will be linked to consumption patterns and, as such, a thorough understanding of effects on consumer response to consumption and appropriate pricing to ensure cost recovery is required where a reduction in demand leads to a reduction in revenue.

In addition, revenue will be impacted by climatic conditions which will vary year to year. A wet summer with corresponding low irrigation will provide lower revenue than a dry summer.

4 QLDC's Principles for Water Supply Management

4.1 Overview

It is valuable to formulate overarching principles that will be applied to the water supply management. These principles will form the basis of decision making during the establishment and on-going implementation of a robust strategy. The adopted principles are set out in the following sections with brief explanatory notes.

4.2 Water Supply Management Principles

1. Financial sustainability

Water supply must be managed in a manner that avoids financially unsustainable capital expenditure across the water supply network.

Capital expenditure is triggered by a combination of three factors; maintaining or raising an agreed level of service, to increase capacity due to increases in demand, and to replace or renew deteriorated assets. Managing and reducing water demand is required to reduce the scale and extent of capital projects.

2. Environmental sustainability

Unnecessary water demand needs to be managed in a manner that minimises avoidable adverse effects on the environment. QLDC will consider the impact on the environment of its water abstraction, conveyance and disposal activities and will endeavour to minimise or avoid any adverse effects.

Reduction in water demand helps to achieve this aim by reducing the scale and nature of physical works on the network. In particular a reduction in consumption has a corresponding reduction on wastewater generation and its associated environmental impacts (volume of discharge to water, treatment requirements, energy consumption etc.).

3. Fair and equitable allocation of costs:

All water supply costs (both operating and capital costs) should be fairly and transparently allocated to ratepayers (i.e. without unreasonable cross-subsidisation).

The current water revenue model is not equitable as it cannot factor individual consumption. Therefore, low water users are effectively subsidising high users. Therefore Council will aim to establish a model that fairly allocates costs with regard to volume of use between individual ratepayers and between different parts of the network. Coupled with this, the revenue model should have incentives and disincentives to change water-consumption practices.

4. Efficient management

Our water supply strategy must be undertaken in a manner that enables the most efficient and cost-effective management of our resources and network, and therefore use tools which will provide us with better information to enable this to be done.

The increased knowledge of water use patterns and levels through universal metering provide many benefits with regard to efficient and cost effective management of the supply network. Outcomes achieved by better information include a more targeted leakage reduction programme, better planning of maintenance activities and capital works, and reduced energy and chemical costs.

5. Cost recovery

Any changes to the current form of charging for water supply must maintain the principle of cost recovery only through the reallocation of costs, and therefore avoid any windfall revenue gains. Reallocation of revenue between high and low volume consumers will balance anticipated expenditure on the water supply system.

6. Demonstrable cost benefits

The introduction of any form of metering should only occur when the financial and other benefits from doing so demonstrably outweigh the costs of implementation.

Universal metering and the associated reduction in water consumption must provide financial benefit to the district through deferment of capacity driven infrastructure projects as well as reductions in operational costs.

However, the financial benefits of water demand reductions needs to be assessed against the potentially significant costs of implementation as well as increased operational costs (meter reading and processing). Therefore, a robust and thorough financial cost benefit analysis of metering needs to be undertaken. This should be done at a scheme level as installation costs and financial benefits will vary from scheme to scheme.

7. Revenue stability

Water metering must be implemented in a manner which avoids any material revenue volatility across financial years.

A risk of a volumetric charging based water model is revenue volatility as revenue will be linked to climatic conditions (a wet summer will have lower water consumption and corresponding decrease in revenue). Therefore, water demand forecasting based on consumer response to volumetric charging as well as climate predictions will need to be assessed carefully when developing this type of water revenue model.

8. Complementary water management measures

Alternative or additional measures to metering need to be considered as part of a water demand management strategy.

Metering as a water demand management tool should be complemented by alternative/additional measures including public awareness (education) and regulatory enforcement (through the Water Supply Bylaw).

5 Metering experiences across New Zealand

5.1 Overview

Nationally approximately 50% of New Zealand's population are subject to volumetric or user pays pricing which can only be achieved through the use of individual meters or sub-metering for each connection. This figure includes Auckland which in itself is now nearly a third of the Country's population.

Other districts include Tauranga, Whangarei, Tasman, Nelson, Kapiti, CODC and Christchurch. Christchurch has universal metering but does not charge volumetrically at present. The trend is towards a slow progression towards universal metering across the country.

Those areas that have introduced volumetric pricing have generally sustained a drop in water usage. Out of a total of 67 territorial local authorities, 13 have implemented full or near full volumetric charging in their district. The volumetric charging models vary but are predominantly based on a flat fixed charge with a volumetric charge from the first cubic metre of water consumed. Figure 5.1 shows the spread of volumetric charging models for the 13 TLAs.

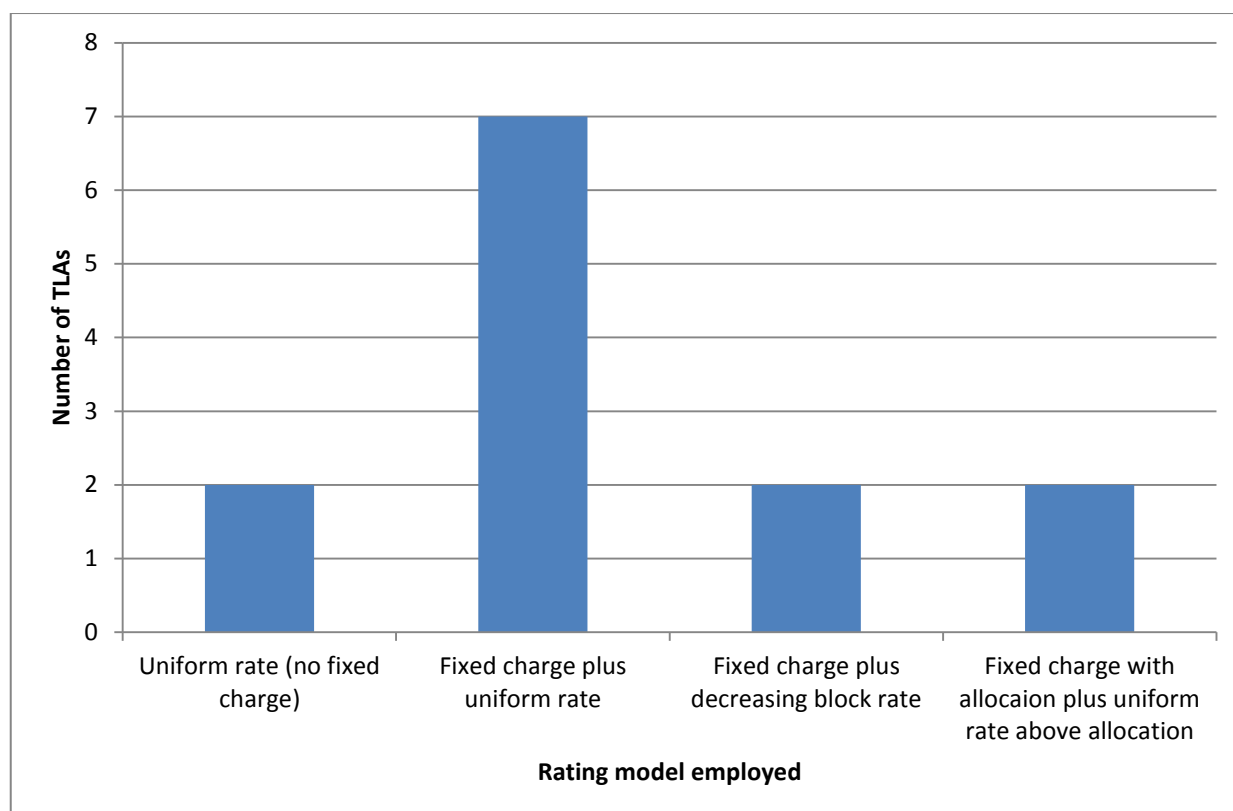


Figure 5.1 Rating models employed by TLAs with full volumetric charging

5.2 Local Authority Case studies

A number of rating models are employed by Local Authorities across New Zealand. This section summarises a cross-section of LGAs to highlight the different models applied and how water is priced in these districts. These districts were selected by the Office of the Auditor General for its 2010 report “Local authorities: Planning to meet the forecast demand for drinking water” and were considered a representative cross-section of the 67 TLAs in New Zealand and included a number of Authorities who have already implemented universal metering.

Table 5.1 below provides a snapshot of water supply statistics for QLDC and the 8 other New Zealand LGAs.

Table 5.1 Key water supply statistics from nine New Zealand LGAs*

Local authority	Queenstown Lakes District Council	Tauranga City Council	Nelson City Council	Tasman District Council	Kapiti Coast District Council	Opotiki District Council	Christchurch City Council	Central Otago District Council	South Taranaki District Council
Population (2013)	28,224 (average day population in 2011 is 46,612)	114,789	46,437	20,160	49,104	8433	341,472	17,895	26,577
Population growth rate (2001-13)	22.0%	10.5%	8.3%	5.7%	6.3%	-6.0%	-2.0%	7.5%	0.4%
10 year forecast expenditure on drinking water supply (2012-22 LTP)	\$72 M	\$230 M	\$68 M	\$88 M	\$48 M	\$1.8 M	\$158 M (2019-19 - no 2012 LTP due to Christchurch earthquake)	\$51 M	\$81 M
Volumetric Charging?	No	Yes	Yes	Yes	Currently implementing	No	No	Yes	No
Water supply funding mechanism	Targeted rates	User fees and volumetric charges.	User fees and volumetric charges.	Targeted rates and user fees and volumetric charges.	Targeted rates (currently implementing volumetric charging)	Targeted rates and user fees and volumetric charges (where metered).	Targeted rates	User fees and volumetric charges.	Targeted rates and user fees and volumetric charges (where metered).
Value of water supply assets (30 June 2009)		\$175.2 M	\$129.5 M	\$84.0 M	\$ 68.3 M	\$9.8 M	\$342.9 M	\$41.5 M	\$77.4 M
Average drinking water consumption in litres per person per day (lpd)	687 (resident population) 416 (average day population)	270	500	250	458	300	435	490 (approx)	888
Total annual drinking water supply	9.3 M m ³	13.3 M m ³	14.6 M m ³	5.5 M m ³	7.4 M m ³	0.6 M m ³	54.3 M m ³	5.3 M m ³	15.7 M m ³

production									
Equivalent volumetric price of drinking water (revenue/production)	<i>\$0.75 per m³</i>	\$1.10 per m ³	\$0.70 per m ³	\$0.99 per m ³	\$0.89 per m ³	\$1.20 per m ³	\$0.41 per m ³	\$0.48 per m ³	\$0.50 per m ³
Water supply source	<i>Predominantly surface water with some groundwater</i>	Surface water	Surface water	Mix of groundwater and surface water	Mix of groundwater and surface water	Surface water	Predominantly groundwater with some surface water	Mix of groundwater and surface water	Surface water

* Water supply statistics from Office of the Auditor General 2010

Key comments from the TLA case studies include are made below.

Central Otago District Council (CODC) implemented volumetric charging in 2012 after near universal metering of the district (with the exception of a minor scheme). The CODC rating model is based on an Annual Uniform Charge (AUC) which varies significantly from scheme to scheme (\$50 to \$700 per year) with a set volumetric charge per cubic metre of water of \$0.58 to \$0.86 per cubic metre, depending on the scheme.

Tauranga City Council (TCC) applies a uniform charge across the district of \$1.70 per cubic metre without applying an AUC and has made successful efficiency gains through metering. Since the introduction of metering and volumetric charging in 2002, average per capita water consumption is 25% below levels prior to metering, and per capita peak use is 30% lower.

Nelson City Council adopted universal water metering and volumetric charging in 1996 with a capital programme installing meters into every property. Reducing the summer time peak demand was a key imperative for Nelson City Council and was the basis for the Council's decision to meter household water use. Nelson had plenty of water capacity for its winter supply period when water use was low, but needed an intervention that would change water use behaviour in the summer. Nelson determined that the additional summer water demand was being driven by outdoor sprinkler use and to cater for the high number of tourists coming into the town. Failure to implement a water reduction measure would require 100% extra capacity to allow for summer peak use, which is only approximately 10% of the year.

Nelson estimates that the utilisation of water metering has decreased water use and that water savings at peak times of over 37 % have been achieved. Nelson's domestic water use is now reported as 160 litres per person per day.

It should be noted that both Tauranga and Nelson started their water use reduction programme from a far lower level than Queenstown Lakes District so the potential for reduction here, due to volumetric pricing as part of a policy mix, is higher.

The Auckland region is administered by Watercare. This is the only district that charges for both water and wastewater use on a volumetric basis. The unit rate for water consumption is \$1.34 per cubic metre with a unit rate of \$2.28 per cubic metre for wastewater discharge.

6 Rating Model Options

6.1 Current QLDC Rating Model

QLDC currently employs targeted fixed rates for water supply. This includes a flat service charge as well as a connected land use charge which is rated based on scheme and the property value. Table 6.1 provides a summary on equivalent per cubic metre costs based on current consumption patterns and total revenue from water supplies (from 2011/12 revenue and consumption data).

Table 6.1: QLDC Water Supply Revenue and Equivalent Cost per Cubic Metre

Scheme	Annual Revenue from Rates (\$)	Total Consumption (m ³)	Equivalent Cost per m ³ Consumption (\$/m ³)

Queenstown	\$ 3,600,516	4,872,828	\$ 0.74
Arrowtown	\$ 536,448	629,789	\$ 0.85
Glenorchy	\$ 153,564	104,364	\$ 1.47
Lake Hayes	\$ 409,872	392,198	\$ 1.05
Arthurs Point	\$ 161,700	159,568	\$ 1.01
Wanaka	\$ 1,800,402	2,810,064	\$ 0.64
Lake Hawea	\$ 187,620	248,265	\$ 0.76
Luggate	\$ 98,532	69,069	\$ 1.43
All Schemes	\$ 6,948,654	9,286,145	\$ 0.75

This provides an indication of the possible pricing regime if volumetric charging is introduced. As discussed in Section 6.3, there are a number of rating models that are worthy of consideration which will affect the pricing regime.

It is important to note that necessary revenue to meet operational, maintenance and future investment costs needs to be maintained regardless of water consumption patterns. As such, if consumption reduces as a result of WDM measures, a review of the pricing structure will be required to ensure the Council receives sufficient revenue to maintain its level of service and to provide for future investment (outside of development contributions).

6.2 Possible Rating Models with metering

6.2.1 Overview

A number of rating models may be adopted with the availability of universal metering which may vary within an LGA (e.g. scheme by scheme or by property type). These can be broadly categorised as the following:

Fixed rate (current QLDC structure)

This is the current QLDC model. Targeted rates for water supply are a fixed annual charge based on property type and its capital value

Volumetric uniform rate

Where a constant unit price of water is applied; the bill increases at a uniform rate per unit of consumption

Volumetric decreasing block rate

Where decreased unit rates apply for increased consumption in a block fashion

Fixed block plus volumetric rate

Where a water allocation is provided at a fixed charge and a uniform volumetric rate is applied above this allocation

The following section provides a brief discussion of the pros and cons of each.

6.2.2 Rating model comparison

In selecting a rating model to apply with the implementation of universal metering, it is critical that the factors summarised in the table above be given careful consideration. Ideally the rating model will meet the following objectives:

- Provide revenue to meet the operation and maintenance costs of the water supply scheme, including performance, and level of service improvement projects (with growth driven components of projects being funded by developer contributions).
- Provide incentives for water conservation
- Provide a fair and equitable system for the customer across the rating categories
- Attempt, as far as is possible, to provide certainty over customer costs (minimise cost fluctuations)

A further consideration is on the timing of implementation of any new rating model. To minimise cost fluctuations from volumetric pricing, ideally there would be at least two years of metering to understand the consumption patterns and establish an appropriate pricing structure before volumetric charging is implemented. Table 6.2, below, summarises the rating models including possible advantages and disadvantages of each.

Table 6.2: Rating Models, Advantages and Disadvantages

Rating model	Advantages	Disadvantages
Fixed rate	<p>Universal metering is not required</p> <p>Customer bills do not fluctuate providing certainty over expenditure</p> <p>A relatively simple model that is easy to operate and understand</p>	<p>No financial incentive to reduce water use</p> <p>System is inequitable where high users are essentially subsidised by low users</p> <p>There is a lack of clarity as to the price of water to consumers</p>
Volumetric uniform rate	<p>The most simple of the volumetric charging models being relatively easy to understand and implement</p> <p>An equitable system as all customers pay the same unit rate for water</p> <p>Provides an incentive to reduce water use</p> <p>A uniform rate across all rating categories the expense of detailed cost allocations.</p>	<p>Large volume customers may feel that they are unfairly treated</p> <p>Revenue instability may occur, particularly in the short term when transitioning from the fixed rate model</p> <p>Permanent residents may feel unfairly targeted as their annual water use will be higher than holiday home owners however both contribute to high summer use</p>

Volumetric decreasing block rate	<p>Provides incentive for water conservation</p> <p>Recognises that unit rate of water may reduce at higher flow demand (due to economies of scale)</p>	<p>High water use industries are less incentivised to reduce water use</p> <p>A complex model to set up and administer. Requires more frequent monitoring to understand likely consumption for different consumer rating categories (to set an appropriate block)</p> <p>Runs the risk of being inequitable if not set up correctly</p>
Fixed charge plus volumetric rate	<p>Guarantees a revenue stream from holiday home owners who may not use significant quantities of water annually but still contribute to peak summer use</p> <p>Less risk of revenue volatility</p>	<p>Provides a lower incentive for water conservation than the uniform rate only</p>

7 Implementation actions

Considering the rating model options for Council and the principles summarised in previous sections, Council needs to formulate outline actions for implementing good practise water supply management. This section provides a number of proposed outline actions, which will be the subject of further discussion and refinement.

Action 1: Identify the extent, nature and location of high water users in the district

Before consideration of universal metering, it is necessary to understand whether there are particular high water users that can be targeted for specific water demand management measures. Examples of these may include the following:

- Industrial activities that require significant volumes of water for its operations
- Lifestyle blocks that have pastoral areas with high irrigation use (e.g. properties over 1 hectare)
- Accommodation activities with high occupancies (hotels, backpackers etc)
- Sports fields
- New subdivisions or developments that generally have high irrigation use to establish new lawns and gardens
- Geographical areas of lower rainfall that need to supplement with irrigation to maintain gardens
- Any other activities that have high water use

Identification and classification of these high water users will require a number of tools to be used such as GIS analysis of property types and sizes, existing metering information (particularly network metering), anecdotal evidence and inspections.

Action 2: Continue with non-metering water demand initiatives

No-metering water demand initiatives include education, promotions, Council water demand reduction and leakage reduction. Ideally these will be continued to provide the ability to assess benefits over multiple years. This information will be used to refine and calibrate the cost-benefit models.

Action 3: Review the capacity driven projects in the Long Term Plan

A more detailed review of the capacity driven water supply projects is required to confirm the assumptions of deferral that can occur through water demand reduction. This may require additional hydraulic modelling against various scenarios of demand growth based on peak day flows.

Action 4: Review the operational costs of water

The long term marginal cost of water on a per unit basis (\$ per cubic metre of consumption) needs to be determined to assess operational savings from water demand reduction. This requires an investigation into direct energy and consumable costs as well as an assessment of operational maintenance and renewal savings from water demand reduction.

Action 5: Quantify universal metering capital and operational costs

Investigation of the likely complexity of meter installations and quantification of costs is required, particularly in Queenstown and Wanaka with their more urban environments. This will involve review of GIS records, site walkovers and more detailed pricing.

In addition a review of operational options is required when considering volumetric charging (e.g. automatic vs manual metering reading, billing methods, reading frequencies etc.).

Action 6: Review alternative strategies for water supply management

Before embarking on universal metering of the whole district it will be necessary to assess the costs and potential benefits of alternative strategies for water supply management. Examples of these may include the following:

- Installing metering on a scheme by scheme basis to both stagger the capital costs and target the easier schemes first.
- Investigate the advantages of targeting metering (and potentially volumetric charging) to those high water users identified in Action 1.
- Preparing and implementing a robust Water Supply Bylaw that allows for regulating and penalising high water users
- Installation of water supply restrictors (physical restrictors at the point of supply) to high water users, potentially coupled with property water tank storage.
- Application of seasonal restrictions, as per the Lake Hayes scheme

Action 7: Develop a communication strategy

Community education requirements need to be considered if the decision to implement universal metering is made. It is likely that there will be mixed reactions to the project which will require a carefully managed implementation process.

Drawing on the experience of other local authorities that have implemented universal metering (and volumetric pricing) will be very helpful in this instance to understand challenges they faced with community opposition.

8 Summary

This report is a study into the potential options and implications for universal metering in the Queenstown Lakes District. This investigation is one component of the wider Water Demand Management (WDM) strategy for Council. It is envisaged that future studies will include an updated financial cost-benefit analysis based on improved information and further assessment of metering implementation options.

As stated in Section 1.2, the objective of this study is to provide context and background information on universal metering and to assist Council in forming a decision on its implementation. It is emphasised that volumetric pricing is not an inevitable outcome of universal metering.

Eight principles for the district water supply management are proposed which will form the basis of decision making during the establishment and on-going implementation of a robust and comprehensive strategy. These are:

- a. Financial sustainability: water supply must be managed in a manner that avoids financially unsustainable capital expenditure across the water supply network.
- b. Environmental responsibility: unnecessary water demand needs to be managed in a manner that minimises avoidable adverse effects on the environment.
- c. Fair and equitable allocation of costs: All water supply costs (both operating and capital costs) should be fairly and transparently allocated to ratepayers (i.e. without unreasonable cross-subsidisation).
- d. Efficient Management: Water supply must be undertaken in a manner that enables the most efficient and cost-effective management of our resources and network, and therefore use tools which will provide us with better information to enable this to be done.
- e. Cost recovery: Any changes to the current form of charging for water supply must maintain the principle of cost recovery only through the reallocation of costs, and therefore avoid any windfall revenue gains.
- f. Demonstrable cost benefits: The introduction of any form of metering should only occur when the financial and other benefits from doing so demonstrably outweigh the costs of implementation.
- g. Revenue stability: Water metering must be implemented in a manner which avoids any revenue material revenue volatility across financial years.
- h. Complementary water management measures: Alternative or additional measures to metering need to be considered as part of a water demand management strategy, including public awareness.

In summary, universal metering has many potential advantages, including:

- A slowing in water demand, resulting in deferment of capacity driven capital works and a reduction in maintenance and operational costs
- Consumer and Council attitudinal change to water consumption
- Improved data on consumption patterns that allow enforcement and incentive tools to be used to reduce consumption such as penalising or limiting supply high users
- Council is able to better identify leakage (both network and private) to further reduce demand on the network

- Provides the opportunity to consider volumetric charging of water and its associated benefits

Potential disadvantages on metering include:

- Upfront capital cost. Metering of all connections is a significant investment and must be quantitatively balanced against the financial benefits
- Operational costs in reading the meters and managing the increased data.
- The additional operational cost incurred if volumetric pricing is implemented through the management of a more complex billing system
- The risk of financial revenue instability as revenue will be linked to consumption patterns
- Public opposition to implementation due to a perception of a money-making exercise or a first step to privatisation

A number of rating models are worthy of consideration with the implementation of universal metering. Ideally any model will meet the following objectives:

- Provide revenue to meet the operation and maintenance costs of the water supply scheme.
- Provide incentives for water conservation
- Provide a fair and equitable system for the customer across the rating categories
- Attempt, as far as is possible, to provide certainty over customer per unit costs (minimise cost fluctuations)

There are a number of risks when assessing the benefits of universal metering for the district as follows:

- Consumer responses to WDM measures are significantly influenced by a number of factors (socio-economic, demographics, climate, the 'health' of the network and the method of implementation).
- Water consumption behaviour may resort back to pre-WDM levels once initiatives are imbedded in, if volumetric pricing is not adopted.
- There are other, indirect benefits to the community that can be significant such as the environmental benefits and reduction in hot water heating.
- A number of the capacity driven CAPEX projects that would be deferred by WDM are beyond the five year window providing some uncertainty as to timing of these projects.
- In reality, a capacity driven upgrade will be triggered by the specific demands and operating conditions within each scheme. Therefore, water demand reductions and associated capital work deferrals needs to be assessed on a scheme by scheme basis.
- Establishing the average cost of installing water meters has many variables. The most significant variable is the complexity of meter installations.

As part of the on-going review of universal metering in the district, the following actions will be undertaken and refined:

1. Identify the extent, nature and location of high water users in the district
2. Continue with non-metering water demand initiatives
3. Review the capacity driven projects in the Long Term Plan
4. Review the operational costs of water
5. Quantify universal metering capital and operational costs

6. Review alternative strategies for water supply management
7. Develop a communication strategy

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