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Stocktake of Freshwater Demand Management Initiatives

Report prepared for Ministry for the Environment

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1 Introduction

1.1 Scope of the Project

Hill Young Cooper was engaged by Ministry for the Environment (MfE) to undertake a stocktake of freshwater demand management initiatives within New Zealand.

The aim of the project is to identify local and national level initiatives that are in place to manage demand for freshwater for municipal water supply, primarily for residential and commercial/industrial uses.

The information from this report is to inform the Supplementary Measures work stream of MfE's "New Start for Freshwater" work programme and assist in undertaking a "gap" analysis to identify where central government initiatives to assist in managing freshwater demand may be appropriate.

The key questions MfE is seeking to answer through this project are:

1. What freshwater demand management initiatives exist nationally?
2. What freshwater demand management initiatives do local councils have in place? and
3. What is the intended effect of each initiative?

MfE also sought to obtain information, where it existed, on the following questions:

4. What monitoring of the effectiveness of each initiative has been/ will be undertaken?
5. If there has already been some monitoring to date, what do the results show?

1.2 Methodology

The methodology for the stocktake was as follows:

1. Review a selection of base information to identify and classify demand management options, particularly information from previous water demand projects that have been undertaken by Beacon Pathways.
2. Develop a survey questionnaire for organisations that supply water (primarily Territorial Authorities and associated water supply utilities/CCOs) based on the review and targeted at the questions identified above.
3. Circulate the survey to a range of water supply organisations, with the aim of receiving at least 20 representative responses across a geographical and scale (volume of water supplied) range.
4. Compile, tabulate and review the survey results to draw conclusions on the range of water demand measures that are applied and the success of these measures (where possible).
5. Review other national initiatives for freshwater demand management.
6. Prepare a report summarising the findings of the stocktake.

1.3 Survey Questionaire

As can be seen by the project methodology, the survey questionnaire is the primary method of obtaining information on the water demand measures that are applied in practice. The questionnaire and covering letters to organisations are attached as Appendix 1.

The questionnaire is divided into four areas. These are discussed briefly below.

Section 1: Contextual Information

This section captures information on the nature of the organisation and its customer base. One of the aims of this information is to assist in identifying whether there is a relationship between the water demand measures that are applied and the size of the organisation or the nature of its customer base, particularly given that many water demand measures are predominantly applied to residential water use.

Another important contextual element for water demand is whether water organisations use a different design criterion for determining base water use requirements and the extent to which this varies across the organisations, prior to any water demand management being applied.

In addition, the key drivers for water demand management were sought to provide an insight into the primary motivation for implementing water demand management strategies.

Section 2: Water Demand Measures

This section focuses on what measures are applied and the methods that are used to apply these measures (i.e. voluntary, regularity etc). The survey questions differentiate between residential and commercial/industrial supply in recognition that water demand measures may vary and be applied differently across different water uses. Further detail was sought in respect of how measures were applied, reflecting that different measures may require different methods of implementation.

It was considered unlikely that water organisations would be able to provide detailed information on the extent to which specific measures are applied, so one aim of this section is to obtain an indication of the relative importance of common measures. While this is a subjective assessment, it provides guidance as to what measures are considered to be more effective by water supply organisations.

Section 3: Monitoring of Measures and their Effectiveness

The aim of this section is to capture the extent to which measures are monitored and, if possible, a quantification of their effectiveness. Given the wide range of measures that are used, and that a range of methods may be employed to monitor implementation, it was anticipated that this information would largely be subjective and descriptive, rather than quantified.

Section 4: General Comments

In order to obtain quantifiable information, the questionnaire has focused on common water demand measures and the application of these measures. However, it is appreciated that water demand management is a complex issue and depends on the specific context and circumstances of individual water organisations including matters such as access/availability of water supplies. This section enabled respondents to provide more general feedback as to their organisation's approach to water demand management.

1.4 Outline of report

This report is organised as follows:

- Water demand management;
- Survey results;
- Summary of findings
- Conclusions;
- Appendices.

2 Approaches to Water Demand Management

This section of the report outlines the contextual setting for freshwater demand management, including approaches and national initiatives.

2.1 Definitions

Freshwater demand management is defined as the development and implementation of strategies aimed at influencing freshwater demand, so as to achieve efficient and sustainable use of one of our natural resources. Besides efficiency, it should promote equity and environmental integrity.

Freshwater demand management should not be seen as merely aiming at reducing demands or achieving higher water use efficiencies. Freshwater demand management is another approach to water resources management that contrasts with the traditional supply management, aimed at increasing the supply whatever the demand.

It differs from supply management in that it targets the water user rather than the supply of water to achieve more desirable allocations and sustainable use of water. Apart from structural measures (such as low-flush cisterns for toilets, leak detection and control systems in distribution networks, and drip irrigation in agriculture), demand management strategies mainly consist of non-structural measures: economic and legal incentives to change the behavior of water users and the creation of an institutional and policy environment that enables this approach.

Besides these implementation incentives, an important component of demand management is awareness raising, education, and training. There are many examples where advocacy and the provision of alternative approaches to enhance the efficiency of water use have yielded considerable reductions in water use and pollution. [1]

2.2 Freshwater Demand Options/ Approaches

Demand management measures aim to minimise either the overall or peak demand for water. Measures can be categorised as follows[2]:

Increase system efficiency: This approach does not reduce resource usage by consumers, but achieves less system losses hence reduces overall water usage. Examples include leakage detection and repair; change in system operations such as pressure reduction and changes to mains flushing; reservoir cleaning; and installing peak balancing capacity.

1 *Reference: "Water as an economic good and demand management paradigms with pitfalls", by Savenije, H.H.G and Van der Zagg, P.,2002*
2 *Reference: "Designing Cost Effective Water Demand Management Programs in Australia", by White, S.B. and Fane, S.A.,2001*

Increase end use efficiency: The aim of this approach is to achieve less resource used by the consumer to provide the same service. Examples include regulating for AAA rated shower heads and dual flush toilets in new developments; enforcing minimum performance standards on new appliances (dishwashing machines, clothes washing machines); offering financial incentives for water efficient purchase and installation; and programmes to retrofit efficient equipment into existing buildings.

Promote distributed/ alternative sources of supply: This approach provides services via a locally sourced resource that is not currently being used. Typical examples include encouraging household rainwater tanks and greywater reuse systems and the provision of recycled effluent for non-potable uses via dual reticulation.

Substitute resource use: Provide the same service without use of the resource in question. For example, planting indigenous plants adapted to local rainfall or use of waterless sanitation.

Improve the market in resource usage: This approach seeks to inform the consumer about the full costs of their resource use. Examples include full cost recovery charges for water use, volume-based pricing set at or above the long run marginal cost, providing better feedback on the level and cost of ongoing water usage by universal metering with at least quarterly billing or smart metering with instant feedback, removing perverse incentive for increased resource use such as declining block tariffs, providing comprehensive information on the environmental impacts of water use, running education campaigns and conducting detailed water use analysis (audits) for water customers in key sectors.

Of the above approaches, demand management tends to concentrate on end-use options. Local contexts such as demographics, climate, water resource availability and political environment will have a bearing on both the drivers for demand management to be implemented and the particular demand management interventions that are best adopted. The regulatory and policy framework, current and potential, will also have a significant bearing on what is implemented.

In this stocktake, water demand management interventions have been considered under the following key areas:

- Network maintenance – fixing water supply system leaks, reducing system pressure, and programmes to encourage end-users to fix private reticulation and device leaks.
- Economic instruments – water metering, volumetric user charges, tariffs, wastewater charging, incentives and rebates.
- Water efficient technology – rainwater tanks, greywater reuse, appliances and plumbing fixtures.
- Education, awareness and social marketing – promotional materials and education regarding water use reduction.
- Regulations – District Plan rules, building codes consents, design standards and guidelines.

2.3 National Initiatives

The following section outlines the policy and regulations, as well as projects and partnerships being implemented by Ministry for the Environment with regard to freshwater demand management. Some other projects and partnerships relating to freshwater demand management that are taking place within New Zealand are also outlined below.

2.3.1 MfE Policy and Regulations

Below are the current policies and regulations being implemented and administered by MfE:

New Start for Freshwater: The Government's new strategy was announced on 8 June 2009 and is outlined in the Cabinet paper "New Start for Freshwater". It sets out the Government's new direction for water management in New Zealand, and outlines some of the choices we face and the implications of those choices. A subsequent paper will outline a programme of work to run until 2011 and beyond.

Proposed National Policy Statement for Freshwater Management: Freshwater quality and managing increasing demands for water have been identified as matters of national significance. The purpose of the proposed National Policy Statement for Freshwater Management is to help guide decision-making on freshwater management under the Resource Management Act 1991 (RMA) at national, regional and district levels. This reflects that management of freshwater is a matter of national significance, and is relevant to achieving the purpose of the RMA.

Proposed National Environmental Standard for Measurement of Water Takes: The aim of this National Environmental Standard (NES) is to help provide more accurate information about water use.

Proposed National Environmental Standard on Ecological Flows and Water Levels: This NES will promote consistency in the way that allocation and flow limits are set to ensure that there is sufficient variability and quantity of water flowing in rivers, groundwater systems, lakes and wetlands.

Water Efficiency Labelling Scheme (WELS): This scheme involves attaching a label, which indicates both water efficiency and consumption, on largely household products such as whiteware and plumbing equipment.

2.3.2 MfE Projects and Partnerships

Below are the current projects and partnerships being undertaken by MfE:

Joint Māori Work Programme: The objective of the programme is to enhance decision-making in freshwater management by having greater and more consistent Māori involvement and to incorporate Māori perspectives at the national and regional levels.

Waitaki Catchment Water Allocation Regional Plan: The Waitaki Catchment, in the South Island's Canterbury region, is important for renewable energy and irrigation, and for its natural, recreational, community and fishery values. In 2005 an independent board established the Waitaki Catchment Water Allocation Regional Plan.

The Household Sustainability Programme: Established in 2007 this programme provides advice for the public on living more sustainably, including reducing water use at home.

The Sustainable Water Programme of Action: This programme was implemented from 2003 to 2008 and was a policy programme aimed at improving freshwater management under the RMA. A number of the initiatives listed above resulted from this programme.

2.3.3 Other Projects and Partnerships

Below are current projects and partnerships being undertaken throughout New Zealand:

Smart Water Use on Dairy Farm Programme: This programme is a partnership between Dairy New Zealand and Environmental Waikato and has been launched as a trial in the Waikato region to develop approaches that could be included in a subsequent national water use efficiency programme.

The Primary Sector Water Partnership: This is a group of major primary sector organisations who are committed to ensuring the sustainable use of freshwater resources in the primary sector. Their goals are to maintain and/or enhance water quality from primary production land, with demonstrable and accelerated progress on the resolution of water quality issues from agricultural land within five years; and demonstrable improvements in water use efficiency by the primary sector within five years.

The sector representatives in the partnership are:

- Dairy (Fonterra, DairyNZ);
- Arable (Foundation for Arable Research);
- Horticulture (HortNZ);
- Sheep and Beef (Meat & Wool New Zealand);
- Forestry (NZ Forest Owners' Association and NZ Farm Forestry Association);
- Fertiliser (Fertiliser Manufacturers Research Association);
- Irrigation (Irrigation NZ);
- Federated Farmers NZ.

The Irrigation Efficiency Portal: This new initiative will provide a 'one stop shop' for all things irrigation including tools, best practice information, reports and an up to date guide on what is happening in the world of irrigation. The website address site is: www.irrigationefficiency.co.nz with a "go-live" date of June 2010

Waterwise: is a New Zealand initiative formed by a group of predominantly Auckland schools. The initiative is aimed at schools; to teach children water safety and aquatic awareness in a safe controlled marine environment.

3 Survey Results

3.1 Introduction

The following section provides the results of the survey of territorial authorities and associated CCOs to obtain an understanding of the level of freshwater demand management initiatives that are applied for public water supply systems.

The survey was undertaken in March 2010; 40 questionnaires were sent out to a range of organisations throughout New Zealand including City and District Councils, Council Controlled Organisations and organisations which supply water to local authorities. Organisations were selected to get a fair representative distribution of responses. The questionnaires were sent out on the 5th of March 2010 with respondents given two weeks to respond. Follow up telephone calls were made to the respondents, with a total of 22 water supply organisations responding to the questionnaire, with a further organisation providing its water management plan. The responses to the questions have been collated and provided below as a series of tables and charts to provide a summary of the major freshwater demand management measures, their methods of implementation and information on their effectiveness.

The information provided by the organisations is treated as confidential and is only presented in a summary/ statistical form.

3.2 Context

3.2.1 Data Collected

As indicated previously the first section of the questionnaire provides a context to the more specific information on water demand measures. Information collected included:

- The size of the water supply organisation (annual volume of water supplied);
- The residential and industrial water use design criteria;
- The makeup of the customer base;
- Whether a water reduction target has been established and if so, the target date for achieving it; and
- Whether actual reductions had been identified and the period over which this has occurred.

3.2.2 Scale

From the information in Table 1 below, it can be seen that the surveyed organisations ranged significantly in scale, providing between 1 million and 50 million cubic metres per year, with the majority of respondents providing between 3 and 15 million cubic metres per year.

Table 1: Context information from respondents

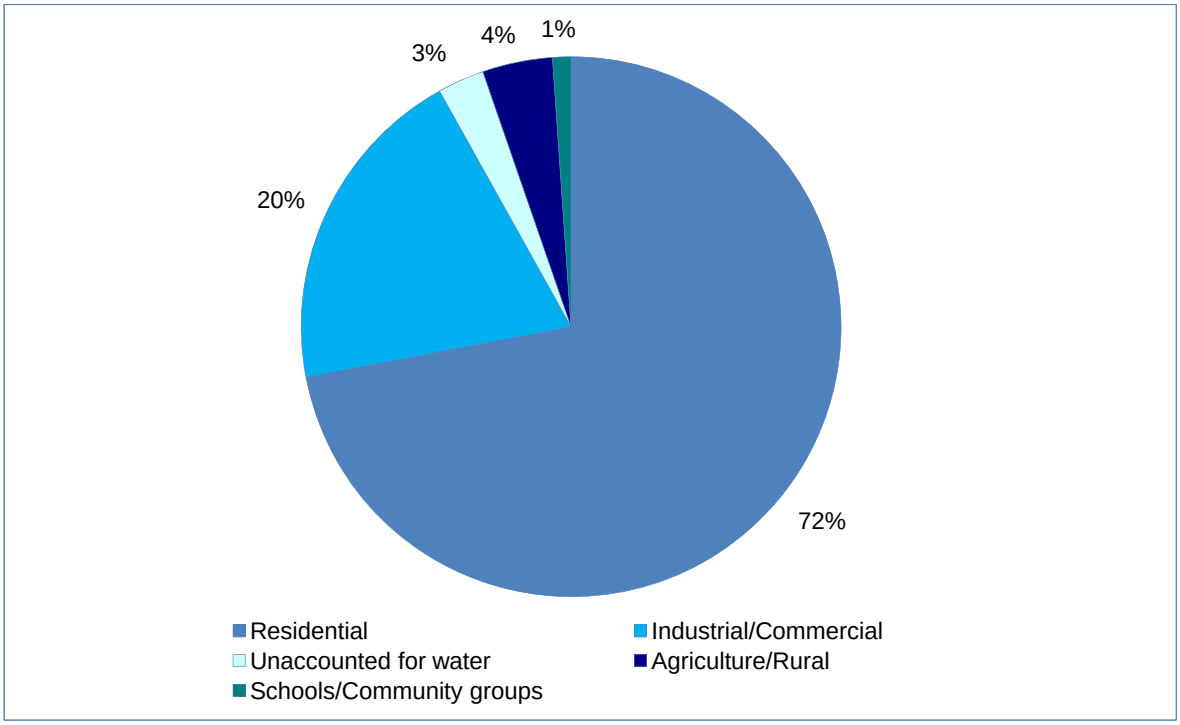
Respondent ID	Volume Supplied (million cubic metres per year)	Residential water use design (litres/ person/day)	Commercial/ industrial water use design (cubic metres per year)	Make up of customer base		Water reduction target	Achievement Date	Water Consumption reduced from/to	Period achieved in	Top 3 most effective Demand Management Measure for reducing water	Demand Management Measures used
				Residential %	Industrial %						
1	53	--	--	57	25	--	--			A	A, I, J
2	35	171	9,434,897	63	17	4.5%	2024	9% Reduction	2004- 2009	J, K, L	A, B, C, F, I, J, L
3	29	230	7283	58	25	15%	15 years			I	A, B, F, I, J, K
4	20.2	250	--	80	20	--	--	11%- 12%		I, A, L	A, B, C, D, I, M
5	15.5	260	4,1600,000	70	30	--	--			B, I	A, B, C, I, J, L, M
6	14	250	1956	65	14	15%	15 years				A, B, F, I, J, K
7	12.8	430	Peak hr flow 1-2 litres /sec/ hectare	70	30	5%	2017	40% Reduction	1997/98-2008/2009	I, J, O	A, B, C, D, E, F, I, J
8	12.5	280	--	37	13	--	--			A, O, B	A, B, C, I, J
9	7.9	550	372,000	93	6	18%	2014	7.6% Reduction	April 2007-March 2009	A, O, I	A, B, C, D, F, I
10	5.3	181	--	70	30	11.5%	2012	18%- 22%	1 year	I, J, L	A, B, C, I, J, L
11	5.1	--	--	70	10	--	--			I, B, A	A, I, J, K, L
12	5.1	--	--	93	7	--	--			L, J, I	A, B, I, J, L
13	5	240	891	70	18	15%	15 years				A, B, F, I, J, K

Respondent ID	Volume Supplied (million cubic metres per year)	Residential water use design (litres/ person/day)	Commercial/ industrial water use design (cubic metres per year)	Make up of customer base		Water reduction target	Achievement Date	Water Consumption reduced from/to	Period achieved in	Top 3 most effective Demand Management Measure for reducing water	Demand Management Measures used
				Residential %	Industrial %						
14	4.9	280	2,179,000	56	44	--	--	19% Reduction	Since metering in 1999	I, J, L	A, B, I, J, L
15	3.8	220	Varies	84	10	5%	2024			I, A, B	A, B, C, D, I, J, L
16	3.8	250	Varies	--	--	--	--			I	C, I
17	3.8	--	--	70	20	--	--			J, I	A, B, C, I, J, K, L
18	3.6	230	--	90	10	--	--	Reductions due to wet summers & acoustic leak detection		I, A, C	A, C, I, J
19	3	340	--	80	20	--	--			B, A, I	A, C, I
20	1.8	448	33800	70	30	--		Reduced by 20% due to metering	Within one year of water universal water metering		A, B, C, D, I, J, K
21	1.6	260	--	85	15	15%	--	12%- 15%		I, J, A	A, I, J
22	1.5	--	--	90	10	--	--			C, I, J	A, B, C, F, I, J
23	1	250	--	85	4	--	--	39% Reduction		I, A, C	A, C, D, F, I

3.2.3 Customer Base

As indicated in Table 1 and Figure 1 the overall customer base across the respondents is dominated by residential water uses, comprising some 72% of the water use volume, with industrial water uses accounting for approximately 20% of the water supplied.

Figure 1: Respondents' Customer Base



3.2.4 Water Use Design Criteria

Of particular interest is the design volumes used to calculate residential water use requirements. These range from 181 litres/person/day to 550 litres/person/day, with typical values lying in the range between 220 and 250 litres/person/day.

Information on design rates for industrial uses does not provide any consistent picture, presumably due to the highly variable and industry specific nature of industrial/commercial activities and associated water use requirements.

3.2.5 Demand Reduction Targets and Achievements

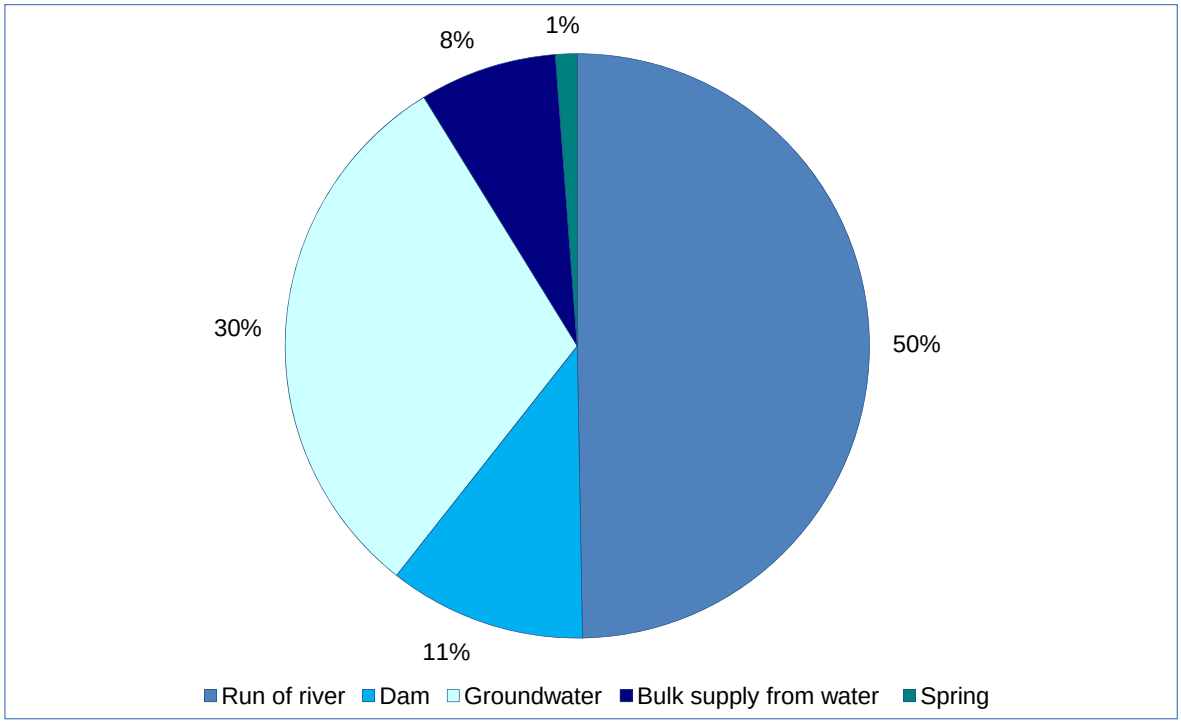
Approximately half of the respondents have identified demand reduction targets, with the targets ranging from 4.5 to 18%. Implementation times to meet the targets are typically 10 to 15 years.

Some organisations have identified reduction achievements to date, with up to a 22% reduction being achieved. In one instance, this reduction was specifically identified as being due to the implementation of water use metering.

3.2.6 Sources of Supply

Organisations were asked to provide information on the sources of the water they provide. This is summarised in Figure 2, which indicates that the majority of water is supplied by run of river at almost 50%, with groundwater the next highest contributor at approximately 30%. As indicated in the chart, some water organisations are retailers of water and receive water from a bulk water supplier rather than direct from a water source. This water supply would originally be sourced from rivers, dams or groundwater.

Figure 2: Respondents' Sources of Water

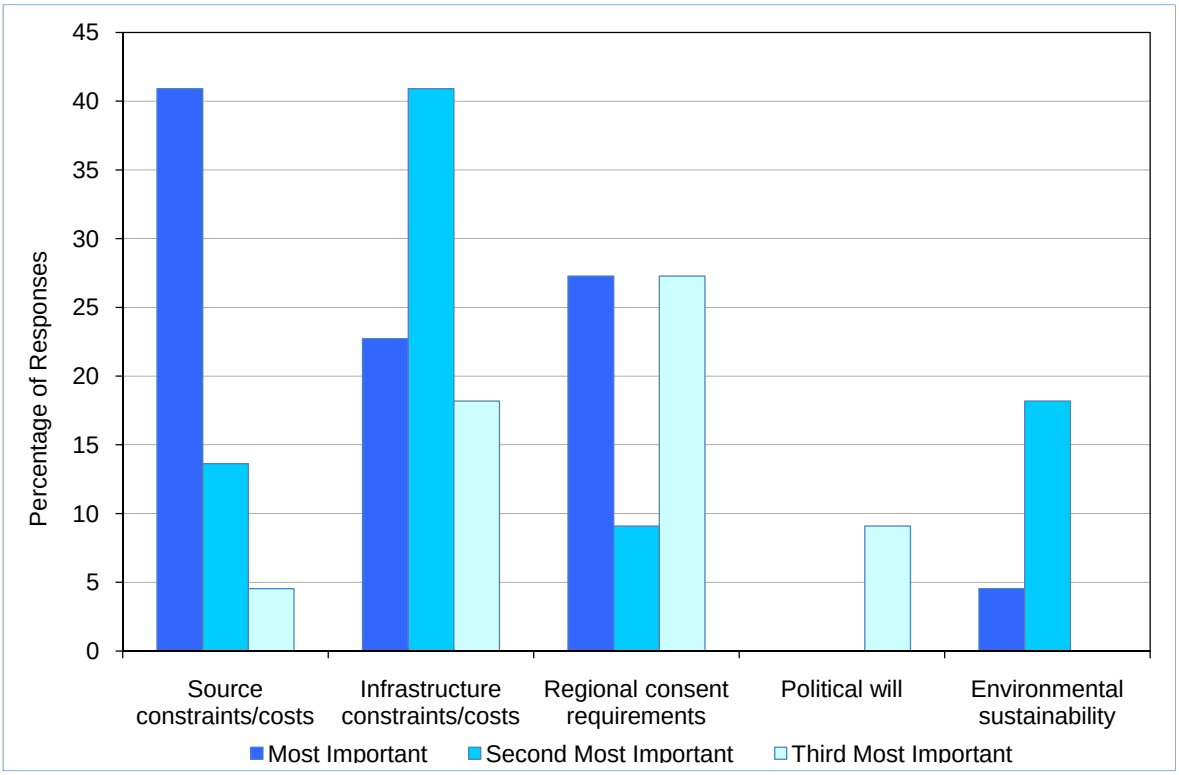


3.2.7 Primary Drivers for Freshwater Demand Measures

Respondents were asked to identify the motivation for their implementation of water demand measures, in terms of the respective importance of major drivers. The responses are shown in Figure 3, which indicates that source constraints/costs, infrastructure constraints/costs and regional consent requirements are the three main drivers.

Political will and environmental sustainability rate significantly lower as a driver for freshwater demand management.

Figure 3: Drivers for Water Demand Management



3.3 Water Demand Measures

3.3.1 Data Collected

The second section of the questionnaire sought detailed information on the nature of the measures that are implemented, the methods of implementation and their relative effectiveness.

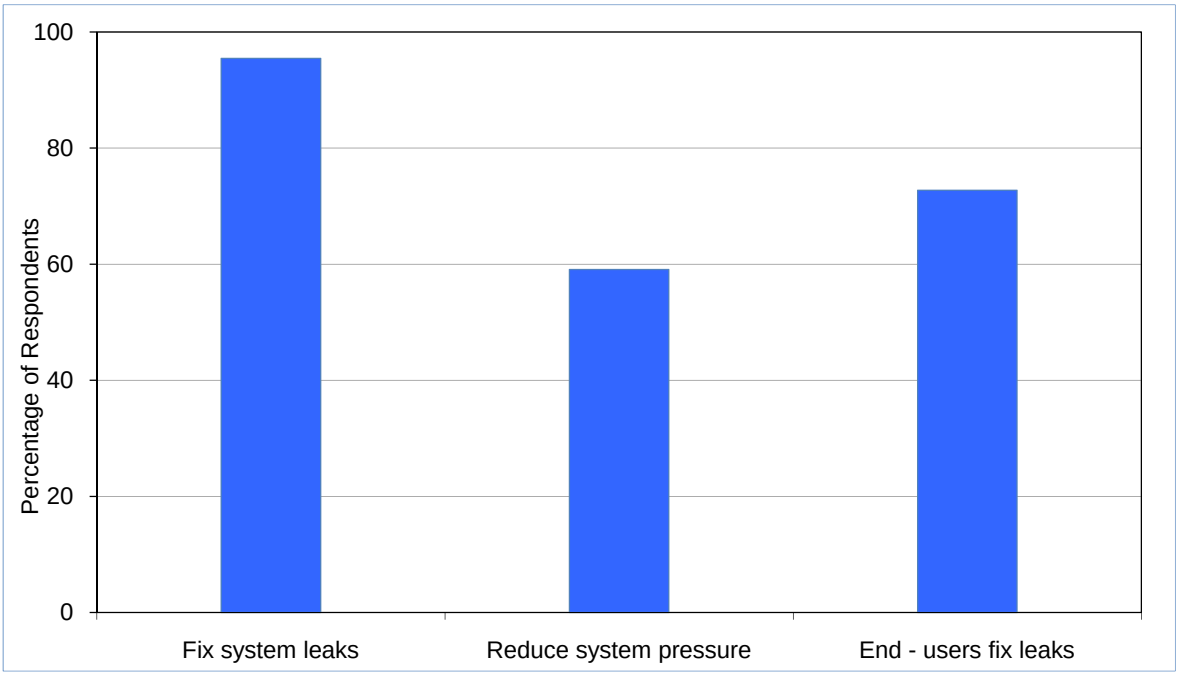
The demand management measures that are implemented by the respondents are divided into three areas as follows: network maintenance, water efficient technologies and economic instruments.

3.3.2 Network Maintenance

The implementation of network maintenance measures is provided in Figure 4. As can been seen from this information, most respondents have active programmes to reduce network system leaks, while approximately 70% have programmes to encourage end users to address leaking private systems and water appliances.

Approximately 50% of the respondents had reduced system pressure to reduce water losses.

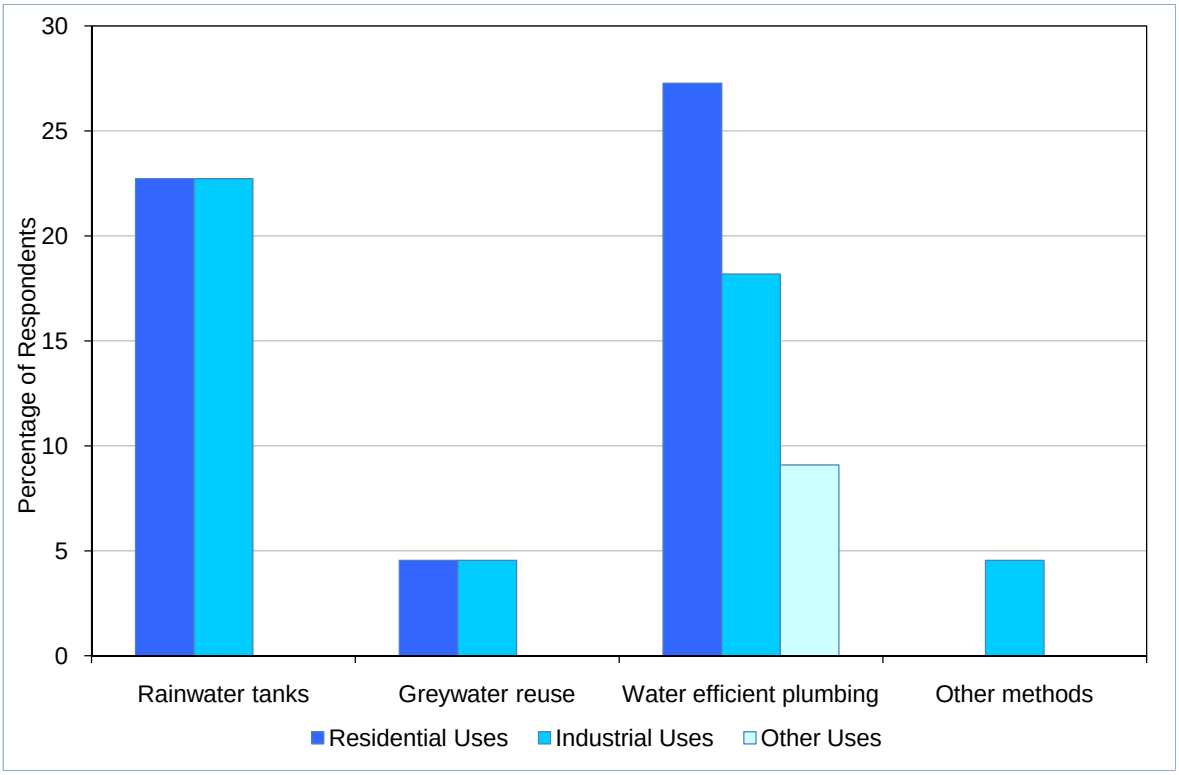
Figure 4: Water demand management – network maintenance



3.3.3 Water Efficient Technologies

The extent to which water reduction technologies are applied is shown in Figure 5. As can be seen from the survey information, water efficient plumbing, fitting and appliances and the use of rain water tanks are the most common efficiency measures that are applied. We note that the application of these measures does not vary significantly between residential and industrial/commercial uses.

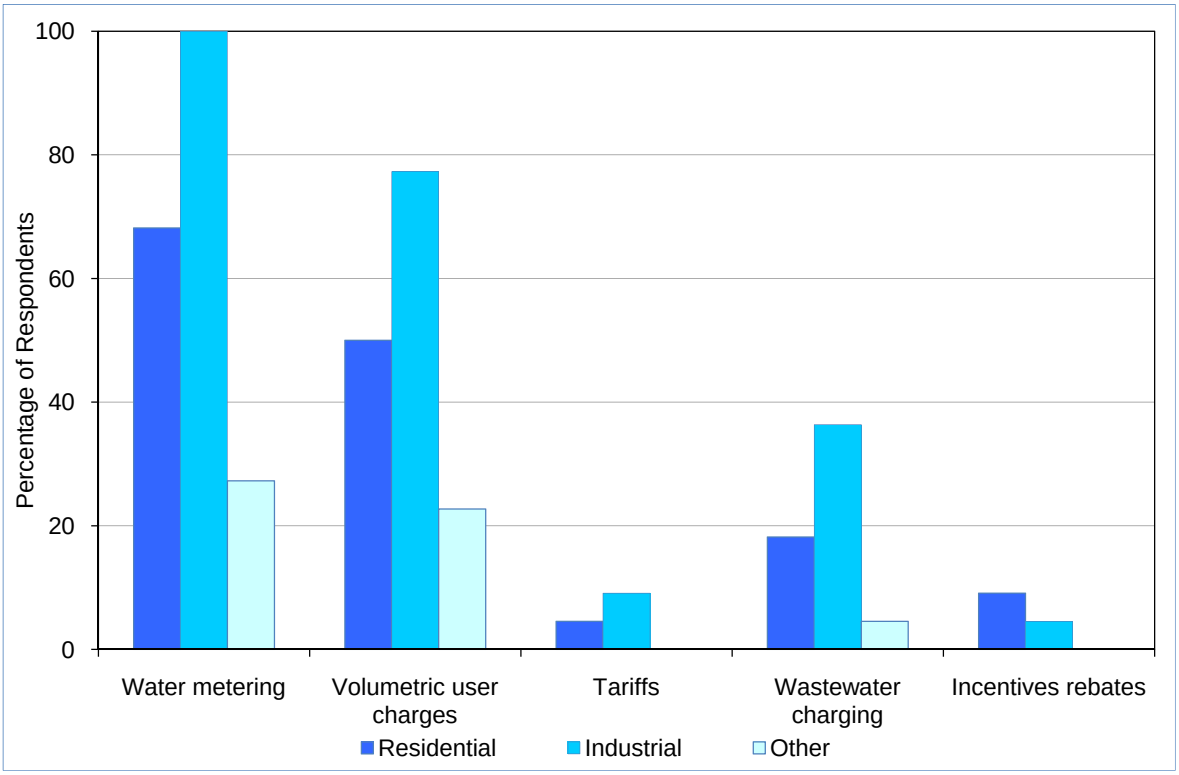
Figure 5: Water demand management – water efficient technologies



3.3.4 Economic Instruments

The economic instruments used by water organisations are shown in Figure 6. This clearly indicates that economic measures are dominated by water metering and associated volumetric water charging. Almost all of the organisations surveyed implemented water metering on industrial/commercial users, presumably due to the highly variable nature of these uses.

Figure 6: Water demand management – economic instruments

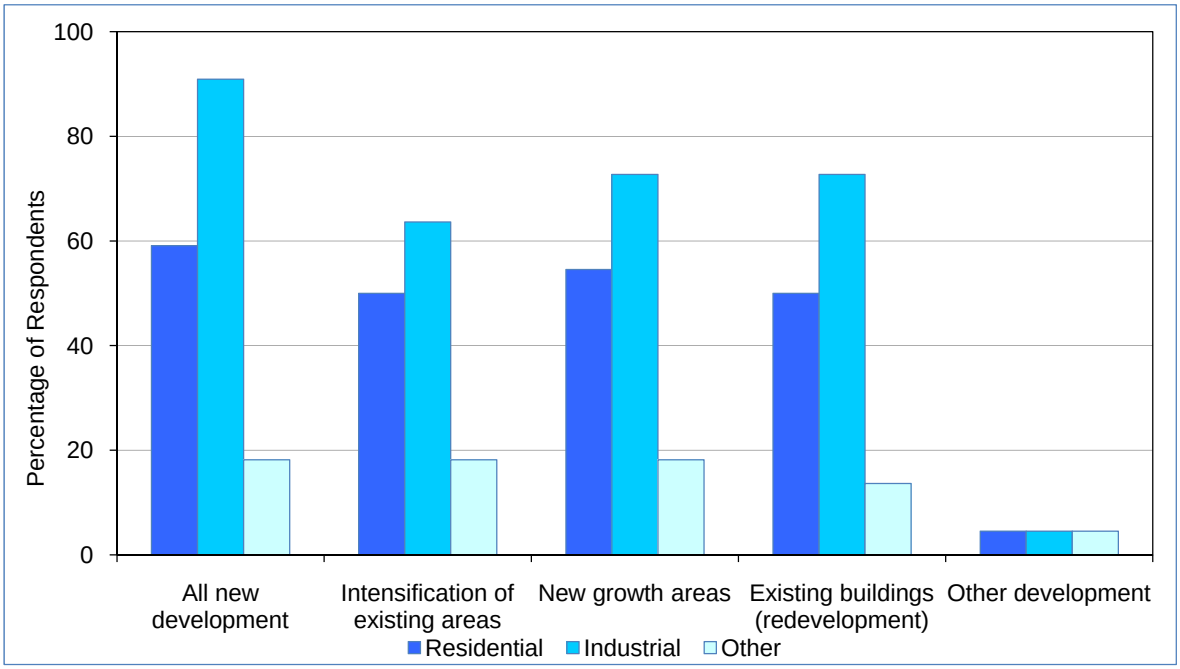


3.4 Application of Water Demand Measures

The organisations were asked what types of developments the water demand management initiatives outlined above are implemented on.

The responses are shown in Figure 7. The results indicate that, where it is applied, water demand management is consistently applied on all development including new and redevelopment of existing areas.

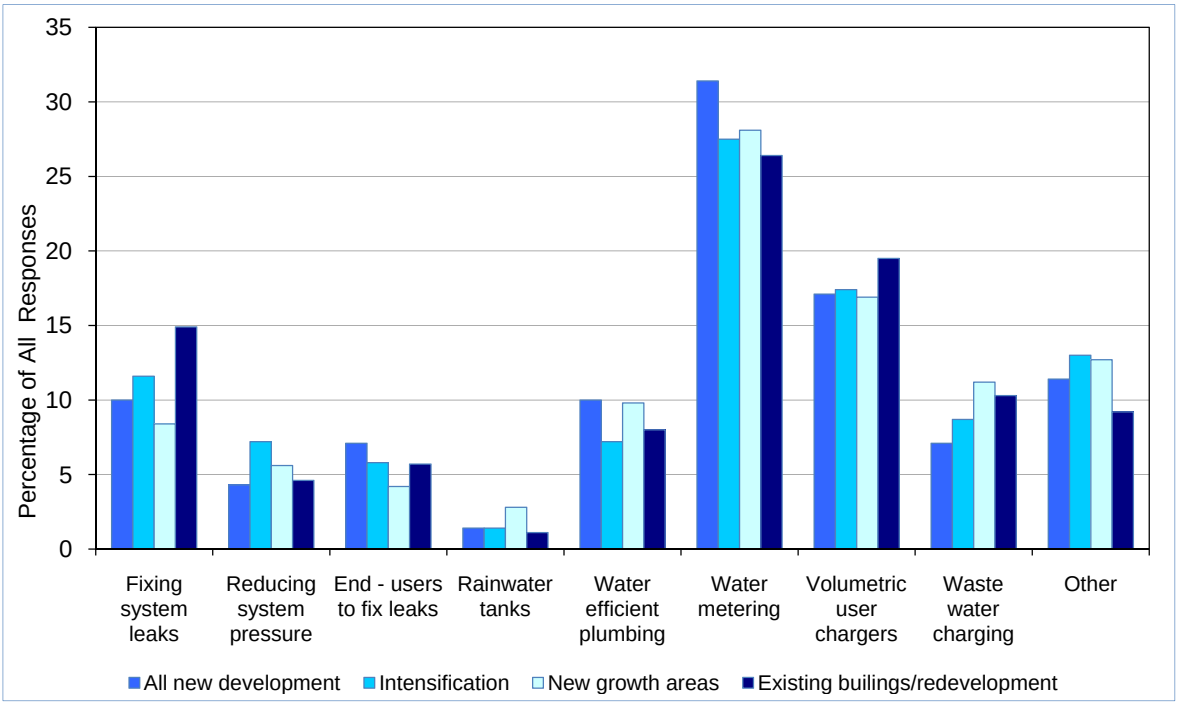
Figure 7: Application of water demand management measures



3.5 Measures Most Commonly Applied

Information was sought on the measures that were most commonly applied to different types of development (Figure 8). Water metering and volumetric water charges were identified by the respondents as being the most common methods applied followed by fixing system leaks and installing water efficient plumbing. Implementation methods do not appear to depend on the type of development, suggesting that if water demand measures are adopted they are applied to all forms of development.

Figure 8: Measures commonly applied to development

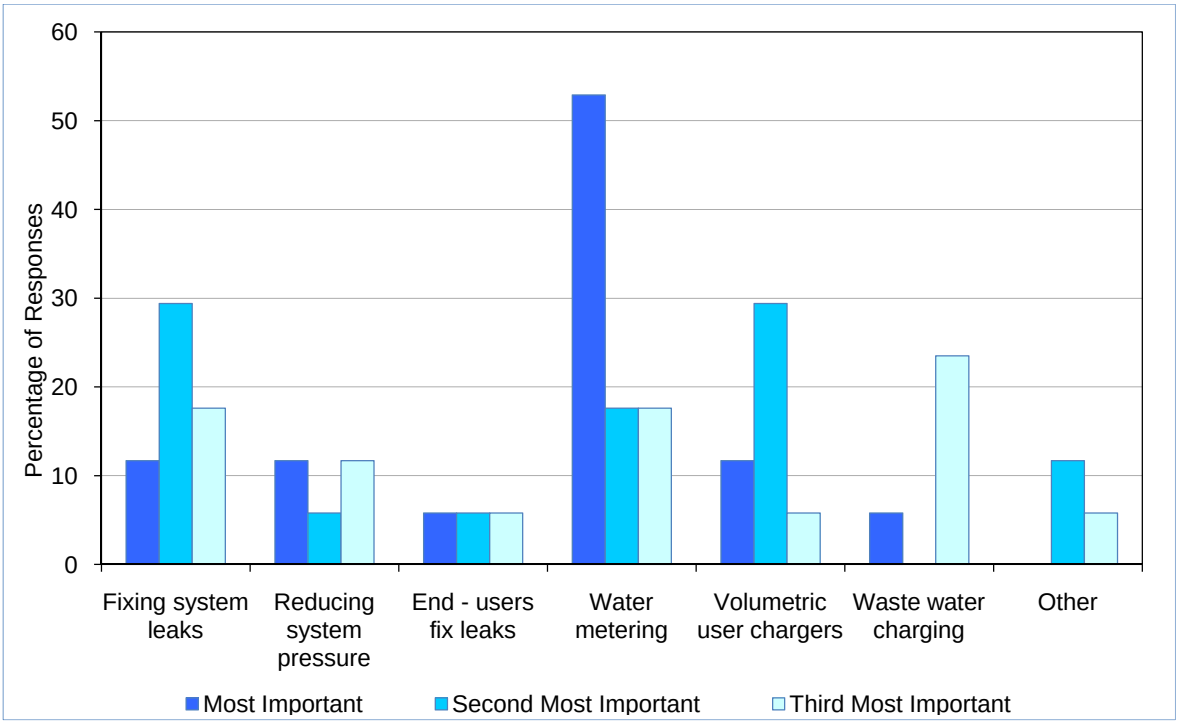


3.6 Relative Importance of Water Demand Measures

The water organisations were asked to identify those measures they considered to be the most important for managing water demand – with 1 being the most important through to 3 being the third most important. As is shown in Figure 9, water metering is identified as being the single most important demand management measure that is implemented, with 50% of the respondents indicating its primary importance. Volumetric user charges and addressing system leaks are identified as the next most important measures.

Wastewater charging is indicated as being the third most important measure, although we note that wastewater charging is often implemented in conjunction with water charging.

Figure 9: Relative importance of demand management measures

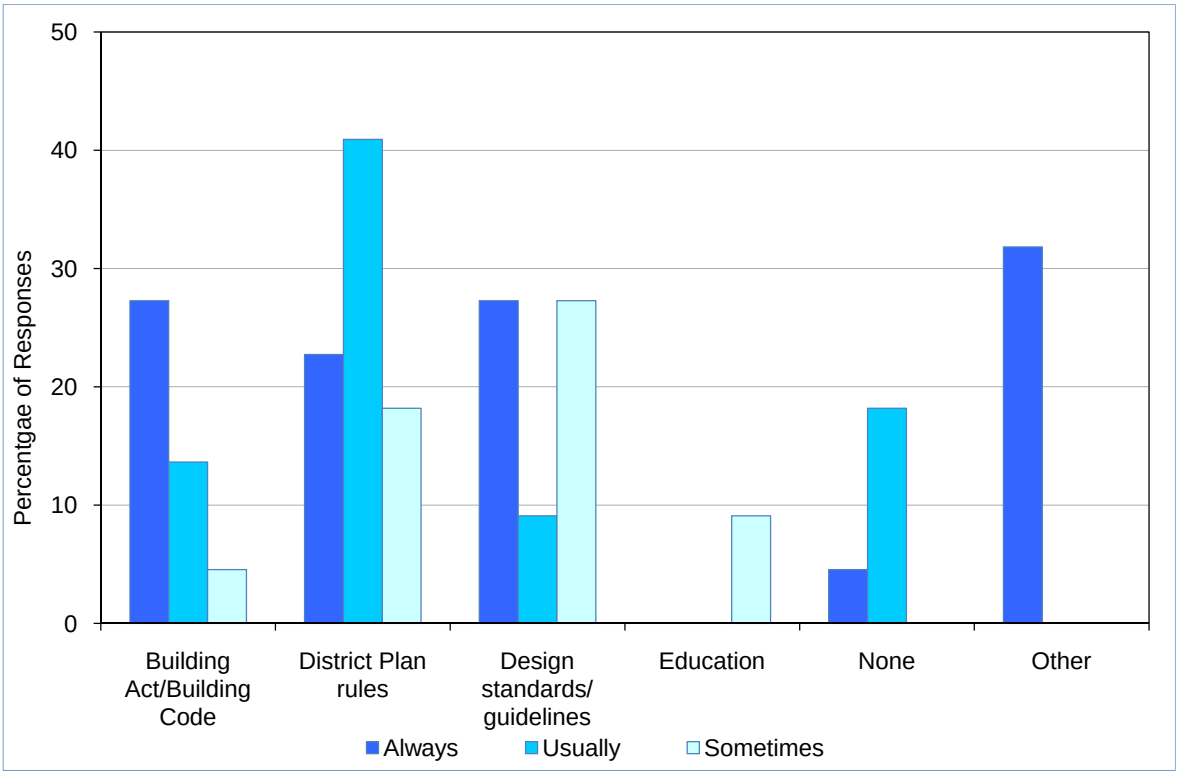


3.7 Methods of Implementation

Information was sought on the methods that were used to implement water demand measures including: Building Act/Code, District Plan rules, design/connection standards and education. Respondents were asked to indicate whether the methods were always used, often used or sometimes used.

The results are shown in Figure 10, which indicates a relatively even split of implementation between Building Act/Code processes, District Plan rules and design/connection standards. Some respondents indicated that other methods, commonly bylaws, were also used used to implement demand management.

Figure 10: Methods of Implementation



3.8 Methods to Implement Specific Demand Management Measures

The organisations were asked to breakdown the information on implementation methods to specific measures, to identify whether some methods were more commonly used to implement certain types of measures. The responses were confined to the implementation of water efficient technologies and economic instruments, as most network measures are able to be implemented by the water organisations themselves. The results are shown in Figures 11 and 12.

Perhaps the most important conclusions drawn for this information is that the implementation of economic measures is generally via statutory processes such as Building Act/Code, District Plan rules bylaws or design/connection standards. In contrast the methods for implementing water efficiency measures are more varied, with eduation playing a large role.

Figure 11: Implementation methods – water efficient technologies

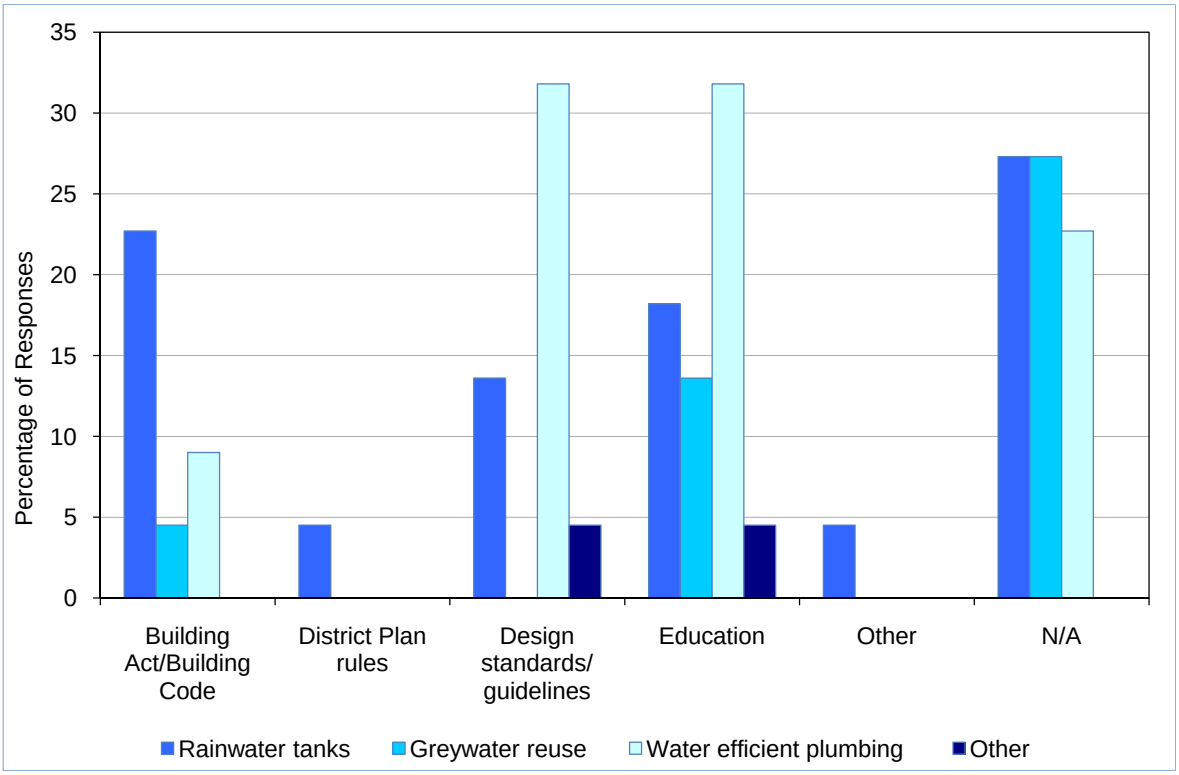
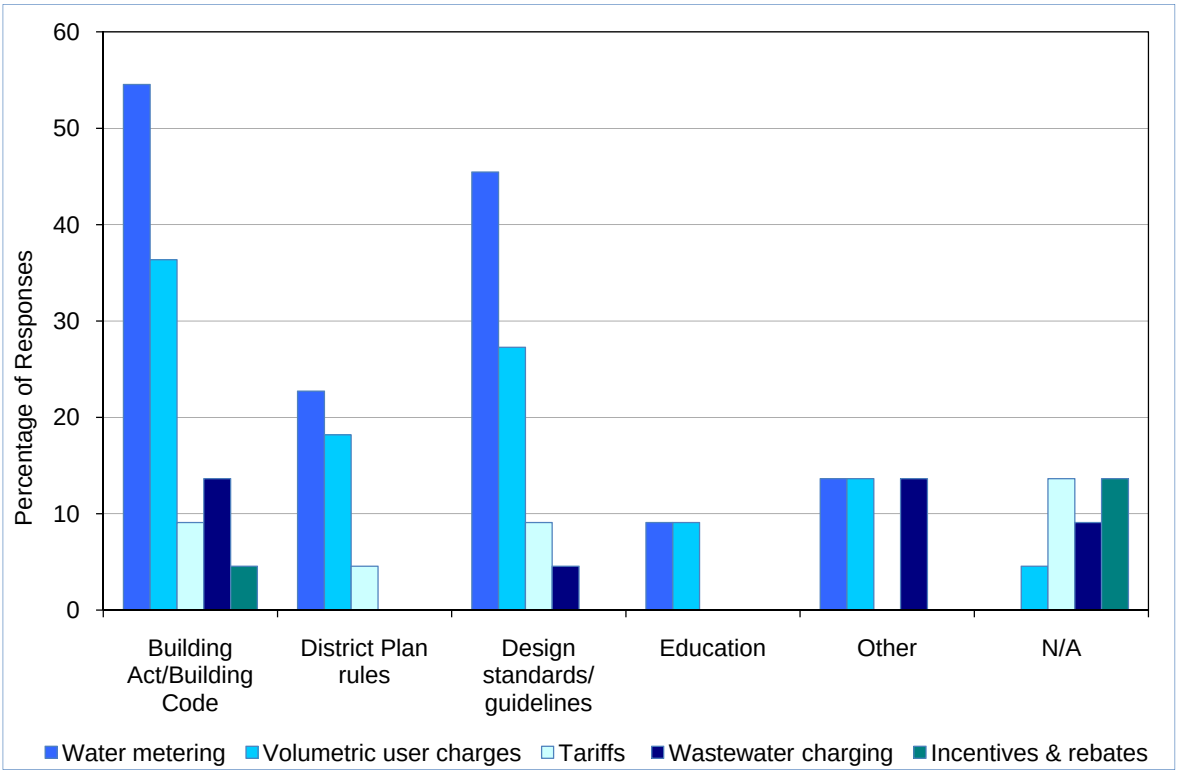


Figure 12: Implementation methods – economic instruments



3.9 General Comments

In addition to the specific information that was received, a range of other comments were also provided. These are summarised below:

ID No.	General comments from organisations: approach to water demand management
1	Water connections are metered for the most part. Households are charged for water via rates, not based on volumetric usage. Commercial/industrial users pay for water in their rates and are invoiced for any excess water use above the calculated allowance for the reading period. The cost of delivering drinking water in is very low. For commercial customers the cost of water is a very small proportion of their operational costs, so water charges are not a significant economic driver. While we have found that the Waterwise campaign (local authority water initiative) raises awareness about water and water conservation, there has been no demonstrable link to reduction in demand/consumption. We are undertaking a study to better understand what will drive people to change their water use behaviour. Water charges for commercial/industrial users is very low relative to the rest of their operational budgets, so water use charging hasn't been a strong water demand reduction tool.
3	A regional water strategy is being developed which includes extensive demand management initiatives. Some of these Councils have year round hosing restrictions and monitor compliance with security patrols. Huge scope for demand management initiatives but currently no financial incentives for consumers to act and no perceived need to save water. Political resistance to the use of pricing for sustainability in conjunction with universal metering to encourage efficient water use requires behaviour change through social marketing.
7	Universal metering provides a total measure of changes in water demand changes. Metering and volumetric charging has had the biggest impact with an immediate change in demand measured and a drop of 30% in the peak demand of 700 l/c/d to about 500 l/c/d was achieved, with a 25% drop in average demand. Since then additional reductions in water demand have been achieved however the direct link to water demand management methods versus seasonal and economic changes have been difficult to directly quantify. However this is an ongoing process and monitoring via metering will highlight trends that are ongoing.
9	Water supply strategy has set the target to reduce water consumption from 2.2 m^3/ household / day to 1.0 m^3/ household / day. Council has updated its Code of practice for development of land last year. Council acknowledges that there is a critical factor in addressing the issue of peak water consumption and maintaining the level of service, moreover research by collating data to investigate the percentile exceedence in abstraction level is vital. Through council commitment, education and attitudinal changes, water demand management shall provide uninterrupted water supply to the community at optimum cost.
10	The best driver for demand management is volumetric charging; this will encourage customers to look at their own water use and implement other measures such as rain tanks or water efficient fittings and fixtures. The next phase of our implementation is pressure management which on a network level reduces the system losses through reduction of leaks.

ID No.	General comments from organisations: approach to water demand management
14	In future we will more actively promote water demand measures such as rainwater tanks, grey water reuse and water efficient appliances. These are planned for in future demand predictions in the Water Supply Asset Management Plan, but we don't need them to be implemented yet for two reasons: we have plenty of water storage available in the Dam to meet current demand; and we want to recoup the cost of infrastructure through water use charges, before actively encouraging further water conservation.
15	he questionnaire was designed with a certain demand management philosophy in mind which is not in line with our own. Customer demand is low (average around 180 L/p/d) but some of our networks have relatively higher water losses (20% to 40%). Therefore, our focus is on leak management and pressure management rather than reducing customer demand (i.e., we need to get our own house in order first). This approach is only feasible with water meters.
17	There is limited political will to progress water demand management measures apart from seeking fairness with uniformity of treatment between different users. i.e. some funding has been provided to extend the coverage of metered properties (currently only extraordinary connections, although one town is universally metered.
19	Water demand management is an area Council will implement in the future once current work priorities are completed. Currently there is a plentiful supply of water in this area. Demand management is viewed as an essential in the future as competition between environmental, commercial, and domestic users intensifies.
20	We have a Working Group of Elected Members and Technical Staff working on understanding the water use and system issues in order to produce a full strategic plan. The Strategic Plan will include Demand Management along with other operational and capital requirements. We are looking at; Leakage Reduction, Usage/head, Supply Robustness, Reticulation Robustness, Water Treatment, Future Needs, Demand Management, Environmental Requirements. And also working on developing a coherent strategy to safeguard our future water needs.
21	We impose water restrictions across the Township from December to March which reduces consumption by allowing odd numbered properties to water lawns and gardens on odd numbered days etc.
22	Because of the restricted sources of supply, council's water supply policy is not to allow any new connections outside the urban boundaries of the towns.

Further comments were also provided with regard to organisations approach to monitoring of freshwater demand management measures. These are summarised below.

ID No.	General comments from organisations: monitoring water demand measures
1	Leak detection programme.
2	Monthly and annual analysis of metered water consumption per customer type. Water meters are installed at: - bulk supply points (Input to our system) - water supply district boundaries (inter district flow) - all customer (sales) - hydrants (all uses of hydrants are metered through standard stand pipes, with the exception of fire fighting)
3	Continuously monitoring water usage and trends looking for leakage or wastage. Network leakage monitoring; Area metering for network monitoring; Monthly commercial meter reading; Some host restrictions compliance monitoring; Following up on private leakage repair action.
4	City Plan measure that our unaccounted for water losses (UfWL) is less that 12%. We calculate the UfWL on a monthly basis and have a leak detection programme.
5	We monitor demand through SCADA system and the water meter billing system.
7	Monitoring is undertaken through the volume (peak and average) of water supplied to our customers via water metering. Benchmarking water losses / night flow measurements etc.
9	Monitoring the effectiveness of demand management measures is a required of our organisation. Greater monitoring of the overall effectiveness of water demand & supply management measures are underway through upgrading telemetry for continuous monitoring and asset management system.
10	All the properties in the district are metered and charged volumetrically. Review and monitoring of water consumption over time.
12	Regional comparisons through the Water Industry Annual Performance Report.
14	Daily water demand, billing records.
15	Consumption at water meters; tracking of network losses.
18	Annual acoustic leak detection of reticulation. Repair of leaks found by acoustic leak detection.
19	Metering of water leaving the water treatment plants plus the metering of industrial and extraordinary users.
20	Water use is monitored for our industrial/commercial users, we have flow meters at several other locations we are working to increase the number of flow meters and to extend the usefulness of the current meters by hourly rather than daily integration
21	Bulk supply water meters are monitored.
22	Water usage for the townships is monitored at all times. Water metering- comparison with the previous monthly usage.

4 Summary of findings

The purpose of this section is to summarise the main points identified during the survey.

Customer Base

- The make up of the customer base for those organisations surveyed is primarily residents, at 72%. The second largest proportion of the customer base is industrial and commercial, at just under 20%.

- The sources of water supply, of those organisations surveyed, is primarily made up by run of river at 50%, followed by ground water at approximately 30%.

Primary Drivers for Freshwater Demand Management

- The greatest primary drivers for freshwater demand management initiatives appear to be source constraints/costs and regional consent requirements. Infrastructure constraints/costs also rates highly. Political will and environmental sustainability rate significantly lower as a driver for freshwater demand management.

Most Effective Measures for Reducing Freshwater Demand

- Fixing system leaks is the greatest measure for reducing freshwater demand with regard to network maintenance; with over 90% of respondents identified implementing this measure of reduction.

- Water efficient plumbing/fitting and appliances was indentified as the greatest measure of those surveyed for reducing water demand with regard to water efficient technologies.

- For the economic instrument imposed to reduced water demand, water metering was the most common measure used. Almost all of those organisations that responded implemented water metering on industrial sites. Volumetric user charges are the second greatest measure.

- Freshwater demand management initiatives are applied heavily by all those organisations surveyed with 90% implementing them on new buildings and developments in industrial areas. Over 50% of the respondent organisations applied them to all areas of development.

- The measures most often used in development areas include water metering followed by volumetric user charges recording the highest responses. Fixing system leaks also rates highly in existing buildings.

- Water metering is considered to be the most effective measure in reducing water demand with over 50% of respondents identifing that measure as the most effective. The next most effective measures identified by the respondents are volumetric user chargers and fixing system leaks, with almost 60% of respondents identifying either of those measures as the second most effective in terms of reducing water demand. The third most effective measure indentified by the

respondents is waste water charging, with almost 30% identifying that measure as the third most effective measure.

Measures for Implementing Freshwater Demand Management

- The most commonly used measures for implementing freshwater demand management is equally through design standards/ guidelines, District Plan rules and the Building Act/Code processes. Over 40% of respondents indicated that the district plan rules are usually used to implement freshwater demand management.

- Water efficient technologies are implemented mainly through education and social marketing and design standard guidelines, particularly with regard to water efficient plumbing.

- Water metering identified as the most effective measure for reducing water demand is heavily implemented through the Building Act/Building Consents as well as design standards and guidelines.

Summary of General Comments

- It appears that freshwater demand management measures are starting to become, or are a part of, strategic and legislative plans such as a Water Supply Asset Management Plan. However in some instances the need to implement measures is not pressing as the current water supply is sufficient. Furthermore there is a focus on leak management and pressure management rather than reducing customer demand; i.e., "we need to get our own house in order first".

- Some of the organisations have year round hosing restrictions and monitor compliance with security patrols. For example, one town restricts water from December to March by allowing odd numbered properties to water lawns and gardens on odd numbered days. It has also been commented that metering and volumetric charging has had the biggest impact with an immediate change in demand measured. However, it was commented that for commercial customers the cost of water is a very small proportion of their operational costs, so water charges are not a significant economic driver for water reduction..

- There is significant scope for demand management initiatives but in some instances there are no financial incentives for consumers to act and no perceived need to save water. While some organisations have found that water saving initiatives raise awareness about water and water conservation, there has been no demonstrable link to reduction in demand/consumption. It was also commented that political resistance to the use of pricing for sustainability in conjunction with universal metering to encourage efficient water use requires behaviour change through social marketing.

5 Conclusion

5.1 Conclusion

The purpose of this report is to provide a snapshot of the freshwater demand management measures that are implemented in New Zealand, with a particular emphasis on the measures adopted by Territorial Authorities and other water supply organisations.

About half of the organisations that responded to the survey indentified that they had established water use reduction targets, with the main drivers being source constraints and the cost of providing infrastructure to meet increased demand.

The survey results indicate that a wide range of measures are applied to reduce water demand. The current focus of the measures appears to largely be network related (for example fixing leaks and reducing pressures) or economic (water metering and associated user charges), rather than measures that directly reduce water demand such as water efficient devices or alternative water sources such as rain tanks. From the general comments received, it appears that these measures yield the greatest reductions in water use and it is often a case of "getting one's house in order first".

It is difficult to get any quantifiable information on the success of water demand measures within the scope of this project. A comment was received that indicates that measures such as water metering can yield reductions of up to 30%. However, little information was obtained on the success of other measures and more detailed research, such as individual case studies, is required to obtain such information.

5.2 Report Limitations

The report was prepared on the basis of a "desk-top" review of available information on freshwater demand management initiatives and the results of a survey of Territorial Authorities and water supply organisations.

23 of the 40 organisations that were sent the survey responded, providing a reasonable cross section of organistations in terms of both scale and geographic distribution. Given the limited scope of the project, no independent verification of the survey results was undertaken to ensure their accuracy or that questions were being answered consistently across different organisations.

The report therefore provides an overview of the freshwater demand measures that are applied by water supply organisations in New Zealand and some comments as to the relative effectiveness of the measures that have been adopted.

Appendix One: Cover Letter

4 March 2010

ATTENTION: =======

Dear ========,

RE: FRESHWATER DEMAND MANAGEMENT SURVEY

Hill Young Cooper has been engaged by the Ministry for the Environment to undertake a survey of freshwater demand management initiatives in New Zealand. This survey follows on from a water conservation survey undertaken by Beacon Pathway in 2007/08.

The aim of this survey is to update and expand the information obtained for the Beacon Pathway report [Best practice water efficiency policy and regulation (May 2008)] to better understand the level and scope of freshwater demand management initiatives taking place across the country by local government to assist the Ministry in identifying areas where central government action may be appropriate.

The main information we are trying to collect includes:

- What freshwater demand management initiatives do local councils have in place? These may include measures such as rainwater tanks, grey water recycling, water efficient technologies and financial instruments such as metering and pricing.
- How are these measures implemented? Methods may include education/voluntary approaches, district plan rules, bylaws and connection standards.
- Whether there are specific reduction targets and the basis for these.
- Whether monitoring of the uptake of these initiative has been/will be undertaken and what the results show.

To do this we have attached a questionnaire regarding your organisation's approach to demand management. We would appreciate it if you could complete the questions and send back to us. If you would like to be kept informed of the results of this study, then please indicate in the appropriate place on the attached questionnaire.

To enable your response to be put into a wider context, the questionnaire seeks some basic information about the scale of your water supply service and the nature of your customer base. The questionnaire then moves on to the more specific questions regarding demand management initiatives. We would appreciate a response even if your organisation does not implement demand management measures – one of the aims of the survey is to identify the extent to which measures are applied and a null response is important in this regard. The information you provide to us will be treated as confidential and will not be shared without your permission, other than in a summary/statistical form.

The questionnaire has been designed to make it as easy for you to fill out as possible. Simply download the attached Microsoft Word file and type your response to the questions in the space given, resave the document and send it back to n.eagle@hyc.co.nz (that is the email address from which the questionnaire has been sent to you so you can also just hit reply). **We would appreciate a response by 18 March at the latest.** Similarly if you have any further queries then please don't hesitate to contact me either by email or on the numbers below.

Hill Young Cooper and the Ministry for the Environment would like to thank you for taking the time to assist with this research. To find out more about Hill Young Cooper, we encourage you to follow the links to our websites given below.

Yours Faithfully,

HILL YOUNG COOPER LTD

Ian Mayhew- Director

Hill Young Cooper Ltd

Visit www.hyc.co.nz

Nick Eagle- Consultant

Hill Young Cooper Ltd

Ph: +64 4 473-5310

Appendix Two: Questionnaire Results

Freshwater Demand Management Questionnaire

Section 1: Organisation Information

1.1 Contact Details

Name of person completing form	
Telephone Number	
Email	
I would like to be kept informed of the results of this study – Yes/No	

Please insert responses into grey boxes

1.2 Is your organisation a:

Local Authority	
CCO	
Water Utility	
Other1 (please specify)	

Please check relevant box with X

1.3 What is the annual volume of water supplied by your organisation?

Annual volume	

1.4 Do you have a supply design criteria for estimating residential and industrial/commercial supply requirements?

Residential	l/per person/day
Industrial/commercial	cubic metres per yr

1.5 What is the make up of you customer base (% water volume)?

Residential	72 %
Industrial/commercial	19.9 %
Unaccounted for water	2.8 %

Agriculture/ Rural	4.2 %
Schools/ Community groups	1.1%

1.6 What are the sources of the water you supply?

Run of river	49.7 %
Dam	10.9 %
Groundwater	30.58 %
Bulk supply from water care	7.6 %
Spring	1.2 %
Streams	0.02 %

1.7 Does your organisation have an identified water reduction target and if so, at what date is this aimed to be met?

Target	%
Target achievement date	

Please put NA if no specific target reduction

1.8 What, if any water reductions has your city/ district achieved in the past?

Water consumption reduced from/to:	
Period achieved in:	

1.9 What are the three primary drivers for freshwater demand management initiatives?
Please rate from 1 to 3, 1 being the most important

Source constraints	1 = 9 2 = 3 3 = 1
Infrastructure constraints/costs	1 = 5 2 = 9 3 = 4
Regional consent requirement	1 = 6 2 = 2 3 = 6
Political will	3 = 2

Environmental sustainability	1 = 1 2 = 4 3 = 7
Other1 (please specify)	
Other2 (please specify)	

2. Water Demand Measures

2.1 What water demand measures does your organisation implement?

Network Maintenance

A. Fixing system leaks	21
B. Reducing system pressure	13
C. Programmes to encourage end- users to fix household leaks	16

Please check relevant boxes with X

Water Efficient Technologies

	Residential	Industrial	Other
D. Rainwater tanks	5	5	0
E. Greywater reuse	1	1	0
F. Water efficient plumbing- fittings and appliances	6	4	2
G. Other1 (please specify):	0	1	
H. Other2 (please specify):			

Please check relevant boxes with X

Economic Instruments

	Residential	Industrial	Other
I. Water metering	15	22	6
J. Volumetric user charges	11	17	5
K. Tariffs (stepped pricing)	1	2	0
L. Wastewater charging	4	8	1
M. Incentives and rebates	2	1	0
N. Other1 (please specify):	1	1	1

Please check relevant boxes with X

Other Tools

	Residential	Industrial	Other
O. Other1 (please specify): (rural)	6	6	5
P. Other2 (please specify):			

Please check relevant boxes with X

2.2 To what developments does your organisation implement these measures?

	Residential	Industrial	Other
All new buildings / developments	13	20	4
Intensification of existing urban/ town areas	11	14	4
New growth areas	12	16	4
Existing buildings (redevelopment/retrofitting)	11	16	3
None			
Other1 (please specify):	1	1	1
Other2 (please specify):			

Please check relevant boxes with X

2.3 Of the water demand measures A - P listed in 2.1 above, please identify the 3 key measures, in order of importance, currently applied to residential and industrial/commercial users to manage water demand.

	Residential			Industrial		
	Measure 1	Measure 2	Measure 3	Measure 1	Measure 2	Measure 3
All new buildings / developments	F, I, P, L, A, I, A, C, F, I, J, I, I, F	A, A, O, J, O, J, C, I, A, L, J, J, D	B, F, I, B, F, J, C, O, L, O, I	F, I, I, L, I, A, I, I, C, I, I, J, I, I, I	I, I, A, J, J, O, J, F, I, A, L, J, J, F	B, P, I, J, L, D, J, C, O, L, O, L
Intensification of existing urban/ town areas	B, I, P, L, A, I, A, I, I, J, I, I, A	A, A, O, J O, J, C, A, L, J, J, F	C, B, F, I, B, F, C, O, L, O, B	F, I, I, L, A, A, I, I, I, J, I, I	I, I, A, L, J, J, O, J, F, A, L, J, J	B, P, I, J, L, D, C, O, L, O, I
New growth areas	B, I, P, L, A, I, A, I, I, J, I, I, F	F, A, O, J, O, J, C, A, L, J, J, D	B, F, I, B, F, C, O, L, O, I	F, I, I, I, L, A, I, I, I, I, I, J, I	I, I, A, F, J, J, O, J, F, A, L, J, J	B, P, I, J, L, D, C, O, L, O, L
Existing buildings (redevelopment/ retrofitting)	A, I, P, I, L, A, I, A, C, I, A, A, I, J, I	F, A, O, F, J, O, J, C, I, A, I, L, J, J	B, F, I, B, F, J, C, J , O, L, O, B	A, A, I, I, I, L, A, J, I, I, I, C, I, A, I	F, A, J, J, L, J, O, L, J, D, I, J, A, I	I, B, P, L, I, J, L, I, F, J, L, I, F, J, C, J, O, O
Other1 (as specified in 2.2 above):	A, I	O	B	J, A	O, O	P, B

Please check relevant boxes with appropriate letter (A-P)

to identify key water demand measures

2.4 Historically, of water demand measures A-P listed in 2.1 above, which tools do you consider have been the most effective to date in reducing water demand?

Measure 1	Measure 2	Measure 3
B, B, I, J, L, A, I, A, I, I, A, I, C, I, I, J, I, I, A	I, A, A, I, J, O, B, J, A, I, A, J, A, K, J, J, O	A, I, B, I, B, A, L, C, J, C, A, L, L, L, O, I

Please check relevant boxes with appropriate letter (A-P)
to identify key water demand measures

2.5 What methods does your organisation commonly use to implement measures for residential and industrial users?

Please rate as follows: 1 - always, 2 - usually, 3 - sometimes

	Residential	Industrial	Other
Via Building Act/Building consents/Code processes	1, 3, 3, 1, 1, 3, 1, 1, 3, 1, 3	1, 2, 3, 1, 1, 3, 1, 1, 3, 1, 3	3, 1, 1, 1
Via District Plan rules	1, 3, 2, 2, 3, 2, 3, 3	1, 3, 2, 1, 3, 2, 3, 3	3, 2
Via Design standards/ guidelines	1, 3, 3, 3, 1, 2, 3, 1, 3, 1, 1,2	1, 3, 3, 3, 1, 2, 3, 1, 3, 1, 1, 2	3, 3, 1, 1
Via Education/ Social marketing	1, 3, 2, 3, 3, 1, 1, 1, 1, 1, 3, 3, 1, 1	3, 2, 3, 3, 2, 3, 1, 1, 1, 3, 3, 1, 3	3, 2, 1, 1, 1
None	2	2	2
Other1 (please specify):	1, 1, 1,	1, 1, 1	1

2.6 Of the water demand measures identified below, please identify the methods your organisation commonly uses to implement these measures?

Water Efficient Technologies	Building Act/ Building consents/ Code processes	District Plan rules	Design standards/ guidelines	Education/ Social marketing	Other1 (please specify from 2.4 above):	Other2 (please specify from 2.4 above):	N/A
Rainwater tanks	4	1	3	5	1		6
Greywater reuse	1		1	3			6
Water efficient plumbing - fittings and appliances	3		4	7			5
Other1 (please specify):			1	1			2
Other2 (please specify):							2

Please check relevant boxes with X

Economic Instruments	Building Act/ Building consents/ Code processes	District Plan rules	Design standards/ guidelines	Education/ Social marketing	Other1 (please specify from 2.4 above):	Other2 (please specify from 2.4 above):	N/A
Water metering	12	5	10	2	3		
Volumetric user charges	8	4	6	2	3		1
Tariffs (stepped pricing)	2	1	2				3
Wastewater charging	3		1		3		2
Incentives and rebates	1						3
Other1 (please specify):							2

Please check relevant boxes with X

Other Tools	Building Act/ Building consents/ Code processes	District Plan rules	Design standards/ guidelines	Education/ Social marketing	Other1 (please specify from 2.4 above):	Other2 (please specify from 2.4 above):	N/A
Other1 (please specify):				10			4
Other2 (please specify):							

Please check relevant boxes with X

3. Monitoring of Water Demand Management Measures

3.1 What monitoring, if any, of the implementation of demand management measures is undertaken?

Monitoring:

3.2 What level of implementation of water demand management measures is indicated by the monitoring?

Estimate of implementation of water demand management measures	%

4. General Comments

4.1 Do you have any general comments about your organisations approach to water demand management, the success of implementation or areas of opportunity?

Comments:

Appendix Three: Organisations that completed Questionnaire

North Island Councils	Completed Questionnaire	Name	Direct Dial Number	Council Phone Number
Franklin District Council	**Yes**	Colin Hart (or will pass to correct person)		(09)2371300
Gisborne District Council	Sent in Water Plan	Mr. Kerry Hutsin		(06)8672049
Horowhenua District Council	**Yes**	Ken Hale	06 3660996	(06)3660999
Manawatu District Council	**Yes**	Wayne Spencer		(06)3230000
North Shore City Council	**Yes**	Shisee Tan	4868571	(09)4868600
Papakura District Council	**Yes**	Ken Clive	2.12E+08	(09)2951300
Rodney District Council	**Yes**	Bruce Fulford		(0800)4265169
South Taranaki District Council	**Yes**	Katie Armstrong	2.72E+08	(0800)111323
South Waikato District Council	**Yes**	James Paddock	8850798	(07)8850340
South Wairarapa District Council	**Yes**	Ravi Mangar		(06)3069611
Stratford District Council	**Yes**	Mike Oien		(06)7656099
Tararua District Council	**Yes**	Eric Bonny	027 4905297	(060)3744080
Taupo District Council	**Yes**	Nicola Hancock	07 3760682	(07)3760899
Tauranga City Council	**Yes**	Peter Bahrs		(07)5777000
Wairoa District Council	**Yes**	Vic Minter	x719	(06)8387309

South Island				
Dunedin City Council	**Yes**	Peter Caswell		(03)4774000
Gore District Council	**Yes**	Paul Withers		(03)2090330
Nelson City Council	**Yes**	Deborah Bradley	03 5460375	(03)5460200
Waimate District Council	**Yes**	Mike McTigue		(03)6898079
Christchurch City Council	**Yes**	Dianne Shelandr	9418304	(03) 941 8999
Council Controlled Organistions:				
Manukau Water (MCC)	**Yes**	Priscilla Chung		(09) 2654488
Capacity (WCC, HCC, UHCC)	**Yes**	Martin Gribble	9103826	(04)4994444
United Water (Papakura District Council)	**Yes**	Craig Mills		