**REPORT 1**
*(1215/52/IM)*

# WATER CONSERVATION AND EFFICIENCY PLAN

## 1. Purpose of Report

The purpose of this report is to outline the current water situation and the approach proposed to manage water demand in order to ensure a sustainable water future for Wellington.

Sustainable water sources underpin our economic growth, our health, our environment, and our quality of life. It is therefore imperative that we take action to ensure a sustainable water future in the face of growth and climate change challenges.

## 2. Executive Summary

Population growth and climate change pose challenges to future water supply availability in the Wellington region. Increasingly these changes will tax the regions ability to satisfy the associated demand for water in a sustainable way.

Wellington has been fortunate in that it has had plentiful and relatively cheap water in the past and this has masked the need to manage our demand for water.

Recent studies indicate that the current population has already exceeded the population that can be sustained by the bulk water system if the same quantity of water per head of population is to continue being used, especially in dry summer years. This is creating “security of supply” concerns.

Water shortages experienced in recent summers have necessitated careful management of the limited supply available, with additional restrictions on water use being applied to ensure adequate supply continued to be available to meet demand. Increasingly summer water demand is likely to lead to more stringent watering restrictions and possible hosing bans.

The prospect of further water shortages in the future suggests that we need to do more than simply react to shortages as they occur. Rather, we will need to become more climate resilient with our water supplies and this will require working in partnership with the community to bring about change in our approach.

In addressing supply availability and increasing demand there is the choice of building additional capacity and creating new infrastructure, or alternatively taking action to manage and reduce demand through a range of demand management initiatives. Essentially we need to strike a balance between increasing demand and water supply availability in a way that provides for the sustainable management of drinking water, now and in the future.

This report focuses on using demand management to defer the need for new long term source development, more specifically aimed at deferring the immediate need for a new dam, with the ultimate aim of working towards a sustainable water future.

A phased development approach to demand management activities is proposed in this report, based on progressively implementing a range of demand management measures. Phasing will enable flexibility and allow for progressive implementation and tailoring of demand management measures to suit needs.

Initial phasing aims to encourage water savings without the need to resort to capital expenditure or incentivisation schemes in the early stages of the phasing. Managing summer water demand, and working towards deferring the construction of major new water supply infrastructure are two of the initial aims.

The initial phase is intended to compliment GWRC's summer conservation proposals and build on Councils existing demand management work. More extensive publicity is also proposed to illustrate Councils commitment to managing demand through the activities it already undertakes and the progress it is making in addressing aspects such as system leakage.

Further phases will support an interim goal...

"*To accommodate Wellington city's population growth through to 2025 with the same amount of water we have available to us now.*"

This goal is 'water-neutral' and will require per capita consumption to drop at a rate that corresponds to the rate of population growth. A benchmark level of historical consumption has been established at 30,377ML which will form the basis of this goal. Demand trigger mechanisms will be established and used to initiate the implementation of further demand management measures and keep the goal on track.

Community engagement is a key part of the phased approach. Development of the Water Conservation and Efficiency plan will follow consideration of feedback from the community on ideas, attitudes and preferences over supply and demand options.

In essence this plan will provide a framework for water conservation efforts in the city. This will help guide decision making on future phases, measures and priorities for demand management and water efficiency in the city.

The phased approach doesn't commit Council to any particular demand management initiatives beyond the initial phase at this stage of the plan development.

## 3. Recommendations

It is recommended that the Committee:

1. *Receive the information.*

2. *Agrees to adopt an interim target of stabilising water consumption in acknowledgement of the goal:*
   *"To accommodate Wellington city's population growth through to 2025 with the same amount of water we have available to us now."*

3. *Agrees to adopt a phased approach to water demand management.*

4. *Agrees that Council continues to take a leadership role implementing water efficiencies in our operations and supply networks.*

## 4. Background

### 4.1 General

At its meeting on 12 June 2008 the committee instructed officers to investigate and develop a water demand management strategy. Further to this, the committee resolved on 11 September 2008 that all efforts to manage/reduce water consumption be considered to delay or avoid the need for and the cost of a new dam and that officer's continue to work with Greater Wellington Regional Council (GWRC) to that end.

Prior to commencing this work GWRC advised that it was proceeding with the preparation of a draft regional water strategy. Consequently a decision was made in October 2008 to defer the preparation of a demand management strategy for this Council until the GWRC had prepared their strategy.

Early this year GWRC released a second draft of their regional strategy in the form of a working paper. This draft, whilst it now incorporates water aspects relating to Wairarapa and Kapiti and regional issues such a stormwater runoff from roads, has not further advanced the development of the regional demand management strategy, except for the inclusion of some basic information on universal metering.

The consensus of officers of the four Wellington Territorial Local Authorities (TLA's) is that further analysis and development of the strategy would be required before it could be presented to the TLA Councillors.

GWRC is continuing with studies related to security of supply matters and with the ongoing development of their regional strategy.

## 4.2 The regional water supply situation

### 4.2.1 Sources of supply

Wellington City is fully dependent on the regional water supply, receiving all its bulk water from water sources outside the city.

The Wellington regions water supply is sourced from rivers and underground aquifers. These sources are subject to seasonal variations. Generally there is plenty of water available during the winter months but shortfalls occur in the summer due to less rainfall and higher demand.

Despite the common perception that Wellington has an abundant water supply there are limits on the amount of water that can be sustainably extracted from the river sources and abstracted from the aquifers. The bulk water supply system has not been configured to take advantage of the available supply, as the region does not have storage facilities that could harness the surplus water in winter for use as supply reserves through a dry summer. At best the Stuart Macaskill Lakes can provide for up to 20 days of average water use.

Climate change effects may result in higher river flows in the winter with less water available in the summer.

A key deliberation in taking a balanced approach to supply and demand issues associated with both growth and climate change will be the consideration of how best to utilise supply sources that are already available to us.

### 4.2.2 Climate Change

It is impossible to say with any certainty what our future climate will be, but warmer temperatures, wetter winters and sea level rises are predicted for Wellington. Summer rainfall is expected to stay about the same.

The impact of these climate change effects on water supplies in the region could mean:

- Increased river flooding and turbidity loads causing water clarity issues for treatment processes.
- Diminished groundwater recharge and reduced river flows with a consequential reduction in the amount of water that is available from aquifers that are hydraulically connected to surface water.
- Sea level rise could significantly change the sea water/freshwater interface increasing the potential for salt water intrusion and contamination into the freshwater aquifer.
- Increased water demand due to warmer summer temperatures and more extensive garden watering.

- An increased incidence of slips with potentially greater network damage

Climate change effects not only influence water supply sources but also the behaviours of consumers and therefore are an important consideration in determining solutions to security of supply issues and future water needs.

### 4.2.3 Population Growth

Figure 1 shows a comparison of population projections for the Wellington Metropolitan Region. These projections are based on Statistics NZ projections and show 2002, 2006 and 2007 projections. The projections are the average of medium and high Statistics NZ projections.

GWRC has utilised these projections in its planning for supply source augmentation works.

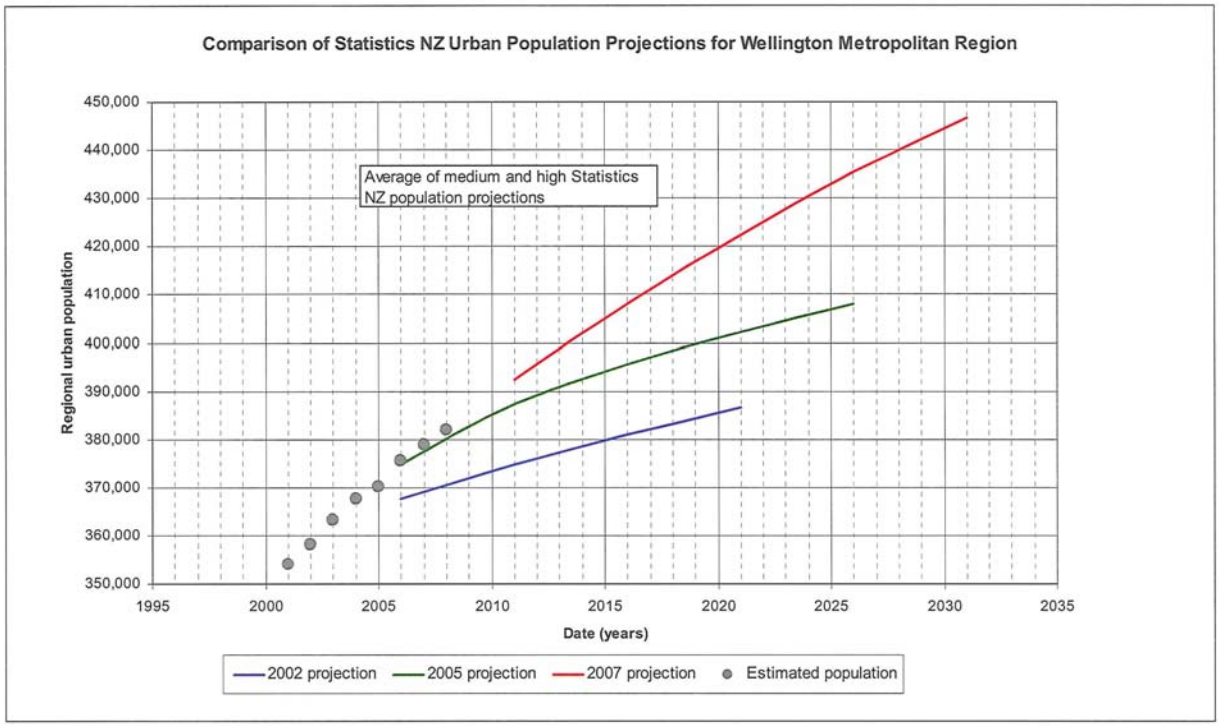


**Figure 1 – Regional Population Projections**

**Note:** The ●'s represent the census years of 2001 and 2006 and the estimated populations in the years outside the census years.

Whilst the projections are on a regional basis there are some population increase characteristics associated with future housing development, particularly in Wellington City, that will affect future growth in water demand. It is anticipated that future development in Wellington City will comprise a mix of 1/3 apartment, 1/3 infill style townhouse development and 1/3 greenfields type residential development. This will influence water demand growth as, for example, apartments do not have an outdoor water usage demand.

On the other hand predictions suggest that more people will be living alone or in smaller family groups, an effect which is likely to lead to greater water usage per head.

It can therefore been seen that there is not a direct correlation between population growth and increasing water demand. Increases in demand will thus be more dependent on the household types than population increases in Wellington City, whereas demand may be more closely linked to population in the other three cities. This creates some challenges in determining and planning for anticipated future regional water demand growth and will be kept in consideration during planning works.

### 4.2.4 Security of supply Standard

For a number of years the region has had in place a "security of supply" standard aimed at ensuring sufficient bulk water is available to the four metropolitan cities to ensure they incur no more than a 2% probability of being short of water on any one day in a year. This is equivalent to providing enough water at current levels of demand to cope with a one in 50 year drought.

In effect this equates to a level of service to customers, which relates to the frequency of water restrictions being imposed. The 2% standard is equivalent to the probability of a total hosing ban across the regional once in every 50 years. The frequency is an average over a long period of time and does not preclude more frequent occurrences if there is a particular run of very dry years.

Recent population growth has resulted in this standard declining to the point where the region is now operating at a level that can only cope with a one in 26 year drought, with a 3.9% probability of an annual (summer) water shortage or total hosing ban. Note that this assumes current water usage.

Due to the population growth being higher than that predicted a decade ago, the GWRC believes there is an urgent need to return to the adopted security standard of 2% probability of a shortfall. This need was highlighted over the 2008 summer when more stringent water restrictions were introduced for the first time in over 20 years to manage supply shortages. GWRC have stated ..."there was a significant change in projected populations between 2002 and 2005 which suddenly brought forward by some 15 to 20 years the need to augment the Wellington regional water supply."

It should be noted that there is a question over whether the 1 in 50 security of supply standard that has been adopted remains appropriate, especially in a changing environment and an era of climate uncertainty. By way of comparison Auckland and Perth City's have adopted a 1 in 200 standard. In Perth's case it has reduced the probability of requiring a total sprinkler ban from 1 in 30 years (3%) to 1 in 200 years (0.5%) on the basis that it considers a restriction regime that requires a total sprinkler ban as undesirable.

There is a need to review the 2% standard in the Wellington region, and although the short term augmentation proposals simply aim to restore the existing standard to 2% from the current 3.9%, decisions will need to be taken

on the standard we wish to go forward with before any commitment is made to medium and long term supply augmentation proposals. Essentially agreement needs to be reached amongst the regions TLAs on what level of service is considered appropriate and affordable in the region. It is therefore proposed to encourage GWRC to undertake an independent assessment of this 2% standard.

### 4.2.5 Regional Supply source augmentation

To address this current security of supply issue GWRC has identified and recommended three short term supply augmentation options that together should achieve the aim of restoring the 2% security of supply standard and maintain it to 2012.

These short term options to maintain supply include:

- Reduce the minimum residual low flow at the Kaitoke weir from 600l/s to 400l/s
- Raising the level of the Te Marua Lakes by approximately 1.3 m
- Developing the Upper Hutt aquifer

The total cost of these short term options ranges from $28M to $31.5M, dependent on the extent of associated seismic enhancement required at the Te Marua Lakes.

In considering long term options GWRC suggests that security of supply for the future will be solved by building a dam, particularly if the dam height is increased in height to provide a 50% increase in stored volume. It has investigated three GWRC owned sites for storage dams sufficient to accommodate a 60,000 increase in population. The Whakatikei site has been selected as the preferred site after consideration of site attributes, impacts and costs. A dam is expected to take 8-10 years to consent and build at a cost of $142M. Council has accepted that if a dam is required then the Whakatikei site is the preferred option.

Figure 2 below illustrates the timing and corresponding population that can be served by the various supply enhancements.

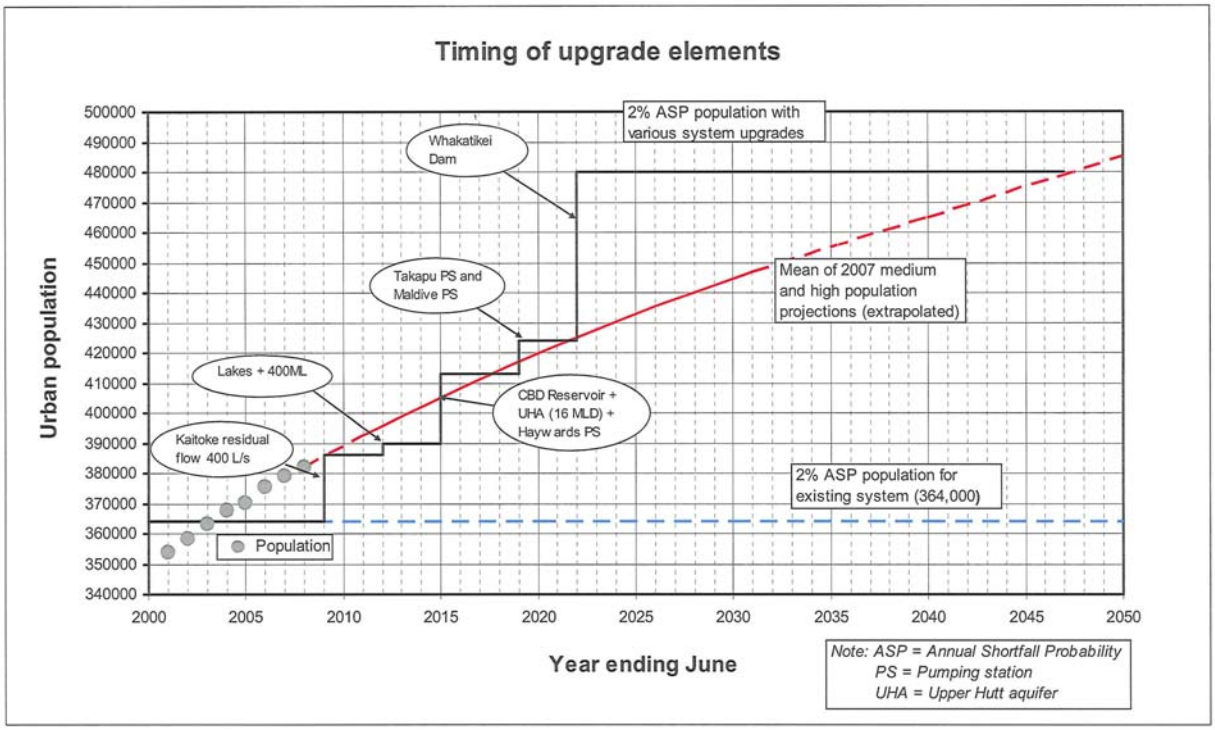


**Figure 2 - Timing of upgrade elements**

GWRC has analysed 5 development scenarios, the scenarios include all three short term options plus meters and dam. The 5 scenarios were:

- Scenario 1 (Upper Hutt aquifer, meters, dam)
- Scenario 2 (meters, Upper Hutt aquifer, dam)
- Scenario 3 (Upper Hutt aquifer, dam)
- Scenario 4 (meters, dam)
- Scenario 5 (dam only)

A present value economic analysis was undertaken by GWRC on the 5 scenarios with the following outcome:

| Scenarios | | Present value (7% discount rate) | Ranking |
|---|---|---|---|
| No | Options/Sequence | | |
| 1 | **UH aquifer, meters, dam** | **$51.7M** | **1** |
| 2 | Meters, UH aquifer, dam | $72.9M | 3 |
| 3 | UH aquifer, dam | $70.3M | 2 |
| 4 | Meters, dam | $127.9M | 5 |
| 5 | Dam | $93.9M | 4 |

**Figure 3 – Economic analysis**
**Note:** Present value shown for 16 MLD aquifer

The economic analysis has identified Scenario 1 as having the lowest cost on a present value basis. Based on Scenario 1 being ranked first of the 5 scenarios analysed GWRC have considered the implementation timing for Scenario 1 as shown in Figure 4.

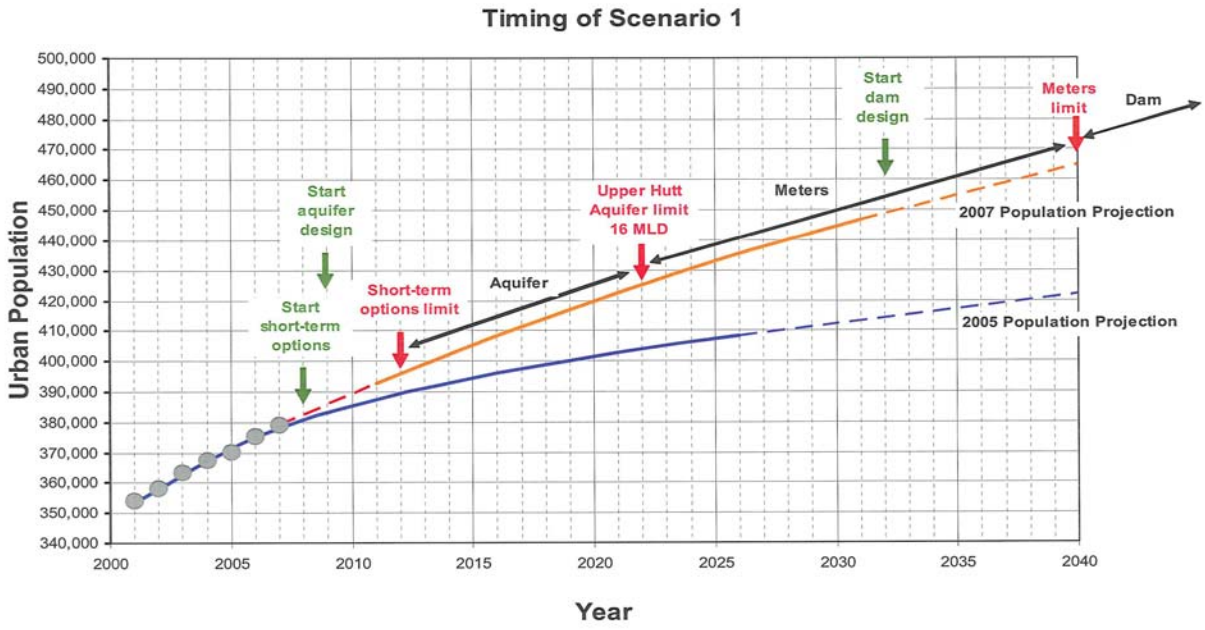


**Figure 4 – Timing of scenario 1**

Essentially Scenario 1 proposes the installation of meters in 2022 (or earlier) to defer the need for a dam by 18 years.

# 5. Discussion

## 5.1 Current water usage

In the 5 year period 2003 to 2008, Wellington city's annual usage averaged 30,377 ML. This equates to a 5 year average daily supply of 83 million litres per day.

The figures below show the comparative trends in water demand across the four cities in the Wellington region.

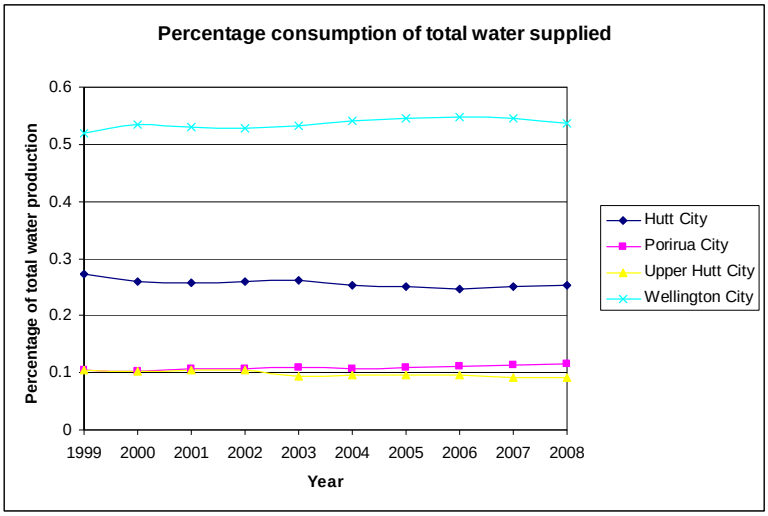


**Figure 5 – Water usage in the Wellington region**

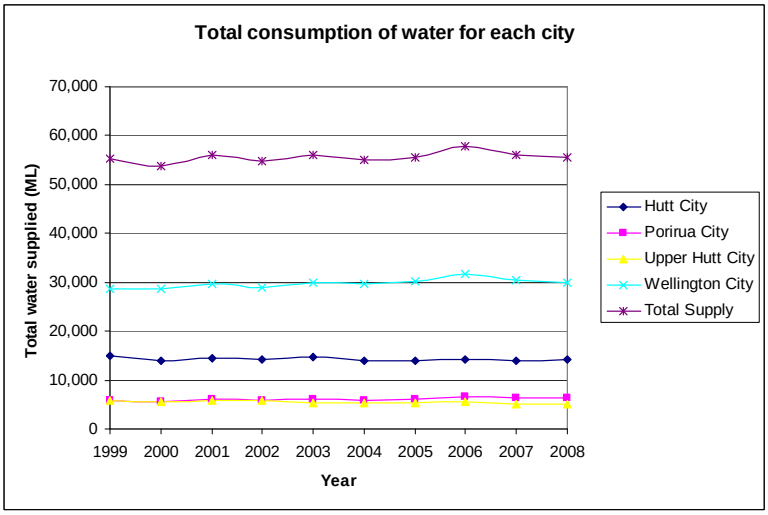


**Figure 6 – Water usage in the Wellington region**

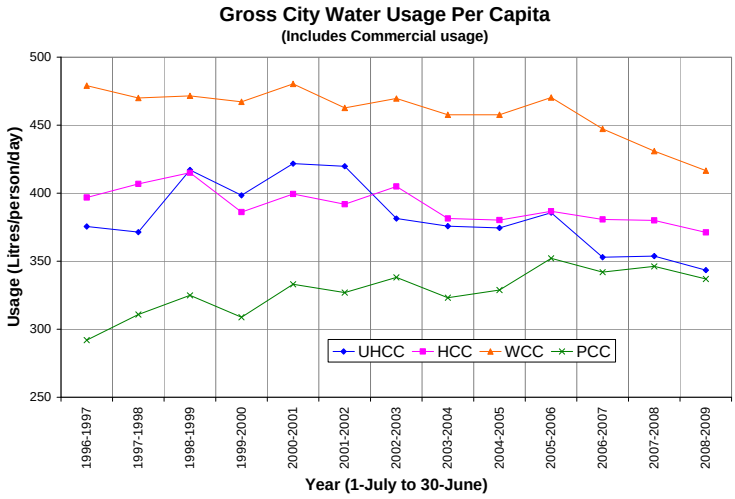


**Figure 7 – Water usage in the Wellington region**

The conclusions that can be drawn from Figure 7 are that Wellington, Upper Hutt and Hutt cities have reduced consumption over the past 12 years by approximately 13%, 8% and 5% respectively, whereas Porirua's consumption has increased by 17% over the same period.

The following graph depicts the population/demand trends in Wellington city since 1992.

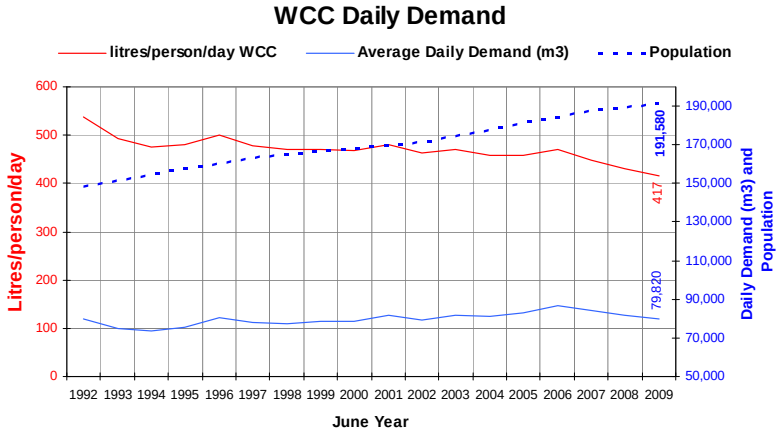


**Figure 8 – Population/demand trends in Wellington**

The current declining demand trend is largely due to leak detection activities, and conservation education efforts from the mid 1990s resulting in a growing water conservation awareness.

## 5.2 What's already being done by Council?

Current water efficiency measures practiced by Council include the following systemic and behavioural measures:

- consumption monitoring through telemetered area metering, and commercial metering
- network leak detection and elimination
- private leak elimination detected through consumption monitoring and reporting of leaks
- watermain renewal programmes
- commercial and voluntary residential metering
- Infrastructure leak detection
- year round watering restrictions
- additional water restrictions when required in summer
- summer indoor/outdoor water savings campaigns in conjunction with GWRC
- Water main renewals

Due to the considerable effort being put into leak detection and control Wellington city's usage figures have trended down significantly over recent years, as shown Figure 9 below. This clearly illustrates what can be achieved through systemic demand management activities although this benefit will decrease to a point when the costs outweigh the benefits.

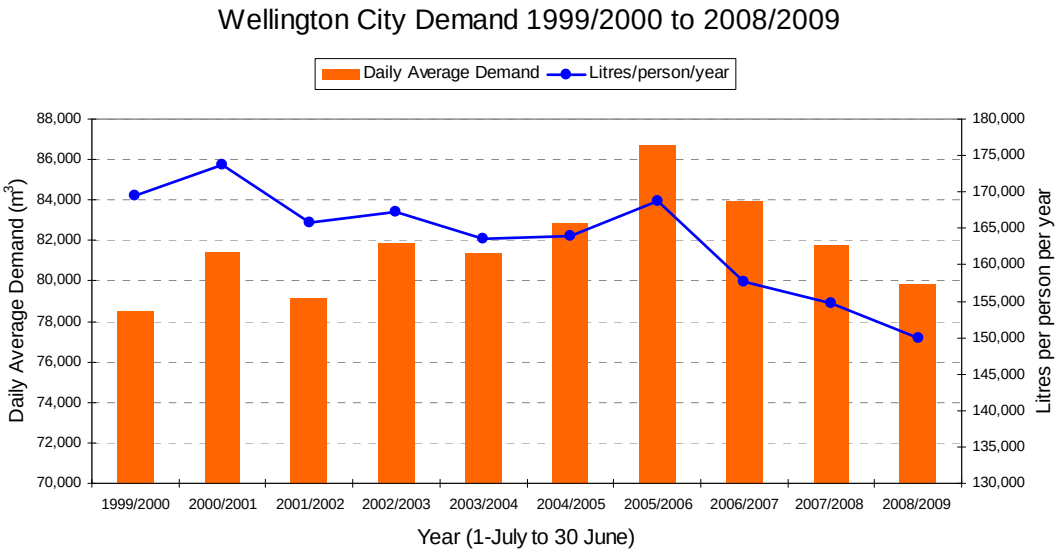


**Figure 9 – Wellington City water demand**

To facilitate improved consumption monitoring it is planned to establish a residential customer monitoring system through the installation of 250 randomly selected residential monitoring meters to enable us to more accurately assess overall customer demand. This will provide a more accurate basis to forecast likely demand from our non metered residential customers.

Council has in the past been proactive in raising awareness of water conservation needs, and whilst less emphasis has been placed on promoting conservation in recent years Council is nevertheless very active in systemic demand management activities. These activities are largely focused on water use efficiency in the supply network and the very nature of the activities means that they have not had a high profile in the community.

We continue to drive down leakage as part of our system monitoring and leakage identification and reduction programme. The total annual budget for planned and reactive leak detection work is $108,000 which is relatively small sum considering the 1065 kilometres of water pipelines in service in the city.

## 5.3 Future water requirements and water savings goal

In pursuance of the vision of a sustainable water future for Wellington it is proposed that no major new infrastructure be constructed until all practical and economic conservation and efficiency measures have been pursued, effectively deferring the need for a dam until we have exhausted water savings opportunities. To do this we will need to commit to finding the water we need

to cater for growth through savings generated by conservation and efficiency initiatives.

It is suggested that as an interim step we establish the following goal:

“To accommodate Wellington city’s population growth through to 2025 with the same amount of water we have available to us now.”

This is a ‘water-neutral’ goal that will require per capita consumption to drop at a rate that corresponds to the rate of population growth. This benchmark level forms the basis of this goal, and the trigger mechanism will be used to keep the goal on track.

It is proposed that Wellington City’s total annual water usage averaged over the past 5 years be established as a benchmark consumption level and that demand be managed so that this level remains static through to 2025. This is aimed at deferring a dam, and progressing towards a sustainable water future through more efficient use of water.

Although the City has measures in place already to address the efficiency of water use within its supply networks there are many more opportunities in Wellington for significant reductions in water consumption. The success of additional water saving measures depends on everyone’s participation; therefore it is desirable to establish a goal or targets for the community to aspire to and an incentive for change. Targets also provide a benchmark with which to gauge progress.

GWRC’s draft regional water strategy calls for a regional wide water conservation goal:

‘To reduce annual water consumption per person by 15% by 2025 using the average consumption for each city over the period 2003 to 2008 as a baseline’.

It is estimated the regions population will increase at a rate of almost 1% per annum culminating in a 15% regional population growth by 2025. Assuming this growth rate creates an equivalent demand increase of 15% over the same period (although there isn’t necessarily a strict correlation between population growth and demand growth) then the region will need to achieve water savings of around1% per year. In other words with demand assumed to increase by 15% over the next 15 years the region would need to make 15% water savings to achieve the above goal.

Rather than simply adopting a goal aimed solely at deferring a new dam it is suggested that a goal centred on generating water efficiency savings be adopted for Wellington city. It is therefore proposed that a target of achieving 15% in 15 years be set for Wellington city. This would allow for economic growth, as well as population growth, and a move towards a sustainable water future.

Achievement of the 15% reduction goal would require a per capita reduction from 415 to 350 litres per person per day by 2025 (this includes total domestic, commercial and industrial consumption).

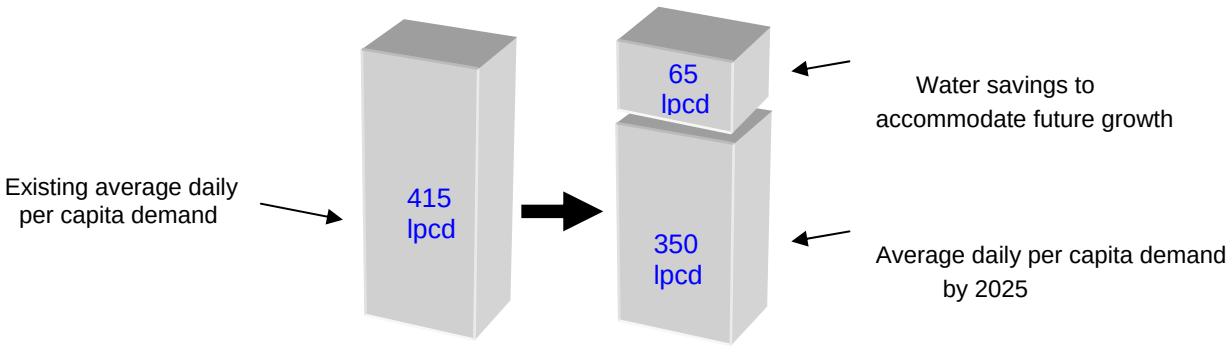


**Figure 10 – Water savings required to accommodate growth**

Water usage peaks each summer, when water availability is generally limited. It is therefore proposed that a further water savings target be established for the summer period (with summer taken as the period from 1 November to 31 March).

A target of a 2% reduction in water use per summer is proposed, based on the 5 year annual summer supply average of 13,091 ML.

The target would not only help offset population growth and climate change impacts but it would also enable our energy use associated with pumping and treatment processes to remain constant, or decrease.

## 5.4 Security of supply options

The short term options proposed by GWRC for addressing security of supply are largely centred on restoring the deterioration in the 2% security of supply standard due to population growth. These options do not provide for aspects such as future growth, climate change or supply resilience.

Security of supply is however far more than just having enough water for population growth, or the economics of its provision; it's about ensuring our water supply infrastructure is resilient and adaptable to future changes and needs. An essential aspect of security of supply is also having resilient infrastructure and being able to quickly restore supplies to support life, public health, and the economy after a seismic or other damaging event.

Security of supply may mean we need to build in spare capacity and supply redundancy, and allow for diversity in how we supply water particularly during adverse events. These are all aspects, together with climate change impacts, that don't appear to have been addressed by the current augmentation proposals, even though they are very pertinent to long term water supply security in Wellington.

GWRC is thus continuing with studies related to long term security of supply matters, such as an economic analysis of the seismic recovery benefits of the

Whakatikei dam. It is anticipated the outcomes of this work will be included in the regional water strategy proposals.

In addition to these studies the Climate Change Research Institute at Victoria University also proposes to undertake a case study on vulnerability of the Wellington city water supply under climate change. The premise for the Wellington study is that although existing studies indicate that whilst population growth is by far the dominant driver for supply and demand interventions, climate change is likely to exacerbate water security issues and reduce the effectiveness of some response options.

The case study is planned to undertake a more detailed assessment of how various climate change and socioeconomic development scenarios could exacerbate water security issues for Wellington city, and the extent to which response options would be cost-effective and resilient under alternative future scenarios. The study will also consider the degree to which different parts of the community would be affected by water shortages and response measures, investigate the attitudes that different parts of the community have towards alternative responses (e.g. demand management through voluntary action or water metering compared to supply-side measures), and assess the extent to which information on climate change and its links with water security could influence such views.

This study is timely and its findings could be very useful in assisting Council's own deliberations on a long term demand management strategy. Given this, it seems prudent for Council to await the outcome of this study, expected in 2010, and the outcome of GWRC's further studies, before embarking on additional demand management initiatives requiring new funding.

It is therefore proposed that a progressive approach to the establishment of a demand management strategy be taken with the initial phase centred on short term actions that compliment GWRC's summer conservation proposals and build on existing demand management work, the key focus being the management of summer water demand. This approach is further discussed below.

## 5.5 Drivers for a demand management approach in Wellington

Whilst we could simply rely on using additional water restrictions to manage our way through supply shortages, this is unlikely to be acceptable to the community in the long term. Realistically we need to respond to water supply needs and ensure long term security of supply, in a way that meets community expectations over desired levels of service.

It is considered that the required security of supply be achieved through an integrated and balanced approach to supply and demand. It would require new sources supported by a strong focus on reducing our water consumption and all of us becoming much more efficient in how we use water.

Whilst the supply augmentation options outlined in 4.2.5 above are available to address growing water demand we need to balance these source options with demand management initiatives aimed at managing and reducing this demand.

There are several drivers for the development of a water demand management strategy for the Wellington region:

- Security of supply
- Population and demand growth
- Climate change
- Using water more efficiently to make better use of the water we already have available
- Working towards a sustainable water future
- Deferring expenditure on a dam

The first two drivers have been the centre of attention in recent times and are driving the need to address current water supply shortfalls, with these two drivers also instigating proposals to construct a new dam to address longer term security of supply.

There has been considerable discussion over the use of water conservation as a means of deferring the need for that dam and GWRC has suggested water savings of 15% by 2025 (all year round) will be required to defer the dam for several years. The savings would need to be about 28% if only peak time usage reductions are pursued.

The main focus of recent water conservation discussions has therefore tended to be around their use to defer the need for a new dam. The GWRC Chair has reinforced this by recently stating that .....

*"It is up to the TLA's to find ways to conserve water. If they don't the need for a dam is immediate."*

Notwithstanding an initial focus on water savings to defer a new dam, our ability to continue to generate and maintain water savings when faced with continuing growth and climate change impacts will however reach a point where it will be inevitable that new water sources will need to be developed, in much the same way as has occurred throughout Wellingtons water supply history. Debates between conservation and new source development tend to be counter productive, as both are needed to address water supply needs in the region.

In working towards a long term sustainable water future we will ultimately need to adopt strategies that enable us to adapt to changing circumstances and become more climate resilient.


This will require us to work in partnership with the community to reduce water use and use water more efficiently; to seek out opportunities to recycle water; and identify and develop potential new water sources, as depicted by the adjacent graphic.

(Graphic adopted from the Western Australian Water Corporation's "Water forever" initiative, a 50 year plan to deliver sustainable water services to its customers)

The transition from where we are now to climate resilience will need to be a shared journey with the Wellington community. We will need to work in partnership with households, schools, commercial and industrial businesses, using an integrated approach to demand management, through partnering and shared responsibility.

The initial phase of the demand management approach suggested in this report represents the first step on this journey.

## 5.6 Conservation plan considerations

### 5.6.1 Research outcomes

A key message from recent customer surveys is that....

*"Support for and participation in wide conservation measures will not happen until the public is aware and convinced there is a reason to do so" GWRC Opinion Research 2007*

The 2007 opinion research found that:

- 94% make some form of water saving, and
- 92% would do more <u>if</u> a shortage arose, but ...
- 71% think there's only a low risk of water shortage.
- 77% agreed "the community could do much more to conserve water", but only 14% disagreed with "I'm doing enough now"

  .....If there's a problem <u>&</u> others do their bit, I will too

The research recommendations were that we need to:

- Explain ***'why'*** and well as ***'how'*** to conserve
- Raise awareness of water restrictions
  - restrictions convey shortages are a concern
- Continue to focus on avoiding waste
- Multi-stage approach needed medium term
  - education, incentives, regulation

In addition to this, whilst most Wellingtonian's would probably consider water as an invaluable and essential element of life, that consideration does not necessarily motivate them to conserve water.

In general New Zealanders regard water as 'precious', but also believe it is plentiful and limitless in this country - "*because it rains all the time*". This reinforces the position often stated that water should be 'free' or at least made available at little or no cost to the consumer.

New Zealanders have a fundamental belief that waste is bad – but they also believe they have the right to use water freely and without restriction.

These perceptions provide significant challenges to Council in implementing demand management strategies to improve water use efficiency and generate water savings.

Clearly the key to gaining community 'buy in' and participation in water conservation practices is for the community to understand why saving water is necessary or desirable, and for the Council to show that it is doing all it can to be water efficient in all its activities. In other words Council needs to be seen to be "walking the talk" and setting an example for others to follow.

The above research recommendations are acknowledged and It is therefore proposed that the initial approach to a demand management strategy be centred on promoting the 'why' and 'how' to conserve, and Council taking the lead in demand management initiatives by demonstrating very clearly to the community its commitment to water savings and sustainability.

### 5.6.2 Plan approach

The approach taken to preparing this report is based on the principle that water supply be treated as a service rather than an end in itself. For the purposes of this report, **Water efficiency** relates to providing and using the water supply service more efficiently by making the best use of the existing service through initiatives like eliminating system leakage and wastage, and the installation of water efficient devices. **Water conservation** relates to modifying usage of the service so less water needs to be supplied, such as through taking shorter showers.

Making the most of every drop of water we use requires efficient water use. It means adopting new technology that requires less water and changing our behaviour to use less water. For example, using appliances such as washing machines that have a high water efficiency rating (technological improvement) and only using them when they are full (behavioural change).

The title of the plan reflects these two aspects of demand management.

## 5.7 Demand management initiatives

Given the uncertainty over when the regional water strategy will be completed work has commenced independently by Council officers on the development of a water demand management strategy for Wellington City.

A range of demand management measures are being considered. Each measure, to various degrees, could be a useful tool to assist reduce demand and generate water savings. To ensure success each measure would require an appropriate level of investment to achieve the desired benefits, with some of the measures, especially those requiring significant expenditure or regulatory change, having substantial lead times before they can be implemented.

The demand management measures considered can be broadly placed into three categories – **behavioural, systemic and technical,**

> **Behavioural** measures involve conservation education and social marketing to inform, persuade and motivate water use behaviour changes. They help to encourage people to think about things differently and to feel they are part of the solution.
>
> **Systemic** measures include measures such as leak detection, pressure management, water main maintenance and renewals, system monitoring, area metering, and pricing for sustainability in conjunction with universal metering, etc
>
> **Technical** measures include measures like water efficient appliances, low flow shower roses, dual flush toilets, and rainwater tanks etc which are utilised to improve water use efficiency.

These categories are interlinked so that changes to systems and technologies encourage changes in behaviour.

Most of the systemic measures, such as leak detection, are already utilised as demand management tools in Wellington City. It is expected that these will continue as "business as usual" although there is a case for enhancing these activities. The importance of raising awareness in the community of systemic activities being pursued by Council is emphasised further in this report.

Many of the measures considered would not necessarily generate significant savings and therefore the focus needs to be on measures that produce demand savings of 1% or higher over 10 years.

These measures were determined to be:

| | | |
|---|---|---|
| *Behavioural* | > | Education |
| Systemic | > | Leakage reduction |
| | > | Pressure management |
| | > | Water metering and pricing for sustainability |
| *Technical* | > | Dual Flush Toilets |
| | > | High-efficiency washing machines and shower roses |

From this initial work the analysis of the measures showed that a water savings target of 15% reduction in gross water consumption is unlikely to be achieved by

increased uptake of water efficient technologies or education alone, although it can be achieved through the introduction of universal water metering.

The issue then is that without metering achievement of a 15% target seems unlikely within the required timeframe, and this is exacerbated if a higher level of savings is actually required to combat the effects of higher population growth over that timeframe. Achievement of a lower level of savings would necessitate the bringing forward of the date when a dam is required.

### 5.8 Next steps

Our challenge is to build on the work done to date and develop and implement a comprehensive water conservation and efficiency plan that has an emphasis on efficient water use and will:

- Initially be focused on deferring the need for a new dam
- Aim to achieve significant water savings
- Work towards a sustainable water future in the city through more efficient use of water
- Balance conservation initiatives to ensure continued economic viability of the city
- Further our aim of accommodating population growth through to 2025 with the same amount of water we have available to us now

By promoting efficient water use Council can:

- foster a “culture of sustainability” amongst Wellingtonian’s
- reduce impacts on the environment
- increase the capacity of the water supply to accommodate increases in population and commercial and industrial growth, as well as climate change impacts
- reduce the amount of water and wastewater that must be treated and distributed, thereby reducing operating costs
- maximize the use of existing water distribution infrastructure
- minimise the need for mandatory water restrictions or hosing bans

A phased development approach is proposed, based on progressively implementing the demand management measures outlined above. Phasing will enable flexibility and allow for progressive implementation and tailoring of demand management measures to suit needs.

In essence it is proposed to establish a water conservation and efficiency plan that will provide a framework for water conservation efforts in the city. This will help guide decision making on future measures and priorities for water efficiency in the city.

The initial phase would focus on managing summer water use to ensure sufficient water continues to be available until the short term supply augmentation works are commissioned.

A demand trigger mechanism is also proposed in conjunction with the benchmark consumption level. The intent being that demand trends diverging from the benchmark will trigger the promotion and implementation of further water conservation and efficiency measures.

These trigger points will help ensure that decisions are cost effective and timely. They should also:

- reduce the risk of making investments that prove to be redundant or are delivered ahead of need
- reduce risk and identify opportunities
- ensure that supply and demand is continually monitored

Figure 11 below illustrates past water demand in Wellington city and the proposed benchmark level (The dotted line which is the average of the last five years usage).

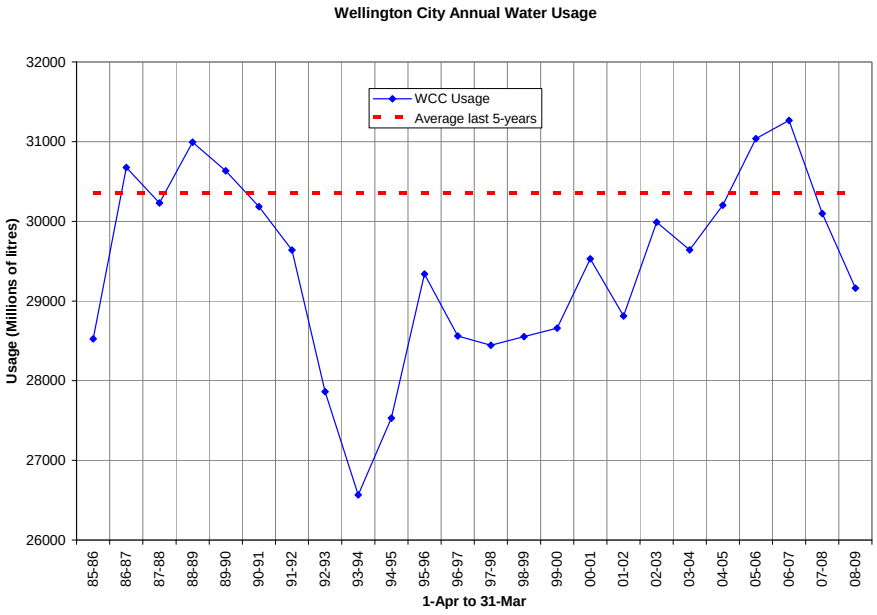


**Figure 11 – Wellington City historical annual demand**

Note that the trigger mechanism proposed above is complimentary to the existing regional supply and demand triggers that are based on a complex weather, supply, and demand matrix that is utilised each summer to determine the need for additional water restrictions and publicity.

## 5.9 Conservation education promotions for summer 2009/10

GWRC has available a total budget of $175,000 for water conservation in the 2009/10 financial year, of which $75,000 is specifically for a summer water conservation campaign and $100,000 for unspecified activity. Although some projects are yet to be confirmed with potential partners, the main strands of activity are proposed as:

| | Promotion name | Promotion period | Description | Budget |
|---|---|---|---|---|
| 1 | Spring mulch campaign | Nov.2009 | Promotes the benefits of mulch for easy summer garden care. Includes discount promotion via NGIA retailers. | $40,000 |
| 2 | Why conserve advertising | Dec.2009 & Jan.2010 | Develop advertising, guided by customer consultation, to explain the case for water conservation around Wellington during summer and show what councils are doing. Two placements are envisaged. | $15,000 |
| 3 | Joint water restriction advertising | Climate and demand dependent | As described for Trigger Level 2 of the Summer water Demand Management Plan. Up to 8 placements budgeted for. | $30,000 |
| 4 | Summer water conservation tips | Jan. – Mar.2010 (and possibly Dec.2009) | Promotes key water wise gardening tips. To investigate discount promotion of 'good' watering hardware. | $75,000 |
| 5 | 'How to' guides | Available from Oct. 2009 | Complete four 'How to' guides, including for water efficient watering equipment and watering frequency and duration | $2,500 |
| 6 | Regional Native Plant Guide | TBC | A printed guide to native plants suitable for different climate and soil conditions around the Wellington region. Budget dependent on suitable promotional plan. | $5,000 |
| 7 | Miscellaneous | Likely targeting Apr. – Jun.2010 | Allowance for unspecified tactical activity. | $7,500 |

**Figure 12 – Schedule of GWRC conservation education promotions for summer 2009/10**

The activities in Figure 12 will collectively both add depth to the strategy followed in past years – of promoting awareness of summer water supply issues and water wise gardening methods - and introduce an increased level of incentive to purchase water efficient watering and garden products.

It is proposed Council will compliment, support and promote the GWRC programme through its own communications channels and website.

## 5.10 The initial phase of the water conservation and efficiency plan

The initial phase would commence with raising awareness of supply issues and their implications. Further publicity would then be focused on managing summer demand and actions the community could take to help with this. Publicity about the actions Council is taking with its own activities and media coverage on the progress Council is making with its endeavours to save water, and progress against targets, will form a key part of the initial approach.

This initial phase does not require any new expenditure as we will be working with GWRC and supporting their summer water savings campaign.

It is proposed the initial phase of the implementation plan continue with the following:

- Setting the short term interim water savings target
- Increasing the publicity given to day-to-day consumption monitoring, zone metering, leak detection and repair, pressure management, maintenance and infrastructure management activities currently in hand.
- Raising awareness of the 'why' as part of educational campaigns
- Utilise a social marketing promotional strategy aimed at changing the way people think about water, modifying behaviour, and encouraging social responsibility in water use
- Complementing and supporting GWRC's summer water savings campaign
- Setting a positive example for Wellingtonian's by establishing Council as a leader in responsible water use through Council leading by example and promoting the work it currently undertakes in pursuing efficient water usage
- Continue to implement water efficiencies in Council operations and supply networks through leak detection and pressure management activity
- Increased publicity on water restrictions and high usage/low supply management strategies
- Commencing the development of a community engagement campaign
- Review the water services customer charter
- Monitor demands and instigate a reporting regime to Council and the community on successes and progress against targets

The key with Council activities is to clearly show the public that Council is taking action to save water and use water efficiently. It needs to promote its water saving activities and publicly acknowledge its successes. The overall aim is for Council to set an example, show what it is doing, and encourage the community to also take action.

Activities like consumption monitoring, leak detection and elimination, area metering, network renewal and maintenance, and limited pressure management are important ongoing activities but these generally have a low public profile. The aim is to lift this profile with frequent publicity covering all these activities.

Making it easier for the community to report leaks by improving the Councils website may also help encourage greater customer response.

## 5.11 Further phases of the water conservation and efficiency plan

Subsequent phases will involve the implementation of future phases of conservation options based on the benefit that can be expected. The options will be prioritised in order of effectiveness and a prioritised list with an indication of future costs and the suggested trigger methodology will be brought back to Council in May 2010

As indicated, a range of demand management measures falling into the behavioural, systemic and technical categories are identified and are being considered. These are as follows

- Education and awareness raising
    - School education programmes
    - Promotions
    - Website development
    - Water Audits – both within and external to Council
- Behavioural changes / social marketing
    - Fostering partnering with community groups, schools, suppliers and businesses and other Councils to deliver programmes, highlight water saving opportunities, leverage resources and share and celebrate stories of water conservation success
    - Community engagement / partnering with the community
    - Water efficient garden practices
    - Water advisory service
    - Industry water efficiency plans
    - Water sensitive urban design
    - Water efficient landscaping (xeriscaping)
    - Water efficient outdoor use
- Stormwater harvesting / Rainwater tanks
- Grey water reuse
- Dual flush toilets
- Low flow shower roses,
- Water efficient washing machines
- Universal metering
- Voluntary metering – enhancing the current scheme
- Leak detection and management (current practice but could increase)
- Pressure management (current practice but could increase)
- Water mains renewals (current practice but could accelerating)
- Property meter testing, calibration, repair, and replacement procedural changes

The items will be considered taking into account:

- Retrofitting
- Metered tariff structures
- Economic instruments
- Pricing for sustainability
- Regulation and restrictions
- Non-regulatory policy
- Incentive packages

These measures will now be further evaluated with a cost - benefit analysis having a particular emphasis on the costs of implementation and their suitability in the Wellington situation.

It is envisaged that officers will monitor the trend of the city's total and summer usage and when this trend approaches the agreed trigger, Council will be presented with an update including the suggested items for implementation or acceleration.

Further consideration and investigation is also proposed on the following:

- Development of consultation and community engagement documentation
- Work on the benchmark triggers methodology
- Aligning policy with conservation objectives by exploring regulatory opportunities and pursuing changes that favour water–efficient technologies, standards and procedures
- Development of an audit tool to focus on Council's own facilities and operations
- Encouraging the use of water–efficient technologies and promoting water-smart buildings and operations
- Further development of education and water awareness campaigns
- Work with GWRC to undertake an independent review of levels of service and a review of the appropriateness of the 1 in 50 (2%) security of supply standard
- Provide annual water efficiency reports to SPC and the community on progress being made with the water efficiency goal. Success would be measured against some key indicators, such as the level of unaccounted for water
- Population prediction update

These will be reported back to Council in May 2010 along with the results of the outcomes of the regional water strategy and other work being undertaken by GWRC and Victoria University

Many of the activities outlined above are geared towards influencing choices and encouraging action by individuals and organisations. This is based on the recognition that the greatest impact on water resources occurs through our individual values, choices and behaviour.

## 5.12 Timing of implementation of demand management measures and supply augmentation works

It is anticipated that implementation of demand management measures and the supply augmentation works, will be implemented on a continuum as depicted by Figure 13.

| Year | Supply augmentation | Demand management initiatives (Based on implementation of the six key measures) | | |
|---|---|---|---|---|
| 2009 | 2009 - Kaitoke residual flow 400l/s | *Initial phase* | *Behavioural* | e.g.Education |
| | 2012 - Te Marua Lakes + 400ML | | *Systemic* | e.g. Leak reduction, pressure management |
| ↓ | 2015 - CBD reservoir + Upper Hutt aquifer Haywards pump station | *Phase 2* | *Technical* | e.g. Dual flush toilets, high-efficiency washing machines, shower roses |
| | 2019 - Takapu Pump station Maldive pump station | | | |
| 2020 | 2020 - Whakatikei dam | *Phase 3* | *Systemic* | e.g. Water metering and pricing for sustainability |

**Figure 13 – Implementation timeline**

The phasing and timing of individual demand management measures is dependent on water saving achievements. The implementation of measures is largely independent of the supply augmentation timelines. The measures shown in Phases 2 and 3 will not be implemented until decisions are taken on their appropriateness and need, based on the benchmark triggers. Further phases would be undertaken as determined in the future.

Additional measures will be included in the phasing as their viability, suitability and need is determined.

The actual implementation timing of individual demand management measures will be dictated by progress against water savings targets. Likewise the current planned dam completion date of 2020 will be determined by the level of savings

achieved. Greater savings could defer the dam beyond 2020, but conversely lower savings will bring forward the need for the dam.

### 5.13 Funding

Aside from the funding currently available for activities like leak detection and summer water restriction advertising there is no funding allocation for additional demand management activities at this stage. Council has to date been funding the regional summertime advertising campaigns facilitated by GWRC through the bulk levy.

Funding of new demand management initiatives will need to be addressed once further work on possible new initiatives has been completed and agreed by Council. This will be completed prior to the next LTCCP round.

### 5.14 Community engagement

Community engagement is essential to the understanding of water supply issues and the recognition of the need for the community's action and involvement in the solutions. In Wellington's case there is a need to change water use behaviours, largely through education, social marketing and possibly incentives to encourage wise use of water. This requires the goodwill and co-operation of a motivated community.

Community engagement can gauge the community's attitudes to factors like their tolerance to water supply restrictions, acceptable levels of service, the construction of dams versus restrictions and demand management measures, water metering, etc.

It is proposed to prepare a community engagement proposals to cover community involvement aspects like:

- Raising awareness through various media channels
- Community information sessions and workshops hosted by key community groups
- Public displays and information dissemination
- Focus groups
- Website to provide interactive opportunities for information and feedback, online surveys, etc
- Telephone opinion surveys
- Public submissions

Taking a "Have your say" approach to community engagement will enable Council to promote an exchange of information and ideas, hear the views and preferences of the community and take these into account in developing the water conservation and efficiency plan for the future.

This proposal will be submitted for consideration by Council in May 2010 with the report on the engagement outcomes being reported in September 2010.

### 5.15 Implementation risks

The predominant risks to delivering a water conservation and efficiency plan include:

- Failure to achieve community participation and engagement in the strategy
- Reliance on a single approach (silver bullet) to security of supply issues
- Climate change impacts much sooner and greater than anticipated
- Relying on demand management measures and still failing to reduce demand sufficiently
- Weather variability and extended droughts dictating a change in timing of supply augmentation

## 6. Conclusion

The intent of the demand management measures to be included in the water conservation and efficiency plan is two fold. Firstly it is to defer the immediate need for a dam and secondly to ensure a sustainable water future.

A key consideration is that whilst emphasis is currently on demand management to defer a dam, demand management is also an essential tool in managing the water supply system to minimise capital and operating costs and ensure levels of service can be maintained. It is likely then that these intentions will be undertaken simultaneously.

The initial demand management approach proposed here to address "security of supply" and to accommodate population growth and climate change effects is to take a 'water neutral' approach. This means we will need to live within the current level of water use, effectively requiring per capita water consumption to drop at a rate that corresponds to the rate of population growth.

A historical benchmark usage level is proposed to further the goal ...
"*To accommodate Wellington city's population growth through to 2025 with the same amount of water we have available to us now.*"
and drive future demand management initiatives. Trigger mechanisms would be used in conjunction with this to determine when the next set of demand management measures should be rolled out under a phased implementation strategy.

Information available to date on supply augmentation options does not fully cover the range of issues that need to be considered, and therefore further analysis by GWRC is a vital prerequisite to any significant decisions on a future demand management strategy.

There is considerable investment at stake with both supply augmentation works and demand management measures. It is therefore essential that we reflect on all the known issues that will impact on our ability to supply water into the foreseeable future and strike a balance between the options available to us.

Existing demand management measures should be continued. The phased approach facilitates a measured and timely implementation plan as further analysis outcomes and results are derived.

The advantage of the phased approach is that it could be implemented over a number of years progressively building on previous activities and implementing new initiatives in response to the success or otherwise of the earlier phases. Monitoring of population and demand growth, deviations from the supply benchmark, and achievements in water savings against targets would be an essential part of the phased approach, as this information would in effect drive and determine the timing of the next phase. This would also enable financial outlays to be matched to the need for that expenditure.

Implementation of a water conservation and efficiency plan will take time and resources. It will require leadership by Council and participation and engagement by the community.

Community engagement is a vital step in the development of the plan. The formulation of consultation documentation and community engagement proposals will be reported to Council in May 2010. This will be followed up in September 2010 with a report on the community engagement outcomes

Public reporting on the progress of targets, actions and commitments will become an essential part of the plan. It will be important to measure results so that we can determine whether we have been effective, and can demonstrate to city residents that the measures have been worthwhile.

Sustainable water supplies is about choices, our challenge is about getting the choices right.

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## Supporting Information

**1)Strategic Fit / Strategic Outcome**

*The development of a WCC water supply demand management plan supports the Councils long term outcome of reducing Wellingtons environmental impact by making efficient use of energy, water, and other resources, and minimising waste (See outcome 4.5 More Sustainable).*

**2) LTCCP/Annual Plan reference and long term financial impact**

*The development of a WCC water supply demand management plan will require additional operational expenditure in out years.*

**3) Treaty of Waitangi considerations**

*None.*

**4) Decision-Making**

*This is not a significant decision. The report recommends that a water conservation plan be developed to build on existing conservation initiatives and does not constitute a change in policy direction.*

**5) Consultation**

**a)General Consultation**

*None, though public consultation will be undertaken as part of the ongoing plan development to formulate a range of measures to reduce water demand. Many of these policies are likely to involve new public education campaigns to increase awareness and encourage more conscientious water use.*

**b) Consultation with Maori**

*None.*

**6) Legal Implications**

*None.*

**7) Consistency with existing policy**

*This report recommends measures that are consistent with existing WCC policies on water usage that prioritise water conservation and encourage more efficient use of water.*