

## Essential Services Commission

# Urban and Rural Water Price Review 2008: Assessment of Demand Forecasts

Final Report

March 2008





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# 1 Introduction

PricewaterhouseCoopers (PwC) has been engaged by the Essential Services Commission of Victoria (ESCV) to undertake a review and assessment of the demand forecasts prepared by the Victorian urban and rural water businesses.

The businesses have prepared these forecasts for inclusion in their water plans that set out the revenue and expenditure they propose to undertake over the years 2008-09 to 2012-13. The ESCV is currently undertaking a water price review that will assess the reasonableness of the proposals set out in the businesses' water plans.

The outcome of PwC's review of the businesses' demand forecasts will be an input into the ESCV's consideration of the businesses' water plans.

## 1.1 Objective of this review

PwC has been asked by the ESCV to provide advice on whether the demand forecasts proposed by the urban and rural businesses:

- have been developed using appropriate forecasting methodologies or approaches, given the materiality of the forecasts for the businesses' revenue and resulting prices
- reflect reasonable assumptions about the key drivers of demand, including the impact of supply restrictions
- use the best available information, including historical data that can support trends in demand, and
- take account of current demand and economic conditions.

In providing this advice, PwC is expected to have regard to:

- any guidance issued by the ESCV with respect to how it will assess the businesses' proposed demand forecasts;
- the information set out in the businesses' Water Plans (and accompanying templates) and any explanations that the businesses provide with respect to the basis used to derive the forecasts including any assumptions used;
- comparisons amongst the businesses of their forecasting methodologies and assumptions and resulting forecasts;
- relevant Victorian Government policies related to the water industry that impact on demand management, pricing, water conservation, metering and recycled water;
- any readily available data and information that PwC has available to assess demand forecasts; and
- PwC's own experience in preparing and assessing the veracity of forecasts of demand for rural and urban water services in Victoria and other Australian states.

If PwC does not believe that the businesses' proposed demand forecasts reflect these requirements, it is required to provide the ESCV with an alternative forecast. PwC has also

been asked to identify any implications of adopting an alternative demand forecast for the relevant businesses' operating or capital expenditure requirements and/or prices.

## 1.2 Limitations

This report has been prepared consistent with the terms and conditions agreed to between PwC and the ESCV for the provision of services.

It has been prepared by PwC for the ESCV for the sole purposes of providing an indication of whether forecasts of demand for services prepared by the water businesses are reasonable. While PwC understands that the ESCV will make this report publicly available it is not intended to be relied upon by any person other than the ESCV, nor is it to be used for any purpose other than that articulated above.

Accordingly, PwC accepts no responsibility in any way whatsoever for the use of this report by any other persons or for any other purpose.

This report has been prepared using information provided to the ESCV and PwC by the businesses in their Water Plans and information templates. We have also relied on the responses that we have received from the businesses in response to information requests that we have had.

Importantly, PwC has not undertaken any independent verification of the reliability, accuracy or completeness of this information. Therefore, it should not be construed that PwC has carried out any form of audit or other verification of the adequacy, completeness, mathematical accuracy, or reasonableness of the information provided by the businesses and upon which this report is based.

## 1.3 Structure of this report

The remainder of this report is structured as follows:

- Chapter 2 assesses the key assumptions used by the businesses in developing their demand forecasts
- Appendix A provides our assessment of each of the urban water businesses' demand forecasts, and
- Appendix B provides our assessment of each of the rural water businesses' demand forecasts.

Two of the businesses — GWMWater and Lower Murray Water — provide both rural and urban water services. The urban and rural components of these businesses have been dealt with separately in appendices A and B.

## 2 Assessment of the key assumptions

In this chapter, we set out the framework that we have used to assess the key assumptions that most businesses have applied to develop their demand forecasts and provide our view on what the value of these assumptions might be over the next regulatory period. Our views on these assumptions are then used to assess each business's forecasts and the methodology and assumptions in developing their forecasts in appendices A and B.

### 2.1 Urban water businesses

In developing their demand forecasts for the 2008-2013 price review, each of the urban water businesses has made assumptions in regard to:

- future growth in customer numbers;
- the impact of climate change and the likely level of water inflows into their systems over the period;
- the likely level of water consumption restrictions that will apply; and
- the impact of water conservation measures, including the effect of increased prices on water consumption.

While there is a degree of commonality between the businesses, each has assumed a different combination of these scenarios when developing their forecasts. For example, some have factored in a price elasticity impact while others have not. Some businesses have assumed extremely low water inflow conditions will continue while others have assumed that the level of water inflows will improve as the present drought conditions give way to more normal rainfalls.

In this section, we set out our approach to assessing the assumptions used by the urban water businesses and set out some high level findings from our review. An analysis of each urban water business's assumptions is set out in appendix A of this report.

#### 2.1.1 Approach to assessing the assumptions used

To assess the assumptions used by the businesses, we have used the following principles as our starting point:

1. Consumer behaviour and water consumption patterns should not vary significantly between the businesses. The profile of consumption by a resident in Horsham should not vary to any large degree from a consumer in Bright.
2. Consumers across the state will behave in a similar way when confronted with increased water prices. That is, price elasticity should be fairly consistent across Victoria.
3. Weather patterns should be fairly consistent across the businesses given the size of the territory of Victoria. It is unlikely that climate change will affect one business more severely than another neighbouring business or that an easing of drought conditions occurs only in one business's supply area and not others.

4. Water conservation measures will have similar impacts upon consumer consumption patterns regardless of where the consumer is located.

Despite these principles, we recognise that there may be local conditions, demographic patterns or other reasons that may make it reasonable for a business to use different assumptions from other businesses to develop its forecasts. To test whether this is the case, we have engaged with the business concerned to understand why its assumptions differ from the other businesses. We have also requested that the business concerned provide information or analysis that supports the assumptions they have used.

The other consideration that has framed our assessment has been the evidence available from third party or independent sources. Where possible, we have sought to identify independent third party views on:

- likely rainfall patterns over the next regulatory period and the effect of climate change upon water inflows;
- price elasticity impacts and the effectiveness of the various non-price water conservation measures proposed by the businesses; and
- future population trends and changes in demographics.

Where available, we have tested the assumptions used by the businesses against the information and evidence available from these sources.

Again, we recognise that there may be reasons why the conditions being experienced by a particular business may warrant the use of an assumption that deviates from the views of these third party sources. We have engaged with the business concerned to understand why the assumption they have used varies and requested that further information or evidence be provided in support of their approach.

In late January PwC provided the ESCV with a draft report of its assessment. In this draft report, we had adjusted the businesses' forecasts where the information provided had not supported the assumptions they had used or where information had not been forthcoming from the business. In most cases, we adjusted the forecasts to bring them into line with the assumptions used by the other businesses and/or the evidence available from third party sources. In doing so, we gave consideration to local conditions and modified the final assumption used to develop a revised set of forecasts.

We stressed that the forecasts set out in that report were a draft view on the businesses' forecasts and that there remained issues or questions on the forecasts that we wished to resolve before providing our final view on the forecasts. Further communications with the businesses occurred prior to the final report to ensure that we fully understood the businesses' forecasts and we had all the information we needed to formulate a final view on the businesses' demand forecasts.

The majority of businesses provided submitted responses to the draft report. These responses and further communications with businesses form the basis for any further amendments we have made to the forecast demands in this final report.

In some instances the businesses were able to provide further information supporting their original water plan forecasts and we have adjusted our final forecasts accordingly.

Some businesses took the opportunity to materially revise their water plan forecasts.

- GMMWater revised its forecasts to reflect better information regarding the Grampians Wimmer Mallee Pipeline.
- North East Water revised its forecast consumption in response to our draft report
- Westernport Water revised its full demand schedule after discovery of an error in its base year.

Our analysis in this final report is based on the latest demand revisions submitted by the businesses.

## 2.1.2 Assessment of the urban water businesses' key assumptions

As noted above, the urban water businesses have referred to four key assumptions underlying their demand forecasts — population growth and demographic changes; climate change and likely water inflows; restriction levels applying to water consumption; and price and non-price water conservation measures.

In most cases, it has been extremely difficult to understand the detailed methodology that the businesses have used to develop their demand forecasts. In a number of cases, the impression provided is that the businesses have simply used their 'best guess' at future demand. While more robust methodologies would be preferable, we have some sympathy with this approach given the current severity of the drought in some districts and the large uncertainties over future rainfall patterns.

The Victorian water sector appears at the centre of a confluence of events and uncertainties that make predicting water demand difficult. Much of the State is suffering severe drought conditions and it remains very uncertain whether these conditions will continue or whether normal rainfall patterns will return. Even if normal rainfall levels return, there are water conservation and demand management programs being implemented that may modify future demand patterns from those seen in the past. One of the largest uncertainties confronting this review has been how customer behaviour responds to the lifting of water restrictions and how fast this response will be.

Despite these uncertainties, we have had to formulate a view on the outlook for water supplies and the likely customer response to the lifting of restrictions and implementation of water conservation measures in order to assess the assumptions that the businesses have made. In formulating this view, we have given consideration to the views and analysis provided by the businesses as well as the views and information of third party sources, such as the CSIRO and Bureau of Meteorology.

However, the uncertainties concerning the future have led us to err on the side of caution where we have been confronted with conflicting analysis and information. We believe that this approach is necessary to ensure that we do not recommend a set of forecasts that are overly optimistic and thus which could affect the future revenues that these businesses earn.

In the sections that follow, we set out our views on the likely trend in population and demographic changes, water inflows and resulting restriction levels and the effectiveness of water conservation measures. These views are used to assess the assumptions that have been used by the business when evaluating their forecasts. A business-by-business assessment is provided in appendices A and B of this report.



## Population growth and demographic changes

Most businesses have forecast an average per annum growth rate of between 1% and 1.5% for customer connections. The exceptions are:

- Western Water which is forecasting much higher growth due to expected strong population growth as a result of the Melbourne 2030 strategy; and
- GMMWater which is forecasting much lower customer connection growth due to declining fertility rates and its ageing population.

To develop their forecasts, most of the businesses have relied on the Victorian Government's *Victoria in Future* report (VIF 2004). As the population groupings contained in the VIF do not often translate directly to the water businesses' supply areas, the businesses have adjusted the forecasts in the VIF using local council and/or historical information to develop a population forecast for their water supply area.

We agree with the businesses' use of the VIF forecasts as the starting point for developing a set of customer number forecasts.

As a result, the issue that we have focussed on in this review is the methodology that the businesses have used to:

- translate the VIF forecasts into population forecasts for their supply area;
- adjust the population forecasts into a customer number forecast;
- forecast water supply connections for non-residential customers; and
- forecast the number of customers connecting to the wastewater and trade waste system.

Few of the businesses explained in their water plan the detailed methodology that they have used to translate the VIF forecasts into population forecasts for their water supply area. While some noted that they have used local council or historical information to adjust the forecasts, there was no detail on how this additional information had been used or what adjustments were actually made.

Where we have had reservations regarding the forecast growth rate in customer connections we have discussed the methodology used to derive the forecasts with the business.

Most of the businesses have forecast that the growth in residential customer connections will be above the expected population growth rate forecast by VIF. The higher growth rate aims to take account of ageing populations in many of the urban communities that these businesses serve. In their view, an ageing population will result in more single occupancy residences and thus a greater number of connections than suggested by population forecasts.

We believe that increasing the growth in connections above the population growth rate is appropriate as the information presented in VIF indicates that single occupancy residences will increase in number over coming years. The VIF report projects two key expectations about Victoria's population:

1. As the population ages and as increasing numbers of people do not have children, Victoria will see strong increases in lone person or couple without children households.

2. One of the key impacts of population growth that will be visible in the future will be the rapid growth of households compared to total population growth. In almost all areas of the state, household growth will outpace population growth due to declining average household size.<sup>1</sup>

In most instances, we have found no issues with the way that the businesses have made this adjustment to their expected forecasts and thus we believe that most of the residential connection forecasts presented by the businesses are reasonable.

However, we note that there was at least one instance in which the ViF forecasts for last few years under-forecast actual connections growth for one business. For this business, we did not believe that the ViF forecasts were an appropriate basis for assessing the customer connection forecasts of the business concerned.

The businesses have used a variety of methods to forecast non-residential connections. Some have applied the same growth rate that they have used to forecast residential connections because both types of customers have grown at similar rates in the past. Similar relationships have been used to forecast wastewater demand and trade waste demand. For example, one business applied the same forecast growth rate to non-residential customers as it did to residential customers as both types of customer connections have historically grown at similar rates.

Generally, where the growth rates in non-residential connections, wastewater connections and trade waste connections have been forecast using the historical relationships between residential, non-residential, wastewater and trade waste growth, we have tended to accept the forecasts generated as reasonable.

In only a few cases are we of the view that the customer connection forecasts provided by the businesses require adjusting. As a result, we have used the customer connection forecasts as a check of any adjustments we have made to the volume forecasts. Any adjustment to the volumes should not result in unrealistic changes in the average consumption levels that the forecasts produce.

### **Water inflows, climate change and restriction levels**

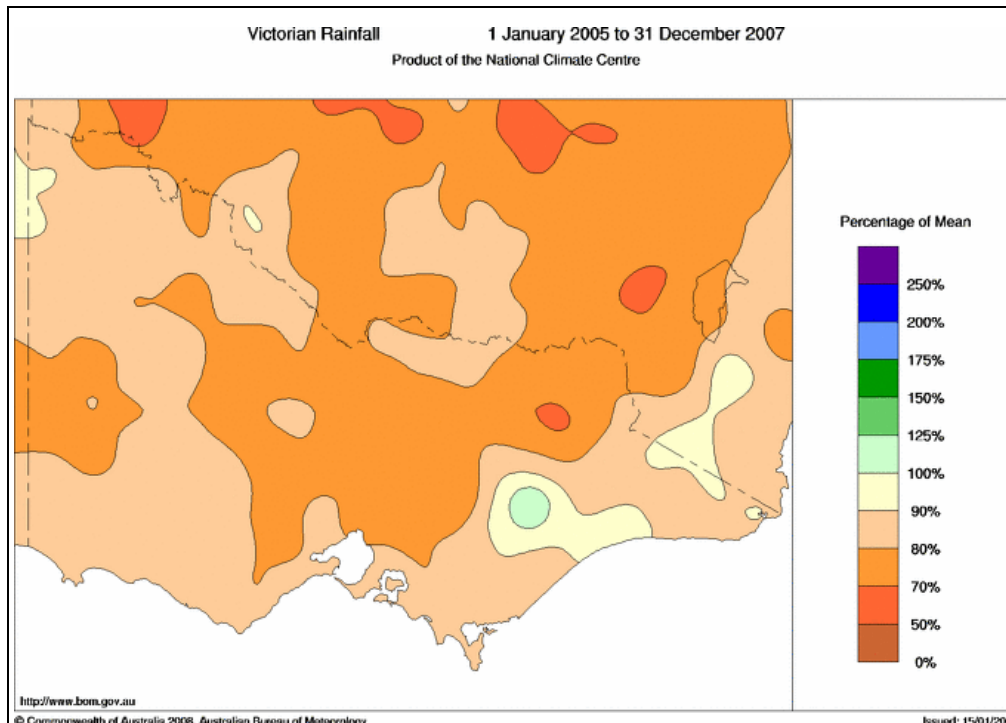
One of the key factors that the businesses have considered when developing their demand forecasts has been their expectations about the availability of water over the next regulatory period. Most areas of Victoria are currently experiencing some level of drought which has reduced the availability of water supplies and thus forced demand reductions upon customers. In some cases, dam levels are critical, severe restrictions apply and the water authority is investigating alternative sources of supply, including trucking water in from other districts.

Figure 1 shows that rainfall levels have been between 70 and 90% of mean rainfall levels over the last three years, indicating the extent of the drought in some areas.

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<sup>1</sup> Victoria in Future 2004 Overview Report, Department of Planning and Community Development, p. 5

**Figure 1: Rainfall in Victoria, January 2005 to December 2007, percentage of the mean**



One of the key factors that will influence the level of water demand over the next regulatory period is whether there will be an easing of drought conditions and a return to more normal rainfall levels resulting in an increase in consumption as water becomes more readily available.

Consistent with our framework, we have sourced information from third party sources where possible to develop a view on a likely scenario for water inflows over the next regulatory period. In particular, we have sought information from these sources on expected weather patterns and likely rainfall levels and the impact of climate change on weather and rainfall levels.

There is a great deal of uncertainty over what rainfall levels will occur in the future and, in particular, how climate change will affect the pattern and quantity of rainfall. Due to this uncertainty, we believe more cautious assumptions on these matters are preferable to minimise the risk that we recommend demand forecasts that are overly optimistic. However, we are also mindful of excessively pessimistic assumptions that may lead to forecasts that are overly conservative.

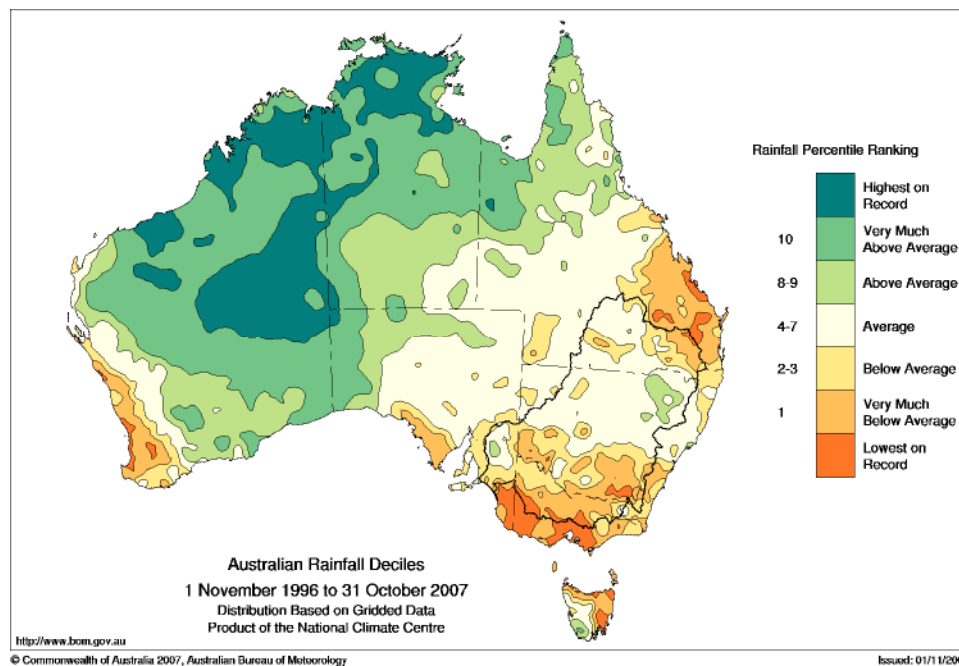
#### *Water inflows and restriction levels*

Some of the businesses have developed their forecasts assuming a low water inflow scenario. A low inflow scenario predicts future inflow levels using an average of the last 10 years of inflows.

The majority of these businesses reside in the western districts of the state where drought conditions appear worst.

Given the extended drought period experienced in Victoria, the average inflows used by these businesses would be below long term averages and thus imply that they expect severe drought conditions to continue. Figure 2 sets out the rainfall percentile ranking for the last 11 years, confirming the extremely dry conditions that have prevailed over much of Victoria during this period.

**Figure 2: Rainfall percentile ranking, Australia, 1995 to 2007**



We have attempted to source information on the most likely rainfall scenario over the next 5 to 10 years from the Bureau of Meteorology and other agencies. However, very little is publicly available on the likely rainfall scenario going forward. Available forecasts only extend out over the next twelve months, whereas we require forecasts for the next 6 to 7 years.

While we understand the severity of the drought conditions occurring in some areas, we have assumed that the next regulatory period will see a return to a 'medium climate change rainfall scenario'. This scenario is one of gradual climate change based on the long run average (the past 50 to 100 years) of inflows.

In our view, this scenario provides a reasonable 'middle ground' between the low inflow and high inflow scenarios available and thus provides the right balance of risks over the period. We note that many of businesses have assumed a medium rainfall scenario over the next regulatory period when developing their forecast demand.

We are of the view that the medium inflow scenario should be modified to account for the broad community acceptance of climate change. The CSIRO is predicting that climate change will lead to annual, winter and spring rainfall decreasing whereas changes to summer and autumn rainfalls are less certain. Overall, the CSIRO believe that the effect on Australian rainfall by 2030 will be as follows:

Best estimates of annual precipitation change represent little change in the far north and decreases of 2% and 5% elsewhere. In summer and autumn decreases are

smaller and there are slight increases in the east. Decreases of around 5% prevail in winter and spring, particularly in the south west where they reach 10%.<sup>2</sup>

Thus, while we have assumed a medium inflow scenario, we expect inflows to be less than the average over the last 50 to 100 years because of the declining rainfalls expected under climate change.

Assuming a medium rainfall scenario (with climate change impact) suggests that water restrictions will ease over the period and consumption will return to levels similar to pre-drought levels. How quickly customers return to consumption patterns and levels that were prevalent prior to restrictions coming into effect will influence the rate of growth in water demand over the period.

We have not been able to source information or research that examines how rapidly customers return to earlier consumption levels and patterns as water restrictions are lifted. However, several water businesses have anticipated that consumption will return to between 70% and 90% of pre-restriction levels over a two year period.

To assess the bounce back in consumption following the easing of restrictions, we have assessed each business's assumption on a case-by-case basis using a return to between 70% and 90% of pre-restriction levels over a two year period as a benchmark. In this assessment, we have given consideration to the reasons the businesses have given for the pattern they have assumed where such information has been provided.

Some of the businesses believe that many of the water conservation measures introduced in recent years, such as water efficient appliances, as well as greater public appreciation of water and the impact of restrictions on their consumption behaviour will lead to permanent declines in water consumption. Thus, even with increased water inflows and the removal of restrictions, these businesses believe that baseline water consumption will be lower than the baseline level that has occurred in the past.

Despite some businesses assuming a low inflow scenario, we have found that few of the volume forecasts that they have submitted require adjusting to reflect a medium inflow scenario. Most of these businesses will be the beneficiaries of alternative water supplies — in particular the Goldfields Pipeline — that will come on line during the period. Thus, even though these businesses have forecast low inflows, their water demand forecasts anticipate the complete removal of restrictions and strong growth in consumption levels as the supplies from these alternative sources become available.

### **Water conservation measures**

The final factor that we have considered in reviewing the businesses' demand forecasts is the effectiveness of the water conservation measures that they intend implementing over the period. Under their Water Strategies, each business has committed to reducing mid 1990s average consumption levels by 25% by 2015.

Water conservation measures are the primary tool that the businesses' intend to use to achieve this target and thus we have examined how their assumptions regarding the effectiveness of these measures have been factored into the forecasts.

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<sup>2</sup> CSIRO 2007 Climate Change in Australia — Technical Report, p. 67

Water conservation measures can be price-based or non-price based. In our view, price is a water conservation measure that can be used by a business to encourage more efficient use of water. The measure of price elasticity can thus be considered a measure of how effective price is as a water conservation measure.

*Price-based measures (price elasticity)*

Only five of the water businesses have taken into account the impact of changing prices on residential demand through assumptions about the price elasticity of demand (see table 1). Where it has been applied, it has often been unclear from the plans what elasticity figures has been used and/or how the measure used has been translated in the businesses' demand forecasts.

Most of the businesses have not incorporated elasticity impacts into their forecasts for non-residential demand. The water plans did not provide any obvious reasoning for why this was the case.

To assist the analysis, where a business has not incorporated price elasticity impacts, we have assumed that they believe price elasticity is zero and thus we have assessed their assumption to apply a zero price elasticity measure.

**Table 1: Price elasticities applied by selected businesses in their water plans**

<b>Business</b>	<b>Thresholds</b>	<b>Elasticity measure</b>
Barwon Water	n.a.	-0.6
Lower Murray Water	0-300kL	-0.05
	300-600kL	-0.2
	>600kL	-0.3
North East Water	Indoor consumption	10% price increase will result in a 0.5% reduction in demand
	Outdoor consumption	10% price increase will result in a 1.5% reduction in demand
Western Water	0-53kL	0
	53-106kL	-0.1
	>106kL	-0.1

Consistent with our framework, our starting point for assessing the price elasticities used by the businesses has been third party views. For this purpose, we have sourced price elasticity information from the Water Supply Association of Australia (WSAA) which has published the following price elasticity figures:

- Indoor consumption — for every 10% increase in price there will be a 0.5% reduction in demand; and

- Outdoor consumption — for every 10% increase in price there will be a 1.5% reduction in demand.

In analysing the businesses' demand forecasts, we have assessed the extent to which price impacts can explain any slowing in future water demand growth rates. For example, one business is proposing to introduce large price increases in the next regulatory period and, at the same time, is forecasting a slowing in demand growth compared with recent history. Applying the WSAA elasticity estimates to the anticipated price increases accounts for almost all of the slower growth and thus we have accepted their volume forecasts.

Some businesses have not assumed any price impact on demand in the future because, under the current level of restrictions, they do not believe that price will have a noticeable impact upon customer usage. Customers in these water supply areas are already subject to stage 3 or 4 restrictions while effectively ban all outdoor usage.

We also are of the view that in those areas where stage 3 or 4 restrictions currently apply, customers have already reduced their discretionary consumption to such a point that price will have little impact on usage.

This is borne out by the WSAA elasticity measures that suggest that price elasticity for indoor residential use under normal supply conditions is quite low. Under stage 3 and 4 restrictions, customers have severely curtailed or eliminated altogether their outdoor use of water. As a result, it is unlikely that residential water usage will respond noticeably to price increases.

While considering a low or zero price elasticity may be appropriate under current supply conditions and restriction, the task that we have had to consider is how restriction levels may change in the future. This in turn is dependent on the likely rainfall scenario assumed going forward and/or the coming on line of alternative water supply sources.

We believe that higher rainfall levels in the future will see an easing of restrictions and thus consumers will begin to increase their discretionary use. As a result, we expect them to respond more noticeably to price elasticity impacts, although the absolute price elasticity impacts will remain quite low.

For the draft report and this final report, we have applied a 0.07 price elasticity to the demand forecasts where we have believed this necessary. 0.07 has been derived by taking the weighted average of WSAA's price elasticity estimates with the weights based on 80% indoor use and 20% outdoor use.

The elasticity adjustments made to the businesses' forecasts were based on the prices that the businesses had set out in their water plan templates. If the ESCV adjusts the businesses' prices as a result of its price review, then this may affect the price elasticity adjustment made to the businesses' forecasts.

### **Non-price water conservation measures**

Most of the businesses propose implementing non-price water conservation measures over the next regulatory period. The measures include water efficient appliance programs, indoor retrofitting and business efficiency programs.

Most businesses also indicate that they intend to maintain permanent water saving rules. These rules limit the extent of water use for outdoor activities such as odd/even day watering programs and prohibitions on pavement watering.

In most cases, non-price water conservation programs have been introduced to achieve the business's water conservation targets set out in their Water Strategy. In these Strategies, the businesses have committed to achieving 25% reductions in water use by 2015 from mid-1990 levels.

The level of information provided by the businesses in support of the water savings that will be achieved by the proposed water conservation programs and water savings rules varies.

Some businesses have used the results achieved in metropolitan areas such as Melbourne and Sydney to quantify the anticipated benefits of these programs. In most instances, where anticipated water savings have been supported by such information, we have tended to accept the savings proposed.

Other businesses have not provided similar independent support for the savings that they anticipate they will achieve over the period. In some cases, the business has stated that certain programs will be implemented with little justification of the water volume savings they have assumed when developing their forecasts.

In the draft report we queried the assumptions used by a number of businesses and adjusted the forecasts upward to discount the effect of water conservation programs in their forecasts. Most of the affected businesses were able to provide further information in response to the draft report. This information was in most cases sufficient to provide us with confidence in the assumed benefits of the conservation programs.

### 2.1.3 Conclusions

We have amended several of the water businesses demand forecasts. In most cases, it is the water volume forecasts that have been altered because we believe that they are based on overly conservative assumptions, particularly in regard to the rainfall outlook. In these cases, we have adjusted the forecasts upward to reflect our assumption of a medium rainfall scenario going forward. Price elasticity impacts have also been applied in some cases.

We have also made adjustments to some of the customer number forecasts because they have also appeared overly conservative. These adjustments have had flow effects to the water volume demand forecasts and thus these have also been altered to maintain a realistic average consumption level.

## 2.2 Rural water businesses

There are five water businesses that provide rural water services — Lower Murray Water; Grampians Wimmera Malley Water; FMIT; Southern Rural Water; and Goulburn Murray Water. Their primary role is to supply irrigation water in line with the water entitlements that govern the allocation of this water. They also supply stock and domestic allocations and some provide drainage services to their irrigation customers.

### 2.2.1 Approach to assessing the forecasts

The approach we have taken to assessing the rural water businesses' forecasts has been to compare the forecasts against the available history.

Under normal rainfall scenarios, we would expect to see a fairly consistent trend of increased usage and increasing number of customers. However, we have been conscious of the extent of the drought and the extremely low dam levels prevalent in a number of the irrigation



districts. We are also aware that many river and groundwater systems have been capped preventing the water business from issuing any further licences to use these resources.

Hence, while the available history has provided a starting point for our analysis, we have given close consideration to the factors influencing supply in the businesses' supply area and what this will mean for demand over the next regulatory period.

Some of the conclusions on the assumptions that we have made in regard to the urban water businesses are also relevant to the rural water businesses. This is particularly the case regarding our view on the rainfall outlook.

Consistent with the conclusion we have come to for a medium climate change scenario going forward, we have expected the same conditions to apply to the rural water businesses and thus we expect that water demand will increase in rural areas over the regulatory period.

### 2.2.2 Assessment of the rural water businesses' key assumptions

The key factors that the rural businesses' have given consideration to when developing their demand forecasts include number of irrigation licences; water supply conditions and the availability of alternative water sources; water trading outcomes, and improved irrigation practices.

It should be noted that the businesses have not all assumed the same set of assumptions when developing their forecasts. As a result, we have not set out our analysis of their assumptions in this section and instead address each business individually in section 4 of this report.

As with the urban water businesses, it has often been difficult to gain a detailed understanding of the methodology the rural water businesses have used to forecast demand in their supply areas.

### 2.2.3 Conclusions

For the final report, we made adjustments to the demand forecasts provided by one rural water business to reflect a medium inflow scenario and adjust for incorrect use of historical data.

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## A URBAN WATER BUSINESSES

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## Western Water (WW)

Western Water's (WW) demand forecasts for the period 2007-08 to 2012-13 are as follows:

- Residential and non-residential water demand is predicted to increase at an average annual rate of 6.0%. This growth results from forecast increases in customer numbers (an average annual rate of 3.3% for residential and 3.4% for non-residential connections) and the easing of restrictions over the regulatory period. Offsetting these drivers of growth to some extent is the predicted effect of WW's demand management strategy. Overall, the net effect is that per connection residential and non-residential water demand is forecast to increase at an annual average rate of 2.5%.<sup>3</sup>
- In forecasting customer growth, WW uses *Victorian in Future 2004* (VIF) population growth rates, adjusted by the DSE's *Urban Development Program 2006 Annual Report* (UDP). WW's forecast customer growth rates are significantly higher than many of the other businesses. This is due to expected continued strong population growth, reflecting the State Government's metropolitan growth strategy *Melbourne 2030*. Given the Victorian Government's focus on commercial and industrial development in the region, and WW's low non-residential base, WW has assumed that non-residential customers will also increase in line with predicted population growth figures.
- According to WW, its WSDS uses a 'medium' climate change scenario to model forecast rainfall and inflows. In any case, it has coordinated restriction forecasts with Melbourne Water and the three metropolitan retailers, as its supply will be largely sourced from its Yarra Bulk Entitlement, meaning that restrictions imposed in metropolitan Melbourne will be mirrored for most of its customers.<sup>4</sup>
- WW then uses the 'industry average' to estimate changes in demand as a result of changes in the level of water restrictions. It also factors in an additional 'local effect' reduction in water demand. According to WW, the inclusion of this 'local effect' reflects its customers' strong awareness of the severity of the drought. It expects that as demand management measures are implemented this factor will reduce and business as usual water conservation will take over as the norm (shown by the declining 'local effect' in Table A.12). This 'local effect' constitutes a 5% demand reduction in 2008-09, declining to 0% in 2012-13. Note that Table A.5 below lists a 0% reduction under PWSR (Permanent Water Saving Rules). However the effects of PWSR are factored into WW's estimates of demand reductions under its demand management program (which are added to the forecast effects of restrictions).
- In addition to the demand reductions associated with restrictions, WW assumes that its water conservation/demand management program will reduce water demand by between 10% and 18% over the period (relative to historic unrestricted demand levels). Demand

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<sup>3</sup> The figures and analysis in this chapter are based on the 'Adj Revenue Summary spreadsheet.xls', provided by Western Water in correspondence dated 19 December 2007.

<sup>4</sup> WW reports (p. 37-38 of its Water Plan) that 90% of its customers are interlinked with the Melbourne system, and towns supplied by any component of water from the Yarra Bulk Entitlement are subject to at least the same level of restrictions that exist in metropolitan Melbourne.

reductions assumed for specific programs, as well as the forecast cost of these programs (to both WW and customers), are listed on page 116 of the Water Plan.

- In terms of the effect of tariff structure and increases in price on demand, WW has applied a price elasticity figure of -0.1 for the second (53 to 106 kL) and third (> 106 kL) tariff blocks, with no change in consumption assumed for the initial block (i.e. for consumption less than 53 kL in any billing cycle).

**Table A.12: Western Water – assumptions regarding water restrictions and their effect on demand**

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Restriction level	2	PWSR	3	3A	3	2	2	1	PWSR
Expected 'industry average' % reduction in water demand*	5.5	0	9.5	10	9.5	5.5	5.5	0	0
Additional 'local effect' % reduction*	18	12.5	13.5	7	5	3	1	1	0
<b>Total reduction - %*</b>	<b>23.5</b>	<b>12.5</b>	<b>23</b>	<b>17</b>	<b>14.5</b>	<b>8.5</b>	<b>6.5</b>	<b>1</b>	<b>0</b>

\*% reduction is relative to a scenario without water restrictions, but with demand management / water conservation measures in place.

#### *Water forecasts*

Our view is that WW's residential and non-residential water demand forecasts appear reasonable. They factor in strong customer growth rates, as well as the impact of WW's demand management program and restrictions. Overall, they allow for a 2.5% per annum growth in per connection demand over the period. However, as discussed below, we have made some relatively minor amendments to these forecasts.

WW's forecast annual customer growth rate of 3.3% for residential customers is based on data from VIF and the UDP report. We believe that this is a reasonable approach, as is WW's assumption that non-residential customers increase in line with predicted residential growth figures.

Given that restrictions can take away all, or at least a significant component of discretionary water demand, we do not believe that price effects should be added to the effects of restrictions. Consequently, we have added WW's assumed effects of its Rising Block Tariff back onto forecast residential tier 2 and 3 consumption volumes. We have maintained price effects in 2012/13, where the only restrictions are PWRS.

WW's assumptions regarding the impact of restrictions (both 'industry average' and additional 'local effect') also appear reasonable. Previous work by SKM and WW's historical restriction/consumption levels (2005-06 to 2006-07) suggests that WW is not underestimating water demand associated with various levels of restrictions. For instance, SKM has previously reported that restrictions were found to have the following impacts on consumption in WW's area of operations:

	Stage 1	Stage 2	Stage 3	Stage 4
Impact on consumption (% reduction)	6%	12%	17%	22%

Source: Western Water Demand Forecasting Report, MWH 2004 (as referenced in Assessment of Demand Forecasts for Victorian Water Businesses, SK M report to the ESC, December 2004, p 106).

In doing so, it notes that these impacts are high compared to the metropolitan retailers, and there are valid reasons for this including:

- average block size is larger in WW’s area of operations – hence, it is likely that outdoor use will be higher than for metropolitan Melbourne
- WW pays careful attention to breaches of restrictions through policing initiatives
- residential customers are most heavily impacted by restrictions, and WW has a high proportion of residential customers.<sup>5</sup>

In our Draft Report, we noted that WW had added the effect of PWSR (as an element of its demand management program) to the assumed effect of water restrictions in each year (except in 2012-13, where the effect of restrictions is assumed to be zero). We were concerned that this may have meant that there was some double counting of the effect of water restrictions, resulting in an underestimation of water demand.

However, WW have since advised that their assumed percentage reduction in baseline demand as a result of each restriction level is over and above the effect of PWSR (that is, without the effects of PWSR, the effects of restrictions would be greater). WW assumes that PWSR reduce unrestricted baseline demand by about 4%. Adding 4% to the total reduction in restrictions listed in Table A.8 (for 2007/08 onwards) produces a very similar total percentage reduction for each level of restrictions to those previously reported by SKM (see above). We have therefore accepted WW explanation.

In developing its forecasts, WW subtracts water savings associated with reduced unaccounted for water (‘UFW’) from baseline demand.<sup>6</sup> A reduction in UFW will reduce total demand of the reticulation system in providing a given supply to end users. However, it will not reduce consumption by end users (residential and non-residential customers). We have therefore added these savings back onto forecast demand volumes.<sup>7</sup>

### *Recycled water*

WW sells recycled water on both a volumetric and non-volumetric basis. The latter is sold under long-term contracts to places such as farms, golf courses and sporting grounds for irrigation. This explains the difference between the Water Plan’s forecast recycled water volumes (p. 128) and volumetric forecasts in WW’s Template/spreadsheet.

Volumetric sales are largely driven by new development (via the provision of dual reticulation schemes). WW generally predicts very strong growth in recycled water sales – for instance,

<sup>5</sup> SKM, 2004, *Assessment of Demand Forecasts for Victorian Water Businesses*, Final Report to the Essential Services Commission, p 106.

<sup>6</sup> See page 116 of WW’s Water Plan.

<sup>7</sup> We have added these savings back to non-residential demand and the three tiers of residential demand in proportion to each categories share of total demand volume.

sales of 'Class A' recycled water are expected to increase by an average annual rate of 33.2% over 2007/08 to 2012/13. This is the result of an even larger increase in 'Class A' recycled water customers (growing by an average annual rate of 99.3% over the same period, or from 120 to 3,777). In turn, this growth in customers will be mainly due to a new 2,900 lot Eynesbury Township development that will incorporate recycled water supplies for residential toilet flushing, garden water, fire fighting and recreation area irrigation.

In developing its volumetric recycled water forecasts, WW obtained predicted Eynesbury lot development rates from the developer. Similarly, its forecast supplies to Melton were based on growth estimates provided by Melton Shire Council.<sup>8</sup>

Savings to potable water as a result of WW's dual pipe system are factored into its potable water forecasts.<sup>9</sup>

According to WW, its other forecast recycled water sales are based on current contractual commitments.<sup>10</sup>

#### *Trade Waste*

WW's forecasts total trade waste volumes to decline by an average annual rate of -2.6% over 2007/08 to 2012/13. This is driven by a large reduction in 'risk rank 4' volumes from 2007/08 to 2008/09, which decline by 31,000 kL over this first year (from 156,000kL) and then remain steady at 125,000 kL throughout the remainder of the regulatory period. Risk rank 2 and 3 volumes actually increase strongly over 2007/08 to 2012/13 – increasing by average annual rates of 17.6% and 27.5%, respectively. Over 2008/09 to 2012/13, total trade waste volumes increase by an average annual rate of 1.7%.

WW attributes the decline in risk rank 4 volumes from 2007/08 to 2008/09 to the move to risk ranked charging (providing a price disincentive to discharge higher risk ranked volumes of trade waste) and it working with facilities to change their processes and lower discharge volumes.<sup>11</sup>

#### *Revised forecasts*

WW's forecasts<sup>12</sup> and our amendments to these forecasts are set out in the table below.

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<sup>8</sup> WW response to PwC, 5 March 2008.

<sup>9</sup> See page 116 of WW's Water Plan.

<sup>10</sup> Ibid.

<sup>11</sup> WW response to PwC, 4 March 2008.

<sup>12</sup> Note: WW's forecasts are not those in the original Template provided to the ESC, but a subsequent spreadsheet ('Adj Revenue Summary spreadsheet.xls') provided by WW in correspondence dated 19 December 2007.

	Category	Tariff Description	Unit	2008-09	2009-10	2010-11	2011-12	2012-13
Water	Fixed Service Charge	Residential	Cust	50,959	52,630	54,318	56,180	58,204
	Variable - 1st tier	Residential	kL	5,614,000	6,115,000	6,379,000	6,922,000	7,162,000
		Revised		5,621,045	6,125,784	6,393,761	6,941,027	7,185,482
	Variable - 2nd tier	Residential	kL	2,484,000	2,705,000	2,822,000	3,062,000	3,169,000
		Revised		2,496,745	2,719,632	2,838,640	3,080,833	3,179,390
	Variable - 3rd tier	Residential	kL	1,709,000	1,861,000	1,942,000	2,107,000	2,180,000
		Revised		1,757,467	1,911,730	1,995,134	2,162,905	2,187,148
	Fixed Service Charge	Non-residential	Cust	3,798	3,921	4,046	4,194	4,343
	Variable - usage	Non-residential	kL	1,907,000	2,078,000	2,167,000	2,352,000	2,434,000
		Revised		1,909,393	2,081,664	2,172,015	2,358,465	2,441,980
Sewerage	Fixed Service Charge	Residential	Cust	43,886	45,324	46,779	48,383	50,126
	Fixed Service Charge	Non-residential	Cust	2,685	2,772	2,860	2,965	3,070
Recycled water	Fixed Service Charge	Class A - Golf Course	Cust	1	1	1	1	1
	Fixed Service Charge	Class A	Cust	295	1,218	2,131	2,954	3,777
	Variable - usage	Class A	kL	254,000	438,000	620,000	788,000	957,000
	Fixed Service Charge	Gisborne	kL	7	9	11	13	15
	Variable - peak	Gisborne	kL	39	44	49	54	59
	Variable - off peak	Gisborne	kL	64	69	74	79	84
	Fixed Service Charge	Sunbury-Melton	Cust	45	50	55	60	65
	Variable - peak	Sunbury-Melton	kL	707	843	979	1,115	1,251
	Variable - off peak	Sunbury-Melton	kL	548	683	818	953	1,088
Trade waste	Availability		Cust					
	Risk Rank 1	Management Fee	Cust	335	350	361	372	385
	Risk Rank 2	Management Fee	Cust	79	83	86	88	91
	Risk Rank 3	Management Fee	Cust	7	9	9	9	10
	Risk Rank 4	Management Fee	Cust	5	5	5	5	5
	Risk Rank 2	Vol Fee	kL	3,860	4,660	5,460	6,260	7,060
	Risk Rank 3	Vol Fee	kL	4,450	5,950	7,450	8,950	10,450
	Risk Rank 4	Vol Fee	kL	125,000	125,000	125,000	125,000	125,000
	Category C - Risk Rank 2	Quality Fee		1	1	1	1	1
	Category B - Risk Rank 3	Quality Fee		1	1	1	1	1
	Category C - Risk Rank 4	Quality Fee		1	1	1	1	1
	Risk Rank 1	Application Fee		15	11	11	13	13
	Risk Rank 2	Application Fee		4	3	2	3	3
	Risk Rank 3	Application Fee		2	-	-	1	-
	Risk Rank 4	Application Fee					1	-
Recycled water	Fixed Service Charge	Romsey		2	3	4	5	6
	Variable - peak	Romsey		49	61	73	85	97
	Variable - off peak	Romsey		29	41	53	65	77
	Fixed Service Charge	Woodend		4	5	5	5	5
	Variable - peak	Woodend		118	143	159	162	165
	Variable - off peak	Woodend		129	154	170	172	174
	Fixed Service Charge	Riddells Creek		1	2	3	4	5
	Variable - peak	Riddells Creek		3	6	9	12	15
	Variable - off peak	Riddells Creek		2	4	6	8	10