

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.¹

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.

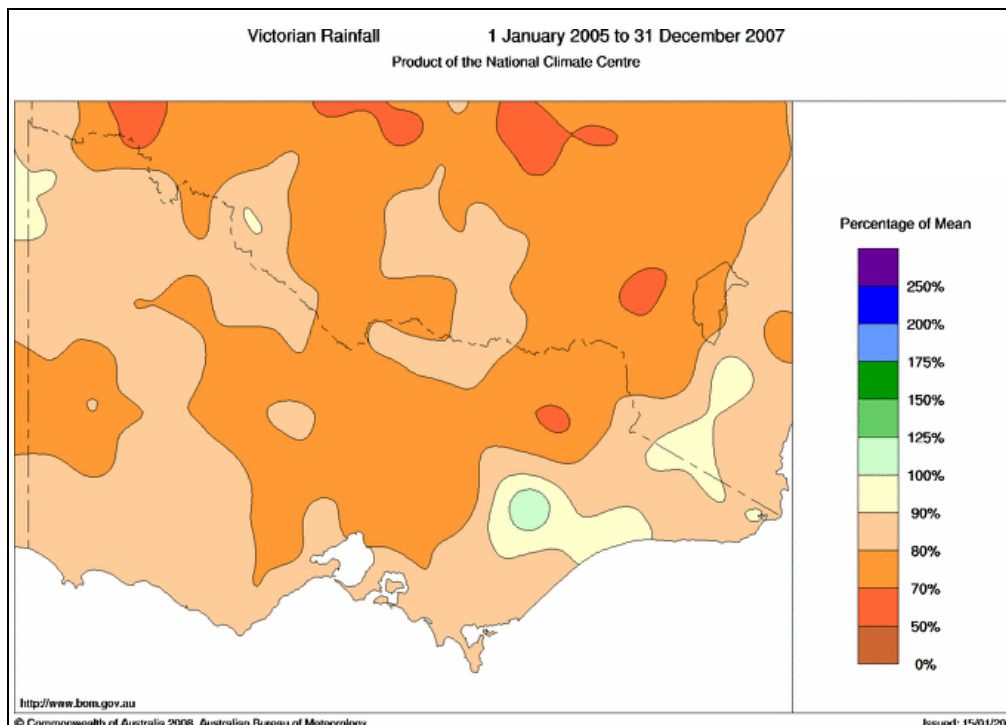
Water inflows, climate change and restriction levels

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.

¹ 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.

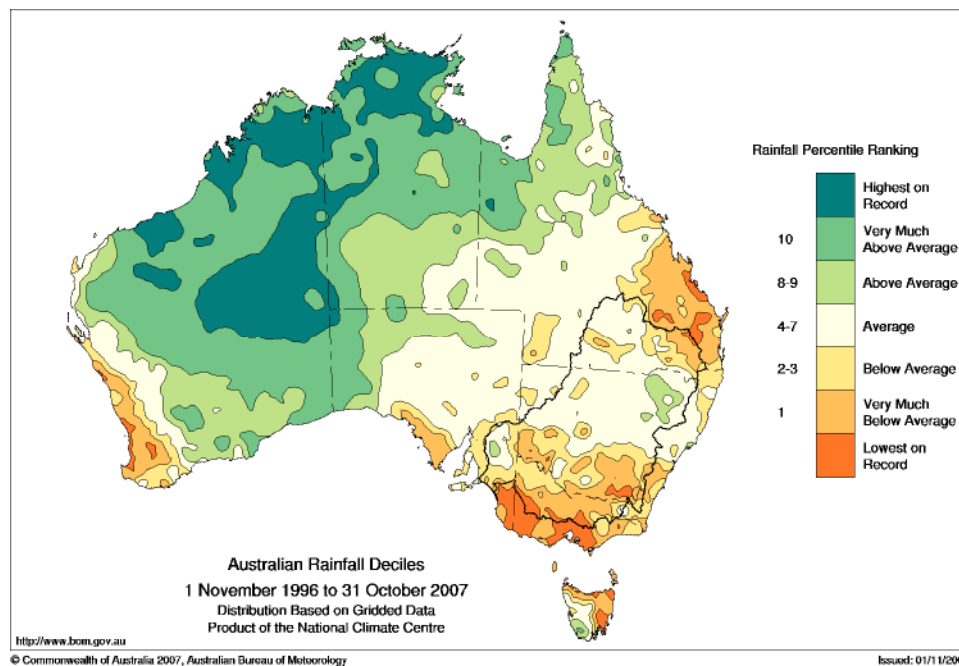
Water inflows and restriction levels

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%.²

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.

² 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

| Business | Thresholds | Elasticity measure |
|--------------------|---------------------|--|
| 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.

A URBAN WATER BUSINESSES

Lower Murray Water (LMW) (Urban)

From its Water Plan and accompanying Template, LMW's forecasts for its urban business for the 2007-08 to 2012-13 period are as follows:³

- Residential and non-residential water demand is predicted to increase by an average of 17.2% and 0.8% per annum, respectively. Growth in residential demand is driven by predicted increases in customer connections and the assumption that restrictions will ease from level 4 in 2007/08 to level 1 from 2009/09 onward, with these effects moderated to some extent by predicted effects of LMW's water demand management strategy, price increases and the lasting effect on consumption of higher level restrictions (e.g. through household investment in water saving technology). Over the period, per connection demand is expected to increase by an average of 15.6% per annum. Growth in non-residential demand is driven purely by increases in connections, as average per connection consumption is forecast to remain unchanged at 592 kL per annum.
- The high level of growth over the period for residential demand, however, reflects very low levels of forecast consumption in 2007-08. Residential water demand declined by 16% over 2005-06 to 2006-07, and is forecast to decline by 52% over 2006-07 to 2007-08 (residential water consumption levels are predicted to be approximately 40% of those of 2005-06). In contrast to the 17.2% annual growth rate mentioned above for 2007-08 to 2012-13, residential water demand is forecast to increase at an average annual rate of only 0.8% from 2006-07 to 2012-13 (or -0.6% per annum on a per connection basis).
- Residential water customers are forecast to grow at a greater rate (an average of 1.3% per annum) than non-residential water customers (0.8%). However, wastewater (sewerage) residential and non-residential customers are forecast to grow at approximately the same rate (1.5% and 1.4% per annum, respectively). According to LMW, its forecasts of customer growth are sourced from VIF, with forecast connections assumed to be the same as forecast households for the region. Its Water Plan (p 38) also states that the number of non-residential customers is assumed to mirror growth of residential customers. LMW assumes no growth in the number of its trade waste customers.
- LMW notes that weather conditions have a significant impact on water demand. Based on regression analysis, LMW found that each degree increase in average maximum temperatures results in an increase of 8.1kL per quarter demand per connection; while each additional mm in monthly rainfall results in a decrease of 1.6kL per quarter per connection. In forecasting a baseline level of demand per connection, LMW used a weighted average of weather conditions over the last 60 years – but which gives more weight to average weather conditions over the last 6 years (70:30). This results in a per connection demand of 539.5 kL per annum, which then has to be adjusted to take account of the effect of restrictions, LMW's demand management strategy and price rises/tariff structure changes.

³ These figures are sourced from LMW's ESC Price Review Template. As discussed in this chapter, there appear to be some discrepancies between these figures and those listed in its Water Plan.

- LMW estimates that levels 1, 2, 3 and 4 of restrictions will reduce residential demand by 10%, 50%, 55% and 60%, respectively. LMW notes that the assumed high impact on demand of levels 2 through to 4 reflects the high proportion of residential water use that would otherwise be used on lawns and gardens (in turn, reflecting the hot and dry conditions of the region).
- At the time of submitting its Water Plan, LMW's water demand forecasts were based on the predicted restriction regime listed in row 1 in Table A.4. However, LMW has since advised that it expects to be 'Stage 4 restrictions with exemptions' throughout 2007-08 (which would fall between Stages 4 and 3 in terms of impact on demand). It then expects to start 2008-09 on Stage 4 restrictions, with the possibility of moving to Stage 3 by September/October.⁴ This revised forecast restriction regime is listed in row 2 in Table A.6 below.

Table A.6: Forecast water restriction levels – Lower Murray Water

| Service | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 |
|---|---------|---------|---------|---------|---------|---------|---------|
| 1. Restriction levels for Water Plan demand forecasts | 1/2/3 | 4/3/2* | 1* | 1 | 1 | 1 | 1 |
| 2. Revised restriction levels | 1/2/3 | 4 | 4/3/2* | 1 | 1 | 1 | 1 |

*We assume each of these levels of restrictions will be in place for approximately 1/3 of the year each.

- LMW also assumes that some water savings achieved under the restrictions regime are maintained permanently after restrictions are scaled back Level 1. This results from expected permanent changes in consumption behaviour as households make investments in water saving technologies (for example, rain water tanks) or practices or simply change their attitudes to water use. LMW allows for water savings of 15%.
- To determine the impact of price rises and a change in its tariff structure on residential demand, LMW assumes price elasticities of -0.05 for first tier consumption (0-300 kL), -0.2 for second tier consumption (300-600kL) and -0.3 for third tier consumption (>600kL). It has not assumed any reduction in demand due to price elasticity for non-residential customers.

Customer numbers

LMW's forecast residential connection growth rates are broadly consistent with VIF household projections for the region (VIF forecasts households in the Mildura, Swan Hill and Gannwarra LGAs to grow by an annual average rate of 1.3% over 2007/08 to 2012/13).

In our Draft Report, we noted that we were unclear why residential and non-residential connections grow at different rates, given LMW's statement in its Water Plan (p. 38) that:

The growth rates in the number of non-residential customers are assumed to mirror the growth of residential customers.

LMW has since advised that this statement was made in relation to the 2005 Water Plan, and that it expects growth rates for non-residential connections to grow at a lower rate than

⁴ LMW response to ESC/PwC, 21 December 2007.

residential connections as this has been the trend in recent years. Connections numbers from LMW's Water Plan (p.44) show that from 2003/04 to 2006/07 residential water connections grew at an average rate of 2.1% per annum, while non-residential water connections increased at an average rate of 1.1% per annum (or 0.9% per annum from 2004/05 to 2006/07). We accept these differences between forecast residential and non-residential water connection growth rates.

Water demand

LMW has predicted strong growth in residential water sales over 2007-08 to 2012-13. However, this is from a very low base year in 2007-08, and the resulting level of average per connection consumption in 2012-13 still finishes well below historic levels (per connection residential demand in 2005-06 was 548kL, compared to LMW's forecast in 2012-13 of 435kL).

As mentioned above, LMW has advised that its outlook for restriction levels over 2007/08 and 2008/09 has changed. It has not provided revised demand forecasts, but has stated that amendments to the restrictions regime "*has an impact on the level of demand for 2007/08 onwards, and there will be a need to amend the demand forecasts accordingly if there are amendments.*"⁵ Consequently, we have amended residential demand forecasts using the above-mentioned assumed demand reductions that LMW equates to each level of restrictions.

LMW has assumed large impacts on residential demand as a result of water restrictions. However, given the high per connection consumption figures for the region, and hence the high volumes of discretionary/outdoor use, this is understandable. This also seems to be supported by the significant drop in residential consumption from 2006-07 to 2007-08 (about 52%) associated with moving to higher levels of restrictions (see Table A.4 above).

LMW also assumes that water savings achieved under the restrictions regime will be maintained after restrictions are scaled back to level 1. This is attributed to permanent changes in household consumption behaviour as a result of investments in water saving technologies and/or changes in practices and attitudes to water use. LMW assumes that these lasting effects of high level restrictions will reduce baseline residential demand by 5%, in addition to the 10% reduction in demand attributed to level 1 restrictions.

We believe this 5% assumption is reasonable, given analysis of the lasting effects of drought conducted by other utilities, water conservation and demand management initiatives outlined in LMW's *Water Supply Demand Management Strategy* (WSDS) and the high level of discretionary use amongst LMW customers.

As noted in our Draft Report, we believe that LMW's assumed price elasticities for residential demand are reasonable. A figure of -0.05 for tier 1 consumption reflects the very low level of price elasticity associated with non-discretionary demand; while figures of -0.2 and -0.3 for levels of consumption between 300-600kL and greater than 600kL, respectively, are reasonable for these very high (generally discretionary) levels of water consumption for households. However, we have taken price effects out of the forecasts for 2008/09, in recognition of the high level restrictions (and hence low levels of discretionary use) that are now assumed to be in place for that year.

⁵LMW response to PwC/Draft Report, 26 February 2008.

In most cases, we would also question the addition of price effects to level 1 restrictions. However, given the high level of water consumption per connection by LMW's customers (and hence the likely higher volumes of discretionary use), we have left price effects in under the level 1 restriction regime, which is assumed to be from 2009/10 onwards.

In our Draft Report, we queried why non-residential per connection demand is assumed to remain constant throughout the regulatory period at 2006-07 levels, particularly as it declined by approximately 7% between 2005/06 and 2006/07.

LMW reports that 2006/07 non-residential consumption levels were affected by restrictions. It argues that the non-residential sector will show some permanent water savings as restrictions are eased and that this, combined with the effects of its non-residential water conservation program outlined in its WSDS, means that it is more appropriate to base consumption on this level rather than earlier years that were not affected by restrictions.⁶

While this approach is not necessarily consistent with its 'baseline minus' method of forecasting residential demand, we believe that LMW's forecast non-residential water demand is reasonable. It represents a 7% reduction on 2005/06 per connection, unrestricted demand, which is a reasonable estimate given that there may be some lasting effects of higher level restrictions on non-residential demand, in addition to the fact that LMW's is striving to reduce non-residential demand by approximately 10% by 2015 (based on 2005/06 consumption levels) by working with local councils and industry to develop water conservation plans and strategies.⁷

Wastewater demand

LMW does not levy volumetric charges for sewerage.

For residential connections, LMW's Water Plan (p.44) states that, while historically the aggregate number of sewerage connections has been lower than for water, future growth assumes that water and sewerage connections will be the same. Consequently, its forecasts assume that domestic water and sewerage connections both increase by 370 connections per annum over the regulatory period (which, in turn, is driven by VIF household projections). This also explains the slightly different annual average growth rates in number of residential water and sewerage connections over the period (given the different bases from which they are both starting).

As with water, LMW has used recent historical data as its basis for assumed growth (of 1.4% per annum) in non-residential wastewater connections. From 2005/06 to 2006/07, non-residential wastewater connections grew by 1.6%. This is significantly less than the average annual growth rate over 2003/04 to 2006/07 (3.6%), but VIF household projections for the LMW region over 2007/08 to 2012/13 (1.3% per annum) are also less than the average annual growth in residential wastewater connections over 2003/04 to 2006/07 (3.5% per annum).⁸

The significant growth over 2003/04 to 2005/06 has been attributed to several large schemes and developments. LMW's Water Supply Demand Strategy mentions that in developing its forecasts it consulted Mildura City Council, "which did not reveal any significant new water

⁶ LMW response to PwC/Draft Report, 26 February 2008.

⁷ LMW's *Water Supply Demand Management Strategy 2006 to 2055*, p 31.

⁸ LMW's Water Plan, p 44.

using industries or industrial developments in the region in the short term". However LMW also noted that industry can establish or expand relatively quickly giving rise to some uncertainty when forecasting non-residential connections.⁹

Revised forecasts

In general, we believe that LMW's forecasts are reasonable. As listed in the table below, we have only have amended its original forecasts to reflect the changed restriction outlook for 2008/09.

In making this amendment, we have reduced baseline demand by 54.5%, which is the evenly weighted average of LMW's assumed effect of level 4 (60%), 3 (55%) and 2 (50%) restriction levels. As noted above, due to these higher level restrictions in 2008/09, we have not included price effects in this year.

| | | | | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 |
|--------------------|--------------------|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Water | Domestic | Service Charge | kL | 27,200 | 27,570 | 27,940 | 28,310 | 28,680 |
| | | First tier | kL | 4,826,982 | 5,866,323 | 5,932,482 | 5,998,307 | 6,063,800 |
| | | Revised | | 3,726,741 | | | | |
| | | Second tier | kL | 2,777,109 | 3,353,362 | 3,369,130 | 3,384,124 | 3,398,344 |
| | | Revised | | 1,613,316 | | | | |
| | | Third Tier | kL | 2,502,257 | 3,008,202 | 3,008,779 | 3,008,301 | 3,006,770 |
| | | Revised | | 1,344,133 | | | | |
| | Environmental Levy | Cust | 27,200 | 27,570 | 27,940 | 28,310 | 28,680 | |
| | Non Domestic | Service Charge | Cust | 7,021 | 7,076 | 7,132 | 7,187 | 7,243 |
| | | First tier | kL | 649,241 | 654,374 | 659,506 | 664,639 | 669,771 |
| Second tier | | Cust | 3,504,325 | 3,532,029 | 3,559,732 | 3,587,435 | 3,615,138 | |
| Environmental Levy | | kL | 3,787 | 3,817 | 3,847 | 3,876 | 3,906 | |
| Sewerage | Domestic | Service Charge | Cust | 23,706 | 24,076 | 24,446 | 24,816 | 25,186 |
| | | Environmental Levy | Cust | 23,706 | 24,076 | 24,446 | 24,816 | 25,186 |
| Sewerage | Non Domestic | Service Charge | Cust | 4,647 | 4,712 | 4,777 | 4,842 | 4,907 |
| | | Environmental Levy | Cust | 3,087 | 3,131 | 3,175 | 3,219 | 3,263 |
| Trade waste | Non Domestic | Minor trade waste charge | Cust | 2,559 | 2,559 | 2,559 | 2,559 | 2,559 |

⁹ LMW's Water Supply Demand Management Strategy 2006 to 2055, p 21.