PRICEWATERHOUSECOOPERS

Essential Services Commission

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

Final Report

March 2008

Contents

1 Introduction 4

1.1 Objective of this review 4

1.2 Limitations 5

1.3 Structure of this report 5

2 Assessment of the key assumptions 6

2.1 Urban water businesses 6

2.1.1 Approach to assessing the assumptions used 6

2.1.2 Assessment of the urban water businesses' key assumptions 8

2.1.3 Conclusions 16

2.2 Rural water businesses 16

2.2.1 Approach to assessing the forecasts 16

2.2.2 Assessment of the rural water businesses' key assumptions 17

2.2.3 Conclusions 17

B RURAL WATER BUSINESSES 18

Lower Murray Water (LMW) (Rural) 19

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.

- GWMWater 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
- GWMWater 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.

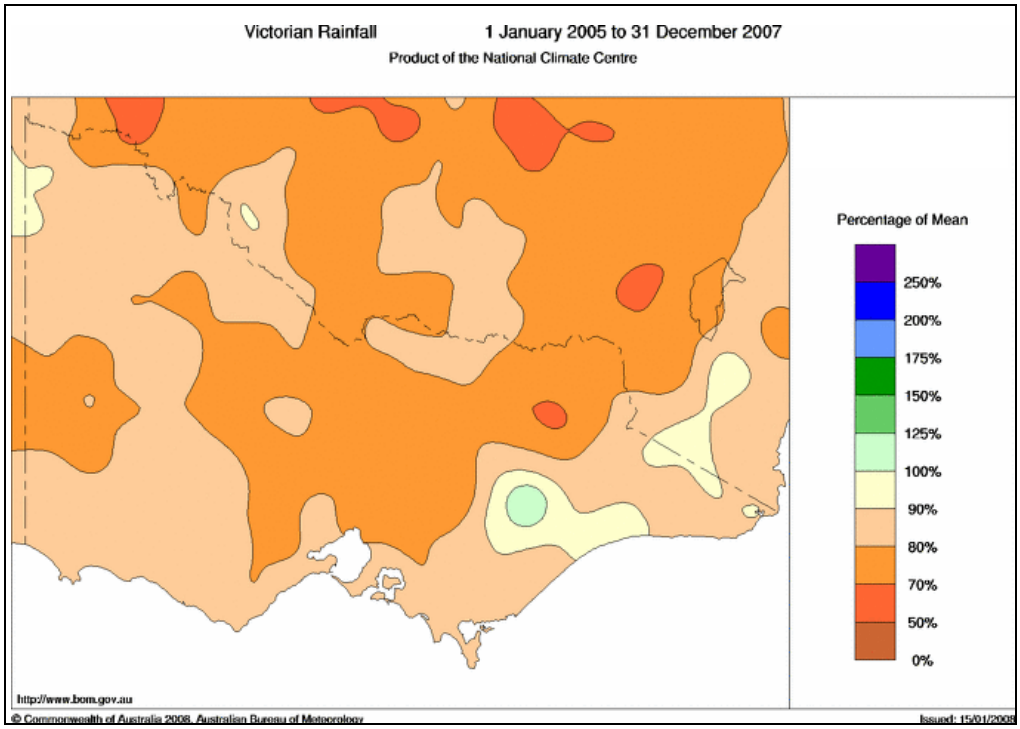
Water inflows, climate change and restriction levels

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.

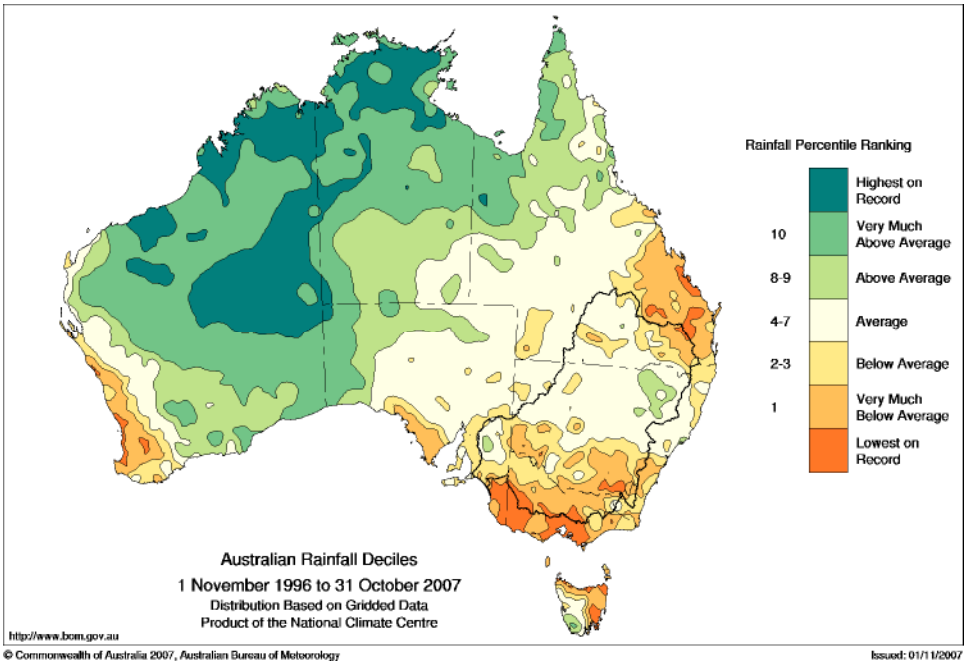
Water inflows and restriction levels

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 to10 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 Wate	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% indoor 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 quantity to 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.

B RURAL WATER BUSINESSES

Lower Murray Water (LMW) (Rural)

LMW's Water Plan made the following key assumptions in forecasting rural demand in its area:

- Forecast volumes of water delivered to the Irrigation Districts are based on average water deliveries to each region over the previous 7 years. Hence, the forecast for 2007-08 is based on the average of the years 2000 to 2006, and volumes delivered for 2007-08 to 2012-13 are assumed to remain unchanged.
- Stock and Domestic volumes for 2007-08 are assumed to be the same as volumes for 2004-05 – the most recent actual data available. LMW's Price Review Template then assumes these remain constant throughout the regulatory period.
- No growth in delivery share is expected over the regulatory period, as the irrigation districts are almost fully developed
- Total metered garden volumes for the three irrigation districts are forecast to increase by 19% from 2006-07 to 2007-08 (48% from 2005-6 to 2007-08), and then remain steady from 2007-08 onwards.
- Drainage delivery shares are assumed to remain constant throughout the regulatory period, as are the additional garden water rights that enter into a drainage charge
- From 2007-08 onwards, the quantity of water taken by diverters is forecast to increase by 20,000 ML per annum (which translates into an average annual growth rate from 2007-08 to 2012-13 of 5.9%). In turn, this is based on the assumption that the volumes of water taken by diverters over the last three years (approximately 20,000ML to 23,000ML) continues.
- LMW assumes that the number of properties/customers remains constant throughout 2007-08 to 2012-13. Notably, this follows an assumed decrease in connections/offtakes for most customer categories from 2005-06 to 2006-07. Hectares are forecast to remain at 2004-05 levels throughout the regulatory period.

However, LMW makes the following comment in its Water Plan:

> *LMW needs to reassess its demand forecasting for volumetric use by rural customers. With the onset of less allocation of water rights than anticipated, the outlook for rural volumetric usage appears much less. Prices have been determined on full allocation. LMW will reforecast its demand in consultation with the ESC … An aerial study is currently being undertaken by Sunrise 21, coupled with meter reads in December 2007, which will enable LMW to gain a better understanding of the number of customers that will be using water and the amount of usage for 2007-08 and ongoing.*[3]

In the absence of these revised forecasts, we have assessed the forecasts that are currently set out in LMW's Water Plan.

Irrigation water

LMW believes that it is appropriate to base its forecasts on flows for the last 7 years because, in LMW's view, this represents a reasonable approximation of what can be

[3] Lower Murray Water 2007 Water Plan, p. 33

expected from future weather patterns and usage. According to LMW, the last 7 years have generally been dry relative to historical inflows. It also points out that over the years growers have become more efficient in their use of water (e.g. moving away from flood irrigation to drippers) and that the last 7 years is more representative of this.[4]

However, forecasting demand using the last 7 years is inconsistent with our view of a medium rainfall scenario going forward.

LMW's Water Plan provides water volume data dating back to 1997-98.[5] We believe that basing forecasts on average volumes from 1997-98 to 2006-07 would achieve a more appropriate balance between accounting for recent efficiency gains in water use, while also being more representative of weather conditions going forward. We have consequently made this change to LMW's forecasts, which alter expected total annual volumes for the three irrigation districts from 85,974 ML per annum to 87,368 ML per annum[6] for the period 2007-08 to 2012-13.

We note that this higher figure of 87,368ML is still relatively conservative compared to historic levels.

Stock and domestic

In our Draft Report we noted that LMW did not explain why stock and domestic volumes are assumed to be the same as historic/current volumes and then remain constant throughout the regulatory period.

LMW has since advised that volumes for the Millewa district have generally been consistent – although varying volumes were recorded in 2005/06 and 2006/07 because 14 months of volumes were recorded for 2005/06.[7]

Instead of assuming that the most recent year's volumes will apply in each year of the next regulatory period, LMW believes that it is more appropriate to use an average over the last five years. We accept this point and have amended forecasts accordingly.

Diversions

LMW assumed that the volume of water taken by diverters increases at a rate of 20,000ML per annum. This is based on volumes over the last 3 years, which have increased at a rate of between 20,000 and 23,000ML per annum. These volumes are the result of water being traded into the area for large scale irrigation development in the Mallee region.

According to LMW, it assesses demand for diversion water by tracking approvals for new irrigation development and by maintaining contact with major developers of irrigated areas. It also noted that the rate of growth is sensitive to a number of factors, including tax treatment of rural development, the exchange rate of the Australian dollar, and viability of the top five businesses in the area.

[4] LMW response to Draft Report, 26 February 2008.

[5] LMW response to ESC/PwC, 21 December 2007.

[6] This figure is based on amended figures for 2006-07, which have been provided by LMW since submitting its template to the ESC.

[7] LMW response to Draft Report, 26 February 2008.

We note that LMW has been conservative in selecting the low end of its 20,000 to 23,000ML range; and that from the figures in its Water Plan (Table 21, p 38), the average annual increase since 2003 has been 21,659 ML per annum. Given this, we have amended forecasts so that the annual increase throughout the regulatory period is 21,500 ML.

Properties/connections and hectares

For several categories of properties, the number of connections declines from 2005-06 to 2006-07 (see Table 22, p 38, in Water Plan), and in some instances from 2003-04 to 2006-07. LMW explained that the number of rural and stock and domestic connections in dryland areas can decline over time as properties become amalgamated. [8] However, it acknowledged that:

> *There appears to be an issue with the data supplied for Merbein, Red Cliffs, and Robinvale metered and unmetered properties. The issue is moving to an unbundled environment, and changing tariff structures. Prior to 2007, the tariff structures were different causing the comparison difficult. Lower Murray will attempt to work back to 2005 using the current tariff structure and re supply to property numbers*."[9]

LMW has since provided revised projected metered and unmetered property numbers, which show that properties are being gradually changed from unmetered to metered. We have included these amended unmetered connection numbers in our revised forecasts.[10]

In response to our Draft Report, LMW has also provided revised estimates for hectares and delivery share. We have also included these revisions in our amended forecasts below.[11]

Revised forecasts

Our view on LMW's forecasts is set out in the following table.

[8] LMW response to ESC/PwC, 21 December 2007.

[9] Ibid.

[10] Ibid.

[11] Ibid.

Service	District	Tariff Description	Unit	2008-09	2009-10	2010-11	2011-12	2012-13
Irrigation	Merbein irrigation	Service Charge	Cust	764	764	764	764	764
Drainage	Merbein drainage	Service Charge	Cust	0	0	0	0	0
Irrigation	Red Cliffs irrigation	Service Charge	Cust	1,221	1,221	1,221	1,221	1,221
Drainage	Red Cliffs drainage	Service Charge	Cust	0	0	0	0	0
Irrigation	Robinvale irrigation	Service Charge	Cust	326	326	326	326	326
Drainage	Robinvale drainage	Service Charge	Cust	0	0	0	0	0
Domestic and stock	Other stock and domestic (Irrigation)	Service Charge	Cust	39	39	39	39	39
	Millewa Rural (Irrigation)	Service Charge	Cust	257	257	257	257	257
	Millewa Urban (Irrigation)	Service Charge	Cust	0	0	0	0	0
Surface water	Diversions (Irrigation)	Service Charge	Cust	1,067	1,067	1,067	1,067	1,067
Irrigation	Other (CMA/Misc/Other residuals)	Service Charge	Cust	0	0	0	0	0
	Other irrigation	Service Charge	Cust	0	0	0	0	0
	Other drainage		Cust	215	215	215	215	215
	Merbein irrigation	Access	ML WR					
	Merbein irrigation	Delivery Share	ML VR	3,888	3,888	3,888	3,888	3,888
	Red Cliffs irrigation	Access	ML WR					
	Red Cliffs irrigation	Delivery Share	ML VR	5,492	5,492	5,492	5,492	5,492
	Robinvale irrigation	Access	ML WR					
	Robinvale irrigation	Delivery Share	ML VR	2,567	2,567	2,567	2,567	2,567
	Other irrigation	Delivery Share	ML VR	0	0	0	0	0
Surface water	Diversions (Irrigation)	Access (Old Water)	ML WR	323,644	343,644	363,644	383,644	403,644
	Diversions (Irrigation)	Access (New Water)	ML WR	6,920	6,920	6,920	6,920	6,920
	Diversions (Irrigation)	Bulk Water Charge (Old Water)	ML WR	323,644	343,644	363,644	383,644	403,644
	Diversions (Irrigation)	Bulk Water Charge (New Water)	ML WR	6,920	6,920	6,920	6,920	6,920
Drainage	Merbein drainage	District Charge	ML Supp	31,229	31,229	31,229	31,229	31,229
	Red Cliffs drainage	District Charge	ML Supp	44,181	44,181	44,181	44,181	44,181
	Robinvale drainage	District Charge	ML Supp	21,114	21,114	21,114	21,114	21,114
	Other drainage	District Charge	ML Supp	82,618	82,618	82,618	82,618	82,618
	Merbein irrigation	Regional Environ Charge	ML WR	31,229	31,229	31,229	31,229	31,229
	Red Cliffs irrigation	Regional Environ Charge	ML WR	44,181	44,181	44,181	44,181	44,181
	Robinvale irrigation	Regional Environ Charge	ML WR	21,114	21,114	21,114	21,114	21,114
	Other irrigation	Regional Environ Charge	ML WR	0	0	0	0	0
Surface water	Diversions (Irrigation)	Regional Environ Charge	ML WR	330,564	350,564	370,564	390,564	410,564
Drainage	Merbein drainage	Div 1 Delivery Share Charge	ML VR	3,120	3,120	3,120	3,120	3,120
		Revised		3,111	3,111	3,111	3,111	3,111
	Merbein drainage	Div 2 Delivery Share Charge	ML VR	0	0	0	0	0
	Merbein drainage	Div 3 Delivery Share Charge	ML VR	0	0	0	0	0
	Merbein drainage	Div 4 Delivery Share Charge	ML VR	84	84	84	84	84
		Revised		79	79	79	79	79
	Red Cliffs drainage	Div 1 Delivery Share Charge	ML VR	4,426	4,426	4,426	4,426	4,426
		Revised		4,396	4,396	4,396	4,396	4,396
	Red Cliffs drainage	Div 2 Delivery Share Charge	ML VR	10	10	10	10	10
	Red Cliffs drainage	Div 3 Delivery Share Charge	ML VR	0	0	0	0	0
	Red Cliffs drainage	Div 4 Delivery Share Charge	ML VR	0	0	0	0	0
		Revised		431	431	431	431	431

Service	District	Tariff Description	Unit	2008-09	2009-10	2010-11	2011-12	2012-13
	Robinvale drainage	Div 1 Delivery Share Charge	ML VR	2,547	2,547	2,547	2,547	2,547
		Revised		2,521	2,521	2,521	2,521	2,521
	Robinvale drainage	Div 2 Delivery Share Charge	ML VR	0	0	0	0	0
	Robinvale drainage	Div 3 Delivery Share Charge	ML VR	0	0	0	0	0
	Robinvale drainage	Div 4 Delivery Share Charge	ML VR	0	0	0	0	0
	Other drainage	Div 1 Delivery Share Charge	ML VR	82,618	82,618	82,618	82,618	82,618
	Other drainage	Div 2 Delivery Share Charge	ML VR	0	0	0	0	0
	Other drainage	Div 3 Delivery Share Charge	ML VR	0	0	0	0	0
	Other drainage	Div 4 Delivery Share Charge	ML VR	0	0	0	0	0
Domestic and stock	Other stock and domestic (Irrigation)	1st Div	ha	4,817	4,817	4,817	4,817	4,817
		Revised		4,797	4,797	4,797	4,797	4,797
	Other stock and domestic (Irrigation)	2nd Div	ha	193	193	193	193	193
		Revised		213	213	213	213	213
	Other stock and domestic (Irrigation)	3rd Div	ha	166	166	166	166	166
	Millewa Rural (Irrigation)	Rural access - house	Cust	105	105	105	105	105
	Millewa Rural (Irrigation)	Rural access - scrubland	ha	8,637	8,637	8,637	8,637	8,637
	Millewa Rural (Irrigation)	Rural access - stocked	ha	221,340	221,340	221,340	221,340	221,340
	Millewa Urban (Irrigation)	Urban access - offtake	Cust	65	65	65	65	65
	Millewa Urban (Irrigation)	Urban access - no offtake	Cust	16	16	16	16	16
Irrigation	Merbein irrigation	Water Share Fees	ML WR	31,616	31,616	31,616	31,616	31,616
	Red Cliffs irrigation	Water Share Fees	ML WR	44,774	44,774	44,774	44,774	44,774
	Robinvale irrigation	Water Share Fees	ML WR	21,274	21,274	21,274	21,274	21,274
	Other irrigation	Water Share Fees	ML WR	0	0	0	0	0
	Merbein irrigation	Usage Charge	ML Supp	27,671	27,671	27,671	27,671	27,671
		Revised		28,204	28,204	28,204	28,204	28,204
	Red Cliffs irrigation	Usage Charge	ML Supp	39,257	39,257	39,257	39,257	39,257
		Revised		39,957	39,957	39,957	39,957	39,957
	Robinvale irrigation	Usage Charge	ML Supp	19,046	19,046	19,046	19,046	19,046
		Revised		19,208	19,208	19,208	19,208	19,208
	Other irrigation	Usage Charge	ML Supp	0	0	0	0	0
Surface water	Millewa Rural (Irrigation)	Usage Charge	kL	644,952	644,952	644,952	644,952	644,952
		Revised		633,659	633,659	633,659	633,659	633,659
	Millewa Urban (Irrigation)	Usage Charge	kL	40,829	40,829	40,829	40,829	40,829
		Revised		39,728	39,728	39,728	39,728	39,728
Irrigation	Merbein irrigation	Garden Fee unmetered	Cust	202	202	202	202	202
		Revised		189	179	169	159	149
	Red Cliffs irrigation	Garden Fee unmetered	Cust	331	331	331	331	331
		Revised		310	295	280	265	250
	Robinvale irrigation	Garden Fee unmetered	Cust	101	101	101	101	101
		Revised		96	91	86	81	76
	Other irrigation	Garden Fee unmetered	Cust	0	0	0	0	0
	Merbein irrigation	Env levy per ML VR	ML VR	3,888	3,888	3,888	3,888	3,888
	Merbein irrigation	Env levy H&G per property	Cust	202	202	202	202	202
	Red Cliffs irrigation	Env levy per ML VR	ML VR	5,492	5,492	5,492	5,492	5,492
	Red Cliffs irrigation	Env levy H&G per property	Cust	331	331	331	331	331
	Robinvale irrigation	Env levy per ML VR	ML VR	2,567	2,567	2,567	2,567	2,567
	Robinvale irrigation	Env levy H&G per property	Cust	101	101	101	101	101
	Other irrigation	Env levy per ML VR	ML	0	0	0	0	0

Service	District	Tariff Description	Unit	2008-09	2009-10	2010-11	2011-12	2012-13
			VR					
	Other irrigation	Env levy H&G per property	Cust	0	0	0	0	0
Domestic and stock	Millewa Urban (Irrigation)	Env levy per connection	Cust	79	79	79	79	79
	Millewa Rural (Irrigation)	Env levy per connection	Cust	197	197	197	197	197
	Other stock and domestic (Irrigation)	Env levy per connection	ha	5,176	5,176	5,176	5,176	5,176
Surface water	Diversions (Irrigation)	Env levy per ML old water	ML WR	323,644	343,644	363,644	383,644	403,644
		Revised		325,144	346,644	368,144	389,644	411,144
	Diversions (Irrigation)	Env levy per ML new water	ML WR	6,920	6,920	6,920	6,920	6,920
	Diversions (Irrigation)	Env levy per customer	Cust	240	240	240	240	240
Licensing	Diversions (Irrigation)	Annual Permit fee	Cust	240	240	240	240	240