Final report to the Queensland Competition Authority

REVIEW OF DEMAND PROJECTIONS FOR QUEENSLAND URBAN UTILITIES AND UNITYWATER

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SKM

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Contents

Executive Summary

Under the Queensland Competition Authority Act (1997), the Queensland Competition Authority (the Authority) has a role in the investigation into and reporting on the pricing practices of those water utilities that are declared by the Premier and Treasurer to be monopoly or near monopoly business activities.

In the Interim Price Monitoring Period of South East Queensland (SEQ) Water and Wastewater Distribution and Retail Activities, Queensland Urban Utilities (QUU), Allconnex Water and Unitywater were referred by the Government to the Authority for a price monitoring investigation from 1 July 2011 to 30 June 2013.

The Authority's price monitoring report for 2012/13 will be the third and last report under the interim monitoring period. As Allconnex Water is no longer responsible for the delivery of water and wastewater activities, the 2012/13 review will focus only on QUU and Unitywater (the entities).

The Authority has engaged SKM to assist in the review by conducting an independent assessment of the forecasts of demand for water and wastewater activities from 1 July 2012 and the approaches adopted.

In the setting of prices for water and wastewater services, forecasts of demand for these services have a critical role to play in both:

- Estimating future capital investment, which is largely driven by the volumes of water consumed and wastewater generated; and
- Estimating the revenue for the reporting period, which will be driven by:
  - The volumes of water consumed, which generates water usage revenue;
  - The number of customers, which generates water and wastewater connection charges including trade waste charges; and
  - The number of new customers, which generates revenue through capital contributions charges.

The goals for this review of demand forecasts are to:

> "assess the appropriateness of each entity's forecasts of demand for water and wastewater activities from 1 July 2012 and the approach adopted for this purpose." (Queensland Competition Authority, 2012)

SEQ is one of the most strongly growing urban regions in Australia. The bulk of this growth is attributed to migration from both overseas, and from within other areas of Australia. With historical population growth rates in excess of 2% sustained since 2001, over a number of years, there is strong upwards pressure on water demand.

The millennium drought and high level restrictions on water use has made it difficult to understand the underlying trends in water demand. During the last two years, climate conditions in SEQ have been relatively cool and wet, and with the lifting of water restrictions and the implementation of permanent water conservation measures and a comprehensive demand management effort, there is considerable uncertainty over the time that demand will take to rebound, and what demand levels will be attained in the medium term.

The restructuring of the urban water industry in SEQ has resulted in considerable disruption to the record of both historical customer water consumption and bulk demand. There is a real need to collect additional years of customer consumption and bulk demand data for use in analysing trends in demand and monitoring demand outcomes.

Current demand forecasting approaches are relatively unsophisticated and rely on historical consumption and regional demand forecast outcomes to guide forecasts. In the current circumstances where there is so much uncertainty about demand outcomes following the lifting of water restrictions, this is an appropriate approach. In the next few years however, entities should move to improve their data collection and increase the sophistication of their demand monitoring and forecasting approaches as the length of data record increases. They should move to a formal end use based forecasting approach as soon is as practical (as outlined in Section 2.3.2).

QUU's forecasting approach

QUU develops separate demand forecasts for pricing and capital planning purposes. Short term demand forecasts are prepared to assist in revenue, pricing and operating costs forecasts while long term demand forecasts are used to underpin the infrastructure planning and capital development process.

Demand forecasts are developed by geographical area (for each of the five council districts), by customer group (residential or non-residential) and services (water, recycled water, wastewater and trade waste). Depending on the forecast item, different drivers of demand are used (number of properties/connections versus volume).

The basis for QUU's short term water demand forecast is the number of properties and the average consumption per connection. For residential consumption, the estimate of this average consumption per connection is based on estimates of the average consumption on a per person per day basis and multiplying this by an assumed number of people per tenement (property). The approach adopted by QUU for water consumption projections is based on establishing an underlying level of consumption on a litres per person per day (LPD). For non-residential consumption, the average consumption per connection was calculated directly from historical data. The average consumption per connection is then multiplied by the number of connections based on Office of Economic and Statistical Research (OESR) dwelling projections adjusted by the proportion of properties connected to the water and wastewater service delivery network. Implicit in the forecast average consumption is the current Permanent Water Conservation Measures. A distinction is also drawn between properties that have water access but no consumption and those that consume water.

The number and growth rate of properties are based on internal information (actual residential water access property counts and external projections sourced from OESR). QUU noted that in 2011-12, the OESR advised that due to the recent slowdown in overseas migration, the low population growth series is more representative of its expectations and therefore QUU has applied the growth rate represented by the low series to forecast population to 2016.

Since the OESR does not provide a low series dwelling projection, QUU manually adjusts the dwelling projections to align with a low population projection between 2011 and 2016 based on the 2011 OESR update.

Beyond 2016 a combination low (2011 update) and medium series (2008 update) is used to obtain dwelling projections. Different OESR population projection publications are used to maintain agreement with the long-term capital forecast models which are based on the earlier medium series. Figures of the intervening years are estimated by interpolating between the years projected (five year intervals) to provide an annual projection.

The adjustment to the dwelling projections is based on establishing an occupancy rate per dwelling. This occupancy rate is then applied to the low series population projections to develop an adjusted (low) dwelling series. QUU has assumed that 95% of new dwellings are developed in an area that are or will be served by their network. Residential water volume demand is derived from an estimate of LPD water consumption, while non-residential water volume demand is driven by kilolitres per property (connection) per annum (klCA). While the underlying rate of residential water demand has experienced significant fluctuations over the past decade the significant water restrictions put in place during drought conditions, which had significantly reduced consumption, combined with Permanent Water Conservation Measures (PWCM) replacing the drought level restrictions (established in December 2009) have increased the usage of alternative water sources and improved water-use efficiency. As a result, per capita demand has reduced significantly from pre drought levels with current per capita demand at around 170 LPD for Brisbane. With water restrictions easing, QUU expects that per capita demand will increase, or 'bounce back' as the impetus for residential customers to reduce water consumption wanes.

QUU has estimated that per capita demand will increase by 5 LPD p.a. (from the current average consumption volume in each Council district). This growth factor is applied up to a maximum of 200 LPD, consistent with the Queensland Water Commission's (QWC) regional voluntary residential consumption target set for SEQ. For non-residential customers, QUU estimates consumption per property will increase by 0.5% pa. This is a conservative growth estimate as production demand is currently reasonably static and water substitutes (recycled water), commonly used by non-residential customers, tends to offset potable water demand growth. QUU is also of the view that water saving practices and Water Efficiency Management Plans (WEMPs) have been ingrained into the non-residential customer base, which reduces the likelihood of significant growth in consumption per property.

The baseline average consumption is based on metered residential and non-residential consumption data based on the most recent billing data from QUU's internal database.

SKM's assessment

SKM has reviewed QUU's approach to demand forecasting and in general accepts that the methods used are reasonable. SKM is of the opinion that given the lack of a longer series of historical data to base our assessment of certain variables including average consumption levels and non-revenue water there remains a fairly high degree of uncertainty in demand projections. This is especially so given the recent lifting of restrictions and its replacement by PWCM leading to some uncertainty about rebound in consumption – the rate at which it will occur and the level it will settle at. The relatively wet weather the region has experienced since the drought ended may also have masked the full impact of rebound to date.

Nevertheless, given these uncertainties, SKM accepts that QUU has used appropriate drivers and has made the appropriate adjustments to external sources of information to present an accurate projection of the likely demand for its services. SKM's recommended changes to QUU's projections are relatively minor and in the main, the recommended values relate to extending QUU's projections to 2014 and 2015 at the regional local government area (LGA) level which QUU did not provide it its submission to the Authority. A summary of SKM's recommendations are provided in Table 1.

- **Table 1: Summary SKM's recommendations for QUU forecasts**

Forecast	Units	2011/12*[1]	2012/13	2013/14	2014/15
Brisbane					
Residential water connection	#	399,130	404,149	408,837	413,449
Residential wastewater connection	#	391,657	396,582	401,182	405,708
Non-residential water connections	#	30,497	30,881	31,239	31,591
Non-residential wastewater connections	#	29,211	29,578	29,921	30,259
Trade waste connections	#	4,321	4,368	4,416	4,464
Residential water volume	ML	59,158	62,060	64,867	67,780
Non-residential water volume	ML	34,017	34,365	34,704	35,043
Non-revenue water	ML	13,923	13,775	14,225	14,689
Bulk water	ML	107,097	110,201	113,796	117,512
Ipswich					
Residential water connection	#	63,108	65,668	68,264	70,972
Residential wastewater connection	#	56,989	59,301	61,645	64,090
Non-residential water connections	#	1,965	2,044	2,124	2,207
Non-residential wastewater connections	#	1,965	2,057	2,138	2,222
Trade waste connections	#	424	438	455	473
Residential water volume	ML	9,739	10,514	11,310	12,168
Non-residential water volume	ML	4,441	4,519	4,600	4,683
Non-revenue water	ML	905	960	1,016	1,076
Bulk water	ML	15,085	15,993	16,926	17,927
Lockyer Valley					
Residential water connection	#	10,180	10,521	10,870	11,242

[1] Estimated actuals

Forecast	Units	2011/12*[1]	2012/13	2013/14	2014/15
Residential wastewater connection	#	4,240	4,382	4,528	4,682
Non-residential water connections	#	511	528	546	564
Non-residential wastewater connections	#	370	382	395	409
Residential water volume	ML	1,020	1,078	1,143	1,213
Non-residential water volume	ML	263	761	774	788
Non-revenue water	ML	226	325	338	353
Bulk Water	ML	1,509	2,164	2,256	2,354
Scenic Rim					
Residential water connection	#	6,168	6,453	6,740	7,034
Residential wastewater connection	#	4,064	4,252	4,441	4,635
Non-residential water connections	#	1,019	1,066	1,114	1,162
Non-residential wastewater connections	#	739	773	808	843
Residential water volume	ML	784	834	889	946
Non-residential water volume	ML	330	347	364	382
Non-revenue water	ML	197	208	221	234
Bulk water	ML	1,310	1,390	1,474	1,562
Somerset					
Residential water connection	#	4,934	5,111	5,295	5,490
Residential wastewater connection	#	3,083	3,194	3,309	3,430
Non-residential water connections	#	567	587	608	631
Non-residential wastewater connections	#	423	438	454	471
Residential water volume	ML	588	620	651	683
Non-residential water volume	ML	648	659	671	684
Non-revenue water	ML	218	226	233	241
Bulk water	ML	1,454	1,505	1,555	1,609
QUU total					
Residential water connection	#	483,520	491,902	500,007	508,187
Residential wastewater connection	#	460,033	467,711	475,105	482,546
Non-residential water connections	#	34,559	35,106	35,630	36,155
Non-residential wastewater connections	#	32,708	33,229	33,716	34,203

Forecast	Units	2011/12*[1]	2012/13	2013/14	2014/15
Trade waste connections	#	4,745	4,806	4,871	4,937
Residential water volume	ML	71,288	75,107	78,860	82,790
Non-residential water volume	ML	39,699	40,652	41,114	41,580
Non-revenue water	ML	15,469	15,493	16,033	16,593
Bulk water	ML	126,456	131,253	136,007	140,964

Unitywater's forecasting approach

Unitywater's residential demand forecasting model is driven off a base population connected to its network as at 2012. Growth in connected population and access charges (connections) are based on the growth rates projected by the OESR's medium population and dwelling growth scenario in each of the two regions (Moreton Bay and Sunshine Coast) that Unitywater's network covers.

For its non-residential sector, a concept of "*equivalent persons (EP)*" is used. This is based on an estimate of the typical demand for any particular land use type expressed in terms of the demand from equivalent persons. For example, a student's demand is deemed to be the equivalent of 10% of the demand of a person living in a detached dwelling. A school with 1000 students would then be deemed to have the demand of 100 equivalent persons living in detached dwellings.

The approach adopted by Unitywater for forecasting volumes is based on establishing an underlying level of consumption on a per person per day basis (LPD) and multiplying this average consumption by connected population for residential demand and equivalent person for non-residential demand. For the purposes of pricing and budgeting over the next three years Unitywater has calculated the water consumption forecasts that reflect anticipated population increases with a forecast change in per person per day usage based on actual 2012 consumption levels. The growth rate in SKM's 2011 recommendation was then applied to forecast future consumption rates. Implicit in the forecast average consumption is the current PWCM. A cap of 200 LPD was applied to reflect the voluntary target applied by the QWC.

For the non-residential sector, a similar approach was applied using EPs. Average consumption level for the non-residential sector was held constant (ie no growth) to reflect the view that the business sector will be unlikely to increase consumption because restrictions have been relaxed as the measures implemented to reduce consumption during the drought are mainly structural (rather than behavioural) and are thus unlikely to be removed simply due to the relaxation of restrictions. In addition, WEMPs are still in place.

Population projections are based on the 2011 update of the OESR forecast which provides projections in a 5 yearly period. This population projection is interpolated to obtain annual forecasts by assuming linear increase between periods.

Water demand/consumption including pricing tier breakdown is based on the last meter reading (quarter 2). Projections are then broken down to pricing tiers consumption by escalating individual consumption levels using the rate of increase in average consumption level.

A similar method is applied for wastewater connections. Forecast sewerage volume is applicable only for Maroochy. No information has been provided detailing how this forecast was developed except that this was calculated as a percent of metered water consumption based on set discharge factors ranging from 5% to 90%.

The number of sewage access (based on the number of toilet pedestals) charges was based on January 2012 data. This number is then escalated by an uplift factor (1.240 for MBRC and 1.046 for SCRC) to reflect the fact that some customers were not assigned price plans (and thus were not captured in the data). The number of access charges was thus uplifted by the proportion of customers not yet assigned.

To estimate non-revenue water, Unitywater has estimated losses of 22 LPD in 2012. This is expected to fall to 18 LPD by 2021 due to various projects aimed at reducing losses. A loss factor from 2011/12 was calculated to reflect estimated demand in each of the areas. A reducing trend for losses was then applied from the base of actual losses in 2012 to reach its target losses by 2021.

SKM's assessment

Two major issues arise from SKM's analysis of Unitywater's demand forecasting methodology. The first is the use of the OESR's medium population growth forecast. Given the available data from the Australian Bureau of Statistics (ABS) and the view expressed by the OESR, SKM considers that the low population growth series is the appropriate series to use rather than the medium growth forecast. Adjustments will then need to be made to the OESR's dwelling projections to reflect the low population growth scenario.

The second issue is Unitywater's use of EP for the non-residential sector. While SKM agrees that the use of "equivalent persons" is reasonable for long term infrastructure projections, it is not appropriate to use it for short term demand forecasts, especially when average consumption levels for an "equivalent" person are unlikely to remain the same in the residential and non-residential sector when demand is rebounding from restrictions. The use of this concept also introduces additional uncertainty since the number and demand of an "equivalent person" in the non-residential sector is not observable but is assumed. This leads to potential sources of error. SKM recommends the use of connection numbers and the average consumption per connection for the forecasting of short term non-residential demand. A summary of SKM's recommendations for demand growth is provided in Table 2 below.

Table 2 Summary of SKM's recommendations for Unitywater's forecasts

Forecast	Units	2011/12	2012/13	2013/14	2014/15
Moreton Bay					
Residential water connections	#	145,061	147,848	150,551	153,329
Residential wastewater connections	#	145,973	148,777	151,497	154,293
Non-residential water connections	#	4,009	4,086	4,161	4,238

Forecast	Units	2011/12	2012/13	2013/14	2014/15
Non-residential wastewater connections	#	7,305	7,445	7,584	7,725
Trade waste connections	#	1,074	1,094	1,114	1,135
Residential water volume	ML	22,998	24,239	25,522	26,878
Non-residential water volume	ML	4,191	4,257	4,322	4,388
Non-revenue water	ML	2,877	3,092	3,107	3,125
Bulk water	ML	30,067	31,587	32,951	34,391
Sunshine Coast					
Residential water connections	#	119,100	121,326	123,594	125,974
Residential wastewater connections	#	126,647	129,014	131,425	133,957
Non-residential water connections	#	9,062	9,231	9,404	9,585
Non-residential wastewater connections	#	9,960	10,146	10,336	10,535
Trade waste connections	#	812	827	843	859
Residential water volume	ML	20,191	21,323	22,519	23,795
Non-residential water volume	ML	4,394	4,487	4,581	4,680
Non-revenue water	ML	3,255	3,182	3,171	3,163
Bulk water	ML	27,840	28,992	30,271	31,638
Unitywater total					
Residential water connections	#	264,161	269,173	274,144	279,303
Residential wastewater connections	#	272,620	277,790	282,922	288,249
Non-residential water connections	#	13,071	13,317	13,565	13,823
Non-residential wastewater connections	#	17,265	17,591	17,920	18,260
Trade waste connections	#	1,886	1,922	1,957	1,994
Residential water volume	ML	43,189	45,562	48,041	50,673
Non-residential water volume	ML	8,585	8,744	8,903	9,068
Non-revenue water	ML	6,132	6,274	6,278	6,288
Bulk water	ML	57,907	60,579	63,222	66,029

1. Introduction

1.1. Background

Under the Queensland Competition Authority Act (1997), the Queensland Competition Authority (the Authority) has a role in the investigation into and reporting on the pricing practices of those water utilities that are declared by the Premier and Treasurer to be monopoly or near monopoly business activities.

In the Interim Price Monitoring Period of SEQ Water and Wastewater Distribution and Retail Activities, Queensland Urban Utilities (QUU), Allconnex Water and Unitywater were referred by the Government to the Authority for a price monitoring investigation from 1 July 2011 to 30 June 2013.

Amongst other activities under the referral, the Authority must:

- "monitor the change in prices of distribution and retail water and wastewater services for households and small business customers having regard to the CPI price limit as described in the South East Queensland Water (Distribution and Reform) Act 2009;
- "monitor the change in prices for water and wastewater services not included in the CPI price limit as described in the South East Queensland Water (Distribution and Reform) Act 2009 having regard to the change in revenue from these services compared to the change in the total prudent and efficient cost of carrying on the relevant activity; and
- "monitor the maximum allowable revenue based on the total prudent and efficient costs of carrying on the activity." (Queensland Competetion Authority, 2012)

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The Authority has engaged SKM to assist in the review by conducting an independent assessment of the forecasts of demand for water and wastewater activities from 1 July 2012 and the approaches adopted.

1.2. Goals for this Review

In the setting of prices for water and wastewater services, forecasts of demand for these services have a critical role to play in both:

- Estimating future capital investment, which is largely driven by the volumes of water consumed and wastewater generated; and
- Estimating the revenue for the reporting period, which will be driven by:
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– The number of new customers, which generates revenue through capital contributions charges

The goals for this review of demand forecasts are to:

“assess the appropriateness of each entity’s forecasts of demand for water and wastewater activities from 1 July 2012 and the approach adopted for this purpose.” (Queensland Competition Authority, 2012)

1.3. Structure of this Report

This report is divided into four sections:

1) This introduction – which provides background on the regulatory process and goals for the review;
2) A water industry context for SEQ which provides an overview of recent water management changes and recent operating conditions; and
3) Two sections outlining the demand assessments, one each for QUU and Unitywater.

2. South East Queensland Water Industry Context

2.1. Recent Demand Drivers and Outlook

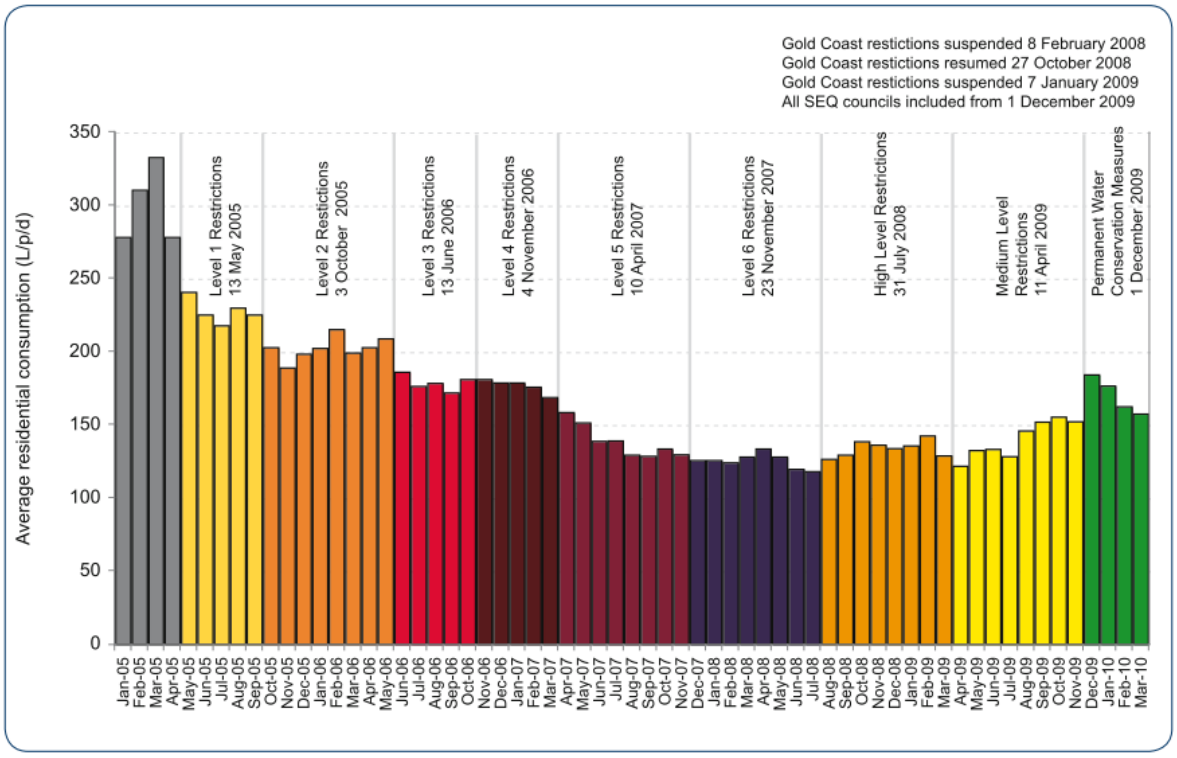
2.1.1. Population

South East Queensland is one of the most strongly growing urban regions in Australia. The bulk of this growth is attributed to migration from both overseas, and from within other areas of Australia. With historical population growth rates in excess of 2% sustained since 2001, over a number of years, there is strong upwards pressure on water demand.

2.1.2. Drought and Water Restrictions

There has been a significant change in the water industry in recent years. The millennium drought over the period 2001 to 2009 has seen a more integrated approach to urban water planning Australia. In South East Queensland, where the drought was arguably the worst in Australia at the time, high level restrictions on water use were implemented (Figure 2-1) at the same time as a comprehensive demand management program, aimed at securing long-term water savings (see Section 2.1.4).

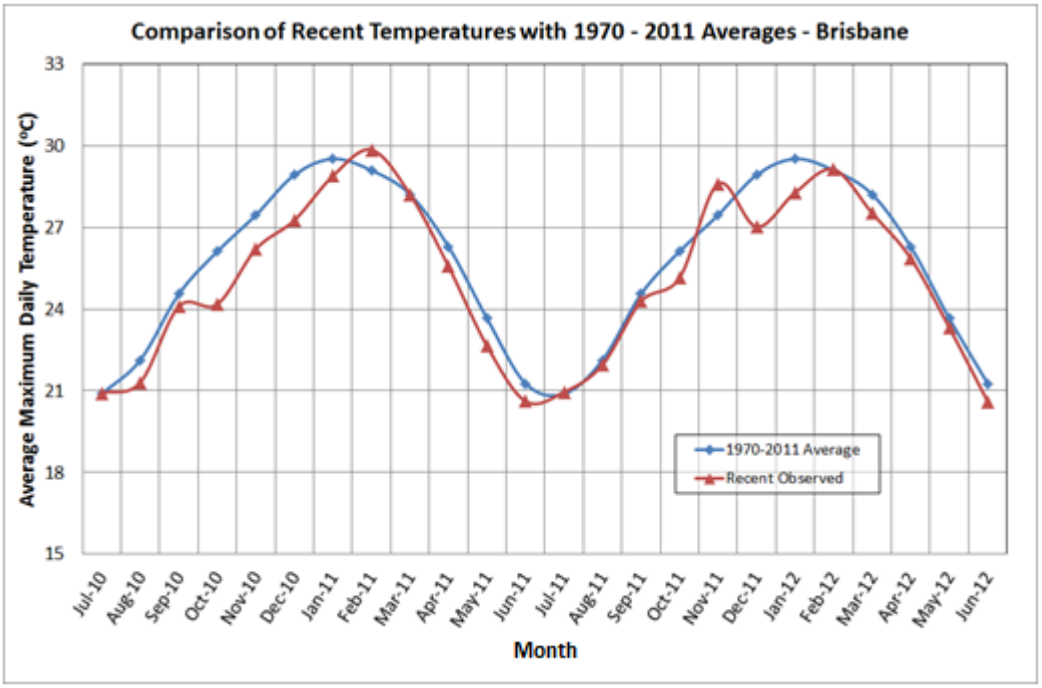
While most of SEQ was in severe drought, the situation on the Sunshine Coast was markedly different. Water in storages remained at relatively high levels and temporary water restrictions were not in place at any time during this period. Region-wide Permanent Water Conservation Measures were implemented on 1 December 2009. In spite of their favourable water security position at the time, the same rebate and retrofit schemes to those in the remainder of SEQ were implemented on the Sunshine Coast during the drought.



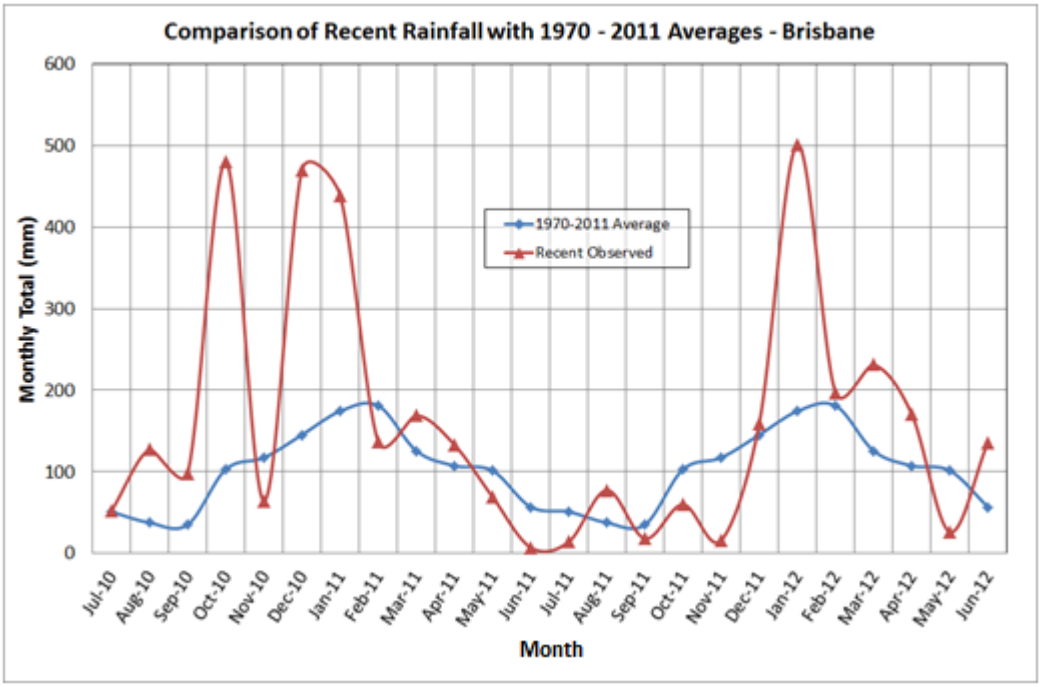
- **Figure 2-1: Water Restrictions in South East Queensland During the Millennium Drought (Queensland Water Comission, 2010)**

2.1.3. Climate Conditions

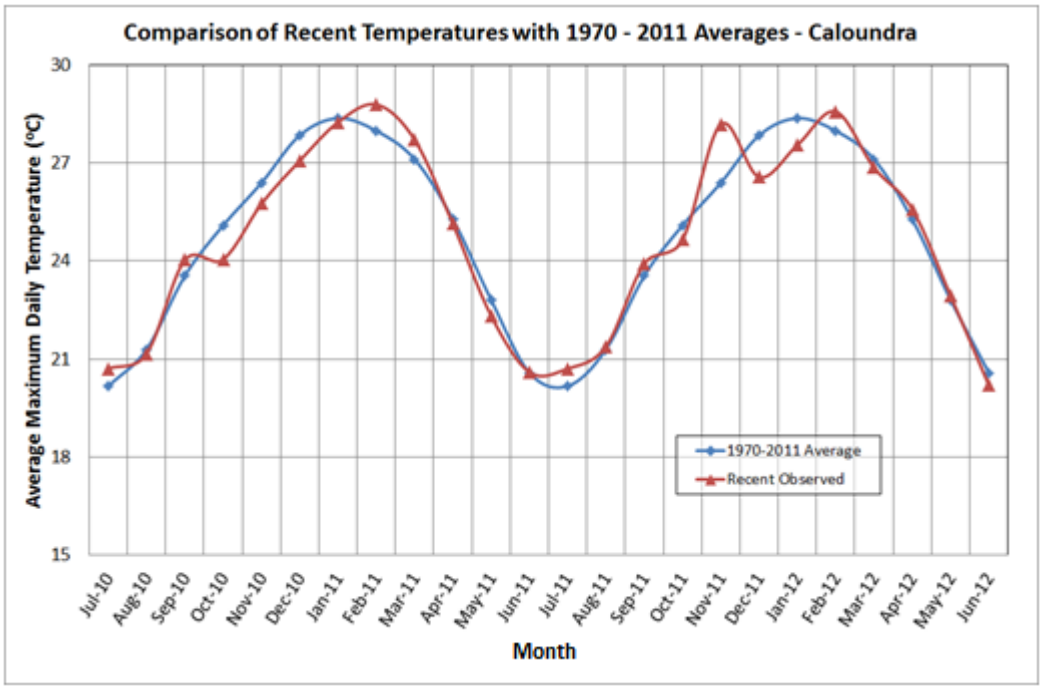
Following the lifting of water restrictions in December 2009, cooler and wetter conditions have prevailed across South East Queensland. In the last two fiscal years there has been both significantly above average rainfall in both the Brisbane and Caloundra areas, with average to below average temperatures (Figure 2-2 to Figure 2-5). It is likely that water consumption has been suppressed as a result, although current low levels of seasonal irrigation and outdoor use are likely to be low in any case because of the impact of demand management programs and the residual impact of water restrictions.



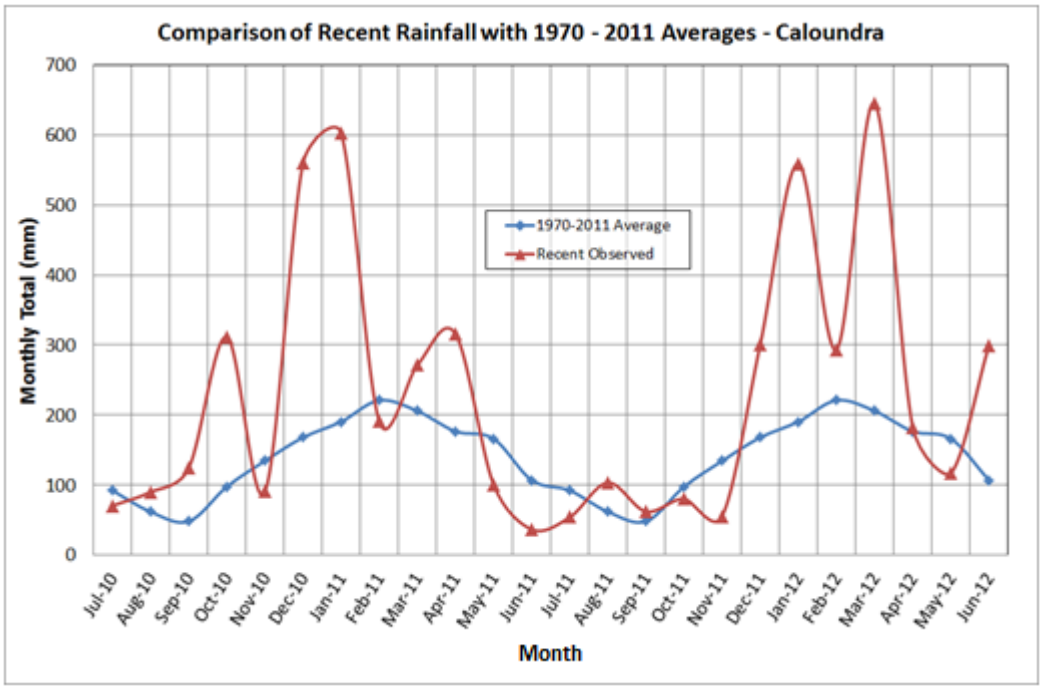
- **Figure 2-2: Comparison of Recent Temperatures with 1970 to 2011 Averages – Brisbane**



- **Figure 2-3: Comparison of Recent Rainfall with 1970 to 2011 Averages – Brisbane**



- **Figure 2-4: Comparison of Recent Temperatures with 1970 to 2011 Averages – Caloundra**



- **Figure 2-5: Comparison of Recent Rainfall with 1970 to 2011 Averages – Caloundra**

2.1.4. Water Efficiency

Following the lifting of the lifting of drought level water restrictions and the transition to permanent water saving rules, there is the legacy of an on-going demand management program. This includes (Queensland Water Commission, 2012):

- Permanent Water Conservation Measures, designed to encourage the more responsible use of water. These include limitations on the timing of irrigations, the use of water in outdoor cleaning and the filling of domestic and non-domestic swimming pools;
- Water Efficiency Management Plans (WEMPs)– requiring the mandatory development and implementation of plans for all water users of over 10 million litres per year and certain specified types of businesses; and
- New development codes that set water efficiency targets and mandate the use of water efficient fixtures and appliance and alternative water sources for various types of domestic and non-domestic buildings.

In the non-residential sector, a 32% reduction in non-residential water use was achieved by the combination of water restrictions and demand management programs (Queensland Water Comission, 2010).

It is anticipated that these measures will maintain a downward pressure on demand to counteract the upwards pressure being exerted by population growth.

2.2. Urban Water Reforms

Prior to the period of the Millennium Drought, the responsibility for bulk supply, treatment, bulk transport and distribution and retail water services was largely the responsibility of local government. The exception to this was three bulk water suppliers in:

1) SEQ Water who were responsible for supplies from the Wivenhoe, Somerset and North Pine Dams;

2) SunWater who were responsible for the Moogerah, Maroon and Borumba Dams; and

3) Aquagen, who were responsible for the Baroon Pocket Dam supplying water to Caloundra and Maroochy.

In 2007, the South East Queensland Water (Restructuring) Act set the legislative framework in place for the restructuring of the water industry. The end result has been a major change in the structure of the water industry with a rationalisation/centralisation of bulk supply, treatment and bulk transport functions and some amalgamation of retail and wastewater services (Figure 2-6).

- **Figure 2-6: Current Urban Water Arrangements in South East Queensland (Queensland Water Comission, 2010)**

2.3. Moving Towards Best Practice Forecasting Approaches

2.3.1. Current Approaches

The development of accurate forecasts of water demand involve coupling robust analysis of historical data with an intelligent forecasting approach that takes account of the most important drivers of demand. In addition, while traditionally demand forecasts for water resources planning were prepared on the basis of the extrapolation of per capita trends, best practice planning approaches now require active consideration of demand management options.

This work has been undertaken in the preparation of the South East Queensland Water Supply Strategy, which has made the assumption of a future regional average urban demand of 375 litres/person/day, inclusive of a residential demand of 230 litres/person/day. An aspirational or challenge target of 200 litres/person/day for residential demand is also stated.

Given the uncertainty following the lifting of water restrictions, most entities in SEQ have reverted to the development of short-term forecasts of residential demand based on a transition between recent per capita demands and the 200 litres/person/day challenge target set out in the SEQ Water Strategy. Non-residential consumption forecasts are largely based on current levels with some relatively minor adjustment. Long-term forecasts of residential demand for capital planning purposes are based on the 230 litres/person/day.

In the current circumstances, with the considerable uncertainty surrounding demand outcomes, this is an understandable and reasonable approach. Analysis of current consumption records suggests that demands are relatively stable and it may be some time (if ever) before regional demands return to the 230 litres/person/day mark.

2.3.2. Best Practice Demand Forecasting

In developing forecasts of future demand, it is in the interest of the each of the entities to come to an understanding of key demand drivers in their area. In the short to medium term each entity will need to make an assessment of the impact of on-going programs based on this understanding of key drivers. Main items of difference for each entity's service area will include:

- Areas of rapid growth will have increased opportunity for new development to comply with water savings codes, thus reducing the volume of water used per capita to a greater extent than those areas that are growing at a slower rate;
- The dwelling mix in areas may change, with re-development in inner city areas generating higher proportion of multi-unit dwellings;
- Each area will have a different climate, demographic and socio-economic composition resulting in a unique culture of water use in each area;
- Levels of non-revenue water, which will be a combination of the age of the water distribution infrastructure and the asset management strategy in place in each area; and

- Commercial and industrial water usage, which will vary significantly across the region.

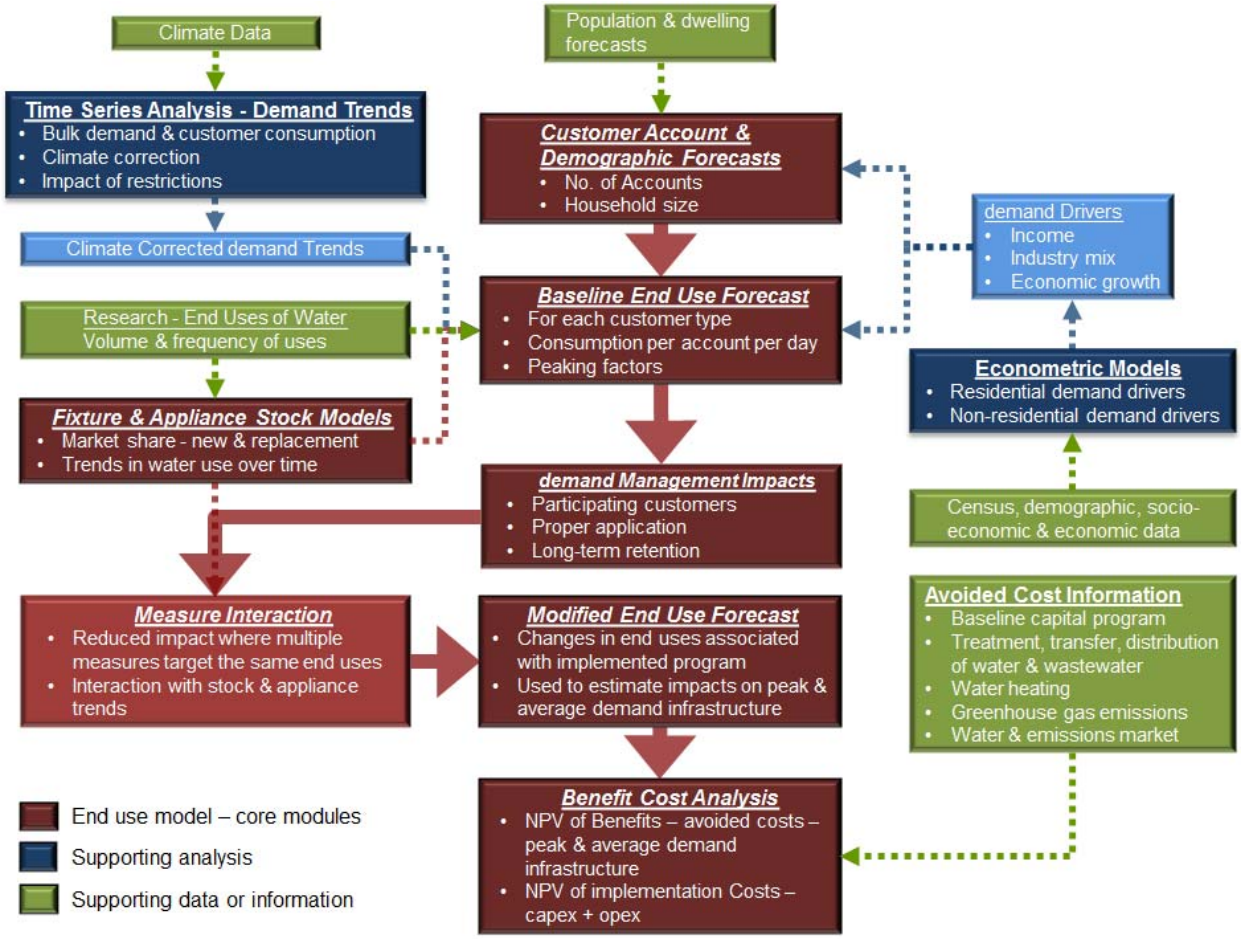
When it comes to the analysis of water demands and the preparation of forecasts, there are so many different approaches, that the concept of “best practice” is perhaps used too liberally. A more relevant label would be most “appropriate practice” where water utilities utilise a due level of sophistication that is dependent on their size and circumstances (and in the case of QUU and Unitywater, access to robust historical data).

There are a number of approaches to demand forecasting that are relevant for consideration and discussion at this point. These are:

- Sydney Water panel-based analysis. This analysis has been designed to assess a number of factors including price elasticity and the speed at which customers transition from water restrictions to the permanent water saving rules. It also takes account of the response to demand management and other programs. In its current form the model cannot be used for long-term forecasting, because:
  - The period of the analysis data is short (5 years) and includes periods of water restrictions – in this situation it will be difficult to examine the impact of key drivers and trends over time such as changes in real household income;
  - The model cannot be used to examine the impact of a variable where data is not available at the customer level. This will include trends in household size and fixture and appliance ownership and future demand management activities for which information on existing customer water use responses is not held.

Nonetheless, the model provides a very robust approach for forecasting short-term trends in demand over the next regulatory period.

- End use modelling approaches as used in the iSDP and DSM DSS models. So called “end use” models generate forecasts of future demand by aggregated estimates of the individual end uses of water. These models are used to estimate how demands change over time with the impact of changes in the water efficiency of water using fixtures and appliances and the impact of demand management measures. A typical end use modelling framework is shown in Figure 2-7.
- A range of econometric analysis approaches that can be used to compliment other forecasting approaches. These include the panel-based analysis utilised by Sydney water outlined above, but also include a range of other, typically regression-based cross-sectional, time series and pooled cross-section/time series approaches.



- **Figure 2-7: A Typical End Use Modelling Framework (Showing Supporting Analysis and Information)**

At the current time water utilities in South East Queensland do not have access to detailed information about which of their customers have participated in retrofit and rebate programs. This will rule out the use of a panel-based analysis. They do have access to a number of end-use monitoring studies, where estimates of water saved by customers participating in different types of demand management measures are provided. To prepare forecasts of future demand utilising this information, some type of end use based forecasting model is required.

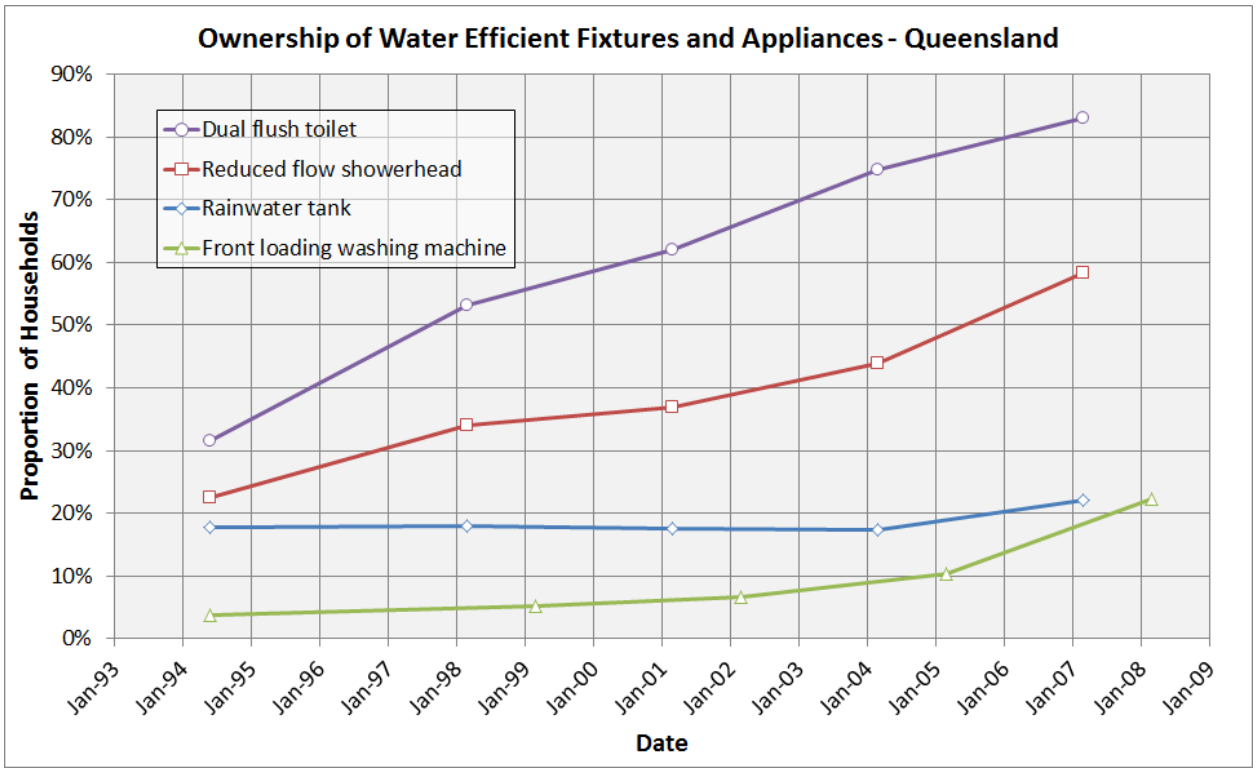
In recommending an approach for use of water utilities in South East Queensland, consideration must be given to:

- Determining an appropriate level of resourcing dedicated to demand forecasting when even the best forecasts can still be inaccurate;
- The data that is available for utilising in the development of demand forecasts.
- The recommended appropriate practice approach should entail the modelling of the impact of:

- Population growth;
- Changes in the dwelling mix;
- Changes in household size;
- On-going demand management efforts including the codes for water efficiency in new developments;
- The increased numbers of water efficient fixtures and appliances (Figure 2-8); and
- The impact of other drivers such as household income and lifestyle/aspiration factors, economic growth and changes in industry mix.

The last of these impacts would be determined by utilising complimentary econometric modelling approaches, the results of which can be utilised in the end use modelling forecasting framework.

- **Figure 2-8: Trends in the Ownership of Water Efficient Fixtures and Appliances - Queensland**



The approach to forecasting growth in the number of accounts in SEQ is sophisticated and based on detailed demographic analysis and population forecasting undertaken by the Office of Economics and Statistical Research (OESR). The current approaches employed by entities in taking and applying that information are essentially robust.

The development of an understanding of how future population and account formation translates into water demand requires the application of additional modelling approaches. Given the importance of demand forecasts to determine future capital budgets and consumption and service based revenue, a degree of sophistication should be employed by entities in the analysis of historical demands and the preparation of forecasts. There are a range of regression analysis approaches available for the analysis of historical water demands that can be applied to provide an understanding of the impact of drivers of demand (American Water Works Association, 2001), (Beatty, 2005).

Preparing forecasts of future demand involves employing the information gained in the analysis phase and adding additional information about the uptake of demand management options. This requires the use of an end use model, where forecasts of demand are built up by aggregating forecasts of water end uses in different customer categories. By modelling at the end use level, the impact of changes in peak demands should also be relatively straightforward to estimate. Detailed water end use modelling information is available to support modelling of anticipated trends in demand and water use for different types of fixtures and appliances (Urban Water Security Research Alliance, 2011).

In selecting an appropriate end use model for use in the development of forecasts, it is important that the model has a number of key features. These are:

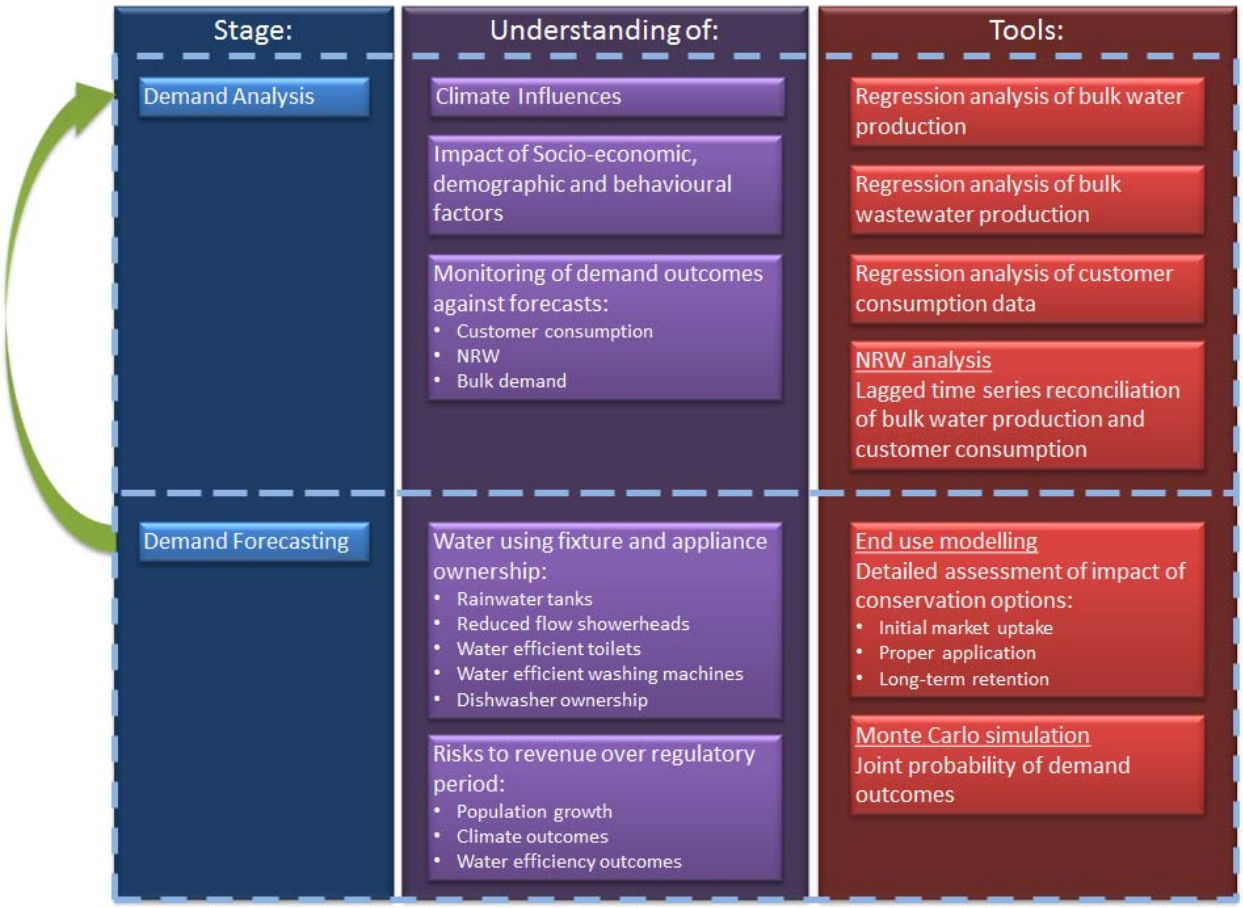
- The model should have an in-built capacity to cater for the reduced impact of demand management options where multiple options target the same end uses;
- The model should have an in-built capability to examine interactions between retrofit and rebate measures and the expected natural trends in the water efficiency of fixtures and appliances;
- The model should be able to forecast the impact of demand management and source substitution models on both average and peak demands;
- The model should have a structure that examines the potential for the savings associated with demand management options to erode over time.
- The model should not utilise levelised cost for the evaluation of demand management options. It should instead use the internationally recognised approach of cost-benefit analysis, where the costs of implementation of options are considered alongside the benefits (AWWA 2001). The benefits are the avoided costs associated with the reduced treatment and transfer of water and wastewater plus avoided capital costs associated with the provision of treatment, transfer and service storage infrastructure. Avoided water heating costs for customers should also be calculated. Levelised cost approaches are an inconsistent evaluation approach for options with different water savings profiles over time (Beatty and O'Brien, 2007).
- The economic analysis undertaken by the model should be from multiple perspectives. This includes the perspectives of the water utility, the customers participating in the demand management activities and the total community, which includes the combined impact of the water utility, participating and non-participating customers.

- The model should have an in-built capacity to calculate avoided greenhouse gas emissions. With the Australian economy anticipated to move to an emissions trading scheme in the short to medium term, it is important that water utilities implementing demand management programs can provide information to regulatory agencies on emissions savings.

The outputs of the end use model should assist in understanding trends in both average and peak demand loads. Understanding uncertainty in forecasts is also important. This includes risks to revenue outcomes over shorter-term regulatory periods, but also uncertainty in long-term forecasts.

A typical demand analysis and forecasting framework to support the development of forecasts and monitoring demand outcomes is shown in Figure 2-9. Examples of reports that outline similar approaches to those recommended are set out in Table 2-1.

- **Figure 2-9: Typical Demand Analysis and Forecasting Framework**



- **Table 2-1: Examples of Studies that use Recommended Demand Forecasting Approaches**

Location	Study	Reference
South East Queensland	South East Queensland Regional Water Supply Strategy Needs and Opportunities Study	(MWH, 2006)
Riverina NSW	Riverina Water County Council, Wagga Wagga City Council, Greater Hume, Lockhart and Urana Shire Council Joint Integrated Water Cycle Management Evaluation Study	(Hydroscience Consulting, 2010)
Bathurst NSW	Bathurst Climate Change and Water Security Study	(Sinclair Knight Merz, 2010)

2.3.3. Transition to New Demand Forecasting Approaches

With the transition to a new water industry structure and the formation of new water retail entities, there has been considerable disruption to customer consumption and bulk water production records. This includes:

- Bulk water records are now held by the South East Queensland Water Grid Manager (SEQWGM) and daily records are not provided to the entities;
- Customer consumption records from the period prior to the formation of the new entities is held by the constituent Councils; and
- With the merger and alignment of customer billing systems and meter reading cycles, historical records are disrupted and potentially inconsistent with current records.

While the current forecasting approach is appropriate in the current circumstances, entities should move towards more sophisticated approaches as soon as is practical. For the setup and calibration of an end use model, at least three to five years of bulk demand, customer consumption and preferably wastewater flow records will be required. This information can be complemented by the available reports on end uses of water.

The first step in this process is to improve the access to the data required to underpin forecasts. This should start with ensuring that daily records of bulk water demand and wastewater flows are provided by the SEQWGM to the entities. While retaining a history of customer consumption data provides valuable information on historical demands and the impacts of water restrictions, the costs of arranging for the transfer of this data from the constituent Councils to the new entities may well outweigh the benefits.

The second step in this transition process is to set up a range of demand analysis tools to enable the meaningful monitoring of water demands. The third step is to establish a formal end-use based forecasting model that will be used to form the basis for understanding the impact of demand drivers and the outlook for both average day and peak demands. A final step will be to utilise a probabilistic demand forecasting overlay that can allow some of the key uncertainties to be understood and quantified. A suggested time table is provided in Table 2-2 below.

- **Table 2-2: Suggested Time Frame for Transition to Best Practice Demand Forecasting**

Step	Item	Responsibility	Time frame
1	Arrange for daily metering of bulk water and wastewater to be made available on-line	SEQ Water	2012/13
2	Setup demand analysis tools for monitoring: ■ Bulk per capita water demand ■ Bulk wastewater flows ■ Customer consumption per account (by sector) ■ Non-revenue water (quarterly estimates in line with billing periods)	Water Utilities	2012/13

Step	Item	Responsibility	Time frame
3	Develop an end use based forecasting model to provide a comprehensive forecasting capability covering impacts of demographic and socio-economic changes and demand management	Water Utilities	2013/14
4	Setup of procedure for forecasting uncertainty in forecasts for both regulatory periods (one to five years) and long-term forecasts	Water Utilities	2014/15
5	Begin to incorporate complimentary econometric modelling results into the demand forecasting framework as is practical and assessed as worthwhile.	Water Utilities	2014/15

3. Queensland Urban Utilities (QUU)

3.1. QUU Forecasting Approach

QUU develops separate demand forecasts for pricing and capital planning purposes. Short term demand forecasts are prepared to assist in revenue, pricing and operating costs forecasts while long term demand forecasts are used to underpin the infrastructure planning and capital development process.

Demand forecasts are developed by geographical area (for each of the five council districts), by customer group (residential or non-residential) and services (water, recycled water, wastewater and trade waste). Depending on the forecast item, different drivers of demand are used (number of properties/connections versus volume).

The basis for QUU's short term water demand forecast is the number of properties and the average consumption per connection. For residential consumption, the estimate of this average consumption per connection is based on estimates of the average consumption on a per person per day basis and multiplying this by an assumed number of people per tenement (property). The approach adopted by QUU for residential water consumption projections is based on establishing an underlying level of consumption on a litres per person per day (LPD) basis. The average consumption per connection is then multiplied by the number of connections to obtain the forecast water consumption.

For non-residential consumption, the average consumption per connection is calculated directly from historical data. The average consumption per connection is then multiplied by the number of connections based on Office of Economic and Statistical Research (OESR) dwelling projections adjusted by the proportion of properties connected to the water and wastewater service delivery network. Growth projections of residential properties are thus used as a proxy for growth in non-residential connections. Implicit in the forecast average consumption is the current Permanent Water Conservation Measures (PWCM) LPD target. A distinction is also drawn between properties that have water access and those that consume water.

The number and growth rate of properties are based on internal information (actual residential water access property counts and external projections sourced from OESR). QUU noted that in 2011-12, the OESR advised that due to the recent slowdown in overseas migration, the low population growth series is more representative of its expectations and therefore QUU has applied the growth rate represented by the low series to forecast population to 2016.[2]

Since the OESR does not provide a low series dwelling projection, QUU manually adjusts the dwelling projections to align with a low population projection between 2011 and 2016 based on the 2011 OESR update. Beyond 2016 a combination low (2011 update) and medium series (2008 update) is used to obtain dwelling projections. Different OESR population projection publications are used to maintain agreement with the long-

[2] In the longer term (post 2016), QUU has applied the growth rate represented by the OESR population medium series projection. While not directly relevant to this review, SKM concurs with this change as the medium series would represent the likely population growth over a period beyond the current slow down in population growth which is mainly related to lower migration rates. This is supported by the email sent by the OESR to Unitywater (see Section 4.3).

term capital forecast models which are based on the earlier medium series. Figures of the intervening years are estimated by interpolating between the years projected (five year intervals) to provide annual projections.

The adjustment to the dwelling projections is based on establishing an occupancy rate per dwelling. This occupancy rate is then applied to the low series population projections to develop an adjusted (low) dwelling series. QUU has assumed that 95% of new dwelling lots will have a service connection.

Residential water volume demand is derived from an estimate of LPD water consumption, while non-residential water volume demand is driven by kilolitres per property (connection) per annum (klCA). While the underlying rate of residential water demand has experienced significant fluctuations over the past decade, drought period water restrictions, which had significantly reduced consumption, and their replacement with Permanent Water Conservation Measures (established in December 2009), have increased the usage of alternative water sources and improved water-use efficiency. As a result, per capita demand has reduced significantly with current per capita demand at around 170 LPD for Brisbane. With water restrictions easing, QUU expects that per capita demand will increase, or 'bounce back' as the impetus for residential customers to reduce water consumption wanes.

QUU has estimated that per capita demand will increase by 5 LPD p.a. (from the current average consumption volume in each Council district). This growth factor is applied up to a maximum of 200 LPD, consistent with the QWC's regional voluntary residential consumption target set for SEQ. For non-residential customers, QUU estimates consumption per property will increase by 0.5% pa. This is a conservative growth estimate as production demand is currently reasonably static and water substitutes (recycled water), commonly used by non-residential customers, tend to offset potable water demand growth. QUU is also of the view that water saving practices and Water Efficiency Management Plans (WEMPs) have been ingrained into the non-residential customer base, which reduces the likelihood of significant growth in consumption per property. SKM concurs with this view as, in the very least, point of use water efficiency measures will remain in place, limiting the amount of 'bounce back'.

The baseline average consumption is based on metered residential and non-residential consumption data based on the most recent billing data from QUU's internal database.

3.1.1. **Proposed forecast**

A summary of the QUU demand projections provided to the Authority for the period 2011/12 to 2014/15 is shown in Table 3-1. While QUU did not provide any detailed forecast for 2013/14 and 2014/15 in the template set up by the Authority despite provisions for such in the Authority's template table 5.2.3, forecasts for these years have been provided in a consolidated form (template table 5.4.1). Some historical data from 2009/10 and 2010/11 were also included in the template. Table 3-1 also shows the average annual expected growth rates over this period.

- **Table 3-1: QUU proposed demand projections**

Forecast	Units	2008/09[3]	2009/10	2010/11	2011/12	2012/13	2013/14[4]	2014/15[3]	CAGR 2012-2013 (%p.a.)	CAGR 2012-2015 (%p.a.)
Residential water connection charges	#	388,483	475,509	474,903	483,520	491,651			1.7%	
Residential water volume	ML		58,897	65,024	71,288	74,750	77,878	81,133	4.9%	4.4%
Non-residential water connection charges	#	31,063	30,406	34,436	34,559	35,083			1.5%	
Non-residential volume	ML		26,610	38,044	39,699	40,642	41,107	41,582	2.4%	1.6%
Non-revenue water	ML		13,003	17,245	15,469	15,442	15,902	16,375	-0.2%	1.9%
Total water volume	ML		98,510	120,314	126,456	130,834	134,887	139,089	3.5%	3.2%
Total water connection charges	#	419,546	505,915	509,339	518,079	526,734			1.7%	
Waste water connection charges	#	407,955	414,674	484,663	492,741	500,650	508,724	516,968	1.6%	1.6%
Recycled water	ML	4,905	5,815	6,731	6,731	6,616	6,616	6,616	-1.7%	-0.6%
Trade waste and other charges	#	4,152	4,190	4,657	4,745	4,806	4,871	4,937	1.3%	1.3%

3.2. Previous forecast

Comparing QUU's current proposed forecast with its 2011 proposal indicates that QUU residential water demand forecast has increased in Brisbane and Ipswich. The actual 2012 demand for Brisbane was 1.4% higher than that forecast by QUU in 2011 although in Ipswich, the actual 2012 demand was in line with QUU's 2011 forecast. Between 2012 and 2015, QUU is currently forecasting a compound average growth rate of 3.8% p.a. for Brisbane, higher than the 2011 forecast of 3.0% p.a. forecast from 2011 to 2014. In Ipswich the forecast growth is now 7.1% p.a. between 2012 and 2015 compared to the 2011forecast of 5.7% p.a. from 2011 to 2014.

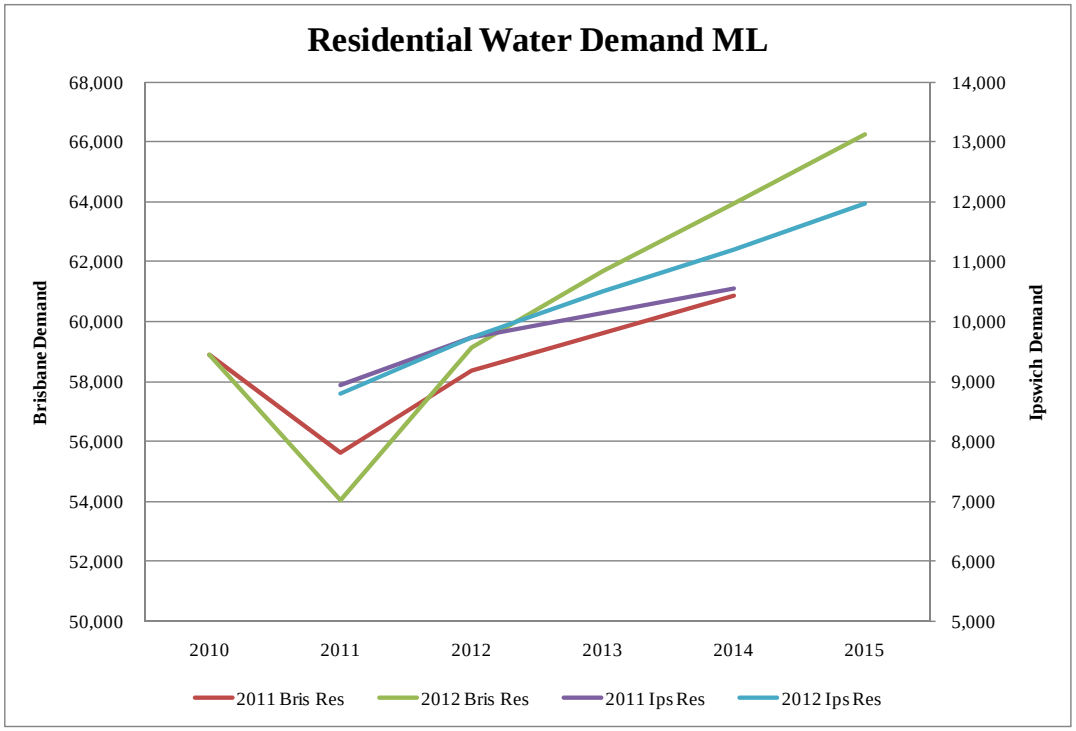
For two of the three rural local government areas (LGAs) (Scenic Rim and Somerset) the 2012 actual consumption is about 3-4% lower than forecast. For the Lockyer Valley the difference is greater at -10.6%. The

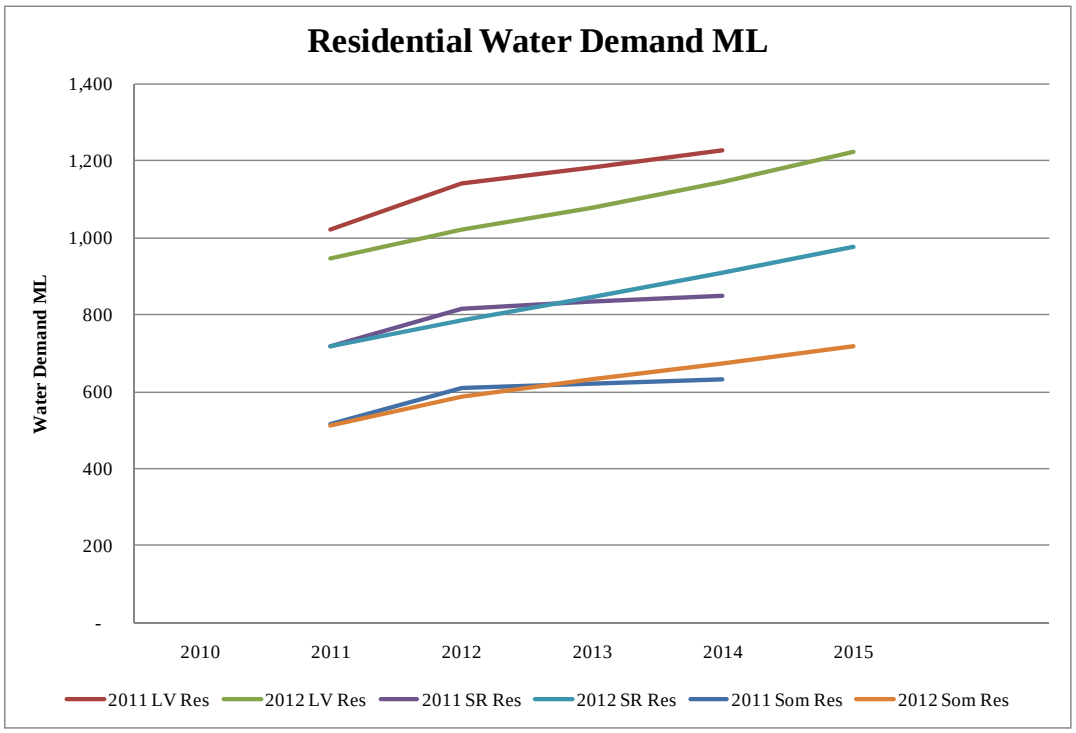
[3] Figures for 2009 provided by QUU related only to the Brisbane LGA. Figures for other LGAs were not included in the template submitted by QUU.

[4] Connection numbers by LGA were not included for 2014 and 2015 in the template submitted by QUU.

forecast consumption growth at the Lockyer Valley however remains at a similar rate (6.4% p.a. from the 2011 forecast from 2011 to 2014 versus 6.3% p.a. in the 2012 forecast from 2012 to 2015). The growth rates for Scenic Rim and Somerset are on the other hand quite different. In its 2011 submission, QUU had forecast residential consumption growth at Scenic Rim at 5.7% p.a. between 2011 and 2014. This has increased to 7.6% p.a. in its 2012 forecast for the period between 2012 and 2015. For Somerset, the opposite is true. The 2011 submission forecast a growth of 7.2% p.a. between 2011 and 2014, falling to 6.8% p.a. for 2012 to 2015 in QUU's 2012 submission. The comparison of the 2011 and 2012 forecasts for residential water demand can be seen in Figure 3-1.

- **Figure 3-1: QUU residential water demand**

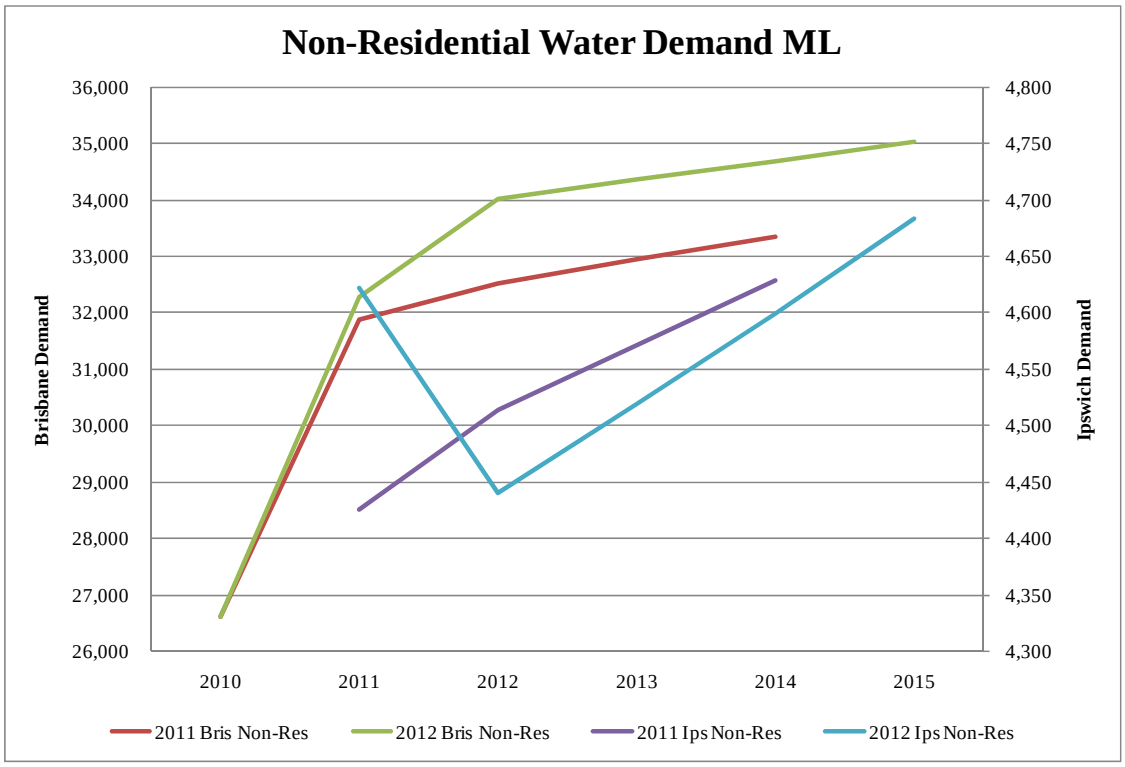




QUU indicated to SKM that the reason for the different demand forecasts for the 2012/13 submission was due to QUU adopting SKM's 2011/12 recommended changes relation to the level of bounce back.

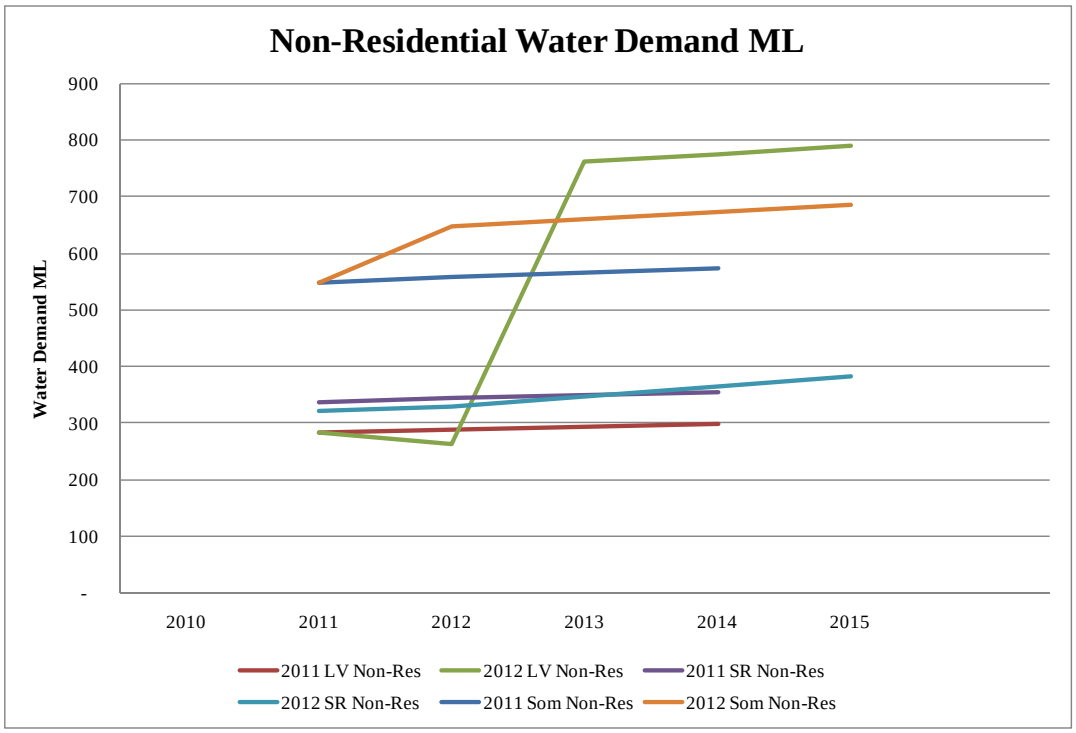
The forecast for non-residential consumption in Brisbane is higher in QUU's 2012 submission than in its 2011 submission. For 2012, QUU's forecast in its 2011 submission was 4.6% below the actual consumption. An opposite outcome is seen in Ipswich were the actual demand in 2012 was some 1.6% below that forecast in 2011. Consumption growth rates also show opposing trends. In 2011, QUU submitted that both Brisbane and Ipswich was expected to grow at 1.5% p.a. between 2011 and 2014. In its current submission, QUU has forecast Brisbane's growth to slow to 1% p.a. while Ipswich is expected to increase its consumption growth to 1.8% p.a. from 2012 to 2015. These trends are shown in Figure 3-2.

- **Figure 3-2: QUU non-residential water demand – Brisbane and Ipswich**



Differences between forecasts are greater in the three rural LGAs, especially Lockyer Valley. The forecasts supplied by QUU for the Lockyer Valley indicates that the consumption forecast for 2013 is almost three times that for 2012. This is due to a large water user planning to start operations in the Lockyer Valley and consume approximately 0.5GL annually. Similarly there was a large user that started operations in Somerset in 2011, thus explaining the step jump in the LGA between the two forecasts. The comparison between the 2011 and 2012 submission forecasts for Lockyer Valley, Scenic Rim and Somerset are shown in Figure 3-3.

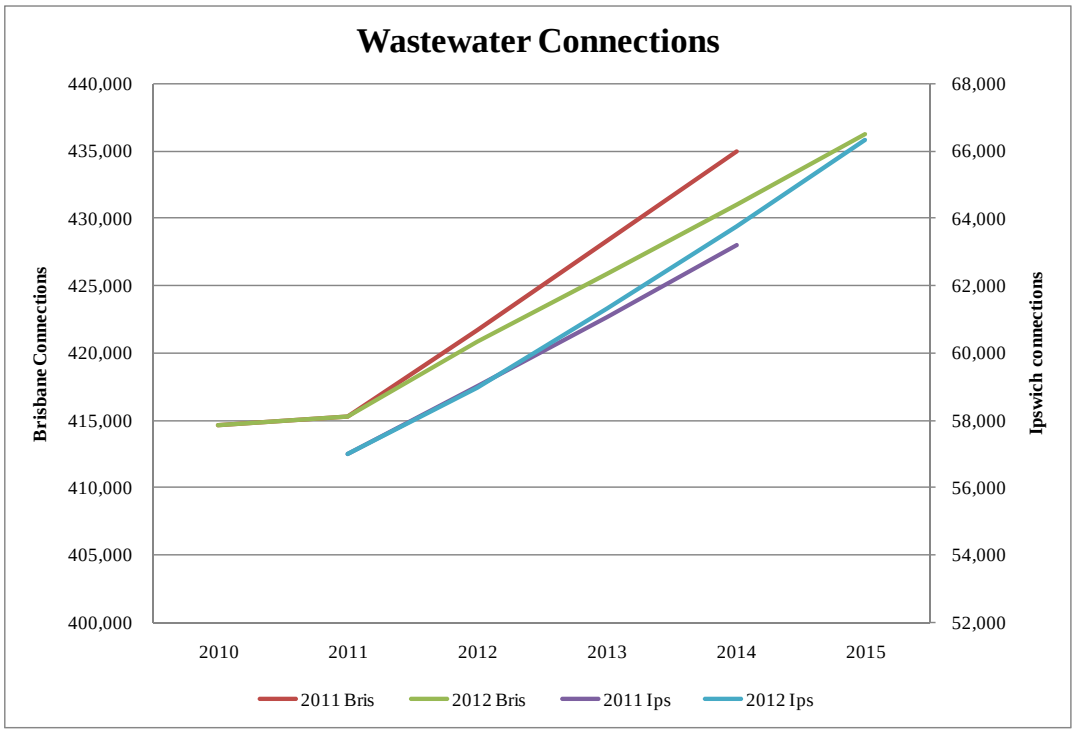
- **Figure 3-3: QUU non-residential water demand – Lockyer Valley, Scenic Rim and Somerset**

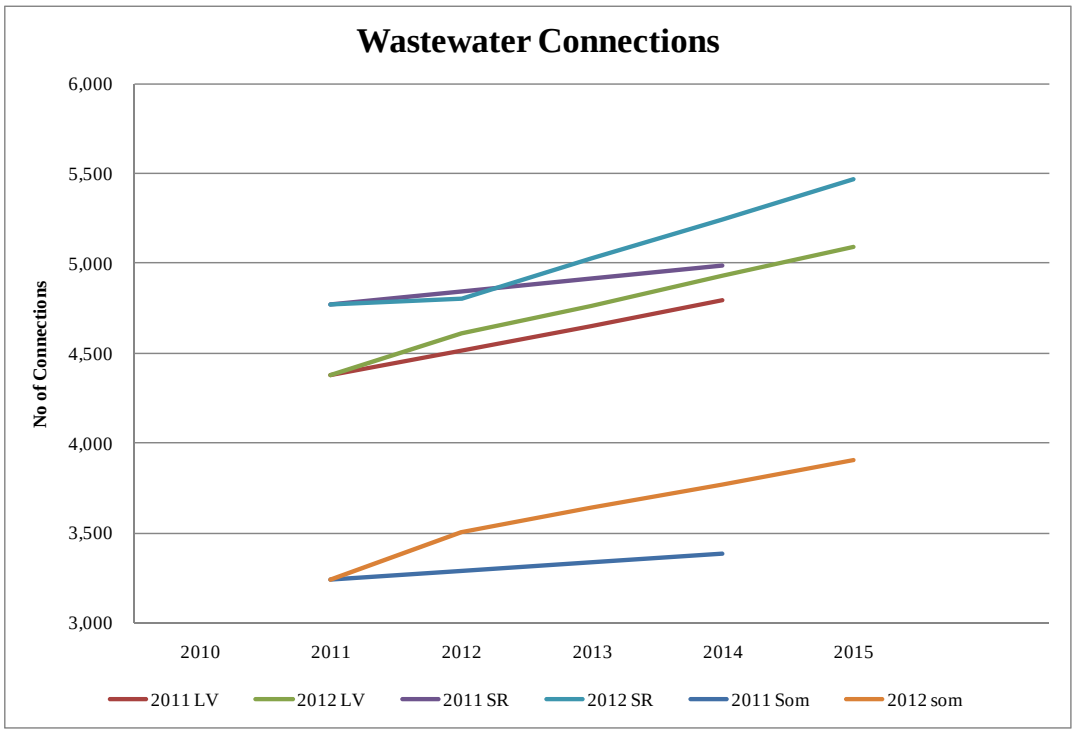


Wastewater connection number forecasts are shown in Figure 3-4. Actual numbers in 2012 for Brisbane and Ipswich are slightly below that forecast in 2011. For Brisbane, the projected growth rate is also a little below that projected in 2011 (2012 forecast of 1.2% p.a. versus 1.6% p.a. forecast in 2011). However, in Ipswich the growth rate is forecast to increase from 3.5% p.a. (2011 submission) to 4% p.a. (2012 submission).

In the Lockyer Valley, the actual number of connections in 2012 was 2.1% higher than that forecast in 2011. Projected growth rate has also increased from 3.1% p.a. in the 2011 submission to 3.4% p.a. in the 2012 submission. Somerset also saw an increase in connections from that forecast in 2011 by 6.6% and its growth rate has been increased from 1.5% p.a. to 3.7% pa. The situation is slightly different in the Scenic Rim with actual 2012 connection showing a 0.8% shortfall from that forecast in 2011. However growth is now forecast to increase at a faster rate (4.4% pa) than that forecast in 2011 (1.5% pa).

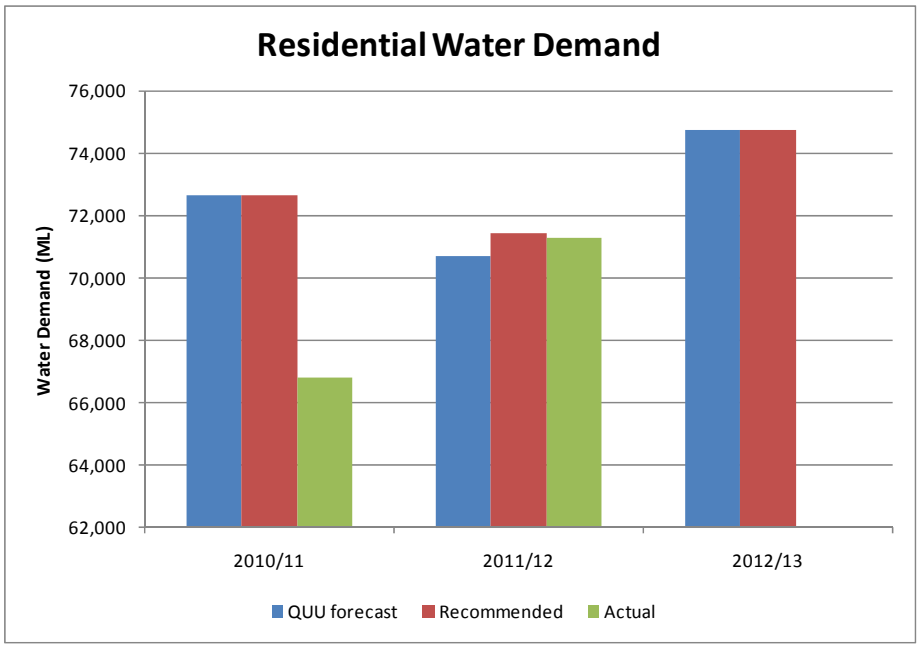
- **Figure 3-4: QUU wastewater connections**

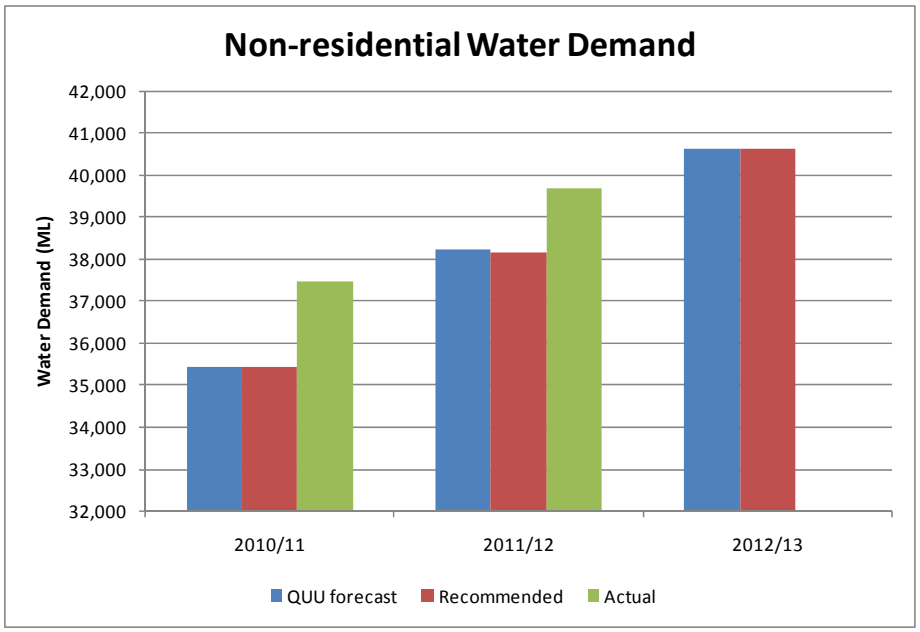




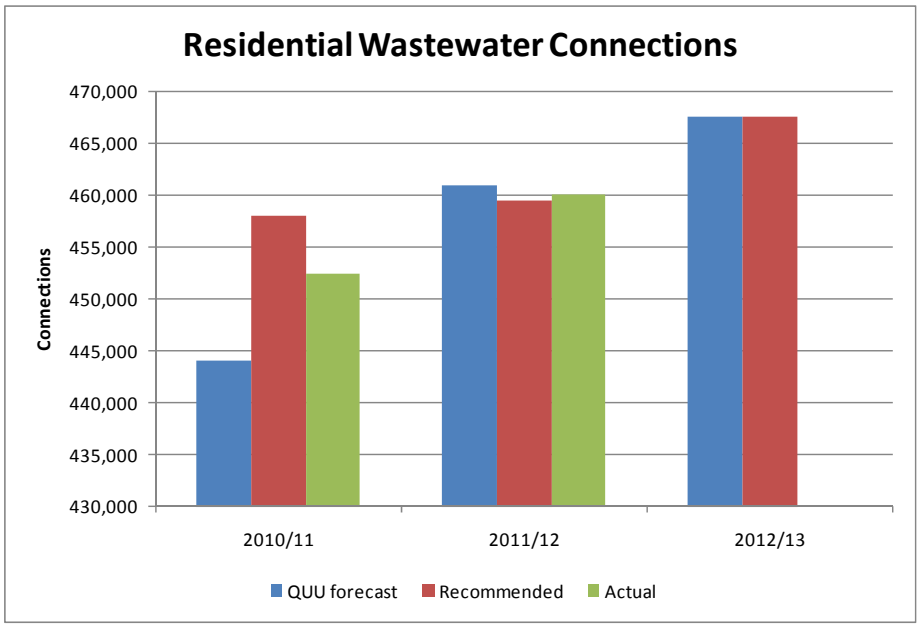
A comparison has also been made between of QUU's water demand and wastewater connection forecasts from previous submissions, the QCA's recommended forecasts and actuals. In general, it appears that actual outcome of water demand has been higher than forecasts although it is not as clear for wastewater connection numbers. This comparison may be seen in Figure 3-5.

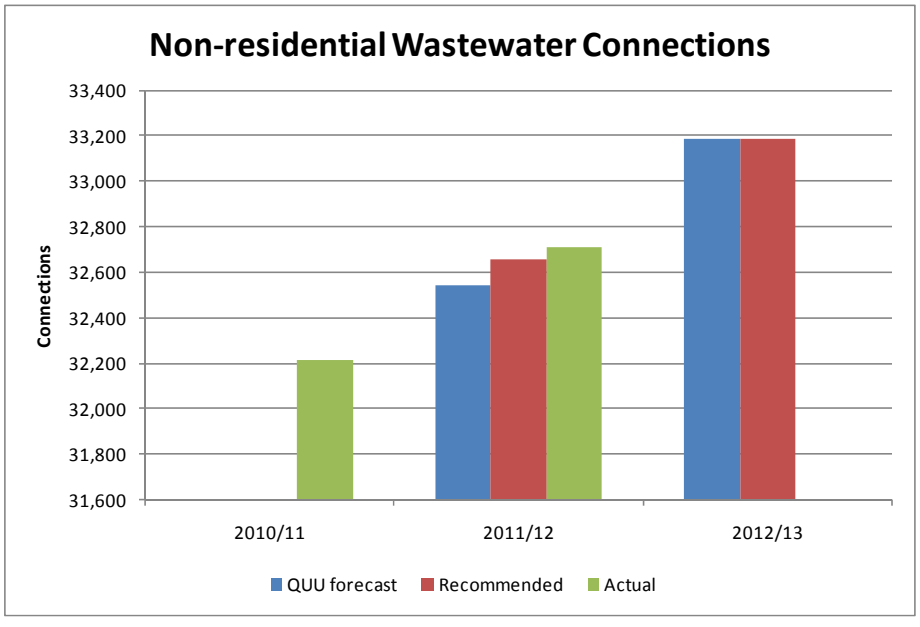
- **Figure 3-5: Comparison of QUU's forecasts and actual**





- **Figure 3-5: Comparison of QUU's forecasts and actual (continue)**





3.2.1. Developments from the 2011/12 demand forecast

QUU's forecasting approach has remained basically the same as in the 2011/12 forecast. A number of minor changes have occurred to reflect the Authority's recommendations from the 2011/12 review with the main

change being the application of a faster bounce back for per person water consumption in the residential sector. In its 2011/12 forecast, QUU had assumed that the historically low levels of per capita demand will continue in the short-term, with an upwards creep of 0.5% pa over the longer term as a response to relaxed water restrictions and that average demand will reach a plateau at around 200 LPD.

In the current forecast, QUU has estimated that per capita demand will increase by 5 LPD from the current average consumption volume in each LGA with a maximum average consumption capped at 200 LPD. SKM had recommended in 2011/12 that the rate of bounce back be increased so that in Brisbane and Ipswich, full bounce back would be achieved in years after the easing of restriction while in the rural areas of Lockyer Valley, Scenic Rim and Somerset, the bounce back period would lengthen to 8 years. This change in bounce back explains most of the difference between the two sets of forecasts.

The other relatively minor change affecting the two sets of forecasts is the adoption of the recommendation to use the latest population and dwelling projections published by the OESR. In 2011/12, despite the availability of the 2011 population projections, QUU had used the 2010 update. This was done as the 2011 update was not available when QUU submitted their forecasts for their Board's approval. SKM had recommended that the latest update be used for the regulatory review. For the 2012/13 review, the latest 2011 update had been used. Also SKM had recommended the use of the low series population growth projections rather than the medium growth series in 2011/12 which was used by QUU. This was based on advice from the OESR that recent actual population growth in SEQ was tracking close to the low series rather than the medium series. For the 2012/13 set of forecasts QUU had adopted the low series population projections. This is consistent with current OESR advice that recent actual population growth was still tracking close to the low growth projections from the 2011 population update. As a result, QUU also made adjustments to the OESR's dwelling growth reflect the low population growth series.

The main issue with the rigour with which QUU is able to undertake demand forecasting continues to be the paucity of data. Historical data on which to base its forecast is still very limited. In addition, the data that is available is very recent and is likely to be affected by the impact of the rebound from restrictions and also the very wet (and flood) conditions of 2010 and 2011. These issues are likely to have constrained demand below the "normal" consumption level. As a result, more rigorous forecasting techniques like end use modelling and econometric modelling cannot be used till more data is available, As discussed in SKM 2011 report, at least 12 to 16 quarters worth of data that is uncontaminated by major disruptions like restrictions or flood events will be required before such techniques can be utilised.

3.3. Population, dwellings and connections

QUU did not provide connection number forecasts for 2014 and 2015 at the LGA level in the template submitted to the Authority. However, QUU had informed SKM that these forecast numbers may be found in its 2012 revenue model provided to SKM. Based on this source for 2014 and 2015 connections and the template for 2012 and 2013 connections Table 3-2 shows QUU's proposed connection forecasts at the LGA level.

- **Table 3-2: QUU proposed forecast connections**

Service Area	2010/11[5]	2011/12[6]	2012/13	2013/14	2014/15
Residential water connections					
Brisbane	393,432	399,130	403,920	408,767	413,672
Ipswich	61,355	63,108	65,632	68,268	71,009
Lockyer Valley	9,765	10,180	10,526	10,884	11,251
Scenic Rim	5,755	6,168	6,452	6,739	7,031
Somerset	4,596	4,934	5,121	5,310	5,503
QUU	474,903	483,520	491,651	499,968	508,466
Non-residential water connections					
Brisbane	29,961	30,497	30,857	31,221	31,589
Ipswich	1,950	1,965	2,043	2,125	2,210
Lockyer Valley	536	511	528	546	564
Scenic Rim	1,341	1,019	1,066	1,113	1,162
Somerset	648	567	589	611	633
QUU	34,436	34,559	35,083	35,616	36,158
Residential wastewater connections					
Brisbane	386,463	391,657	396,357	401,113	405,926
Ipswich	55,238	56,989	59,269	61,650	64,125
Lockyer Valley	3,998	4,240	4,384	4,533	4,686
Scenic Rim	3,994	4,064	4,251	4,440	4,632
Somerset	2,753	3,083	3,200	3,318	3,439
QUU	452,446	460,033	467,461	475,054	482,808
Non-residential wastewater connections					
Brisbane	28,791	29,211	29,556	29,905	30,258
Ipswich	1,779	1,965	2,038	2,120	2,205
Lockyer Valley	380	370	383	396	409
Scenic Rim	778	739	773	807	842

[5] Actuals

[6] Estimated actuals

Service Area	2010/11[5]	2011/12[6]	2012/13	2013/14	2014/15
Somerset	489	423	439	455	472
QUU	32,217	32,708	33,189	33,683	34,186
Trade waste connections					
Brisbane	4,205	4,321	4,368	4,416	4,464
Ipswich	452	424	438	455	4734
QUU	4,657	4,745	4,806	4,871	4,937

QUU does not directly use population as the basis of its forecast. However, QUU does use the OESR population projections to estimate the average occupancy rate in its service area based on the 2011 OESR projection of population medium series divided by the dwelling projections. QUU also uses the low series to adjust the dwelling projections since the OESR does not publish a "low" growth dwelling series. QUU then applies 95% of all growth in dwellings to its "connected" dwellings, the assumption that most new dwellings will be developed in areas that are connected to its network. This growth rate is applied to both residential and non-residential connections.

Table 3-3 shows the comparison of QUU estimated dwelling growth rates against the growth rates from the 2011 projections from the OESR.

- **Table 3-3: Connection, population and dwelling growth rates**

Service Area	QUU Dwellings[7]	2011 OESR "Low" Population	2011 OESR Dwellings	2011 OESR Adj "low" Dwellings
Brisbane	1.2%	0.8%	1.5%	1.1%
Ipswich	4.0%	3.8%	4.9%	4.0%
Lockyer Valley	3.4%	2.3%	2.9%	2.5%
Scenic Rim	4.6%	2.0%	2.7%	1.9%
Somerset	3.8%	1.9%	2.3%	2.1%
QUU	1.7%	1.3%	2.0%	1.6%

[7]QUU, QCA Interim Price Monitoring, Information Return 2012/13 dated 31 August 2012

SKM's view

While QUU does not use population directly in its forecasts, it uses it to develop a "low" dwelling series. In SKM's 2011 review[8], SKM obtained advice from the OESR that the low population series more accurately reflected actual population growth than higher population growth series. This advice was restated in an email from the OESR to the QCA dated 27 August 2012. QUU has adopted this approach in its 2012 submission and made the adjustments to the OESR dwelling growth based on the low population growth scenario. Consistent with SKM's 2011 view that recent population growth has been below the OESR's medium population growth series, QUU has adjusted the OESR's dwelling series using the low population series. SKM concurs that this is appropriate given that recent population growth rates in QUU's area is closer to the OESR "low" population growth projection series than the medium population growth projection series. This can be seen in Table 3-4 where the ABS reports that the estimated residential population growth rates in the five LGA covered by QUU's network has been declining.

The OESR has also advised that estimates of the dwelling projections for years 2012 to 2015 may be obtained by dividing the projected population by the interpolated occupancy rates. Occupancy rates and population for the years 2012 to 2015, may be estimated by taking a linear interpolation between the 2011 and 2016 occupancy rates and population.

- **Table 3-4: Population growth rates**

Service Area	OESR Growth Projection 2011-2016		ABS Estimated Residential Population Growth rates		
	Medium	Low	2008-09	2009-10	2010-11
Brisbane	1.2%	0.8%	2.4%	1.3%	1.3%
Ipswich	4.8%	3.8%	4.7%	3.2%	2.8%
Lockyer Valley	2.6%	2.3%	3.4%	1.8%	1.7%
Scenic Rim	2.8%	2.0%	2.6%	1.4%	0.2%
Somerset	2.1%	1.9%	3.4%	2.8%	1.9%
QUU	1.8%	1.3%	2.7%	1.6%	1.5%

While in 2011, SKM adjusted the dwelling by multiplying the OESR's dwelling projections by the annual low to medium population growth ratio, this has the same effect as the QUU's approach of setting the occupancy rate based on the medium population growth and dividing the low growth population by this occupancy rate to establish a "low" dwelling series. This is illustrated in the following equations:

[8] In 2011, while SKM used the latest (2011) OESR population projections, QUU chose to use the 2008 low growth population series to develop an estimate of the occupancy rate. In the current review both QUU and SKM have utilised the most recent (2011) data from the OESR

QUU approach

$$Dwellings\ ("Low"\ Series) = \frac{OESR\ Dwellings\ (Medium\ Series)}{OESR\ Population\ (Medium\ Series)} * OESR\ Population\ (Low\ Series)$$

The inverse of the term $\frac{OESR\ Dwellings\ (Medium\ Series)}{OESR\ Population\ (Medium\ Series)}$ provides QUU with their estimate of the occupancy rate. While QUU did not explicitly state its estimated persons per connection in its submission, details were provided in its supporting documents and SKM has verified the occupancy rate as shown in Table 3-5.

- **Table 3-5: Estimated occupancy rate**

Service Area	2011	2012	2013	2014	2015	2016
Brisbane	2.47	2.46	2.46	2.45	2.44	2.44
Ipswich	2.70	2.70	2.70	2.69	2.69	2.69
Lockyer Valley	2.62	2.62	2.61	2.60	2.60	2.59
Scenic Rim	2.53	2.53	2.53	2.53	2.53	2.53
Somerset	2.44	2.43	2.43	2.42	2.42	2.41
QUU	2.50	2.50	2.49	2.49	2.48	2.48

SKM's 2011 approach

In 2011, SKM's approach was to adjust the OESR dwelling series by the low to medium population growth ratio as follows to obtain the low dwelling series. This is shown in the following equation:

$$Dwellings\ (Low\ Series) = OESR\ Dwellings\ (Medium\ Series) * \frac{OESR\ Population\ (Low\ Series)}{OESR\ Population\ (Medium\ Series)}$$

An examination of the equations will show that the QUU and SKM approaches are the same for the current review.

SKM accepts the OSER method for estimating the population, occupancy and dwelling rates for 2012 to 2015.

SKM also accepts the assumption that 95% of all growth in the LGA would occur in areas covered by QUU's network. However, SKM is of the opinion that data should be collected over the next few years of new connections to establish the accuracy of this assumption so that adjustments may be made to reflect local conditions.

3.3.1. Connection Numbers

Overall, QUU has forecast 1.7% p.a. connection growth from 2012 to 2013. The growth rates shown in Table 3-3 are applied at the LGA level to the 2012 numbers and range from 1.2% p.a. in Brisbane to 4.6% p.a. in the Scenic Rim. These rates are generally applied to residential and non-residential water and wastewater

connections. These forecasts are based on the 2012 estimates of actual connection numbers. While QUU has only provided connection projections for 2013, Table 3-6 extends this growth through to 2015 as provided for in the Authority's template. These projections are based on QUU's forecasting approach which applies 95% of the annual increase from the adjusted dwelling projections to its residential connections. Non-residential and wastewater connection growth is applied in proportion to the residential growth in the respective LGAs.

SKM's view

The assessment of the methodology applied to estimate connections numbers is hampered by the lack of data. SKM is of the opinion that the approach QUU has taken to forecast its connection numbers is reasonable given the limited amount of historical data available. As available historical data is limited, it is not possible to assess if the connection growth rates proposed are consistent with historical trends. In this environment, we can only recommend that dwelling growth rates projected by the OESR be applied to all connection numbers as QUU has done. SKM agrees with QUU that, as with population projections, growth in water, wastewater and trade waste connection numbers be based on OESR's dwelling projections adjusted by the low population growth series. Table 3-6 shows our recommended connection number projections based on the 2012 connections. SKM has accepted QUU's 2013 projections and has extended the projections to 2014 and 2015 based on the assumption that 95% of the "low" dwelling growth projections shown in Table 3-3 are connected to QUU's residential water network. Growth projections for wastewater and the non-residential sector are in proportion to the residential growth. SKM has accepted the trade waste connection projections proposed by QUU on the basis that the rates proposed are consistent with the growth rates seen in the other connection categories.[9]

- **Table 3-6: Recommended connection projections - QUU**

Service Area	2010/11[10]	2011/12[11]	2012/13	2013/14	2014/15
Residential water connections					
Brisbane	393,432	399,130	404,149	408,837	413,449
Ipswich	61,355	63,108	65,668	68,264	70,972
Lockyer Valley	9,765	10,180	10,521	10,870	11,242
Scenic Rim	5,755	6,168	6,453	6,740	7,034
Somerset	4,596	4,934	5,111	5,295	5,490
QUU	474,903	483,520	491,902	500,007	508,187

[9] While QUU did not provide the detailed breakdown of customer connection numbers to the Authority in the Template, these were included in one of its supporting documents provided to SKM, "Revenue Model_Nolinks 2012.xlsx". SKM's recommended connection projections in Table 3-6 may differ from QUU's values in "Revenue Model_Nolinks 2012.xlsx" due the different way the OESR dwelling projections had been applied. QUU applied a percentage growth rate (rounded to one decimal place) whle SKM applied the average annual growth number based on the increase over the 5 year projection period between 2011 and 2016.

[10] Actuals

[11] Estimated actuals

Service Area	2010/11[10]	2011/12[11]	2012/13	2013/14	2014/15
Non-residential water connections					
Brisbane	29,961	30,497	30,881	31,239	31,591
Ipswich	1,950	1,965	2,044	2,124	2,207
Lockyer Valley	536	511	528	546	564
Scenic Rim	1,341	1,019	1,066	1,114	1,162
Somerset	648	567	587	608	631
QUU	34,436	34,559	35,106	35,630	36,155
Residential wastewater connections					
Brisbane	386,463	391,657	396,582	401,182	405,708
Ipswich	55,238	56,989	59,301	61,645	64,090
Lockyer Valley	3,998	4,240	4,382	4,528	4,682
Scenic Rim	3,994	4,064	4,252	4,441	4,635
Somerset	2,753	3,083	3,194	3,309	3,430
QUU	452,446	460,033	467,711	475,105	482,546
Non-residential wastewater connections					
Brisbane	28,791	29,211	29,578	29,921	30,259
Ipswich	1,779	1,965	2,057	2,138	2,222
Lockyer Valley	380	370	382	395	409
Scenic Rim	778	739	773	808	843
Somerset	489	423	438	454	471
QUU	32,217	32,708	33,229	33,716	34,203
Trade waste connections					
Brisbane	4,205	4,321	4,368	4,416	4,464
Ipswich	452	424	438	455	473
QUU	4,657	4,745	4,806	4,871	4,937

We also note that QUU has also provided a number of connected properties not consuming any water. We understand that these properties are undeveloped land where an access charge is levied as the water supply network reaches the property but no water is consumed. In response to a request from SKM, QUU provided its 2012 revenue model which contained details of properties connected to its system as well as properties which consumed water. Based on 2012 data, SKM has estimated that the proportion of properties not consuming water in QUU's current submission is shown in Table 3-7. These are compared also to similar data provided for

the 2011 review. In most cases, the proportions have shown some movement especially in the regional LGA. The two urban LGAs show similar proportions in 2012 as in 2011. Scenic Rim shows the largest change with the proportion of residential properties not consuming water increasing substantially while that for non-residential properties fall significantly.

- **Table 3-7: Percentage of connections without water consumption**

Service Area	2010/11		2011/12	
	Residential	Non-residential	Residential	Non-residential
Brisbane	3.1%	9.3%	2.8%	9.8%
Ipswich	7.7%	7.6%	7.1%	7.6%
Lockyer Valley	24.6%	31.2%	28.4%	26.6%
Scenic Rim	6.9%	50.3%	11.4%	36.2%
Somerset	13.1%	36.9%	15.7%	32.3%

In response to a query, QUU indicated that the difference in the proportion of non-consuming connections in each of the LGAs is due to improved data cleansing of QUU's information and reflects the continually improving accuracy of the data each year. According to QUU, the 2012/13 data is more accurate than the 2011/12 data. The large difference highlighted earlier in relation to Scenic Rim also reflects the reclassification of some customers from non-residential to residential.

3.4. Water Demand

QUU has forecast water demand to grow from 126.5 GL to 139.1 GL at an average of 3.2% p.a. over the 2012 to 2015 period. This is shown in Table 3-8.

- **Table 3-8: QUU proposed water demand forecast**

Forecast	2010/11[12] (ML)	2011/12[13] (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)	CAGR 2012 – 2015 (%p.a.)
Residential	65,024	71,288	74,750	77,878	81,133	4.4%
Non-residential	38,044	39,699	40,642	41,107	41,582	1.6%
Non-revenue water	17,245	15,469	15,442	15,902	16,375	1.9%
Total water demand	120,314	126,456	130,834	134,887	139,089	3.2%

+ Actuals * Estimated actuals

[12] Actuals

[13] Estimate actuals

3.4.1. Residential consumption

QUU's projection for residential water demand is calculated based on the average daily consumption per person per day multiplied by the average occupancy rate to produce the average daily consumption per connection . Average consumption per connection is multiplied by the number of connections consuming water to derive the residential consumption. As shown in Table 3-8, total residential consumption is forecast to grow at an average of 4.4% p.a. from 74.8 GL in 2012 to 81.1 GL in 2015. The residential water demand for individual LGAs is shown in Table 3-9.

- **Table 3-9: QUU proposed residential water consumption**

Service Area	2010/11[14] (ML)	2011/12[15] (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)	CAGR 2012 – 2015 (%p.a.)
Brisbane	54,043	59,158	61,686	63,949	66,243	3.8%
Ipswich	8,803	9,739	10,510	11,201	11,973	7.1%
Lockyer Valley	947	1,020	1,077	1,146	1,224	6.3%
Scenic Rim	718	784	845	909	977	7.6%
Somerset	513	588	631	672	717	6.8%
QUU	65,024	71,288	74,750	77,878	81,133	4.4%

3.4.2. Average residential consumption

Table 3-10 shows the LPD projected by QUU for each of the LGAs over the forecast period. Based on historic consumption data, QUU has different expected average consumption rates across the five LGAs, reflecting the different customer profiles across these areas.

- **Table 3-10: QUU proposed average residential water consumption rates per person**

Service Area	2011/12 (L/d)	2012/13 (L/d)
Brisbane	170	175
Ipswich	169	175
Lockyer Valley	146	150
Scenic Rim	155	160

[14] Actuals

[15] Estimated actuals

Somerset	160	165

QUU states in its submission that consumption in 2011/12 was influenced by high rainfall and that there is a reasonable likelihood that 2012/13 will be a drier year with higher consumption. QUU has thus applied a slightly higher forecast per capita demand to 2012/13 than current levels of demand.

For its 2012/13 forecast QUU has estimated that per capita demand will increase by 5 LPD from the current average consumption volume in each LGA). This growth factor will be applied up to a maximum of 200 LPD.

From 2012 onwards, QUU has assumed that average non-residential demand per property will increase by 0.5% pa. This conservative growth estimate is influenced by the currently reasonably static demand and the availability of water substitutes (recycled water) which would offset potable water demand growth. QUU is also of the view that water saving practices and Water Efficiency Management Plans (WEMPs) have penetrated deeply into the non-residential customer base and has reduced the likelihood of significant growth in consumption per property.

SKM's view

Comparing QUU's estimate of the 2012 average consumption rate to SKM's 2011 recommendation for 2012 average consumption, it appears that rebound may be slightly slower than SKM envisaged in 2011. Average consumption in Brisbane, Ipswich and Lockyer Valley appear be slightly lower than SKM's 2011 forecast for 2012. However, average consumption in Scenic Rim and Somerset are higher. As QUU had stated, this may be a reflection of the wet conditions in 2011/12 and given the generally drier condition seen in 2012/13, consumption is likely to rebound at a faster pace.

The ability to come to a firmer view of average consumption and its likely level in the forecasting period is hampered by the lack of historical information that reveals the level of average consumption prior to the drought together with the uncertainty surrounding the impact of the lifting of restrictions and their replacement by Permanent Water Conservation Measures (PWCM). This lack of data impacts on our ability to predict the level at which rebound will likely settle and the rate at which it may be expected to rebound. Also in our discussions with QUU, it was stated that demand has been static and that rebound does not appear to be occurring. However, it was noted that the weather conditions since the drought ended have been relatively wet. This means that potential rebound from the lifting of restrictions may have been masked by the wet condition reducing the need to water gardens and other outdoor uses. A clearer picture of rebound may be available after the 2012/13 year where conditions are expected to be drier and with Brisbane having recently experienced a fairly dry winter and early spring.

SKM agrees that the average consumption rate in 2011/12 is likely to have been affected by the wet weather in SEQ. SKM also agrees that it is likely that consumption will rebound in 2012/13 with the onset of drier conditions. We also agree that 200 LPD is an appropriate estimate of the level at which rebound growth will cease. However, SKM notes that 200 LPD is the voluntary target set by the QWC for all of SEQ rather than a firm target that is to be achieved uniformly across all SEQ LGAs.

In our 2011 review, SKM stated that we expect rebound to occur over a four to five year period and settle at a level around the 200 LPD voluntary target set by the Queensland Government for the whole of SEQ. Based on this expectation, we proposed that the average consumption be adjusted to reflect rebound to an SEQ average consumption level of 200 LPD over 4.5 years for Brisbane and Ipswich. For the three relatively rural regions of the Lockyer Valley, Scenic Rim and Somerset, rebound may take longer than the 4 to 5 years estimate to complete. Rural customers have traditionally also been more willing to use alternative sources of water including rainwater tanks and ground water to supplement their water supply. Given the severity of the drought, it is likely that customers in these areas have installed such alternative supplies which we expect will continue to be used. However, given the lack of data especially in respect of data providing an indication of post drought water consumption behaviour, it is difficult to be definitive about the likely rebound in average consumption. Nevertheless, to reflect the expectation that it may take longer to rebound from a low consumption base, SKM recommended applying an eight year rebound period for Lockyer Valley, Scenic Rim and Somerset from 2011 when the drought ended and restrictions eased. SKM has not received any additional or new information to change this view.

Based on SKM's 2011 review recommendation of the rebound target of individual LGAs, where we assumed that average consumption will settle at a level that averages to the 200 LPD voluntary target set by the Queensland Government for SEQ as a whole, and taking current average residential consumption rates into account, SKM estimates that when rebound stabilises in 2015/16 in Brisbane and Ipswich, the average consumption level in these LGAs will be around 196 LPD.[16] In the rural LGAs of Lockyer Valley, Scenic Rim and Somerset, with rebound taking longer, average consumption is assumed to stabilise in 2018/19. The resulting assumed average consumption levels for each of the LGAs is shown in Table 3-11. SKM notes that the recommended average residential water consumption rates are not significantly different from those proposed by QUU for 2012/13.

- **Table 3-11: Recommended forecast average residential water consumption rates per person**

Service Area	2011/12 (L/d)	2012/13 (L/d)	2013/14 (L/d)	2014/15 (L/d)	2015/16 (L/d)
Brisbane	170	176	183	189	196
Ipswich	169	175	181	188	196
Lockyer Valley	146	150	155	159	164
Scenic Rim	155	158	161	164	167
Somerset	160	162	165	167	170

[16] In 2011, SKM had the benefit of estimating the different target rebound levels as all SEQ LGA's average consumption levels were available for analysis. In the current review, while we have access to QUU's and Unitywater's average consumption for the LGA's that their networks cover, SKM does not have access to the average consumption from Redlands, Logan and the Gold Coast. We have based our current estimates on the average consumption levels for these LGAs from the 2011 review (updated for Sunshine Coast – see Section 4.5.1).

3.4.3. Residential water demand recommendation

To be consistent with the method adopted by QUU, we have multiplied our recommended average consumption rate projections by the occupancy rate to derive a projection of the average consumption per residential connection. The recommended residential water consumption projection may be obtained by applying these rates to the adjusted dwelling projections. These projections are shown in Table 3-12.

- **Table 3-12: Recommended residential water consumption projection**

Service Area	2011/12[17]	2012/13	2013/14	2014/15	CAGR 2012 – 2015 (%p.a.)
Brisbane	59,158	62,060	64,867	67,780	4.6%
Ipswich	9,739	10,514	11,310	12,168	7.7%
Lockyer Valley	1,020	1,078	1,143	1,213	6.0%
Scenic Rim	784	834	889	946	6.5%
Somerset	588	620	651	683	5.1%
QUU	71,288	75,107	78,860	82,790	5.1%

3.4.4. Non-residential consumption

Non-residential water demand is calculated based on the average daily consumption per connection. Average consumption is multiplied by the number of non-residential connections to derive total non-residential consumption. As shown in Table 3-8 and Table 3-13, total non-residential consumption is forecast to grow at an average of 1.5% from 37.5 GL in 2011 to 39.2 GL in 2014. The QUU proposed non-residential water demand for individual LGAs is shown in Table 3-13. The non-residential water demand increase at the Lockyer Valley proposed by QUU is almost 190% between 2012 and 2013. This is due to the plans for a large water user locating a plant(s) that is expected to consume about 0.5 GL p.a. in the Lockyer Valley

[17] Estimated actuals

- **Table 3-13: QUU proposed non-residential water consumption projections**

Service Area	2011/12[18]	2012/13	2013/14	2014/15	CAGR 2012 – 2015 (%p.a.)
Brisbane	34,017	34,354	34,696	35,042	1.0%
Ipswich	4,441	4,519	4,600	4,683	1.8%
Lockyer Valley	263	762	775	789	44.2%
Scenic Rim	330	347	364	382	5.0%
Somerset	648	660	672	685	1.9%
QUU	39,699	40,642	41,107	41,581	1.6%

* Estimated actuals

3.4.5. Average non-residential consumption (litres per connection per day)

Given the lack of historical data, it difficult to draw any conclusions on average non-residential consumption. Information provided to SKM, indicates that QUU divides its non-residential customer base into two categories, monthly and quarterly accounts. The majority of accounts are quarterly accounts. These are smaller accounts than the monthly accounts. In Brisbane, monthly accounts are assessed on average to consume over 75 times more water than the quarterly accounts (in Brisbane in 2012, quarterly accounts are assessed to consume an average of 514kL p.a. while monthly accounts consume over 38.7 ML pa). The average consumptions of both types of accounts are assumed to grow at 0.5% pa. For Ipswich, while the difference is even greater with month accounts consuming over 150 times that of quarterly accounts. The proposed average non-residential consumption rates are shown in Table 3-14.

- **Table 3-14: QUU proposed non-residential average water consumption rates**

Service Area	Billing Frequency	2011/12[19] (kL/annum)	2012/13 (kL/annum)	2013/14 (kL/annum)	2014/15 (kL/annum)	CAGR 2012 – 2015 (%p.a.)
Brisbane	Quarterly	513	516	518	521	0.5%
	Monthly	38,687	38,880	39,074	39,270	0.5%
Ipswich	Quarterly	776	780	784	788	0.5%
	Monthly	122,065	122,676	123,289	123,906	0.5%
Lockyer Valley	Quarterly	702	705	709	712	0.5%

[18] Estimated actuals

[19] Estimated actuals

	Monthly	486,000	488,430	490,872	493,327	0.5%
Scenic Rim	Quarterly	508	510	513	515	0.5%
	Monthly	N.A.	N.A.	N.A.	N.A.	N.A.
Somerset	Quarterly	600	603	606	609	0.5%
	Monthly	417,806	419,895	421,995	424,104	0.5%

The vast majority of accounts are quarterly accounts. As discussed earlier, there is only one month account in the Lockyer Valley and another in Somerset. In Brisbane there are 521 monthly accounts and 25 in Ipswich. QUU has assumed that these monthly account numbers will remain stable over the forecast period.

SKM's view

Given the lack of historical data, we are unable to verify the average daily consumption of each non-residential connection in each LGA in QUU's area as used by QUU in its forecast. However, we note that rebound is unlikely to be a major issue in non-residential consumption. Reductions in business consumption during the drought are largely structural and these reduction measures continue to be applicable with the lifting of restrictions. Attempts also continue to ensure that businesses continue with efforts to reduce water use through the WEMP. This is likely to constrain growth in non-domestic water consumption. We accept that some increase in consumption is likely in 2012 as normal weather returns from the wet conditions experienced in 2011. However, non-residential demand is not as greatly impacted by wet weather as residential demand.

As the forecast numbers are understood to be estimates projected from actual metered data, we consider the forecast average consumption of non-residential customers to be reasonable. We also consider the assumed average consumption growth rate of 0.5% p.a. to be reasonable for the reasons set out above. SKM also accepts the assumption that the number of monthly accounts remains constant over the forecast period.

3.4.6. Non-residential water demand recommendation

Our recommended non-residential water consumption projections have been obtained by applying the recommended average non-residential water consumption rates shown in Table 3-14 to the number of non-residential customer connections (Table 3-6) based on the adjusted 2011 OESR dwelling projections after making adjustments for the number of non-water consuming connections (Table 3-7). The calculations were undertaken on quarterly and monthly accounts then summed to provide the non-residential water demand projections shown in Table 3-15. There is minimal difference between the non-residential water consumption projections proposed by QUU and that SKM has estimated.

- **Table 3-15: SKM's recommended non-residential water consumption projections (ML)**

Service Area	2011/12[20]	2012/13	2013/14	2014/15
Brisbane	34,017	34,365	34,704	35,043
Ipswich	4,441	4,519	4,600	4,683
Lockyer Valley	263	761	774	788
Scenic Rim	330	347	364	382
Somerset	648	659	671	684
QUU	39,699	40,652	41,114	41,580

3.5. Recycled Water

QUU provides recycled water to non-residential customers in Brisbane and Ipswich. Since 2009, the supply of recycled water in Brisbane grew at 19% (2010) and 14% (2011) to 6,615 ML. However, with the easing of restrictions, the use of recycled water has not increased in 2012. QUU expects recycled water demand to reduce in 2013 and has maintained the consumption of recycled water in Brisbane at the 2013 level of 6,500 ML. Some 116 ML of recycled water was also supplied to non-residential customers in Ipswich in 2011. This level of supply is expected to be maintained in the forecast period as shown in Table 3-16.

[20] Estimated actuals

- **Table 3-16: QUU recycled water projections**

Service Area	2008/09 (ML)	2009/10 (ML)	2010/11 (ML)	2011/12 (ML)[21]	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)
Brisbane	4,905	5,815	6,615	6,615	6,500	6,500	6,500
Ipswich	0	0	116	116	116	116	116
Total recycled water demand	4,905	5,815	6,731	6,731	6,616	6,616	6,616

SKM's view

Given limited data and the fact that QUU has simply maintained the expected supply of recycled water at current levels we have not expended significant effort to review recycled water forecasts. As QUU has provided no reasons why demand for recycled water is projected to reduce to 6.5GL[22], SKM is of the opinion that it would be prudent to maintain the demand for recycled water consumption at the current level of 6,615 ML in Brisbane. This is shown in Table 3-17.

- **Table 3-17: Recommended recycled water forecast**

Recycled water (ML)	2011/12 (ML)[23]	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)
Brisbane	6,615	6,615	6,615	6,615
Ipswich	116	116	116	116
Total recycled water demand	6,731	6,731	6,731	6,731

* Estimated actuals

3.6. Non-revenue Water

Non-revenue water is the difference between bulk supply data (water use supplied by the SEQ Water Grid Manager) and billable consumption from residential and non-residential customers. This includes network leakage, water theft and authorised unbilled water consumption (eg fire fighting and pipe flushing). This component of water consumption however is highly uncertain given the lack of data as is the level of water theft and unbilled authorised consumption. We understand that the baseline forecast for non-revenue water use is based on a historical estimate (2005/06) of non-revenue water use less estimated savings from leakage reduction programs plus growth in losses from leaks.

[21] Estimated actuals

[22] In its "User Guide", QUU indicated that it rounds off recycled water to the nearest 500ML. We note that this is rounding provision is greater than the quantity of recycled water supplied to Ipswich.

[23] Estimated actuals

QUU's approach to estimate non-revenue water demand is based on historic levels of non-revenue water as a percentage of bulk water demand. The percentage varies across each council district and the QUU states that the percentages are as shown in Table 3-18.

- **Table 3-18: Proposed non-revenue water percentages and levels (ML)**

Service Area	Proposed %	2010/11 (ML)	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)
Brisbane	12.5%	15,185	13,923	13,720	14,092	14,469
Ipswich	6%	949	905	959	1,009	1,063
Lockyer Valley	15%	619	226	325	339	355
Scenic Rim	15%	339	197	210	225	240
Somerset	15%	153	218	228	237	247
QUU		17,245	15,469	15,442	15,902	16,375

As a percentage of total QUU bulk water demand, the peak in 2011 accounted for over 14% of total water use by QUU. This fell to 12% in 2012 and is expected to fall further to 11.8% for the remaining years till 2015.

SKM understands that the leakage component of non-revenue water is loosely related to the number of connections rather than volume of water demand assuming that water pressure remains the same. However, there are no clear drivers of the other components of non-revenue water. Connection (both residential and non-residential) is expected to grow at about 1.6% p.a. and we thus would expect leakage to grow at approximately that same rate. There may even be an argument for growth in leakage to be lower than growth in connections as we would expect that new connections will have lower leakages as these new connections would be useing newer water distribution infrastructure. Between 2012 and 2015, QUU has forecast non-revenue water to grow at 1.9% pa. This growth rate is higher than the growth in connections. From the submitted information, it appears that non-revenue water peaked in 2011 when over 17 GL was lost. In 2012, non-revenue water had declined to about 15.5GL and is expected to remain at around this level in 2013. Non-revenue water then increases at 3% p.a. for 2014 and 2015.

As a percentage of water demand, the peak in 2011 accounted for over 14% of total water use by QUU. This fell to 12% in 2012[24] and is expected to fall further to 11.8% for the remaining years till 2015. It thus exhibits a fair degree of annual variation and SKM acknowledges the high uncertainty of this category. The reduction may also reflect ongoing measures to reduce leakage and the installation of new infrastructure (either new network or replacement of network sections. Nevertheless, for the projected forecast period, while the estimated growth

[24] In the QUU proposal template, Brisbane's 2012 non-revenue water was 13% of bulk water demand instead of 12.5%. This resulted in the overall percentage of non-revenue water for 2012 being higher than the remaining years. In our recommended forecast, SKM has reduced this to QUU's proposed 12.5% for 2012.

appears high, non revenue water levels at11.8% of total water consumption are not unreasonable and hence these growth projections are considered reasonable given the levels of uncertainty.

Hence the percentages for non-revenue water proposed by QUU are not unreasonable when compared with the non-revenue water levels submitted in its 2011 proposal. In 2011, QUU's non-revenue water amount to about 11% of its bulk water projections. At the same review, Allconnex submitted non-revenue water amounting to around 9% of bulk water while Unitywater's non-revenue water was 10.8% of bulk water demand. In the current review, Unitywater has proposed non-revenue water amounting to 10.1% and 11.5% of Moreton Bay and Sunshine Coast bulk water demand respectively. QUU's proposed average non-revenue water amounting to about 11.8% while a little higher than the benchmarks set by other the areas is considered reasonable and SKM accepts QUU's proposed ratio of non-revenue water to total water demand. SKM thus recommends that the Authority accepts the non-revenue water percentages shown in

Table 3-18. However, due to slight differences in water consumption forecasts SKM's recommendation in Table 3-19 is slightly different from proposed by QUU.

- **Table 3-19: Recommended non-revenue water (ML)**

Service Area	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)
Brisbane	13,923	13,765	14,225	14,689
Ipswich	905	960	1,016	1,076
Lockyer Valley	226	325	338	353
Scenic Rim	197	208	221	234
Somerset	218	226	233	241
QUU	15,469	15,493	16,033	16,593

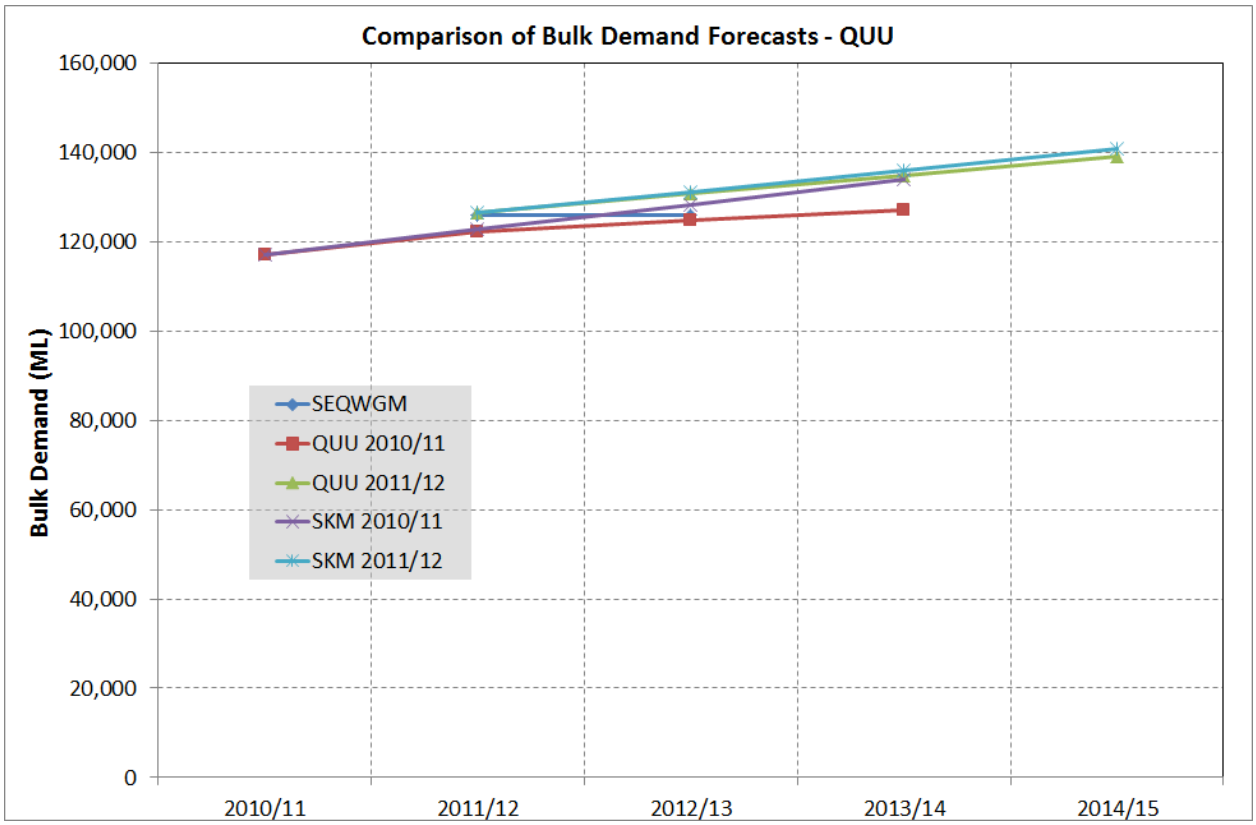
3.7. Bulk Water Demand

Bulk water demand is simply the sum of total residential and non-residential water demand together with the estimated quantity of non-revenue water. The proposed QUU and SKM's estimate of bulk water is shown in Table 3-20. A comparison with current and previous years forecasts is shown in Figure 3-6.

- **Table 3-20: Bulk water demand projections**

Bulk Water (ML)	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)
QUU Proposed				
Brisbane	107,097	109,761	112,737	115,755
Ispwich	15,085	15,988	16,809	17,719
Lockyer Valley	1,509	2,164	2,261	2,368
Scenic Rim	1,310	1,402	1,498	1,599

Bulk Water (ML)	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)
Somerset	1,454	1,519	1,582	1,649
QUU	126,456	130,834	134,887	139,089
SKM Recommended				
Brisbane	107,097	110,201	113,796	117,512
Ispwich	15,085	15,993	16,926	17,927
Lockyer Valley	1,509	2,164	2,256	2,354
Scenic Rim	1,310	1,390	1,474	1,562
Somerset	1,454	1,505	1,555	1,609
QUU	126,456	131,253	136,007	140,964



- **Figure 3-6: Comparison of Bulk Demand Forecasts - QUU**

3.8. Long-Term Population and Demand Forecasts

As outlined above, long-term demand forecasts are utilised by QUU in the forecasting of capital works. Currently QUU utilises the low population series in the near term (2011-2016) and transitions to the medium population series over the medium term (2017 to 2026) and then follows the medium population series until the limit of the OESR forecasts (2027 to 2031). Beyond the OESR forecasts, populations are increased numerically each year by the average of the numerical increase from 2022 to 2031.

The OESR only produces dwelling forecasts for the medium population series and QUU utilises household size forecasts to convert the low and transition populations into dwellings.

QUU currently uses the 2008 version of the OESR medium population series to maintain consistency between demand for services and the costs of supply of services within the long term models, which also utilise the 2008 version of the OESR medium series.

Thus there are 3 fundamental assumptions governing the forecasts:

1) That in spite of current populations tracking against the low series, population will transition to the medium series in the medium to long-term;

2) That medium population series household size forecasts are an appropriate determinant of dwelling formation for the low and transition series; and

3) Beyond 2031, populations will increase in aggregate terms as they have over the period 2022 to 2031.

SKM's view

With the population currently tracking against the low series, SKM supports the approach of using the period from 2017 to 2026 to transition from the low to the medium series. At the current time and under normal conditions, the rates of growth and/or population increases associated with the medium series still represent the OESR's best estimate of the outlook for growth in the medium to longer term. The current slow growth may be associated with a number of factors linked to the current global economic conditions and the fiscal outlook for state governments in Australia.

SKM notes that there is a significant difference in the 2008 and 2011 low population series forecasts. These differences are illustrated in Figure 3-7 below, which shows the difference in population outcomes using either the 2008 or 2011 medium series forecasts in the QUU methodology. SKM recognises that the master planning process is an extended one and that in the process of their development or very soon after, population forecasts may be made redundant by the issue of updated forecasts. QUU should look to use the most recent OESR medium series at the earliest opportunity.

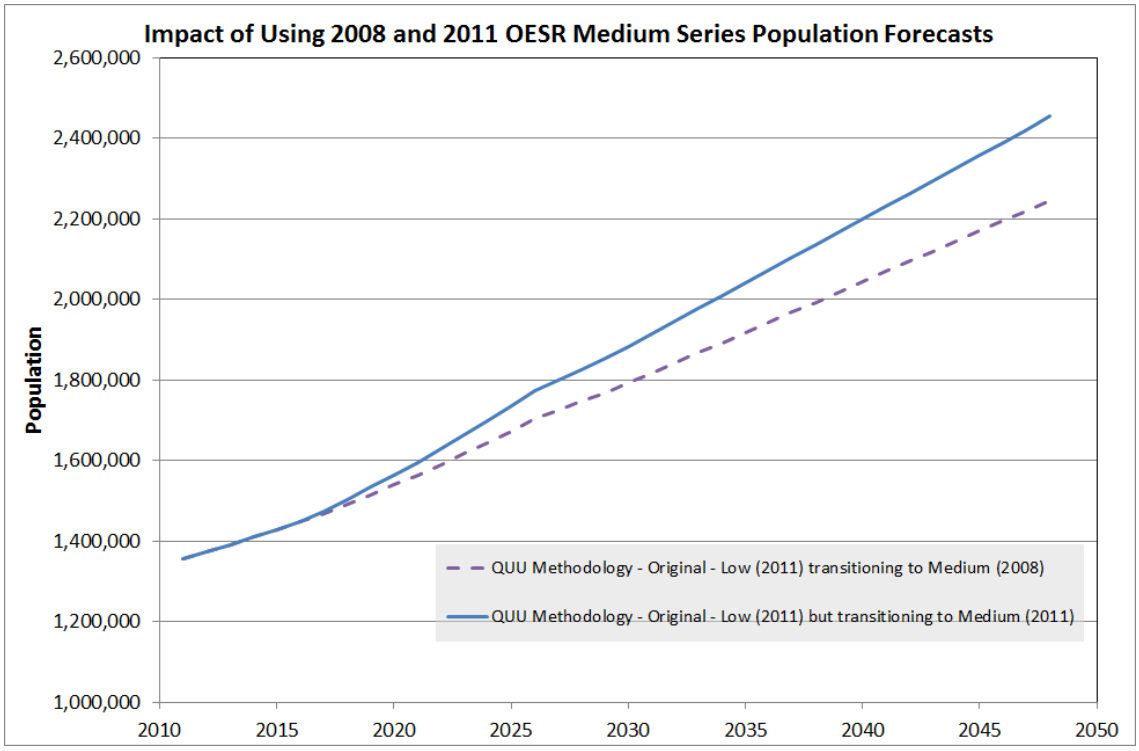


Figure 3-7: Impact of Using 2008 and 2011 OESR Medium Series Population Forecasts

In reference to the medium and long-term forecasts, SKM believes that it is inappropriate, that the period 2022 to 2031 utilises an accelerated rate of growth to transition to the medium population series. It is more appropriate over that period to transition to the growth rates or population changes associated with the medium series rather than the medium series forecasts themselves. QUU should modify its methodology to utilise either the rates or population increase figures associated with the OESR medium series as opposed to the actual population figures themselves.

In addition, beyond 2031, where QUU has previously used a constant annual increase in population (the average over 2022 to 2031), an extrapolation of growth rates should be used. Examples of the types of extrapolations that could be applied are shown in Figure 3-8 to Figure 3-12.

SKM recognises that this extrapolation may not be as straightforward in some areas, where clear trends in OESR forecast growth rates are not clear. Most of this uncertainty however, is likely to be at the end of the forecasting period, which will inherently have less of an impact on outcomes. Given that most rates of population growth will decline in the long run (the Brisbane case is a clear example of this), in cases where there is a short to medium term increase in growth rates our examples have selectively chosen data points for curve fitting at the end of the data. This may not be the most appropriate approach and QUU should consult

with OESR about approaches for extrapolating the long-term population growth rates before adopting an approach.

The resulting change in forecasts is shown in Figure 3-13. It clearly shows that to simply transition to the medium forecast over the period 2017 to 2026 will over-estimate future population. In addition, the reliance on average aggregate population increases over 2022 to 2031 for forecasts beyond 2031 will also over-estimate long-term rates of growth.

These changes are not considered a high priority, given that the forecasts of capital contributions are only anticipated to impact on water prices in the short-term, where under most regulatory frameworks there is an interaction between capital contributions and periodic water bill charges that will correct for any error in contributions forecasts. Nonetheless, it is in QUU's interests to have confidence in their medium and long-term forward capital planning estimates.

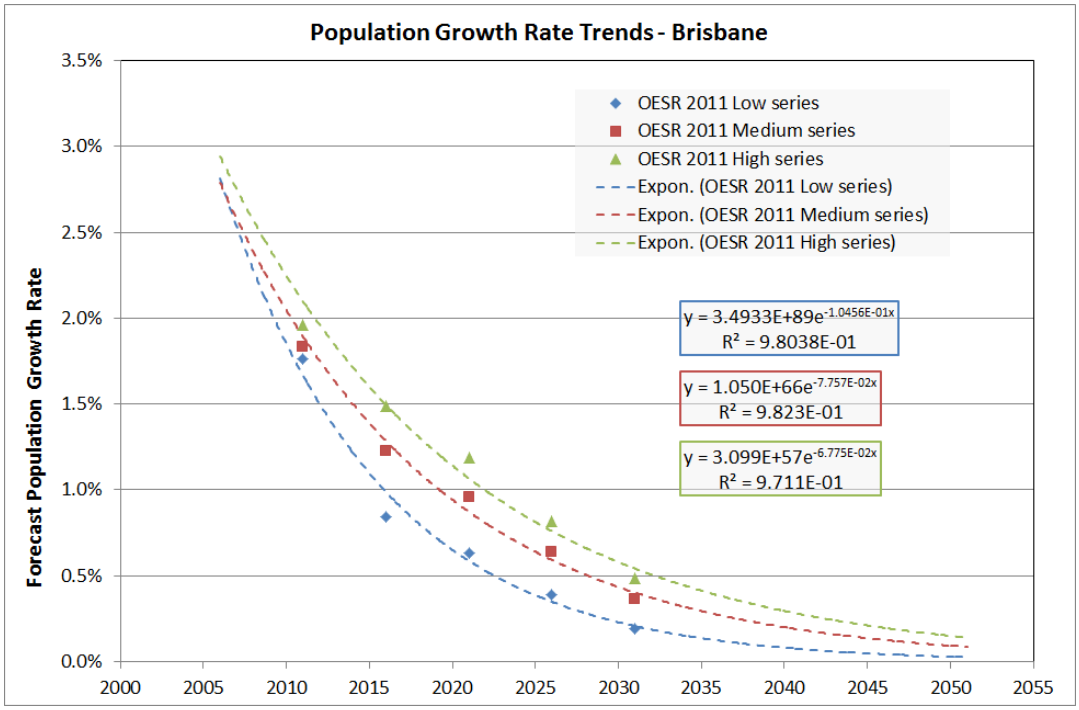
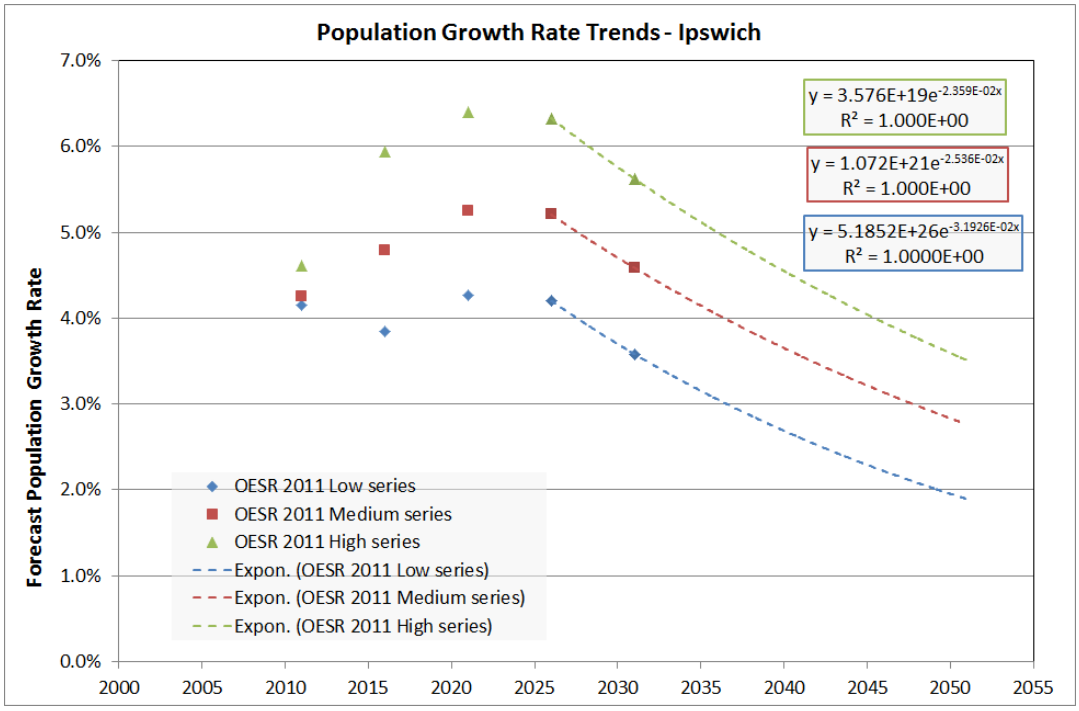
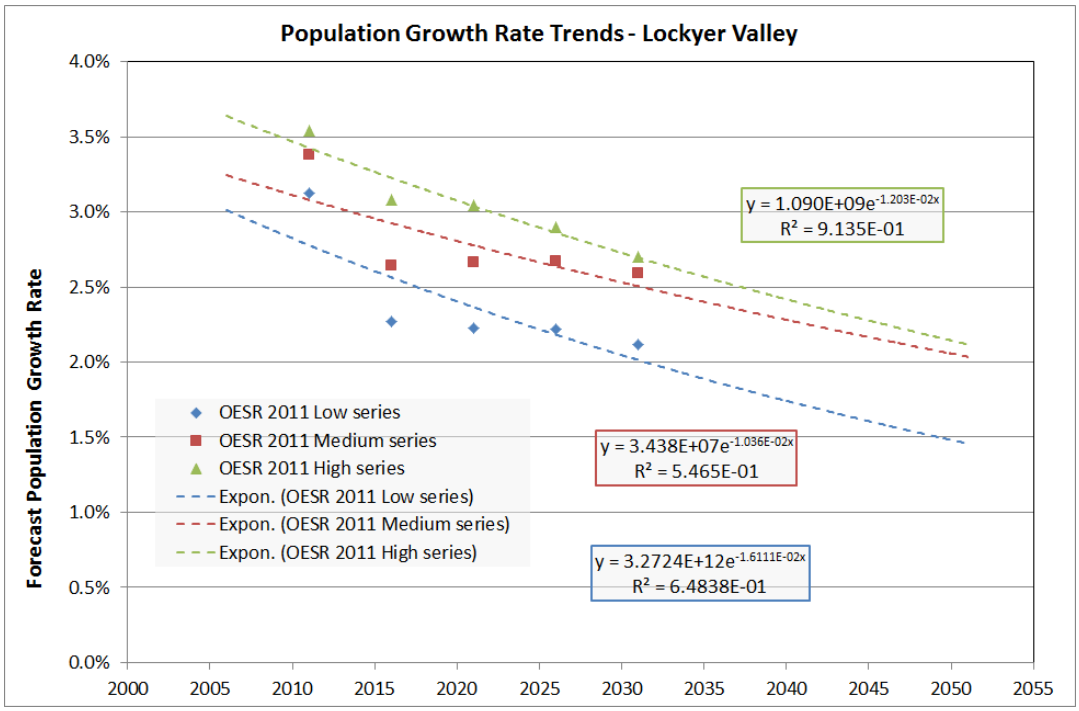


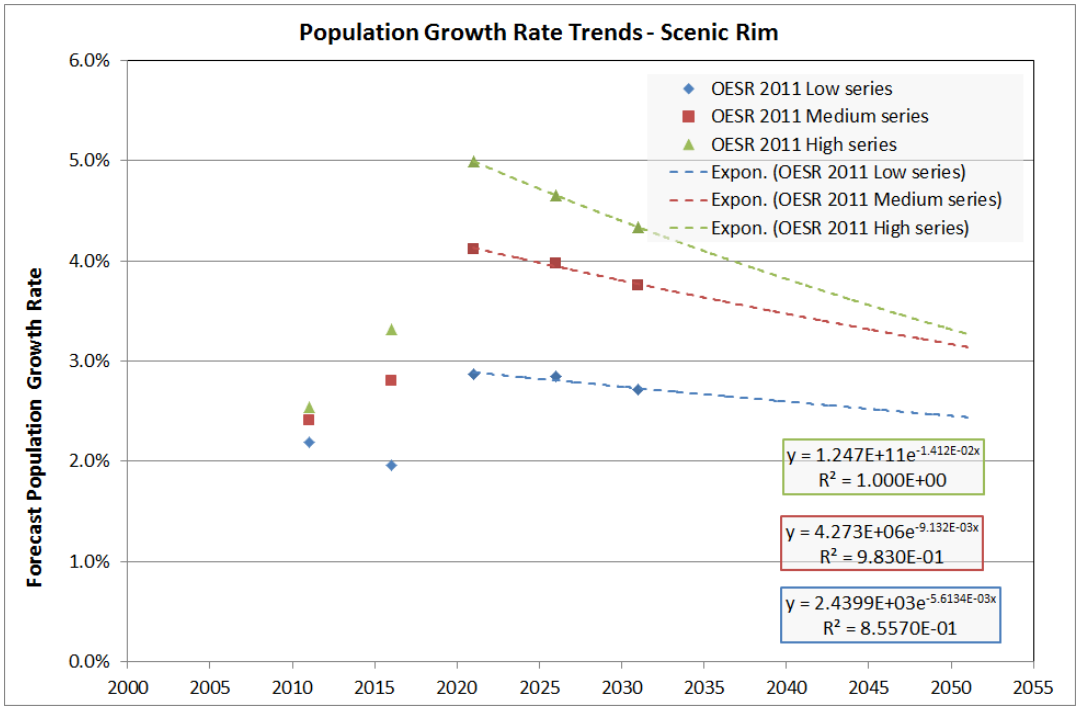
Figure 3-8: Population Growth Rate Trends - Brisbane



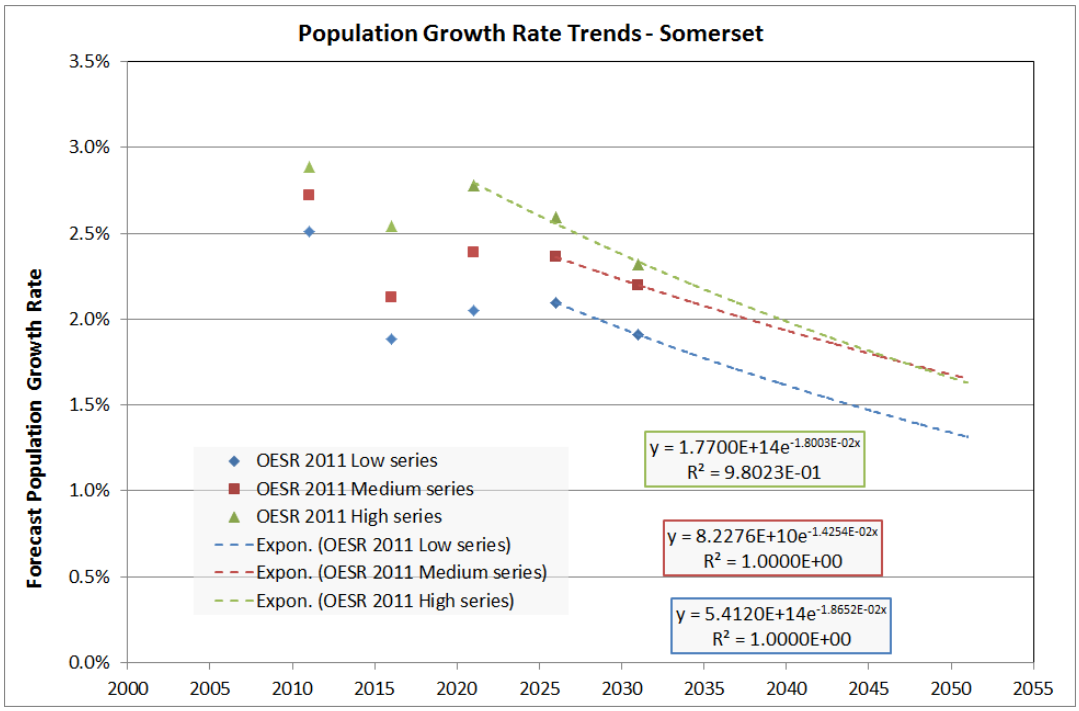
- **Figure 3-9: Population Growth Rate Trends - Ipswich**



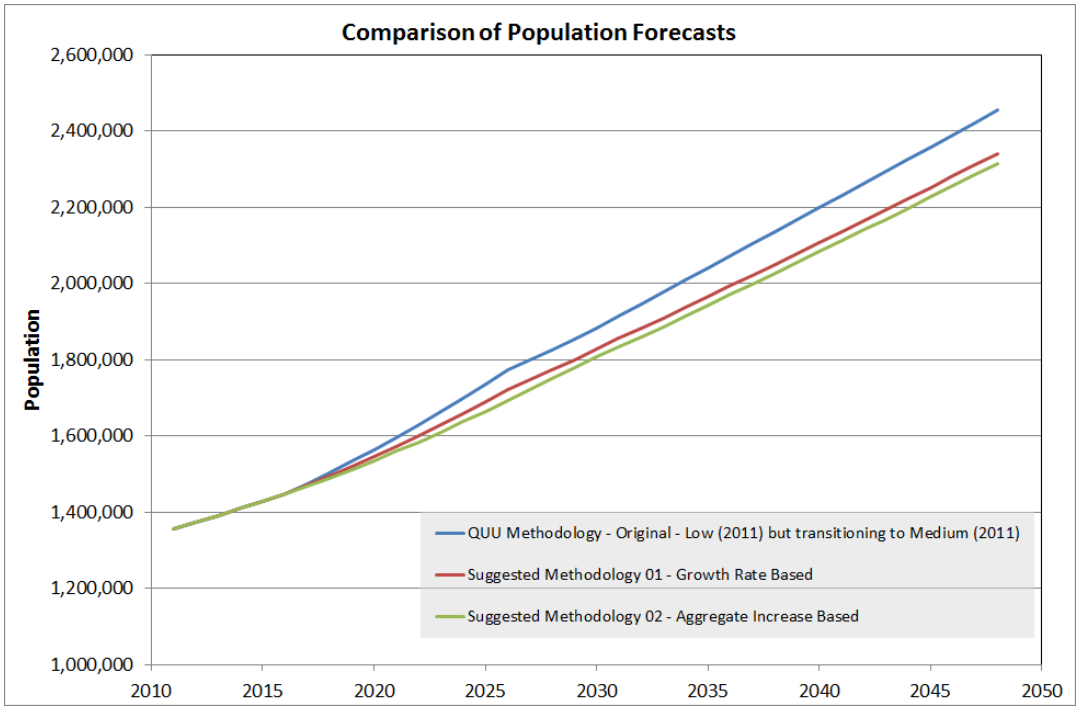
- **Figure 3-10: Population Growth Rate Trends - Lockyer Valley**



- **Figure 3-11: Population Growth Rate Trends - Scenic Rim**



- **Figure 3-12: Population Growth Rate Trends - Somerset**



- **Figure 3-13: Comparison of Population Forecasts - Current and Alternative Methodologies**

3.9. Demand Factors

QUU uses long-term demand forecasts to forecast future capital investment in infrastructure servicing new and infill development areas. Population projections from the OESR are used to generate future populations which are disaggregated into different supply zones within the QUU supply system utilising Council land use planning information. Residential populations are further disaggregated into four different dwelling densities:

- Low Residential (LR) – for low density
- Restricted Supply (RS)
- High Residential (HR) for medium and high density residential;
- Rural Residential (RR).

Estimates of the non-residential demand are also prepared utilising Council forecasts of land use. Smaller non-residential land uses are converted into the equivalent of residential occupants or Equivalent Persons (E.P.'s). For larger non-residential users, QUU uses separate estimates of average and peak demand that take account of the expected water uses.

Where historical data on average demand and peaking factors is available from systems or large water users similar to the one being planned, it is QUU's preference to apply these average demands and demand factors.

Where this historical data is not available, QUU utilise a single set of residential demand factors for planning. These are set out in QUU Water and Wastewater Network Planning Guideline (QUU 2011). All customer types are converted to equivalent residential occupants (Equivalent Persons or E.P.'s) and residential demand peaking factors are applied. Identical peaking factors are utilised for all residential customer types, with the exception of restricted supply customers which have lower peaking factors for peak day and peak hour demands. Population estimates are multiplied by an average demand per unit E.P. to generate estimates of average demands. These unit rates are 230 LPD for LR and RS residential, 165 LPD for HR residential E.P.'s and 300 LPD for Rural Residential.

The standard approach used by water utilities around Australia for the estimation of the infrastructure required to serve future communities is the application of demand factors on the average demand. Different parts of the water supply and wastewater system are designed by applying a series of peaking factors to the average demands. Key design demand utilised in South East Queensland are:

- Mean day maximum month (MDMM);
- Peak day (PD); and
- Peak hour (PH).

The use of demand factors on average demands is a standard approach utilised by water utilities across Australia and supported in the Water Supply and Sewerage Codes of Australia published by the Water Services Association of Australia (WSAA).

SKM's view

SKM is of the view that the average demand factors applied for different types of residential customers are reasonable. For peaking demand factors, many water utilities across Australia have different peaking factors for different types of residential and non-residential development. QUU should look to recognise the diversity of peaking factors not only in the different types of residential customers, but also in the non-residential sector.

This may allow improved design of infrastructure, particularly in areas where urban renewal may result in a significant mix of commercial and high density residential water uses that are atypical of new suburb development areas. In the non-residential sector, SKM would suggest that QUU move to include separate classification of customers as:

- Commercial/Public;
- Industrial; and
- Tourist

SKM are of the view that these modifications to the existing approach could enable more efficient capital expenditure, although we acknowledge that QUU's separate treatment of large non-residential users may mitigate some of the benefits of making this transition.

It is understood that QUU are examining some of these issues in their participation in the production of the South East Queensland Design Code.

3.10. Feasibility Plans

QUU undertakes master planning for areas many years in advance of the construction dates for new water and wastewater infrastructure. To refine the conceptual design and/or sizing of the infrastructure, QUU develops a feasibility plan in the 2 to 5 years prior to the forecast construction date. In the development of that plan, QUU states in their demand forecasting user guide (Queensland Urban Utilities, 2012) that population and demand forecasts are updated using more recent information. The guide then states that to be conservative, the higher of either the master plan or updated demands is selected for feasibility planning.

SKM's View

Updated information is by nature likely to be a more recent and thus more accurate forecast of future demands and infrastructure needs. SKM would recommend that the updated forecasts be adopted for feasibility planning.

3.11. Developer Donations and Capital Contributions

QUU forecasts annual developer donations on the basis of the average of the last three years of receipts. This average is corrected for price movements in construction costs and indexed in line with forecasts of future E.T.'s. The final forecasts have been manually altered in the next two years based on QUU's assessment of ABS and Queensland Treasury and Trade Dwelling statistics (Table 3-21).

- **Table 3-21: Assumed Changes in Donated Water and Wastewater Assets Forecasts due to Slowing Development**

Service Area	Assumed Change 2012/13	Assumed Change 2013/14
Brisbane	-7.5%	2.5%
Ipswich	-15.0%	2.5%
Lockyer Valley, Scenic Rim & Somerset	-15.0%	2.5%

Forecasts of capital contributions are developed from future forecasts of E.T.'s that are based on the population forecasts outlined in Section 0. Forecasts of population are used to estimate the number of residential and non-residential Equivalent Tenements (E.T.'s). These are generated for each local government area with slightly different approaches used. For Brisbane and Ipswich, formal population models are used which distribute the

OESR forecasts to individual planning zones. For Scenic Rim, Lockyer Valley and Somerset, population growth is distributed in planning zones by QUU on the basis of planning information provided by the Councils.

In the short-term, and over the time span of a typical regulatory period, forecasts of growth in the number of E.T.'s is used to which in turn are used to estimate the capital contributions for the regulatory period

The planning zones are the basis for estimating the infrastructure required to service future development and this in turn determines the capital contributions required per tenement to recover costs. This infrastructure planning work is undertaken over a number of years and it is likely that population forecasts will be replaced by a newer series by the time that the infrastructure planning process is completed.

At the current time charges are levied under three schemes:

1) Planning Scheme Policy (PSP) zone charges – these charges per ET are based on a previous round of capital planning and apply to all development that has been approved prior to July 2011;
2) The Maximum Allowable Charge (MAC), which for the water utility businesses capped developer charges for water and wastewater for approvals granted between July 2011 and June 2013. These are set on the basis of the size of dwelling for residential and the gross floor area for non-residential; and
3) The Utility Model Charge, based on Priority Infrastructure Plan charges per E.T. These charges were to replace the PSP zone charges before the introduction of the MAC and are currently anticipated to apply to approvals commencing in July 2013.

The Utility Model charges are reduced by 33% to ensure that future charges are more compatible with historical levels. In preparing forecasts of future revenue QUU has assumed that receipts from capital contributions will transition over time from partial dependence on the PSP and MAC charges to full dependence on the Utility Model in 2017/18 as shown in Table 3-22.

- **Table 3-22: Assumed Receipts from Different Capital Contributions Charging Regimes**

Charge Type	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
PSP Charge %	75%	40%	20%	0%	0%	0%	0%
Max Adopted Charge %	25%	60%	80%	75%	40%	20%	0%
Utility Model Charge %	0%	0%	0%	25%	60%	80%	100%
Total	100%	100%	100%	100%	100%	100%	100%

The final forecasts of capital contributions are adjusted based on predictions about short to medium term development outcomes. These adjustment factors vary from both across service areas and during the forecast period before phasing out in 2023/24.

- **Table 3-23: Adjustment Factors for Forecast Capital Contributions**

Service Area	2012/13	FY14	FY15	FY16	FY17	…	FY23	FY24
Brisbane	95%	95%	95%	95%	95%	…	95%	100%
Ipswich	33%	45%	55%	60%	85%	…	85%	100%
Lockyer	80%	90%	90%	90%	95%	…	95%	100%
Scenic Rim	80%	90%	90%	90%	95%	…	95%	100%
Somerset	80%	90%	90%	90%	95%	…	95%	100%

SKM's View

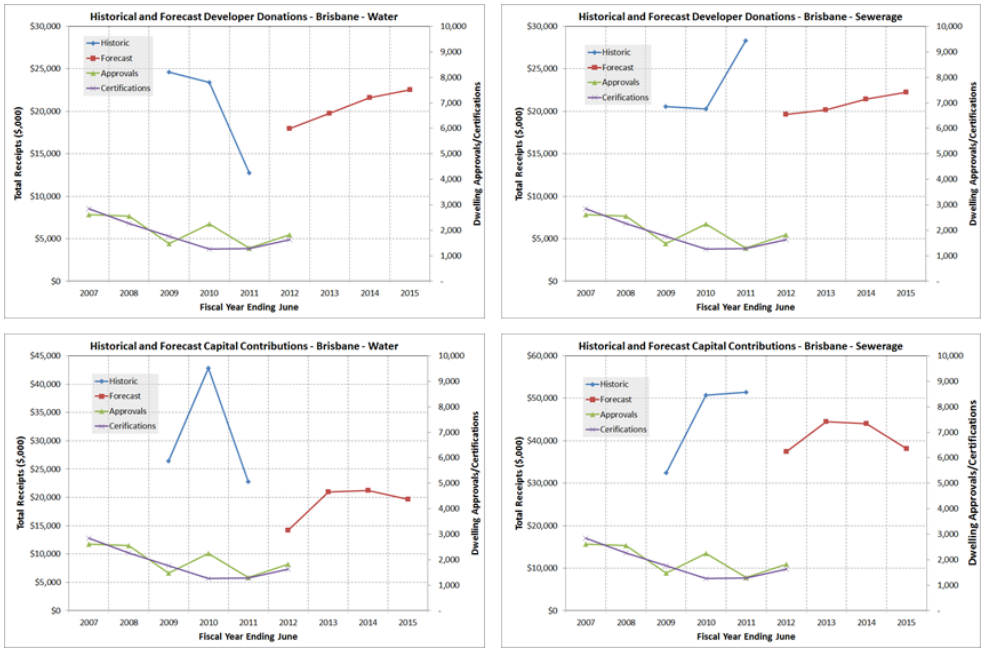
A comparison for historical donations and contributions data and dwelling approvals and certifications for Brisbane and Ipswich (Queensland Treasury and Trade, 2012) are shown in Figure 3-14 and Figure 3-15. It is of some concern that in many cases there appears to be a discontinuity between the actual data and the forecasts.

With the limited data available, there does not appear to be any noticeable correlation or relationship between:

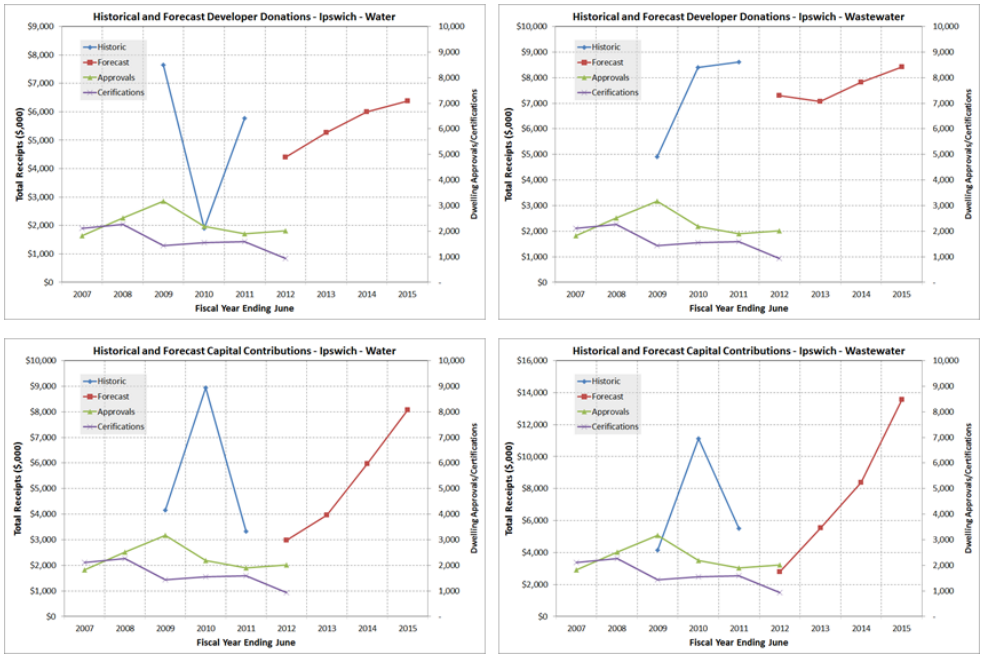
- The donations and contributions for water and wastewater in any one local government area; and
- The donation and contributions and any dwelling approval data

An examination of the quarter to quarter data in graphical form in the publications show that the movements in dwellings approvals and certification time series published by Queensland Treasury and Trade do not appear to follow a deterministic or seasonal pattern. There is a possibility that the quarter to quarter fluctuations be influenced by the timing of the approval of some of the larger individual subdivisions. This will be particularly true in the case of the smaller local government areas.

The donations and contributions received by water utilities are also likely to be influenced by the timing of the contributions from developers that will be brought forward or delayed to take advantage of changes (real or anticipated) in state or local government policy.



- **Figure 3-14: Comparison of Observed and Forecast Donated Assets and Capital Contributions and Dwelling Approval and Certification Data – Brisbane**



- **Figure 3-15: Comparison of Observed and Forecast Donated Assets and Capital Contributions and Dwelling Approval and Certification Data – Ipswich**

To explore the development of a relationship between capital contributions and dwelling approvals/population growth, SKM divided the real cash receipts from 2008/09 to 2010/11 by both the population growth and dwelling certifications over that same period and then compared this with the rate per 2011/12 forecast (

Table 3-24 and Table 3-25). Given that the QUU forecasts of E.T.'s and future contributions are well structured and based on OESR population forecasts, there should be a consistent link between the unit rates calculated over 2008/09 to 2010/11. The differences suggest that the capital contributions received by QUU will vary significantly from year to year, and even averaged over a three year period are not reflective of population or dwelling trends. This makes the development of a robust forecasting approach a difficult task.

- **Table 3-24: Comparison of Previous Capital Contributions with QUU 2011/12 Forecast per Capita Population Growth and Per Dwelling Certification - Water**

Area	Average per capita increase in population - 2008/09 to 2010/11 (2012 base)	2011/12 forecast per capita	Difference (%)	Average per dwelling certification - 2008/09 to 2010/11 (2012 base)	2011/12 forecast per certification (average of certifications from 2008/09 to 2010/11)	Difference (%)
Brisbane	$2.27	$1.77	28.3%	$22.34	$15.70	42.3%
Ipswich	$0.89	$1.57	-43.4%	$3.77	$7.36	-48.8%
Lockyer	$1.36	$2.18	-37.9%	$4.14	$6.78	-39.0%
Scenic Rim	$1.26	$1.31	-3.5%	$6.74	$7.91	-14.8%
Somerset	$3.26	$1.67	95.3%	$5.74	$3.03	89.7%

- **Table 3-25: Comparison of Previous Capital Contributions with QUU 2011/12 Forecast per Capita Population Growth and Per Dwelling Certification - Wastewater**

Area	Average per capita increase in population - 2008/09 to 2010/11 (2012 base)	2011/12 forecast per capita	Difference (%)	Average per dwelling certification - 2008/09 to 2010/11 (2012 base)	2011/12 forecast per certification (average of certifications from 2008/09 to 2010/11)	Difference (%)
Brisbane	$3.29	$3.85	-14.6%	$32.46	$34.25	-5.2%
Ipswich	$1.12	$2.17	-48.3%	$4.76	$10.19	-53.2%
Lockyer	$0.21	$0.95	-78.3%	$0.63	$2.95	-78.7%
Scenic Rim	$0.75	$1.80	-58.4%	$4.00	$10.88	-63.3%
Somerset	$2.37	$1.87	26.7%	$4.18	$3.40	23.1%

Until a robust relationship can be generated between developer donations and capital contributions and their drivers, SKM recommends that QUU continue with their current 3-year averaging approach for developer donations and extend that similar approach to forecasts of capital contributions. In both cases the final adjustment of both sets of forecasts associated with perceptions about the outlook for development should be removed.

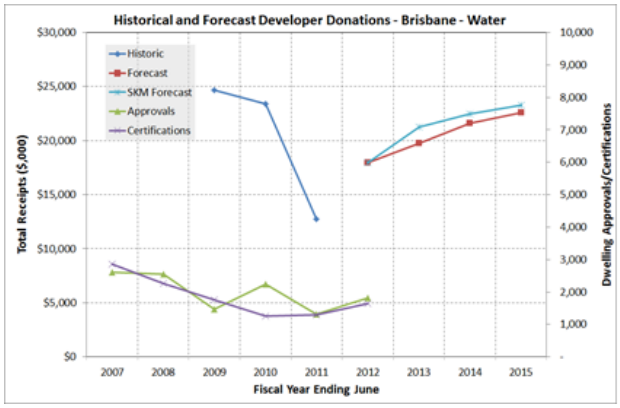
Alternative forecasts based have been prepared by SKM for donated assets and capital contributions.

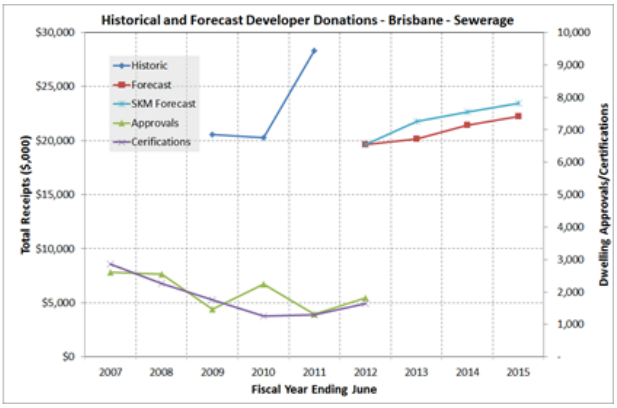
For donated assets, the alternative methodology is almost identical to the original QUU approach with the exception that the adjustment for development outlook has been removed. In making the revision, a systematic error was detected in the QUU calculations. The forecasts in each year use the previous year's donations and then index based on differences in the forecast growth in dwellings between the current and previous years. In the early years there is an adjustment in the figures for growth outlook. The error occurs because these adjustments become permanently entrenched in the forecasts. The correction that is required is to index, not from the previous year, but from the 2012 base year (that is based on the 2008/09 to 2010/11 average). The revised forecasts of donated assets are shown in Table 3-26. The revised forecasts are shown graphically for Brisbane and Ipswich in Figure 3-16 and Figure 3-17.

- **Table 3-26: Revised Forecast Donated Water and Wastewater Assets**

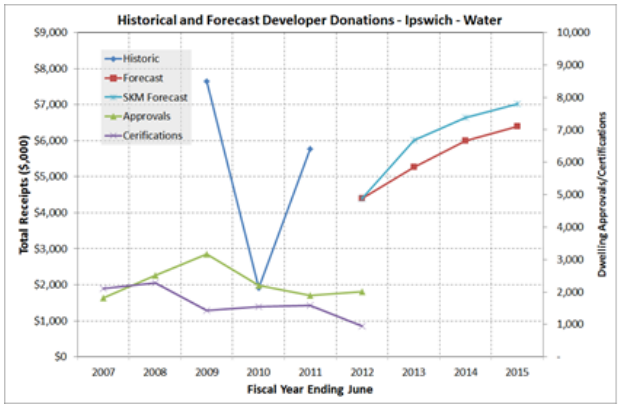
Service Area/Type	2011/12	2012/13	2013/14	2014/15
Brisbane				
Water	$17,944	$21,244	$22,467	$23,264
Wastewater	$19,638	$21,771	$22,620	$23,444
Total Brisbane	$37,582	$43,015	$45,087	$46,708
Ipswich				
Water	$4,396	$6,011	$6,638	$7,022
Wastewater	$7,297	$8,318	$8,887	$9,470
Total Ipswich	$11,693	$14,329	$15,525	$16,492
Lockyer Valley				
Water	$410	$461	$486	$510
Wastewater	$830	$933	$983	$1,033
Total Lockyer Valley	$1,240	$1,394	$1,469	$1,543
Scenic Rim				
Water	$396	$442	$463	$484
Wastewater	$398	$444	$465	$486

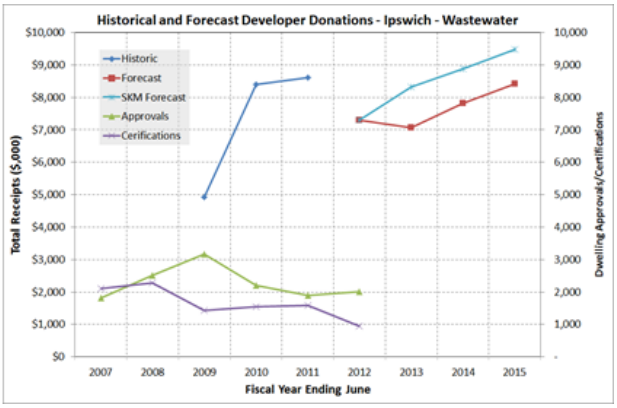
Service Area/Type	2011/12	2012/13	2013/14	2014/15
Total Scenic Rim	$794	$886	$928	$969
Somerset				
Water	$615	$688	$722	$755
Wastewater	$942	$1,054	$1,105	$1,157
Total Somerset	$1,556	$1,742	$1,827	$1,912
All Areas				
Water	$23,760	$28,846	$30,776	$32,035
Sewerage	$29,104	$32,519	$34,060	$35,589
Total All Areas	$52,865	$61,366	$64,836	$67,624





- **Figure 3-16: Revised Forecast Donated Water and Wastewater Assets – Brisbane**





- **Figure 3-17: Revised Forecast Donated Water and Wastewater Assets – Ipswich**

For capital contributions, the approach is also based on actual contributions received over the period 2008/09 to 2010/11. The contributions per capita of population growth have been calculated in real dollars for the period 2008/09 to 2010/11. This per capita rate has been multiplied by the 2011/12 population growth and compared with the output of the QUU contributions model for 2011/12 to generate an adjustment factor Table 3-27. This adjustment factor has then been applied to the forecasts from 2011/12 to 2014/15. The revised forecasts are provided in Table 3-28 and shown graphically for Brisbane and Ipswich in Figure 3-18 and Figure 3-19.

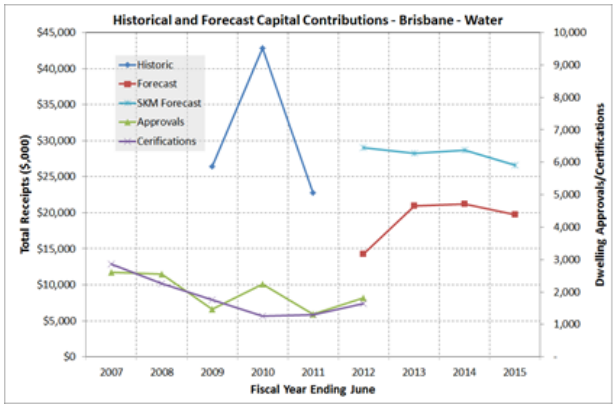
The alternative calculations have revealed an anomaly in the QUU forecasts. The forecasts for the 2012 fiscal year in the worksheet "Forecast" below row 123 have been over-written with values. These numbers are completely different to the numbers generated through the forecasting process that are generated in the rows below row 10 in the same worksheet. It is clearly stated in QUU's return document that these numbers are forecasts (Table 8-15 of the return document). The adjustment uses the QUU model 2011/12 forecast numbers rather than the over-written values.

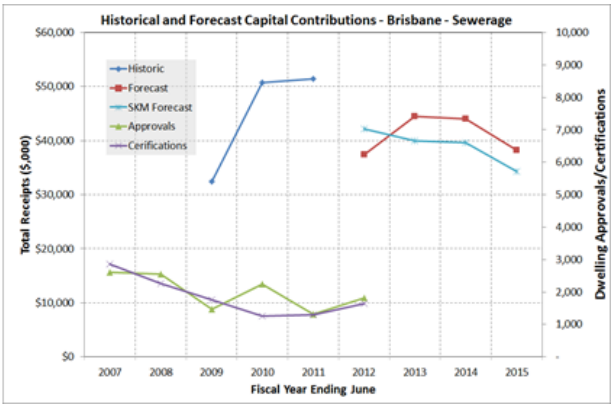
- **Table 3-27: Derivation of Adjustment Factors for Capital Contributions Forecasts**

Service Area	Per Contribution Capita Water (2008/09 to 2010/11	Predicted 2012 - Water	QUU Forecast 2012 - Water	Adjustment Factor - Water
Brisbane	$2.27	$28,985	$22,597	128%
Ipswich	$0.89	$6,343	$11,198	57%
Lockyer Valley	$1.36	$1,311	$2,109	62%
Scenic Rim	$1.26	$1,060	$1,099	96%
Somerset	$3.26	$1,613	$826	195%
	Per Capita Wastewater	**Predicted 2012 - Wastewater**	**QUU Forecast 2012 - Wastewater**	**Adjustment Factor - Wastewater**
Brisbane	$3.29	$42,121	$49,297	85%
Ipswich	$1.12	$8,014	$15,502	52%
Lockyer Valley	$0.21	$199	$917	22%
Scenic Rim	$0.75	$629	$1,513	42%
Somerset	$2.37	$1,175	$927	127%

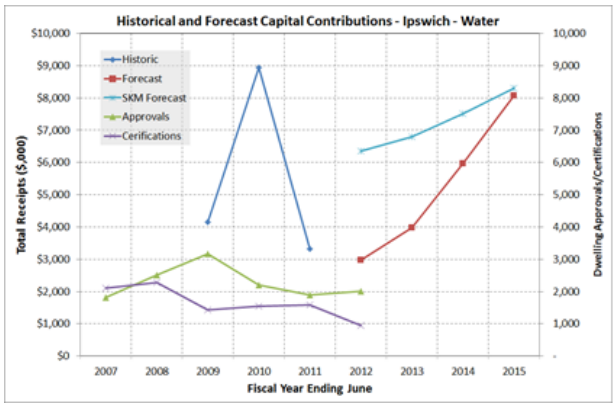
- **Table 3-28: Revised Forecast of Water and Wastewater Capital Contributions**

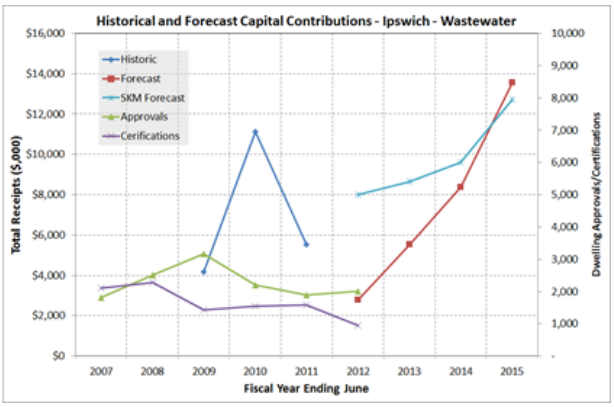
Service Area/Type	2011/12	2012/13	2013/14	2014/15
Brisbane				
Water	$28,985	$28,274	$28,655	$26,595
Wastewater	$42,121	$39,971	$39,579	$34,335
Total Brisbane	$71,106	$68,245	$68,233	$60,930
Ipswich				
Water	$8,014	$8,652	$9,619	$12,733
Wastewater	$6,343	$6,800	$7,506	$8,305
Total Ipswich	$14,356	$15,451	$17,126	$21,038
Lockyer Valley				
Water	$1,311	$1,430	$1,572	$1,763
Wastewater	$199	$333	$435	$562
Total Lockyer Valley	$1,510	$1,762	$2,006	$2,324
Scenic Rim				
Water	$1,060	$907	$854	$698
Wastewater	$629	$863	$1,076	$1,224
Total Scenic Rim	$1,690	$1,770	$1,930	$1,922
Somerset				
Water	$1,613	$1,276	$1,110	$886
Wastewater	$1,175	$1,892	$2,405	$2,882
Total Somerset	$2,788	$3,168	$3,515	$3,769
All Areas				
Water	$40,982	$40,538	$41,810	$42,675
Sewerage	$50,467	$49,859	$51,001	$47,308
Total All Areas	$91,450	$90,397	$92,811	$89,983





- **Figure 3-18: Revised Forecast Water and Wastewater Capital Contributions – Brisbane**





- **Figure 3-19: Revised Forecast Water and Wastewater Capital Contributions – Ipswich**

3.12. Conclusion

SKM has reviewed QUU's approach to demand forecasting and in general accepts that the methods used are reasonable. SKM is of the opinion that given the lack of a longer series of historical data to base our assessment of certain variables, including average consumption levels and non-revenue water, there remains a fairly high degree of uncertainty in the projections. This is especially so given the recent lifting of restrictions and its replacement by PWSM leading to some uncertainty about rebound in consumption – the rate at which it will occur and the level it will settle at. The relatively wet weather the region has experienced since the drought ended may also have masked the full impact of rebound.

Nevertheless, given these uncertainties, SKM accepts that QUU has used appropriate drivers and has made appropriate adjustments to external sources of information to present an accurate projection of the likely demand for its services. SKM's recommended changes to QUU's projections are relatively minor and in the main, the recommended values relate to extending QUU's projections to 2014 and 2015 at the regional LGA

level which QUU did not include in it its template submission to the Authority. A summary of SKM's recommendations are provided in Table 3-29.

- **Table 3-29: Summary of SKM's recommendations for QUU demand projections**

Forecast	Units	2011/12[25]*	2013	2014	2015
Brisbane					
Residential water connection	#	399,130	404,149	408,837	413,449
Residential wastewater connection	#	391,657	396,582	401,182	405,708
Non-residential water connections	#	30,497	30,881	31,239	31,591
Non-residential wastewater connections	#	29,211	29,578	29,921	30,259
Trade waste connections	#	4,321	4,368	4,416	4,464
Residential water volume	ML	59,158	62,060	64,867	67,780
Non-residential water volume	ML	34,017	34,365	34,704	35,043
Non-revenue water	ML	13,923	13,775	14,225	14,689
Bulk water	ML	107,097	110,201	113,796	117,512
Ipswich					
Residential water connection	#	63,108	65,668	68,264	70,972
Residential wastewater connection	#	56,989	59,301	61,645	64,090
Non-residential water connections	#	1,965	2,044	2,124	2,207
Non-residential wastewater connections	#	1,965	2,057	2,138	2,222
Trade waste connections	#	424	438	455	473
Residential water volume	ML	9,739	10,514	11,310	12,168
Non-residential water volume	ML	4,441	4,519	4,600	4,683
Non-revenue water	ML	905	960	1,016	1,076
Bulk water	ML	15,085	15,993	16,926	17,927
Lockyer Valley					
Residential water connection	#	10,180	10,521	10,870	11,242
Residential wastewater connection	#	4,240	4,382	4,528	4,682
Non-residential water connections	#	511	528	546	564
Non-residential wastewater connections	#	370	382	395	409
Residential water volume	ML	1,020	1,078	1,143	1,213
Non-residential water volume	ML	263	761	774	788

[25] Estimate actuals

Forecast	Units	2011/12[25]*	2013	2014	2015
Non-revenue water	ML	226	325	338	353
Bulk Water	ML	1,509	2,164	2,256	2,354
Scenic Rim					
Residential water connection	#	6,168	6,453	6,740	7,034
Residential wastewater connection	#	4,064	4,252	4,441	4,635
Non-residential water connections	#	1,019	1,066	1,114	1,162
Non-residential wastewater connections	#	739	773	808	843
Residential water volume	ML	784	834	889	946
Non-residential water volume	ML	330	347	364	382
Non-revenue water	ML	197	208	221	234
Bulk water	ML	1,310	1,390	1,474	1,562
Somerset					
Residential water connection	#	4,934	5,111	5,295	5,490
Residential wastewater connection	#	3,083	3,194	3,309	3,430
Non-residential water connections	#	567	587	608	631
Non-residential wastewater connections	#	423	438	454	471
Residential water volume	ML	588	620	651	683
Non-residential water volume	ML	648	659	671	684
Non-revenue water	ML	218	226	233	241
Bulk water	ML	1,454	1,505	1,555	1,609
QUU total					
Residential water connection	#	483,520	491,902	500,007	508,187
Residential wastewater connection	#	460,033	467,711	475,105	482,546
Non-residential water connections	#	34,559	35,106	35,630	36,155
Non-residential wastewater connections	#	32,708	33,229	33,716	34,203
Trade waste connections	#	4,745	4,806	4,871	4,937
Residential water volume	ML	71,288	75,107	78,860	82,790
Non-residential water volume	ML	39,699	40,652	41,114	41,580
Non-revenue water	ML	15,469	15,493	16,033	16,593
Bulk water	ML	126,456	131,253	136,007	140,964

There is significant difficulty in identifying the drivers of receipts from donated assets and capital contributions. Until such a relationship is developed, QUU should adjust the approaches used to provide a greater consistency with historical figures and removal the adjustments related to short term trends in the dwelling approvals.

It would be useful for QUU to significantly increase the resolution of both the donated assets and capital contributions datasets. This should include generating seasonal data that can be compared directly with historical building approvals information and recording information on the number of E.T.'s (residential and non-residential) underlying each donation and contribution.

4. Unitywater

4.1. Unitywater forecasting approach

Unitywater's residential demand forecasting model is driven off a base population connected to its network as at 2012. Growth in connected population and access charges (connections) are based on the growth rates projected by the OESR's medium population and dwelling growth scenario in each of the two regions (Moreton Bay and Sunshine Coast) that its network covers.

For its non-residential sector, a concept of "*equivalent persons (EP)*" is used. This is based on an estimate of the typical demand for any particular land use type expressed in terms of the demand from equivalent persons. For example, a student's demand is deemed to be the equivalent of 10% of the demand of a person living in a detached dwelling. A school with 1000 students would then be deemed to have the demand of 100 equivalent persons living in detached dwellings.

The approach adopted by Unitywater for forecasting volumes is based on establishing an underlying level of consumption on a per person per day basis (litres per person per day) and multiplying this average consumption by connected population for residential demand and equivalent person for non-residential demand. For the purposes of pricing and budgeting over the next three years Unitywater has calculated the water consumption forecasts that reflect anticipated population increases with a forecast change in per person per day usage based on actual 2012 consumption levels. The growth rate in SKM's 2011 recommendation is then applied to forecast future consumption rates. Implicit in the forecast average consumption is the current PWCM. A cap of 200 LPD was applied to reflect the voluntary target applied by the QWC.

For the non-residential sector, a similar approach was applied using equivalent persons. Average consumption level for the non-residential sector was held constant (ie no growth) to reflect the view that the business sector will be unlikely to increase consumption because restrictions have been relaxed as the measures implemented to reduce consumption during the drought are mainly structural (rather than behavioural) and are thus unlikely to be removed simply due to the relaxation of restrictions. In addition, WEMPs are still in place.

Population projections are based on the 2011 update of the OESR forecast which provides projections in a 5 yearly period. This population projection is interpolated to obtain annual forecasts by assuming linear increase between periods.

Water demand/consumption including pricing tier breakdown is based on the last meter reading (quarter 2). Projections are then broken down to pricing each tier's consumption by escalating individual consumption levels using the rate of increase in average consumption level.

A similar method is applied for wastewater connections. Forecast sewerage volume is applicable only for Maroochy. No information has been provided detailing how this forecast was developed. We expect that this was calculated as a percentage of metered water consumption based on set discharge factors ranging from 5% to 90%.

The number of sewage access (based on the number of toilet pedestals) charges was based on January 2012 data. This number was then escalated by an uplift factor (1.240 for MBRC and 1.046 for SCRC) to reflect the fact that some customers were not assigned price plans (and thus were not captured in the data). The number of access charges was thus uplifted by the proportion of customers not yet assigned.

To estimate non-revenue water, Unitywater has estimated losses of 22 LPD in 2012. This is expected to fall to 18 LPD by 2021 due to various projects aimed at reducing losses. A loss factor from 2011/12 was calculated to reflect estimated demand in each of the areas. A reducing trend for losses was then applied from the base of actual losses in 2012 to reach its target losses by 2021.

4.1.1. Proposed forecast

A summary of the Unitywater demand projections provided to the Authority for the period 2011/12 to 2014/15 is shown in Table 4-1. Also shown are the average annual expected growth rates over the same period.

- **Table 4-1: Unitywater proposed demand projections**

Proposed	Units	2011/12	2012/13	2013/14	2014/15	CAGR 2012-2015 (%p.a.)
Connected population	#	702,518	717,084	731,953	747,130	2.1%
Residential water connection charges	#	264,161	270,563	276,930	283,446	2.4%
Residential water volume	ML	43,189	45,352	49,123	51,700	6.2%
Non-residential equivalent persons	#	170,558	174,117	177,751	181,461	2.1%
Non-residential water connection charges	#	13,071	13,377	13,689	14,009	2.3%
Non-residential volume	ML	7,387	7,627	7,806	7,990	2.7%
Other demand (incl. commercially negotiated)	ML	1,199	1,199	1,199	1,199	0.0%
Non-revenue water	ML	6,132	6,271	6,422	6,414	1.5%
Total water volume	ML	57,907	60,448	64,550	67,303	5.1%
Total water connection charges	#	277,232	283,940	290,619	297,455	2.4%
Residential waste water connection charges	#	272,620	277,516	284,042	290,723	2.4%
Non-residential waste water connection charges	#	17,265	17,672	18,088	18,513	2.4%

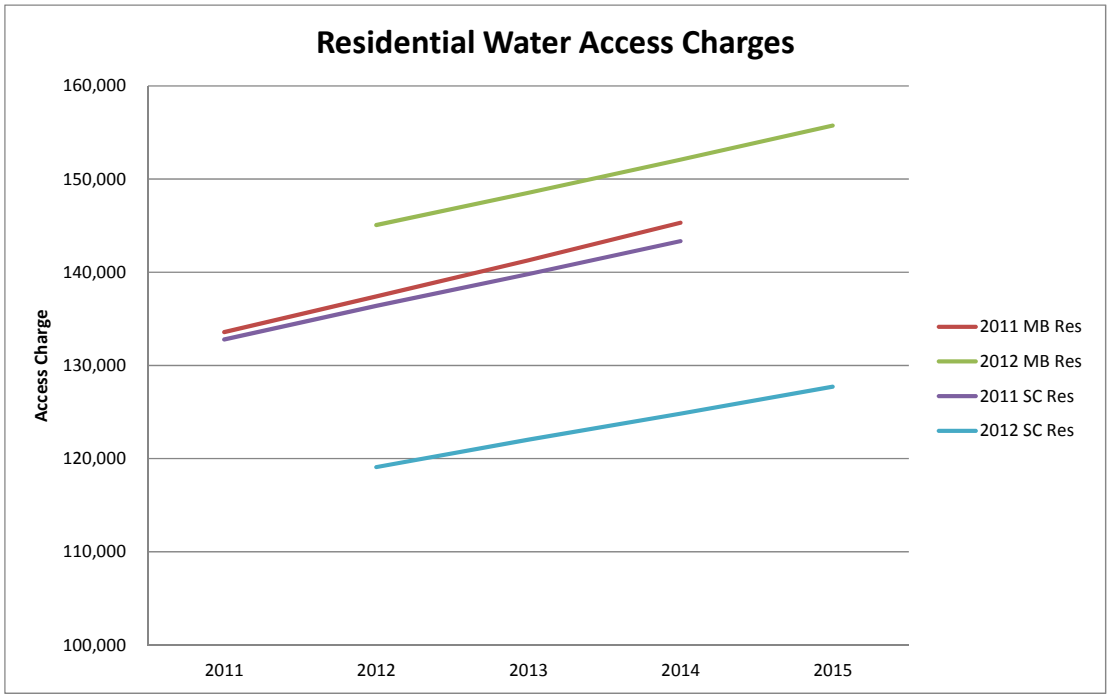
Proposed	Units	2011/12	2012/13	2013/14	2014/15	CAGR 2012-2015 (%p.a.)
Trade waste and other charges	#	2,688	2,843	3,179	3,653	10.8%
Total waste water connection charges	#	292,573	298,031	305,309	312,889	2.3%

4.2. Previous forecast

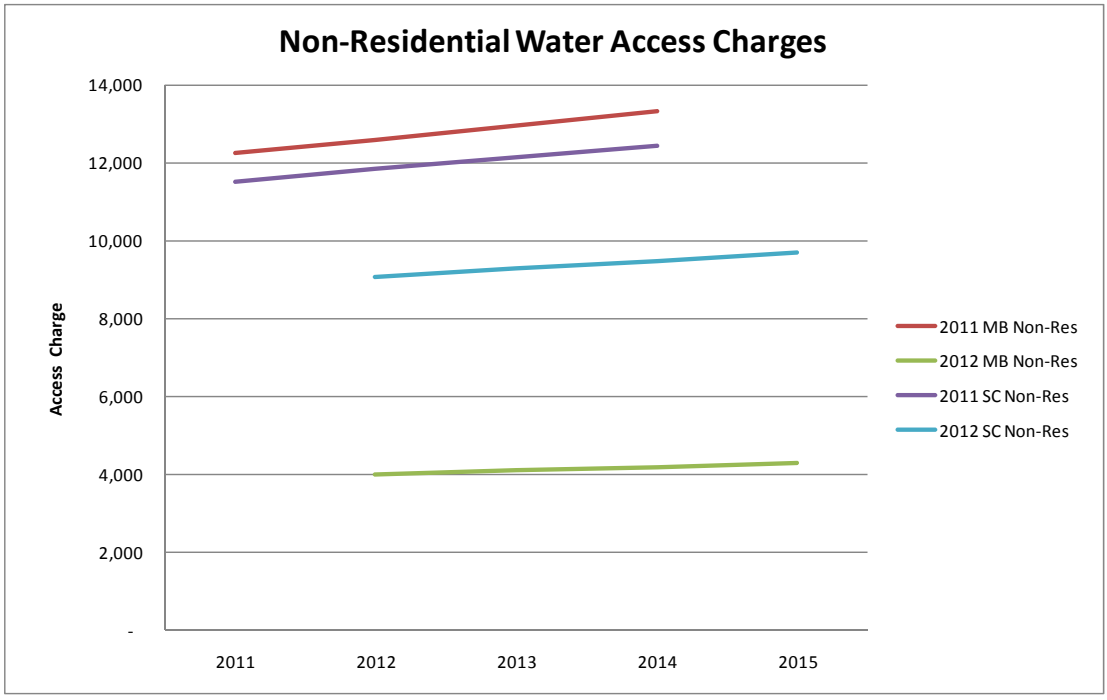
Comparing Unitywater's forecast numbers of access charges between the two forecasts (2011 and 2012 forecasts), Figure 4-1 shows that while Unitywater has increased it estimated residential connections in Moreton Bay it has reduced its estimated residential connections in the Sunshine Coast from that forecast a year ago. Non-residential access charge numbers have fallen in both Moreton Bay and the Sunshine Coast, as shown in Figure 4-2. However, this is likely to be due to the change in how access charges are considered in the forecasts. In the 2011 forecast, Unitywater provided access charge numbers on the basis of "equivalent base charges" while in the current proposal, the basis for access charge appears to be connections.

The forecast growth in access charges are however fairly consistent with the growth rate in access charges falling in both regions from that forecast in 2011. The 2011 forecast of both residential and non-residential access charge growth in Moreton Bay was 2.8% p.a. and in the Sunshine Coast was 2.6% pa. In the 2012 forecast, both these growth rates have fallen to 2.4% p.a.

- **Figure 4-1: Unitywater residential water connection projections**

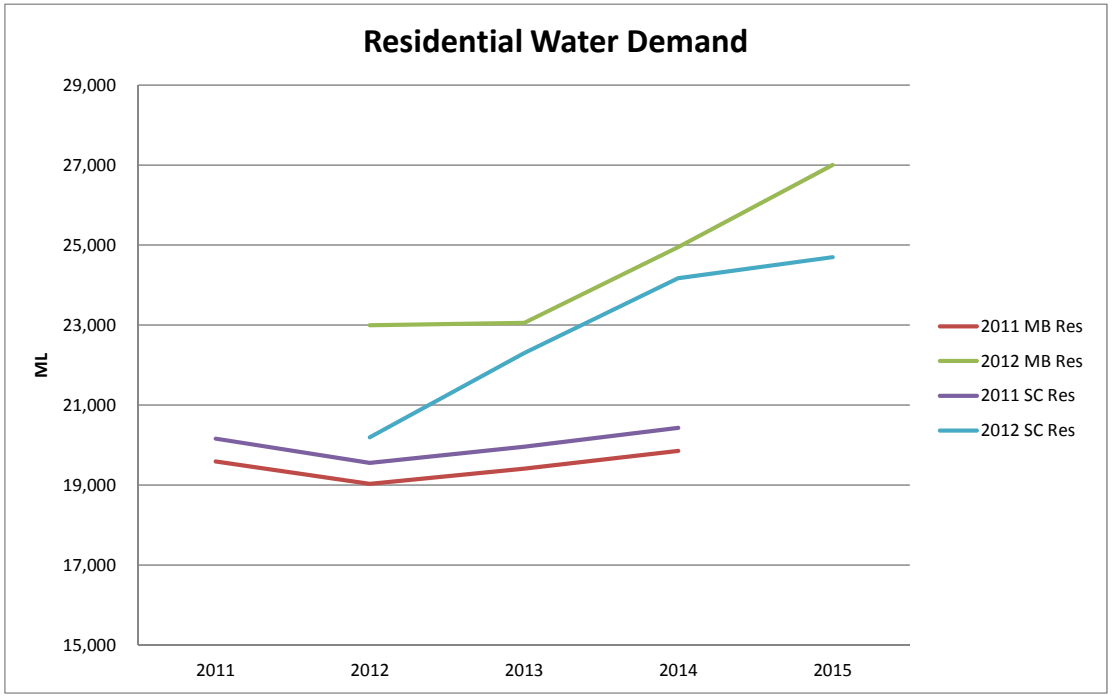


- **Figure 4-2: Unitywater non-residential water connection projections**



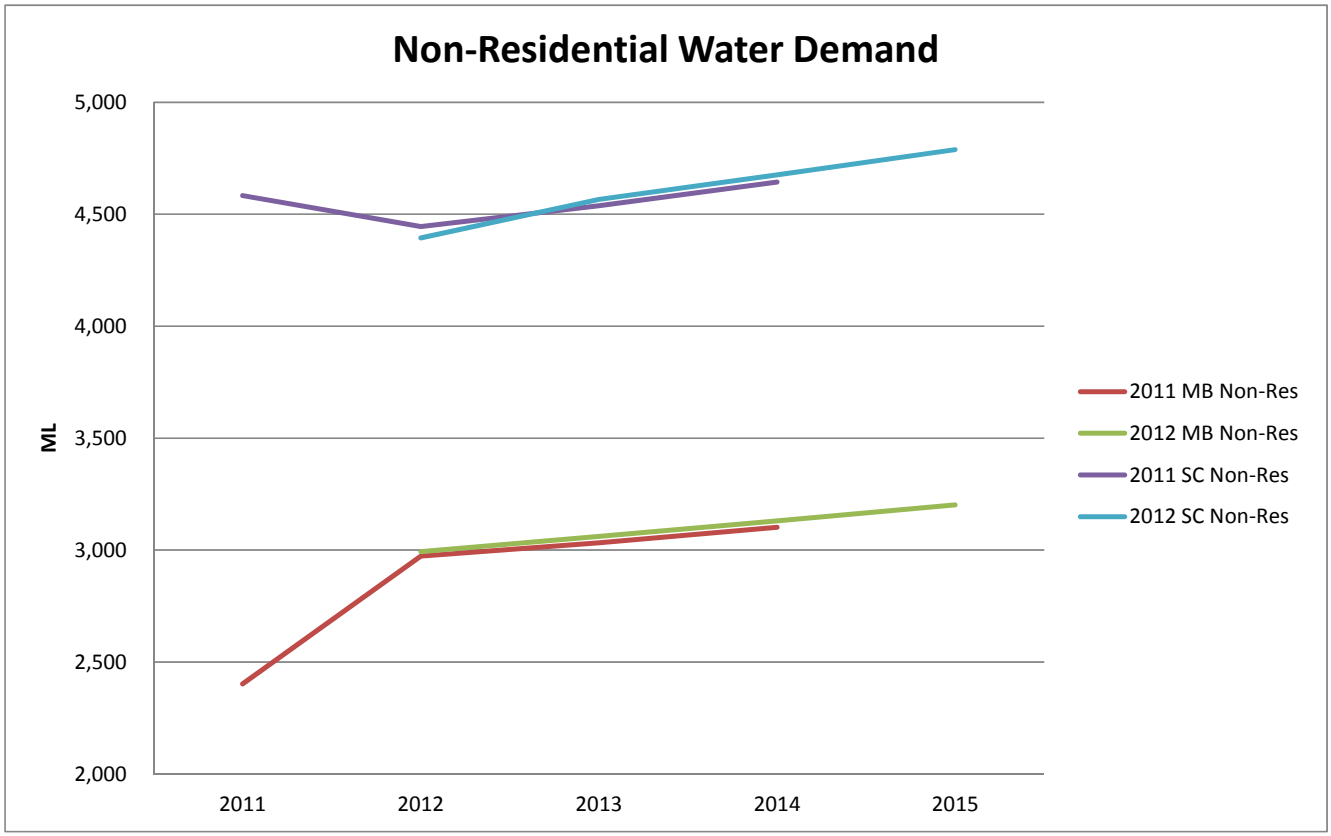
However, the water consumption forecasts show an increase between the two forecasts. These are shown in Figure 4-3 and Figure 4-4. For the residential sector, the forecast for Moreton Bay in 2012 is over 20% higher in Unitywater's 2012 forecast when compared with its 2011 forecast. The increase in the Sunshine Coast is not as great but is still a significant 3.3% higher. Similarly, the growth rates forecast for residential water consumption are significantly higher. In its 2011 forecast, Unitywater provided an increase in consumption of 0.4% p.a. for both Moreton Bay and the Sunshine Coast. In its current proposal to the Authority, the forecast growth of water consumption in Moreton Bay is 5.5% p.a. while that in the Sunshine Coast is 6.5% pa. Significantly, the growth rate at the Sunshine Coast dips in the final year of the 2012 forecast. This is because the average consumption at the Sunshine Coast is projected to have reached its cap of 200 LPD that year.

- **Figure 4-3: Unitywater residential water consumption projections**



In the non-residential sector, the increase in forecast water consumption is not as great as in the residential sector. For Moreton Bay, Unitywater has increased its 2012 water consumption by 0.7% compared to its previous forecast, while the Sunshine Coast has decreased its consumption by 1.1%. Ignoring the 2011 water consumption value provided in the 2011 submission, growth rates have also increased. In its 2011 submission, Unitywater forecast Moreton Bay non-residential water consumption to grow at 1.4% p.a. between 2012 and 2014. In its current forecast this has increased to 2.3% p.a. between 2012 and 2015. Similarly, Unitywater's forecast for the Sunshine Coast shows a higher growth rate from 1.5% p.a. in its 2011 submission to 2.9% p.a. in its current forecast.

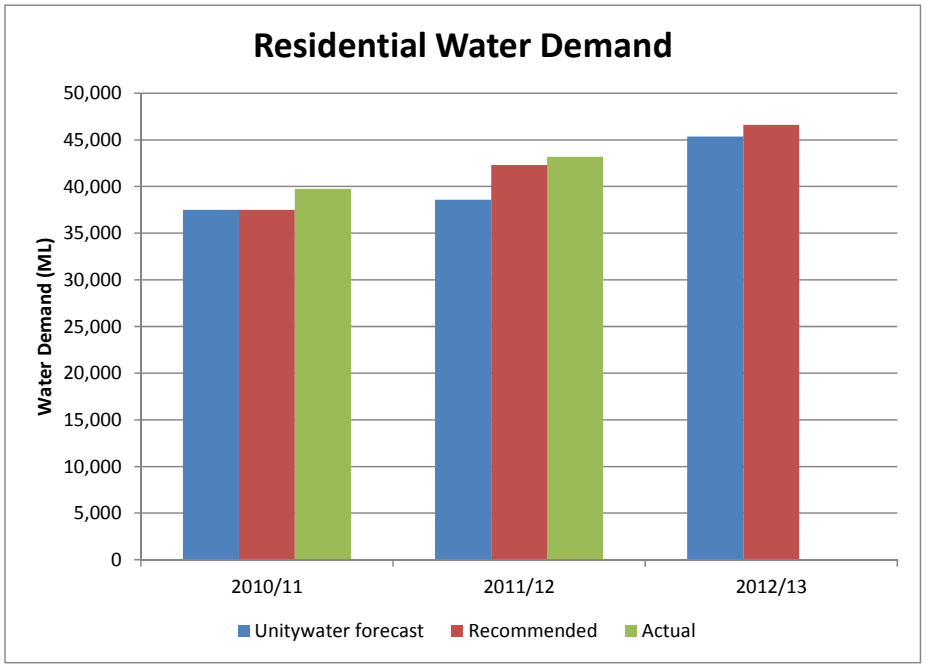
- **Figure 4-4: Unitywater non-residential water consumption projections**

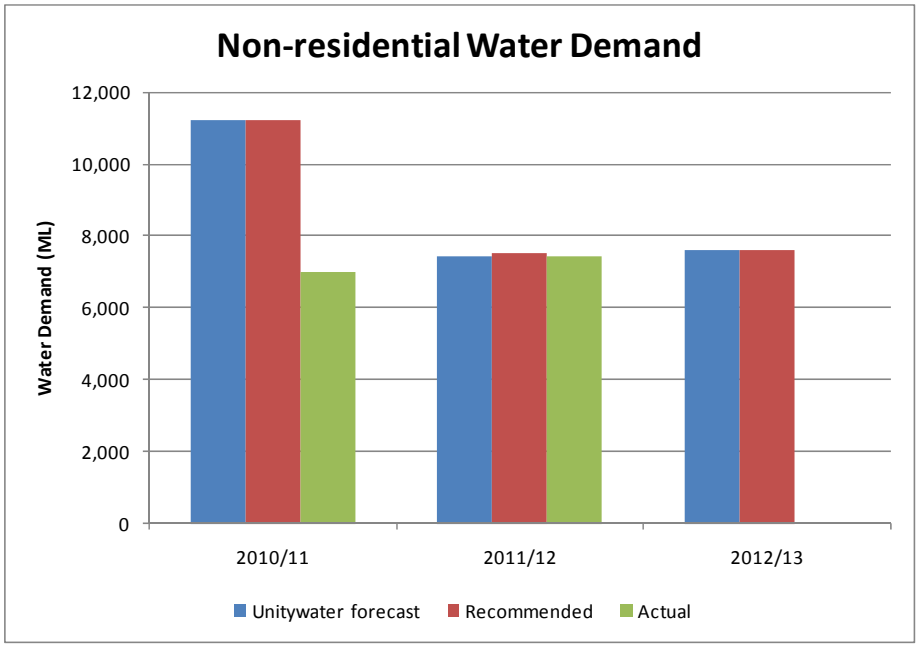


A comparison has also been made between of Unitywater's water demand and wastewater connection forecasts from previous submissions, the QCA's recommended forecasts and actuals. It appears that the actual outcome of residential water demand has been higher than forecasts although it is not as clear if that is a result of a change in classification as the non residential water demand in 2010/11 indicate that a step change in non-residential water may have occurred. If that were the case, then the higher outcome in residential water demand may have been the result of a reclassification of non-residential to residential water demand had occurred in 2010/11. This comparison may be seen in Figure 4-5.

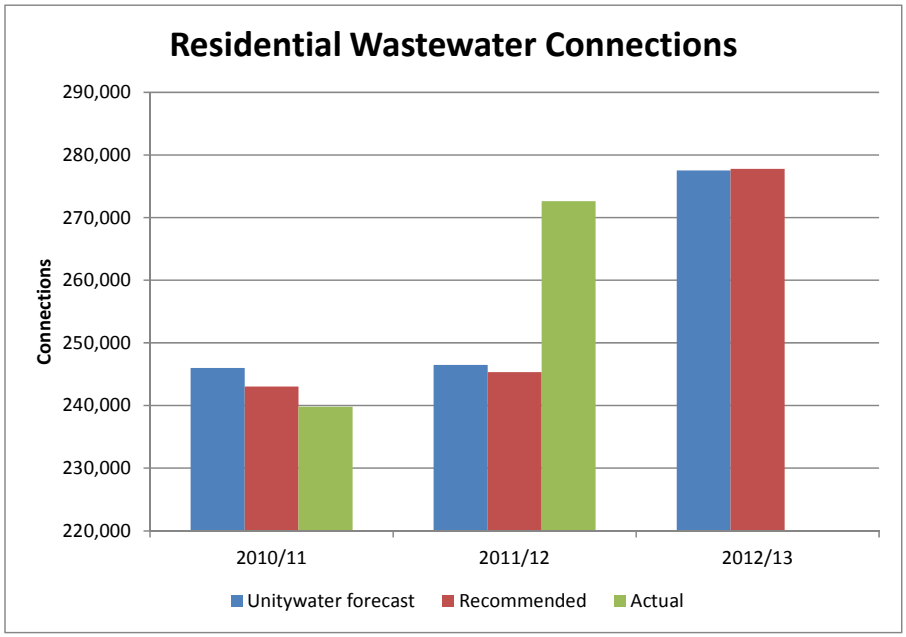
Unitywater has also clearly changed the classification of how connections have been determined in 2011/12. This is seen in the step change in customer connections for both residential and non-residential customers. The number of residential wastewater connections has increased significantly while the number of non-residential wastewater connections has fallen.

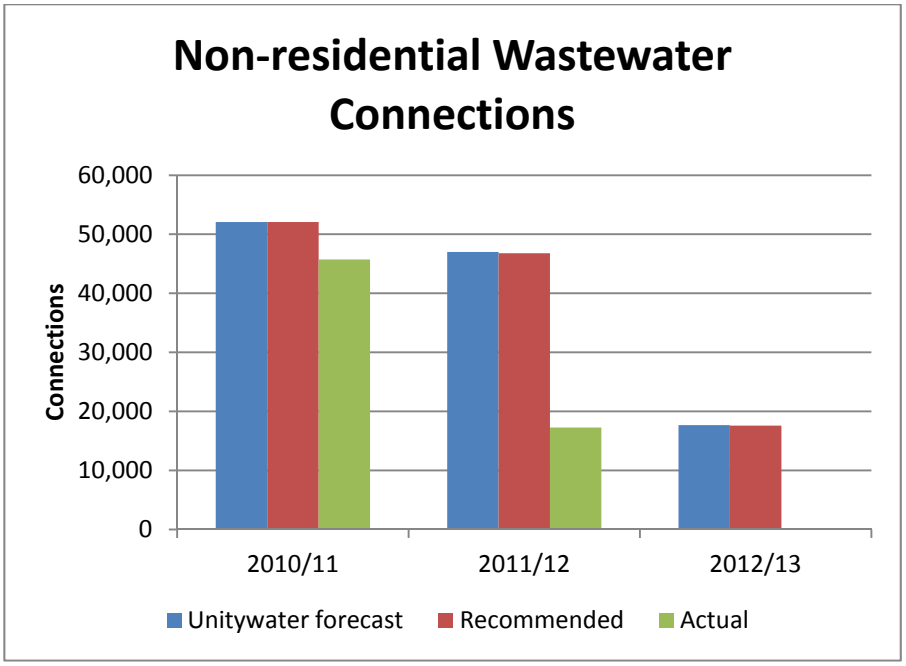
- **Figure 4-5: Comparison Unitywater's of forecasts and actual**





- **Figure 3-5: Comparison of QUU's forecasts and actual (continue)**





4.2.1. Developments from the 2011/12 demand forecast

The forecasting approach adopted by Unitywater for the 2012/13 forecasts has changed for certain categories from that adopted in 2011/12. In 2011/12, Unitywater had assumed a combined residential and non-residential average demand for each of the LGAs over the forecast period. Unitywater's forecasting method did not separately identify residential and non-residential average consumption and assumed that consumption levels for both residential and non-residential customers would remain at those levels in the short terms ie no increase in residential per person consumption from 2012. In response to SKM's recommendation, Unitywater separated the residential and non-residential average demand for its 2012/13 forecast. Unitywater has factored in a bounce back into its forecast for the residential sector in response to SKM's recommendation to include bounce back continuing for 5 years from the time restrictions were lifted. This change explains the difference between the two sets of residential forecasts provided by Unitywater.

The other relatively minor change affecting the two sets of forecasts is the adoption of the recommendation to use the latest population and dwelling projections published by the OESR. In 2011/12, despite the availability of the 2011 population projections, Unitywater had used the 2010 update. This was done as the 2011 update was not available when Unitywater submitted their forecasts for their Board's approval. SKM had recommended that the latest update be used for the regulatory review.

In 2011/12, instead of using connection numbers for its customer number forecast, Unitywater used the concept of "equivalent base charges" to calculate the number of charges it collects (residential and non-residential) that is equivalent to a standard residential connection. The numbers of equivalent base charges were assumed to grow in line with dwelling numbers. This is no longer used and is replaced by the number of charges it collects for both residential and non-residential sectors and are escalated using a rate derived from the OESR's medium growth projection series.

It does not appear that the current residential access charge is the same as the residential "equivalent base charge" of the previous submission since the number of 2012 residential access charges has risen by 8.6% in Moreton Bay and fallen by 9% in the Sunshine Coast from the number of 2011 residential equivalent base charges. However, Unitywater has not provided any historical data in its current submission to enable SKM to be certain if this is the case or otherwise. SKM does note that Unitywater in its submission did indicate that it had taken into account SKM's recommendation in 2011 that its equivalent base charge appears over-stated.

The main issue with the rigour with which Unitywater is able to undertake demand forecasting continues to be the paucity of data. Historical data on which to base its forecast is still very limited. In addition, the data that is available is very recent and is likely to be affected by the impact of the rebound from restrictions and also the very wet conditions of 2010 and 2011. These issues are likely to have constrained demand below the "normal" consumption level. As a result, more rigorous forecasting techniques like end use modelling and econometric modelling cannot be used till more data is available, As discussed in SKM 2011 report, at least 12 to 16 quarters worth of data that is uncontaminated by major disruptions like restrictions or flood events will be required before such techniques can be utilised.

4.3. Population and Dwellings

Unitywater based its forecast of population on the 2011 OESR projection of population which is the latest projection available from the OESR. Rather than using the actual projections, Unitywater has applied the growth rates from the medium series projections to its forecast of connected persons.

In SKM's 2011 review, SKM obtained advice from the OESR that in the recent past, the low series more accurately reflected actual population growth. This advice was restated in an email from the OESR to the QCA dated 27 August 2012. In this email, the OESR indicated that "*the low series is currently tracking quite close to the estimated resident populations that have been published by ABS since our 2011 edition was released*".

More recent publications from the Australian Bureau of Statistics (ABS)[26] indicate that population growth between 2010 and 2011 in the LGAs covered by Unitywater's network has indeed declined from earlier years. This is shown in Table 4-2. Table 4-2 also shows the comparison of Unitywater's estimated population growth rates based on the growth rates from the OESR medium series and the growth rates from the low growth series. Over the whole of Unitywater's area, the growth rate derived from the low growth projection seems certainly to be the preferred growth rate to apply as it reflects recent growth rates. The low growth projection growth rate of 1.6% p.a. is not too far off the growth seen in the combined Moreton Bay and Sunshine Coast LGAs of 1.4% p.a. reported by the ABS.

- **Table 4-2: Population growth rates**

Service Area	Unitywater	OESR Growth Projection 2011-2016		ABS Estimated Residential Population Growth rates		
	2012-2015	Medium	Low	2008-09	2009-10	2010-11
Moreton Bay	2.0%	2.0%	1.5%	3.7%	2.8%	2.0%
Sunshine Coast	2.2%	2.2%	1.8%	1.9%	1.1%	0.6%
Unitywater	2.1%	2.1%	1.6%	2.8%	2.0%	1.4%

What is not clear however is the extent of the slowdown in growth in the two LGAs individually in comparison to the OESR low growth projection. While the overall growth in the Unitywater's area has certainly slowed according to the ABS, from above 2% p.a. between 2008 and 2010 to 1.4% p.a. between 2010 and 2011, it appears that growth is still at 2% p.a. in Moreton Bay (consistent with the medium OESR projections for the LGA). Growth in the Sunshine Coast has however fallen to 0.6% p.a. in latest period, significantly below even the low OESR projections.

Given this scenario, while SKM would not dispute utilising the medium growth projection for Moreton Bay, to be consistent with the overall low growth expected, the growth rate to be applied in Sunshine Coast would need to be significantly below that projected by the OESR. SKM recommends utilising a growth rate of 1% p.a. for the

[26] ABS, *3218.0 Regional Population Growth, Australia*, Table 3 Estimated Resident Population, Local Government Areas, Queensland, 31 July 2012

Sunshine Coast if the medium growth rate of 2% p.a. is applied to Moreton Bay. Alternatively, SKM would recommend adopting the growth rate derived from the low growth OESR series. To be consistent with the previous review and SKM's understanding that all Queensland utilities use OESR's projections, we have adopted the latter approach in our analysis.

To support its use of the medium series, Unitywater provided to SKM an email from the OESR advising the use of the medium series population projection. SKM notes a statement in the email that "*while actual population change may track close to either the low or high series in the short-term, the expectation is that the most likely outcome will be that overall population change over the entire projection period will reflect the medium series*". This is a position that SKM has also accepted and we note that "*over the entire projection period*" (from 2011 to 2031), the medium series should indeed be the appropriate series to use. However, given that this forecast is to be applied in the short term (between 2012 and 2015), the advice SKM has received and our own research has indicated, that the low series is the most appropriate to use for this review period.

4.3.1. Connected population

As not all living in the LGA are within Unitywater's network area, only a portion of the population within the LGA are connected to the water and wastewater network. In 2012, Unitywater estimates that about 96.7% of the population in Moreton Bay and 91.7% of the population in the Sunshine Coast is connected to the Unitywater network. For the residential sector, the growth rate for the connection population projected by Unitywater is based on OESR's medium series.

As discussed in Section 4.1, Unitywater employs the concept of "equivalent persons" based on an estimate of the typical demand for any particular land use type expressed in terms of the demand from equivalent persons. The number of connected population and EP forecast by Unitywater is shown in Table 4-3.

- **Table 4-3: Unitywater's proposed residential connected population and non-residential EP**

Service Area	2011/12	2012/13	2013/14	2014/15	2015/16	CAGR 2012-2015 (%p.a.)
Residential						
Moreton Bay	385,264	392,954	400,796	408,796	416,955	2.0%
Sunshine Coast	317,253	324,130	331,156	338,334	345,66	2.2%
Non-Residential						
Moreton Bay	80,006	81,603	83,232	84,893	86,587	2.0%
Sunshine Coast	90,551	92,514	94,519	96,568	98,661	2.2%

SKM's view

SKM accepts that not all residences in the two LGAs are connected to the water distribution network. The rates of connection appear to be reasonable although, given the lack of historical connection information, SKM is unable to verify its accuracy. However, SKM does not agree that the growth rates used for the population forecasts are appropriate. The residential population growth rates used by Unitywater are based on the 2011 OESR medium series population projections. As this series provided for growth at a higher rate than that currently seen and that the actual growth rate is tracking closer to the low growth rate, SKM has recommended that the OESR low population growth series be adopted instead. The recommended connected population for the residential sector is shown in Table 4-4.

- **Table 4-4: Recommended residential connected population**

Service Area	2011/12	2012/13	2013/14	2014/15	CAGR 2012-2015 (%p.a.)
Moreton Bay	385,264	391,142	396,743	402,486	1.5%
Sunshine Coast	317,253	322,751	328,345	334,223	1.8%

The use of EP for the non-residential sector for short term forecast is not supported by SKM. While the concept may be reasonable for long term capital planning, in the short term, there appears to be an inconsistency in the methodology. While the EP is supposed to reflect the demand for any land use type in terms of the demand from equivalent persons, in the short term (as will be discussed in Section 4.5.1), the average consumption rate is different in the residential and non-residential sector. This indicates to SKM that at least in the short term the demand per EP is not equal to an equivalent demand from a person in the residential sector. Also average demand in the residential sector is growing (rebounding from restriction levels) while that in the non-residential sector is not. SKM thus does not recommend basing the short term water demand forecast on the EP but rather connections or, in Unitywater's case, on the number of access charges (see Section 4.4).

Removing the use of EP in the short term forecast for the non-residential sector also has the advantage of avoiding the introduction of two estimated variables that are not seen by the utility. These are the value of the "equivalent" person and the estimate of the consumption of such a person. Using connections and average consumption instead draws on data that the utility collects in the course of its business. For billing purposes, the utility has to know the number of non-residential customers it has as well as their consumption levels. The data required is thus not an assumption but rather an observed variable. This thus eliminates potential sources of error and average consumption levels are based not on the assumed consumption of an equivalent person but rather on the average consumption of non-residential connections. Growth in non-residential water demand is then not driven by the growth in population but by the growth in the number of access charges which in Unitywater's case is driven by the growth in dwellings as a proxy for growth in non-residential connections.

4.3.2. Dwellings

While OESR produces low, medium and high population series, only one dwelling series is produced based on the OESR's population medium series. Given that SKM is adopting the low population series, this may not be consistent with the dwelling projections provided by the OESR. As a result, an adjustment has been made to the dwelling series as published by OESR in 2011. This was done by applying the ratio of the low to medium population series to the dwelling numbers resulting in a lower dwelling series. This approach maintains the persons per dwelling ratio.

4.4. Access Charges

In previous years, Unitywater employed the concept of an "Equivalent Base Charge" to calculate the number of charges it collects (residential and non-residential) that is equivalent to a standard residential connection. In its current submission, Unitywater has changed this to separate access charges for residential customers and non-residential customers. It does not also appear that the current residential access charge is the same as the residential "equivalent base charge" of previous submissions since the number of 2012 residential access charges has risen by 5.6% in Moreton Bay and fallen by 12.7% in the Sunshine Coast from the number of 2011 residential equivalent base charges. However, Unitywater has not provided any historical data in its current submission to enable SKM to be certain if this is the case or otherwise.

The growth rates of the number of residential access charges projected by Unitywater are shown in Table 4-5. This is compared with the dwelling growth rates projected by OESR adjusted for lower population growth.

- **Table 4-5: Water access charge growth rates**

Service Area	Unity Water proposed access charges growth rates 2012-2015				2011 OESR Dwelling (2011-2016)	
	Residential		Non-residential		Medium	Low
	Water	Wastewater	Water	Wastewater		
Moreton Bay	2.4%	2.0%	2.4%	2.4%	2.4%	1.9%
Sunshine Coast	2.4%	2.3%	2.3%	2.3%	2.3%	1.9%
Unitywater	2.4%	2.2%	2.3%	2.4%	2.3%	1.9%

Unitywater has forecast 2.4% p.a. growth in the number of water access charges from 2012 to 2015. For wastewater, the growth rates vary slightly in the two LGAs, 2.0% in Moreton Bay and 2.3% p.a. in the Sunshine Coast. With the exception of the Moreton Bay waterwater access charge, these growth rates are comparable with the unadjusted OESR forecasted growth of dwellings over the period 2011 to 2016 shown in Table 4-5. The proposed access charges are shown in Table 4-6.

- **Table 4-6: Unitywater's proposed number of access charges**

Forecast	2011/12	2012/13	2013/14	2014/15	CAGR 2012-2015 (%p.a.)
Residential	Water				
Moreton Bay	145,061	148,534	152,091	155,733	2.4%
Sunshine Coast	119,100	122,029	124,839	127,713	2.4%
Non-Residential	Water				
Moreton Bay	4,009	4,105	4,204	4,305	2.4%
Sunshine Coast	9,062	9,272	9,485	9,704	2.3%
Residential	Wastewater				
Moreton Bay	145,973	147,814	151,352	154,976	2.0%
Sunshine Coast	126,647	129,702	132,690	135,747	2.3%
Non-Residential	Wastewater				
Moreton Bay	7,305	7,480	7,660	7,843	2.4%
Sunshine Coast	9,960	10,192	10,428	10,670	2.3%
Non-Residential	Trade Waste				
Moreton Bay	1,079	1,105	1,131	1,158	2.4%
Sunshine Coast	815	834	853	873	2.3%

SKM's view

The growth rates used by Unitywater and the unadjusted 2011 OESR projections of dwelling growth are the similar. However, they are likely to be too high given the view that population growth and hence dwelling growth in likely to be lower than the medium series that the OESR have published which can been seen in the "Low" column of Table 4-5. Accordingly, we recommend adjusting the proposed access charges to that shown in Table 4-7.

- **Table 4-7: Recommended number of access charges**

Forecast	2011/12	2012/13	2013/14	2014/15	CAGR 2012-2015 (%p.a.)
Residential	Water				
Moreton Bay	145,061	147,764	150,517	153,321	1.9%
Sunshine Coast	119,100	121,326	123,594	125,974	1.9%
Non-Residential	Water				

Forecast	2011/12	2012/13	2013/14	2014/15	CAGR 2012-2015 (%p.a.)
Moreton Bay	4,009	4,086	4,161	4,238	1.9%
Sunshine Coast	9,062	9,231	9,404	9,585	1.9%
Residential	Wastewater				
Moreton Bay	145,973	148,777	151,497	154,293	1.9%
Sunshine Coast	126,647	129,014	131,425	133,957	1.9%
Non-Residential	Wastewater				
Moreton Bay	7,305	7,445	7,584	7,725	1.9%
Sunshine Coast	9,960	10,146	10,336	10,535	1.9%
Non-Residential	Trade Waste				
Moreton Bay	1,074	1,094	1,114	1,135	1.9%
Sunshine Coast	812	827	843	859	1.9%

4.5. Water Demand

Unitywater has forecast total water demand to grow from 57.9 GL to over 67.3 GL at an average of 5.1% p.a. over the 2012 to 2015 period. This is shown in Table 4-8.

- **Table 4-8: Unitywater proposed water demand forecast**

LGA	2009/10[27] (ML)	2010/11 (ML)	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)	CAGR 2012-2015 (%p.a.)
Residential	47,146	39,750	43,189	45,352	49,123	51,700	6.2%
Non-residential	7,543	6,985	7,387	7,627	7,806	7,990	2.7%
Other demand (incl commercially negotiated)			1,199	1,199	1,199	1,199	0.0%
Non-revenue water	5,866	5,866	6,132	6,271	6,422	6,414	1.5%
Total Bulk Water Demand	60,555	52,601	57,907	60,448	64,550	67,303	5.1%

Unitywater forecasts total water consumption based on an underlying level of consumption on a per person per day basis and multiplying this average consumption by the connected population. Projections are then broken

[27] Water demand for 2010 and 2011 have been sourced from Unitywater's 2011 submission

down to tiers by escalating individual customer consumption levels by the expected increase in average consumption rates.

4.5.1. Average consumption

Table 4-9 shows the average consumption for the residential and non-residential water demand projected by Unitywater for each of the LGAs over the forecast period. Unlike in 2011 when Unitywater's forecasting method did not separately identify residential and non-residential average consumption, in its 2012 submission, Unitywater has separated residential and non-residential average demand. Unitywater assumes that while the average consumption of residential customers will exhibit some bounce back from restriction affected levels, non-residential customers consumption would remain at current levels in the short term.

Based on historic consumption data Unitywater has different expected average consumption rates for the two LGAs, reflecting the different customer profiles as well as the fact that the Sunshine Coast had not been subject to restrictions during the drought (the Sunshine Coast was not subject to restrictions between 2005 and 2008).

- **Table 4-9: Unitywater proposed average water consumption rates (LPD/LEPD)**

Service Area	2011/12	2012/13	2013/14	2014/15
Residential				
Moreton Bay	152	161	171	181
Sunshine Coast	178	188	200	200
Non-residential				
Moreton Bay	102	103	103	103
Sunshine Coast	135	135	136	136

Unitywater has submitted that its estimate of residential LPD is based on SKM's 2011 recommendation. Average consumption in 2012 is adjusted to reflect actual consumption with the growth projections applied based on the growth rates from SKM's 2011 recommended average consumption growth. A cap of 200 LPD is applied for both Moreton Bay and Sunshine Coast to reflect the voluntary average consumption target set by the QWC for South East Queensland. While this cap does not impact on the forecast for Moreton Bay, average consumption in the Sunshine Coast reaches the cap in 2013/14 which is 5 years after the drought ended.

SKM's view

Average consumption levels and the level of rebound from restrictions are a source of great uncertainty. SKM understands that since the drought ended, weather conditions in SEQ have been relatively wet. This means that potential rebound from the lifting of restrictions may have been masked by the wet conditions reducing the need to water gardens and other outdoor uses. A clearer picture of rebound may be available after the 2012/13 year where conditions are expected to be drier with SEQ having recently experienced a fairly dry winter. As a

result, how consumer behaviour may have changed since the lifting of restrictions may become clearer when the data of the 2012/13 year is available for analysis.

No information was provided in the template as to what the average consumption was in 2010 or 2011. While water consumption for these two years (residential and non-residential demand) in each of the LGAs was provided in the templates that Unitywater submitted to the Authority, no population details were included (not required in the template). If we assume that the same proportion of connections to population that was submitted for 2012, the derived average residential consumption for 2010 and 2011 for Moreton Bay are 162 LPD and 144 LPD respectively. As the average of these (153 LPD) is close to the average consumption supplied by Unitywater for 2012 (and also to the 2011 SKM recommended average consumption of 151 LPD for 2012), SKM accepts that the 2012 average consumption base of 152 LPD is an accurate reflection of the actual level of average consumption in Moreton Bay.

The same however cannot be said for the Sunshine Coast. Appling the same method (assuming same proportion of connections to connected population and dividing residential water volumes by connected population) results in an average consumption of 228 LPD over 2010 (265 LPD) and 2011 (190 LPD). This higher level of average consumption in the Sunshine Coast can be explained as this LGA did not suffer from the strict restrictions imposed on other areas of SEQ during the drought. Although consumption in the Sunshine Coast did fall, the reduction in demand was not as dramatic as in other areas. The assumed 178 LPD average consumption for the Sunshine Coast in 2012 is thus in SKM's view too low (although consistent with SKM's view in the 2011 review).

SKM also notes that for 2012, while the residential average consumption rate proposed by Unitywater is 1 LPD more than that recommended in SKM's 2011 review, the average consumption for the Sunshine Coast is 5LPD more. However, the SKM 2011 recommended average consumption for the residential and non-residential sectors were derived from a combined average consumption level provided by Unitywater and based on information provided by Unitywater. This was done by dividing total residential consumption by population numbers provided by Unitywater and total non-residential consumption by an estimate of the number of non-residential customers. The estimate of non-residential customers was based on supplementary information provided by Unitywater indicating that non-residential customers comprise 7.3% of all customers in Moreton Bay and 10.3% of all customers in the Sunshine Coast. These estimates may not have produced comparable results to Unitywater's current proposal.

Unitywater has also applied a maximum rebound level of 200 LPD for both Moreton Bay and Sunshine Coast. This is unlikely to be reasonable given the different starting positions of the two LGAs. In SKM's 2011 review, an assumption of a 200 LPD cap was applied for the whole of South East Queensland. This did not however mean that all LGA's average consumption was capped at 200 LPD individually. Revisiting our 2011 analysis and updating the Sunshine Coast's 2011 average consumption from 165 LPD to 190 LPD, the maximum rebound level for the Sunshine Coast is 229 LPD. Similarly, the level that applies in Moreton Bay given that the average consumption in this LGA had started off a much lower base is 174 LPD. The analysis undertaken in 2011 estimated that these maximum rebound levels are reached in 2016. After making these adjustments, the recommended average consumption is shown in Table 4-10.

- **Table 4-10: Recommended residential average consumption**

Service Area	2010/11 (LPD)	2011/12 (LPD)	2012/13 (LPD)	2013/14 (LPD)	2014/15 (LPD)	2015/16 (LPD)
Moreton Bay	144	164	170	176	183	174
Sunshine Coast	190	174	181	188	195	229

Non-residential average consumption

Unitywater has estimated its average non-residential consumption based on "equivalent persons". As discussed in Section 4.3.1, SKM does not agree with the use of EP for short term demand forecasting. Rather SKM recommends using the average consumption per connection (which in Unitywater's case, the number of access charges as a proxy). Unitywater has also made the assumption that average non-residential consumption is unlikely to rebound significantly from restriction levels and has assumed a nominal rate of increase of 0.28% p.a. for Moreton Bay and 0.23% p.a. for the Sunshine Coast over the forecast period. Unitywater however has not provided an explanation for adopting these values. Given that businesses do not usually have significant discretionary and outdoor water use and that demand management measures implemented during the drought are mainly structural rather than behavioural, SKM tends to agree with Unitywater's assumption. In addition, the drive to restrain non-residential water use continues through the WEMP.

Given the lack of historical non-residential customer numbers and average usage, SKM has adopted Unitywater's average usage growth rate and applied that to the average consumption calculated by dividing the total 2012 non-residential consumption by the number of non-residential access charges. The resulting non-residential average consumption is shown in Table 4-11.

- **Table 4-11: Recommended non-residential average consumption (litres per connection per day)**

Service Area	2011/12	2012/13	2013/14	2014/15	CAGR 2012-2015 (%p.a.)
Moreton Bay	2,045	2,051	2,056	2,062	0.28%
Sunshine Coast	1,348	1,332	1,335	1,338	0.23%

In addition, Unitywater has provided for 1.2GL of commercially negotiated demand that remains constant throughout the forecast period. This is to supply Amcor and is based on the water demand from July 2011 to December 2011. No further information is provided for this item of demand.

4.5.2. Water consumption

Unitywater's projection for residential water demand is calculated by multiplying the average residential consumption by the projected connected population shown in Table 4-3. Similarly Unitywater's projection for non-residential water demand is calculated by multiplying the average non-residential consumption by the projected equivalent person (also shown in Table 4-3). The LGA breakdown of the proposed residential and non-residential water use is shown in Table 4-12.

- **Table 4-12: Unitywater proposed water consumption projections**

Forecast	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)	CAGR 2012-2015 (%p.a.)
Residential water demand					
Moreton Bay	22,998	23,053	24,949	27,001	5.5%
Sunshine Coast	20,191	22,299	24,174	24,698	6.9%
Total residential demand	43,189	45,352	49,123	51,700	6.2%
Non-residential water demand					
Moreton Bay	2,992	3,061	3,130	3,202	2.3%
Sunshine Coast	4,394	4,566	4,676	4,788	2.9%
Total Non-residential demand	7,387	7,627	7,806	7,990	2.7%

SKM agrees with Unitywater's approach to forecasting residential water demand. However, SKM has recommended that the low series population growth rate be used instead of the medium series. SKM has also recommended that the average consumption levels be adjusted to reflect the historical average consumption levels and also to update the maximum rebound level that is applied at both Moreton Bay and the Sunshine Coast. The resulting recommended residential water demand is shown in Table 4-13.

SKM does not agree with Unitywater's approach in forecasting non-residential water demand, the recommended non-residential water consumption projection may be obtained by multiplying the recommended average non-residential water consumption rates found in Table 4-11 to the 2012 non-residential connections numbers (Table 4-7). This is shown in Table 4-13.

- **Table 4-13: Recommended water consumption projections**

Forecast	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)	CAGR 2012-2015 (%p.a.)
Residential					
Moreton Bay	22,998	24,239	25,522	26,878	5.3%

Sunshine Coast	20,191	21,323	22,519	23,795	5.6%
Non-residential					
Moreton Bay	2,992	3,058	3,123	3,189	2.1%
Sunshine Coast	4,394	4,487	4,581	4,680	2.1%
Commercially negotiated	1,199	1,199	1,199	1,199	0.0%
Total Unitywater	51,775	54,305	56,944	59,741	4.9%

4.6. Wastewater

Wastewater volume forecasts have not been provided as Unitywater does not charge on the basis of wastewater volume with the exception of non-residential customers in the Maroochydore region of the Sunshine Coast. For these customers, rather than actually metering wastewater volumes, volumes are calculated as a percent of metered water consumption based on set discharge factors ranging from 5% to 90%. This approach to forecasting wastewater volumes is consistent with approaches adopted in other jurisdictions. This approach avoids the extensive expenditure that would be required to meter consumption of wastewater services which is forecast to grow at the same rate as water consumption.

SKM's view

In the absence of more historical information, we accept that the methodology applied to estimate wastewater volumes for Maroochydore is appropriate. In SKM's 2011 review, a recommendation was made to update the estimate of the discharge factors for each of the industries taking into account the changing nature of these industries as well as changes to drinking water consumption patterns due to the drought and restrictions imposed as a result of the drought as it is highly possible that the discharge factors will have changed as behaviour has changed due to the increased awareness to reduce water consumption. SKM also suggested that monitoring of any changes to the rate of growth of the deemed wastewater volume in Maroochydore be compared with general water volume growth rate in the Sunshine Coast so that future forecasts may have a better basis for projection. SKM understands that these recommendations are currently being assessed as part of a broader review into sewage pricing and the introduction of a two part tariff.

While we accept the method applied by Unitywater, we have recommended in Section 4.5.2 an alternative water volume for non-residential customers in the Sunshine Coast which provides for a different volume of wastewater from that proposed by Unitywater. This is shown in Table 4-14.

- **Table 4-14: Wastewater volume**

Forecast	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)	CAGR 2012-2015 (%p.a)
Proposed projections	1,640	1,738	1,776	1,814	3.4%
Recommended projections	1,640	1708	1740	1773	2.7%

4.7. Non-revenue water

Non-revenue water is the difference between bulk supply data (water use supplied by the SEQ Water Grid Manager) and billable consumption from residential and non-residential customers. This includes network leakage, water theft and authorised unbilled water consumption (fire-fighting and pipe flushing).

To estimate non-revenue water, Unitywater has estimated losses of 22 LPD in 2012. This is expected to fall to 18 LPD by 2021 due to various projects aimed at reducing losses. A loss factor from 2011/12 was calculated to reflect estimated demand in each of the areas. A reducing trend for losses was then applied from the base of actual losses in 2012 to reach its target losses by 2021.

Unitywater non-revenue water forecast in the templates supplied to the Authority indicates that it expects non-revenue water to increase from 6.1GL in 2012 to 6.4GL in 2015. In 2012, this amounts to some 10.1% in Moreton Bay and 11.5% in the Sunshine Coast. In its demand forecasting model provided to SKM, it appears that the ratio applied is 10.5% in Moreton Bay and 11.5% in the Sunshine Coast. These ratios were supported by historical data showing actual losses. The historical data showed that in Moreton Bay, losses since the beginning of 2010 to the third quarter 2011 range from 7.3% to 12.1% quarterly with a loss factor of 10% over the period. If the period of the floods in early 2011 were ignored, the average loss factor would be 10.3%.

For the Sunshine Coast, bulk water and consumption values from three periods were provided. These data covered the period from September 2009 through to April 2011. Losses over the three periods averaged 12.2% and ignoring the flood period, losses amounted to 11.4%.

Given these historical values, SKM accepts that the loss factors of 10.1% and 11.5% adopted by Unitywater for Moreton Bay and Sunshine Coast are a reasonable estimate of the likely losses for its forecast. Going forward, Unitywater has embarked on an Unbilled Water Project (UWP) which aims to quantify and classify the non-revenue water component of its water balance. This project will benchmark Unitywater's non-revenue water against other water businesses and seek to identify opportunities to reduce the proportion of losses incurred. Unitywater expects that this and other projects to reduce losses will lead to loss reduction of 3.8% p.a. for Moreton Bay and 4.6% p.a. for the Sunshine Coast such that by 2021, the loss factors of 7.4% and 7.6% would apply for Moreton Bay and the Sunshine Coast respectively. Given these measures, SKM accepts the loss factors applied by Unitywater and recommends the adoption of non-revenue water (to reflect the lower water volume recommended) found in Table 4-15.

- **Table 4-15: Non-revenue water volume**

Forecast	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)
Proposed				
Moreton Bay	2,877	2,959	3,047	3,139
Sunshine Coast	3,255	3,312	3,376	3,275
Recommended				
Moreton Bay	2,877	3,092	3,107	3,125

Sunshine Coast	3,255	3,182	3,171	3,163

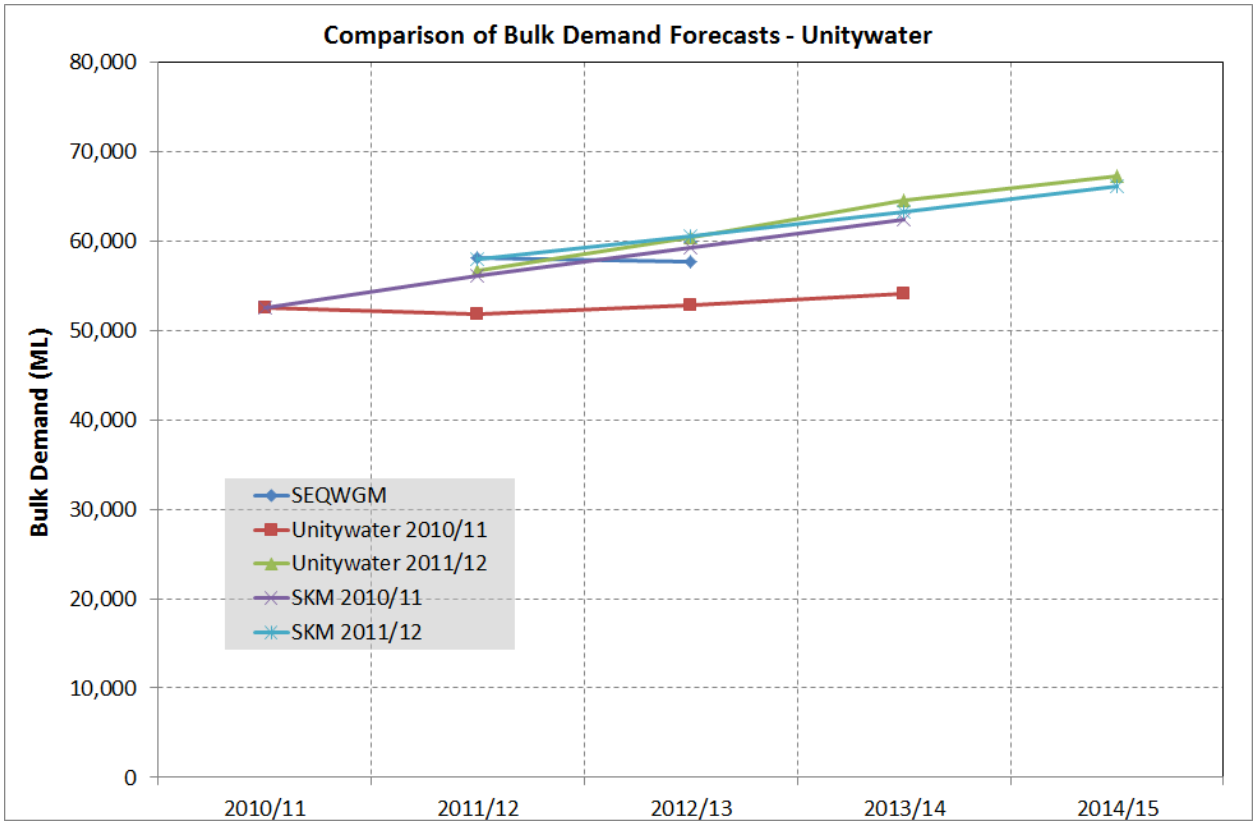
4.8. Bulk Water Demand

Bulk water demand is simply the sum of total residential and non-residential water demand together with the estimated quantity of non-revenue water. The proposed Unitywater and SKM's estimate of bulk water is shown in Table 4-16.

- **Table 4-16: Bulk water demand projections**

Forecast	2011/12 (ML)	2012/13 (ML)	2013/14 (ML)	2014/15 (ML)
Unitywater Proposed				
Moreton Bay	28,390	30,270	32,325	34,541
Sunshine Coast	28,304	30,177	32,226	32,762
Unitywater	56,695	60,448	64,550	67,303
SKM Recommended				
Moreton Bay	30,067	31,587	32,951	34,391
Sunshine Coast	27,840	28,992	30,271	31,638
Unitywater	57,907	60,579	63,222	66,029

A comparison with current and previous years forecasts for the bulk water is shown in Figure 4-6.



- **Figure 4-6: Comparison of Bulk Demand Forecasts - Unitywater**

4.9. Long-Term Population and Demand Forecasts

Unitywater uses long-term demand forecasts to forecast future capital investment in infrastructure servicing new and infill development areas. Population estimates underpinning these forecasts are generated using population projections from the respective Council Planning Schemes (CPS's). These planning scheme projections assign future population to specific land parcels using assumptions on zoning, development densities, developable land, anticipated timing of development, previous development applications and future occupancy ratios. Unitywater has verified that these population forecasts are reasonable by comparing them to the forecasts prepared by the OESR.

The CPS information also provides future projections of non-residential land uses either as land areas or gross floor areas.

Unitywater utilises these population projections to generate forecasts of both residential and non-residential demands. Residential populations are further disaggregated by Unitywater into two different dwelling densities:

- Low/Medium density; and
- High density.

Estimates of the non-residential demand are also prepared by firstly generating unit rates of consumption (per land area or floor area) from the water consumption and land use of existing users similar to those in the new development areas. These are applied to forecast land uses to generate forecasts of non-residential customers as the equivalent of residential occupants or Equivalent Persons (E.P.'s).

Population estimates are multiplied by an average demand per unit E.P. to generate estimates of average demands. These unit rates are 230 LPD for low/medium density residential and non-residential E.P.'s and 200 LPD for high density residential. These average demands are converted to peak demands using a series of peaking factors (see Section 4.10), which are in turn used to size future infrastructure.

The sizing of future infrastructure is generally undertaken in two phases. Firstly, water and sewerage master plans are prepared for each service area. These provide an initial estimate of the sizing or water and wastewater infrastructure required to service population growth. In the second step, in three to five years prior to anticipated commissioning, the master plan information is updated to reflect the latest land use forecasts.

Future demand forecasts are also provided to the SEQ Water Grid Manager for use in the planning of the delivery of water and the delivery of supply, treatment and distribution infrastructure under its jurisdiction.

SKM's View

As outlined above, the OESR has provided confirmation that he current population growth is tracking along the low forecast series. From the perspective of setting water prices and providing water and wastewater infrastructure in an efficient manner, the question must be, what implications are there for the sizing and provision on infrastructure in using forecasts other than those provided through the CPS's?

For the design and delivery of Unitywater infrastructure, there are a number of factors that are relevant to answering this question:

1) The second stage in the planning process (the refinement of the master planning infrastructure sizing) is most likely to be driven, not by population forecasts, but by information provided to Unitywater by Council and developers about the prospects for imminent development in a particular area or areas.
2) The forecasts for the provision of this infrastructure over a typical three to four year regulatory period are again unrelated to the long-term population forecasts.
3) A significant proportion of the costs for such development will be recovered through capital contributions, the rates for which are set for the most part many years in advance of actual infrastructure delivery at the master planning stage.
4) CPS information is updated periodically, and that this updated information is utilised by Unitywater as it becomes available.

In SKM's view, long-term population forecasts and the ensuing forecasts of future demand will have a negligible impact on forecasts of capital expenditure or their flow-on impact on water prices over a typical regulatory

period. Thus for long-term capital planning purposes, it is entirely appropriate to rely on information from the CPS's.

For the provision of forecasts of demand forecasts to the SEQ Water Grid Manager, it is reasonable that these forecasts be adjusted to use the OESR low forecast in the near term (2013 to 2016) with a transition in the medium and longer term to either the growth rates or annual population changes associated with the medium population series will be appropriate. Note that this does not mean that the actual population figures from the medium series be adopted, but that the low series figures to 2016 be built upon using either the rates of growth or population increases (adjusted for the proportion of connected population) from the medium series. Other entities have used the period from 2017 to 2026 to transition from the low to the medium series figures, and SKM supports this approach. At the current time and under normal conditions, the rates of growth and/or population increases associated with the medium series still represent the OESR's best estimate of the outlook for growth in the medium to longer term. The current slow growth may be associated with a number of factors linked to the current global economic conditions and the fiscal outlook for state governments in Australia.

4.10. Demand Factors

Different parts of the water supply and wastewater system are designed by applying a series of peaking factors to the average demands. Key design demands are water systems are:

- Mean day maximum month (MDMM);
- Maximum day (MD); and
- Maximum hour (PH).

For wastewater systems, key design peaking factors are:

- Peak dry weather flow (PDWF); and
- Peak wet weather flow (PWWF).

The use of demand factors on average demands is a standard approach utilised by water utilities across Australia and supported in the Water Supply and Sewerage Codes of Australia published by the Water Services Association of Australia (WSAA).

Unitywater utilise different peaking factors for the following types of customers:

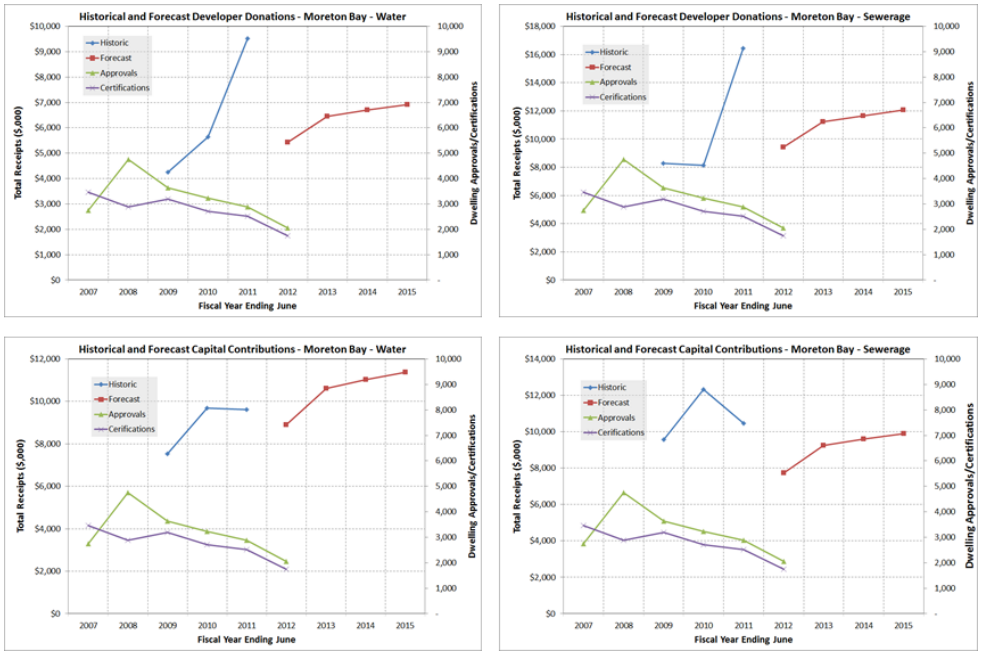
- Single Family Residential (SFR)
- Multiple Family Residential (MFR)*
- Rural Residential (RUR)
- Commercial (COM)
- Industrial (IND)

SKM's View

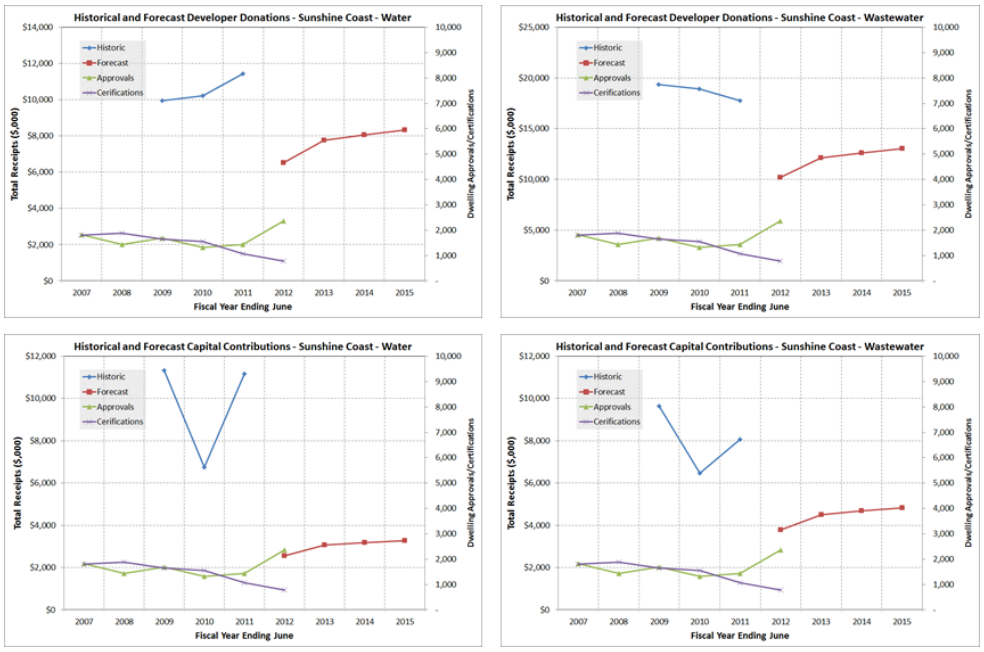
SKM is of the view that the average demand and peaking factors applied for different types of residential customers are reasonable. In the non-residential sector, many water utilities in Australia recognised a greater diversity in peaking factors in the non-residential sector. This allows improved design of infrastructure, particularly in areas where urban renewal may result in a significant mix of commercial and residential water uses that are atypical of new suburb development areas. SKM would suggest that Unitywater should consider the addition of a Tourist customer category which would take account of the peaking characteristics of hotel, motel and tourist park tourist accommodation, which would otherwise be classified as commercial. These types of customer would have peaking factors more closely aligned with residential multi-unit dwellings. This may result in more efficient capital expenditure in areas where there was a significant proportion of this type of tourist accommodation.

4.11. Developer Donations and Capital Contributions

Unitywater has generated forecasts of both developer donations and capital contributions on the basis of the receipts for the year to date in January 2012 (seven months of the 2011/12 fiscal year). For the 2011/12 full year forecast, these values have been increased by a factor of 12/7. In addition, a one-off volume increase is applied in 2012/13 of 15% for capital contributions and 14.7% for developer donations. The reason for this adjustment is not clear in either Unitywater's submission of supporting calculations. There is no indexing of either set of forecasts for changes in future population or account growth. The resulting forecasts showing historical receipts and more recent dwelling approval data (Queensland Treasury and Trade, 2012) is shown for Moreton Bay and Sunshine Coast in Figure 4-7 and Figure 4-8.



- **Figure 4-7: Comparison of Observed and Forecast Donated Assets and Capital Contributions and Dwelling Approval and Certification Data – Moreton Bay**



- **Figure 4-8: Comparison of Observed and Forecast Donated Assets and Capital Contributions and Dwelling Approval and Certification Data – Sunshine Coast**

SKM's View

In almost all cases, forecasts of donated assets and capital contributions are significantly below historical receipts. In addition, there appears to be little correlation between annual movements in dwelling approvals and either set of historical data. In this situation the development of forecasts is clearly difficult.

While dwelling approval data has been on a downward trend in Moreton Bay since 2007/08, forecasts are noticeably lower than receipts. In the Sunshine Coast case, forecasts show an even greater disparity, in spite of there being no equivalent trend in dwelling approval and certification data.

Until a more robust relationship can be developed between the drivers of donations and contributions, SKM are of the view that Unitywater should use the average of the previous three years receipts as the basis for forecasts with adjustment for year to year changes in the forecasts of new E.P.'s.

4.12. Conclusion

Two major issues arise in SKM's analysis of Unitywater's demand forecasting methodology. The first is the use of the OESR's medium population growth forecast. Given the available data from the ABS and the view expressed by the OESR, SKM considers that the low population growth series is the appropriate series to use in the short term. Adjustments will then need to be made to the OESR's dwelling projections to reflect the low population growth scenario for the short term. SKM agrees that the medium growth series is appropriate for the medium and long term.

The second issue is Unitywater's use of "equivalent persons" for the non-residential sector. While SKM agrees that the use of "equivalent persons" is reasonable for long term infrastructure projections, it is not appropriate to use for short term demand forecasts, especially when average consumption levels for an "equivalent" person is not the same in the residential and non-residential sector when demand is rebounding from restrictions. The use of this concept also introduces additional uncertainty since the number and demand of an "equivalent person" in the non-residential sector is not observable but is assumed. This leads to potential sources of error. SKM recommends the use of connection numbers and the average consumption per connection for the forecasting of short term non-residential demand.

- **Table 4-17: Summary of SKM's recommendations Unitywater demand projections**

Forecast	Units	2011/12	2012/13	2013/14	2014/15
Moreton Bay					
Residential water connections	#	145,061	147,848	150,551	153,329
Residential wastewater connections	#	145,973	148,777	151,497	154,293
Non-residential water connections	#	4,009	4,086	4,161	4,238
Non-residential wastewater connections	#	7,305	7,445	7,584	7,725
Trade waste connections	#	1,074	1,094	1,114	1,135

Forecast	Units	2011/12	2012/13	2013/14	2014/15
Residential water volume	ML	22,998	24,239	25,522	26,878
Non-residential water volume	ML	4,191	4,257	4,322	4,388
Non-revenue water	ML	2,877	3,092	3,107	3,125
Bulk water	ML	30,067	31,587	32,951	34,391
Sunshine Coast					
Residential water connections	#	119,100	121,326	123,594	125,974
Residential wastewater connections	#	126,647	129,014	131,425	133,957
Non-residential water connections	#	9,062	9,231	9,404	9,585
Non-residential wastewater connections	#	9,960	10,146	10,336	10,535
Trade waste connections	#	812	827	843	859
Residential water volume	ML	20,191	21,323	22,519	23,795
Non-residential water volume	ML	4,394	4,487	4,581	4,680
Non-revenue water	ML	3,255	3,182	3,171	3,163
Bulk water	ML	27,840	28,992	30,271	31,638
Unitywater total					
Residential water connections	#	264,161	269,173	274,144	279,303
Residential wastewater connections	#	272,620	277,790	282,922	288,249
Non-residential water connections	#	13,071	13,317	13,565	13,823
Non-residential wastewater connections	#	17,265	17,591	17,920	18,260
Trade waste connections	#	1,886	1,922	1,957	1,994
Residential water volume	ML	43,189	45,562	48,041	50,673
Non-residential water volume	ML	8,585	8,744	8,903	9,068
Non-revenue water	ML	6,132	6,274	6,278	6,288
Bulk water	ML	57,907	60,579	63,222	66,029

Population growth is currently tracking against the OSER low growth series. Long-term population and demand forecasts should be revised to reflect more recent trends in growth in the short term, with a transition to higher rates of growth in the medium term. Long term forecasts should utilise the rates of growth associated with the OESR medium series.

The forecasts of donated assets and capital contributions are low in comparison to the last 3 years of actual receipts. This should be revised using the methodology outlined above to provide more consistency with historical data.

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