7 Demand for services

Technical Paper 7

- This paper provides information about the water demand and connection outcomes for the current price path and our forecasts for the next period. We use these forecasts to calculate charges and prices.
- Our forecasts for future water demand are derived from the Integrated Supply–Demand Planning model. This model is used by water agencies across Australia.
- We expect water sales over the period July 2020 to June 2025 to average around 57,700 megalitres per year. This is around 2,000 megalitres per year higher than the average annual forecast for the current price period.
- We forecast connections to our supply network to increase by an average of 3,200 properties per year.

Contents

1. Introduction

Hunter Water provides water and wastewater services to households, businesses and industry across Newcastle, Lake Macquarie, Port Stephens and parts of the Hunter Valley. We supply bulk water to Central Coast Council, MidCoast Council and three private network operators. Stormwater drainage services are also provided to customers whose properties are located within catchment areas in Newcastle, Lake Macquarie and Cessnock.

To calculate prices required to recover target revenues, we have forecast water sales (including for our bulk water customers), wastewater discharge volumes, and water, wastewater and stormwater billable connections. Forecasts proposed and adopted by IPART are required to be as accurate as possible. If they differ markedly from actual outcomes, determined prices could result in Hunter Water significantly over- or under-recovering target revenues.

Hunter Water's forecast water sales are based on best practice and peer reviewed methodologies; however, as demonstrated in the current period, deviations from expected climate conditions and activity levels can have an impact on annual consumption outcomes. Population growth, industry activity and changing water needs are critical drivers of water demand over future years.

Water demand over recent years has placed pressure on our water resources due to the combined impact of reduced local rainfall and an upswing in new housing development. We have assumed a return to historical rainfall levels and, based on current population and activity forecasts, a moderation of the recent strong growth in the local housing sector.

Around 96 per cent of our water customers are also provided wastewater services. Forecast wastewater discharge volumes are a function of water usage. Sewer discharge factors are applied to water sales to reflect the estimated portion of metered water usage discharged into the wastewater system.

This technical paper sets out Hunter Water's proposed demand and billable connection forecasts with explanation of forecast methodology and underlying assumptions. Billable connections, water sales and wastewater discharge volumes over the current regulatory period are documented against numbers adopted in the 2016 IPART Determination.

2. Customer growth in the Lower Hunter

2.1 Population served

Hunter Water provides services to around a quarter of a million properties spread across seven local government areas. Around 92 per cent of these are residential dwellings. Hunter Water's population estimate uses ABS data published annually – titled *Population Estimates by Local Government Area*. We have calculated the population estimate for 2019 by:

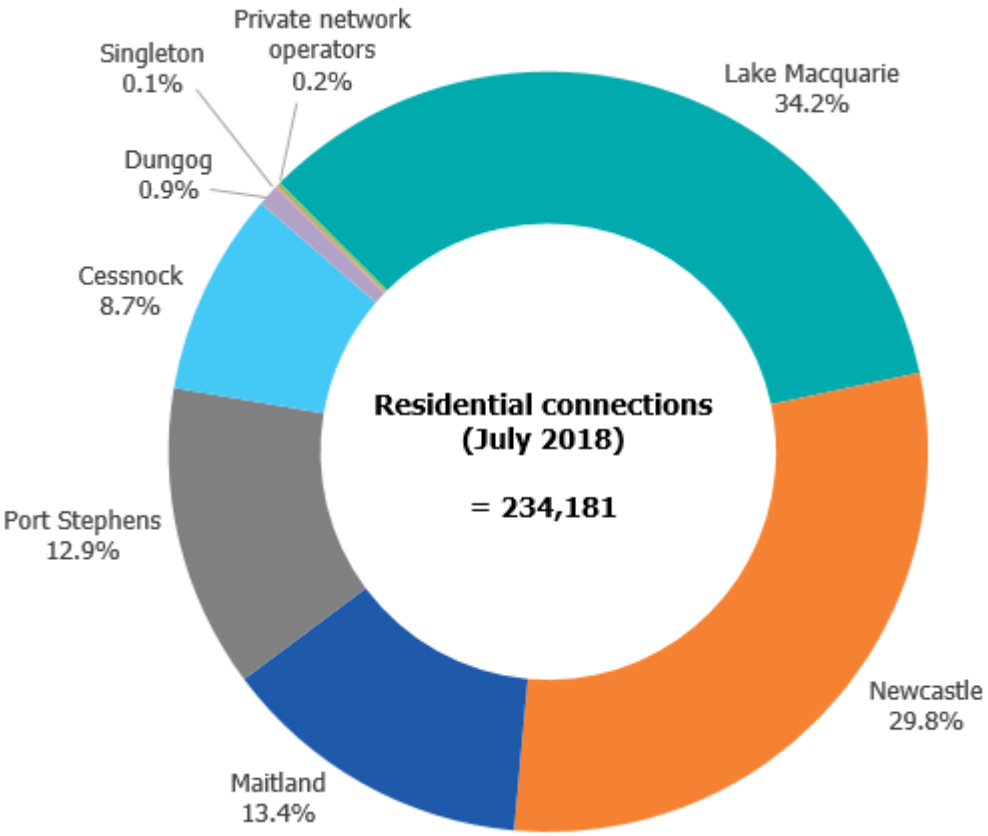
- Extrapolating growth rates from 2017 and 2018 data for each local government area
- Applying a percentage multiplier derived from historical data to each local government area to extract the population serviced by the water supply system, and
- Separating the serviced population in to those residing in private and non-private dwellings (e.g. hospitals, aged care).

The Lake Macquarie and Newcastle local government areas account for about 64 per cent of our residential connections, with a further 26 per cent of customers located in Maitland and Port Stephens (see Figure 2.1). Our network and service base extend to customers in Cessnock, Dungog and a small part of the Singleton area, who, taken together, account for about 10 per cent of residential connections. We also supply drinking water under wholesale supply agreements to Kooragang Water (Newcastle), Huntlee Water (Cessnock) and Cooranbong Water (Lake Macquarie) (see section 7).

Hunter Water saw a significant increase in dwelling numbers over the 2016-17 and 2017-18 financial years, connecting approximately 8,000 new dwellings over two years. This reflected a dwelling approval and completion rate of 1.8 per cent per year, significantly above that recorded in previous years (1.2 per cent per year from 2011 to 2016).

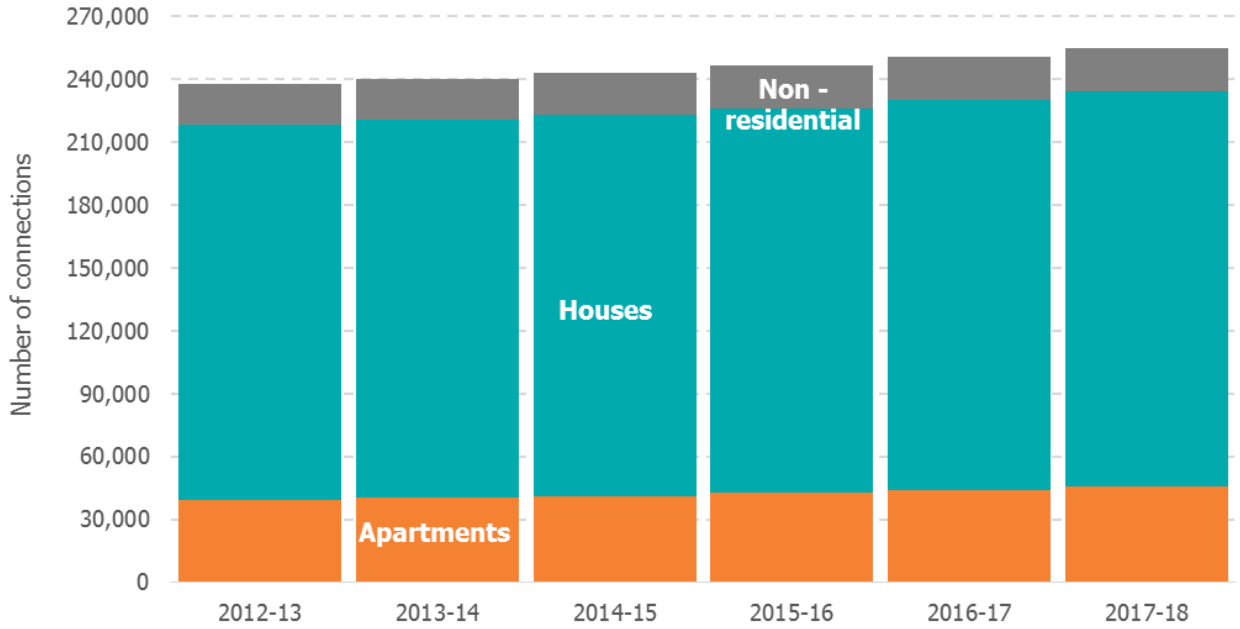
We added over 30,400 dwellings to our customer base over the past decade, with around 64 per cent of these being free-standing houses. The number of apartments serviced by Hunter Water has grown steadily, accounting for around 19.6 per cent of residential connections – up from around 14.7 per cent at the end of the 1990s (see Figure 2.2).

Figure 2.1 Hunter Water residential connections by local government area, July 2018



Source: Hunter Water.

Figure 2.2 Growth and mix of property connections, 2012-13 to 2017-18



Source: Hunter Water.

2.2 Forecast population

Hunter Water prepares forecasts of residential dwelling growth at a regional scale as an input to a number of planning processes, including the overall water demand forecast and the Lower Hunter Water Plan (LHWP). The residential population in the Lower Hunter region has grown at a steady rate of 1.0 to 1.1 per cent per year over the last 25 years. This has historically been less than the residential dwelling growth rate due to a gradual decline in average household sizes.

Hunter Water expects 3,826 new dwelling connections in 2018-19. This is based on dwelling approvals for 2017-18 and a realisation rate of between 70 per cent and 95 per cent over the last five years (reflecting recent outcomes). Hunter Water anticipates a slowing of development activity in 2019-20 and beyond, representing a move back to past trend (see Figure 2.3).

We are working to connect an additional 126 properties within the Williamtown Management Area to Hunter Water's water supply network. This addition of single dwellings has been added in the forecast for year 2019 as a one off connection.

The Hunter Regional Plan 2036 outlines a forecast increase of 60,850 dwellings over 20 years (3,043 per year on average) in the local government areas serviced by Hunter Water. Residential growth areas highlighted in the regional plan are shown in Figure 2.4.

The Greater Newcastle Metropolitan Plan 2018 aims to deliver housing close to jobs and services. The NSW Department of Planning has identified a number of key strategies to support this goal, including the preparation of local strategies to deliver housing and unlocking housing supply through infrastructure coordination and delivery.

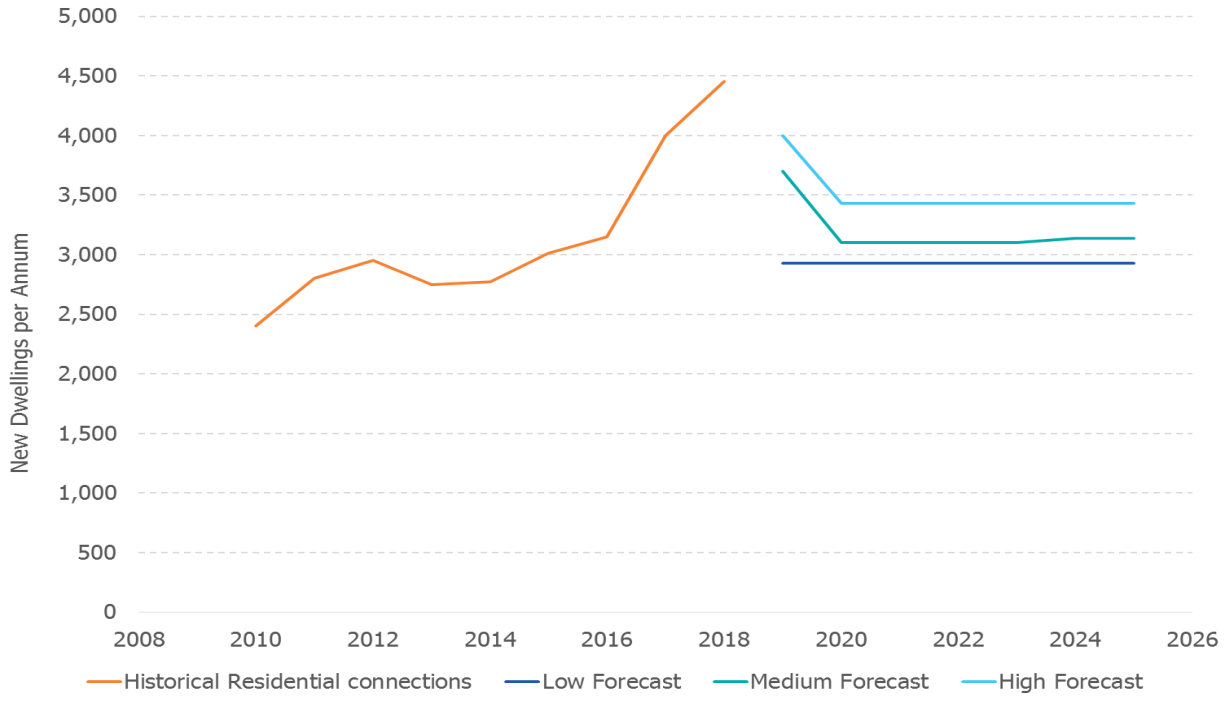
For the period to 30 June 2025, we expect that residential connections growth across our entire service area will average between 2,900 and 3,500 per year. Our mid-range forecast is based on an increase in the residential total averaging around 3,200 connections per year, with the trend increase in the share of apartments continuing over the period.

These connection figures do not include the end-use customers of private network operators. We estimate that those already operating are likely to account for 2,000 to 3,000 connections over the next 10 years. We estimate that an additional 500 dwellings will be serviced by new private schemes by 2024-25.

Actual and forecast annual residential dwelling connections in Hunter Water's area of operations are shown in Figure 2.3:

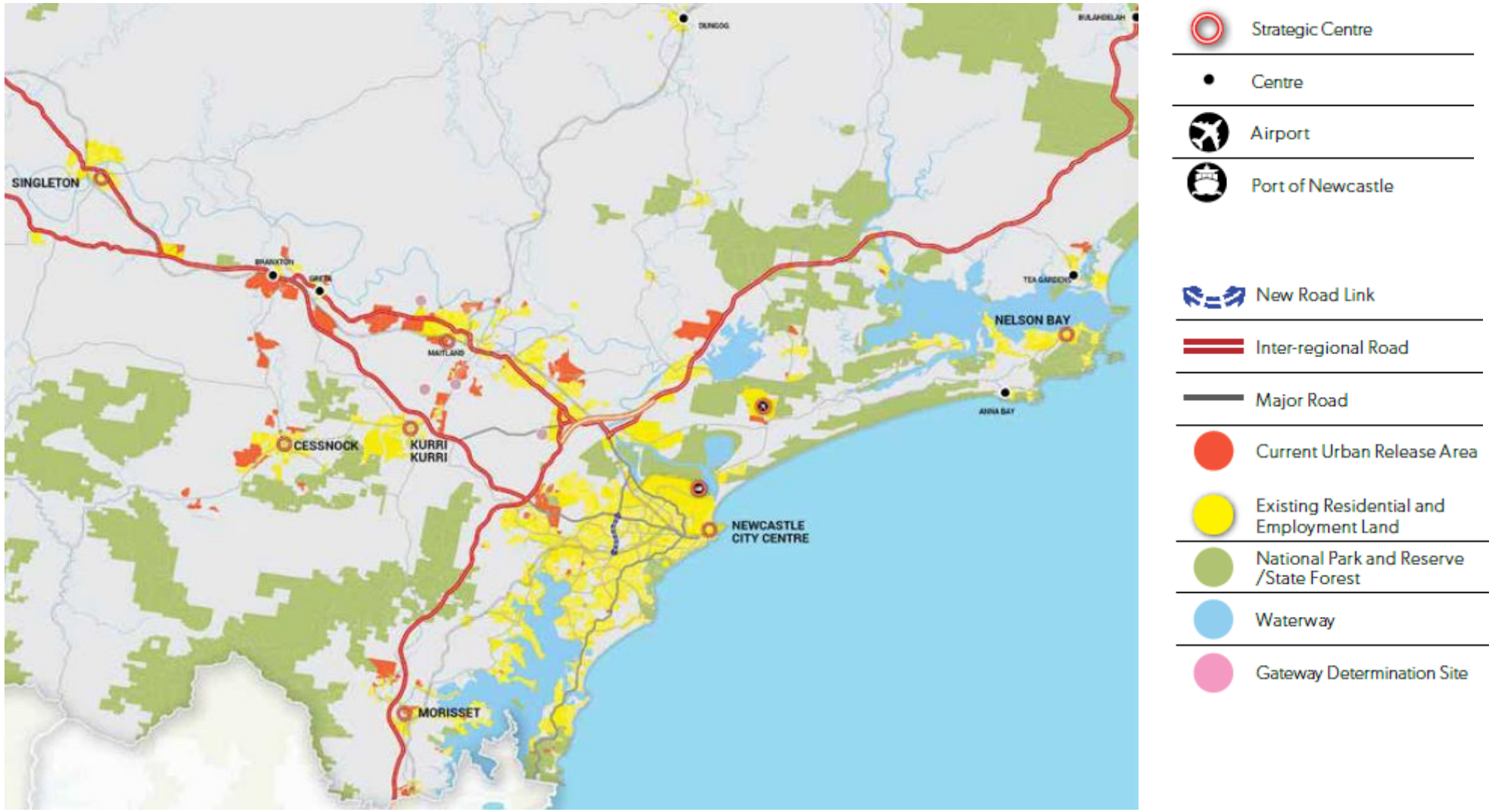
- High connection growth in 2017 to 2018 reflects a significantly higher dwelling approval and completion rate.
- High connection growth in 2019 reflects an increase in the short-term growth rate to reflect the significant connection growth in recent years.
- Lower connection growth 2020 onwards reflects a return to past trend and the long-term growth rate forecast in the Hunter Regional Plan 2036. The development industry has indicated that they expect a slowing of development activity in 2018-19, with the resulting connection growth in 2019-20 easing from the peak levels of recent years. This is consistent with the NSW Government number which indicates similar trend.

Figure 2.3 Dwelling connection growth outcomes and forecasts, 2010 to 2030



Source: Hunter Water.

Figure 2.4 Hunter Regional Plan 2018, settlement plan for Greater Newcastle



Source: NSW Department of Planning and Development, 2016, Hunter Regional Plan 2036, p.52.

3. Modelling water demand

Hunter Water uses the Integrated Supply-Demand Planning (iSDP) model to calculate water demand forecasts. Hunter Water first implemented this modelling tool in 2011 – it has been widely adopted as a demand forecasting model by water utilities across Australia (see Box 1).

Hunter Water's iSDP model provides a water demand forecast for average climate conditions. The model is not intended as a tool to reflect the impact of climate variability on consumption levels. Unanticipated climate events such as drought or above average rainfall can have a major bearing on annual outcomes within the outlook period.

Box 1 – Overview of the integrated supply-demand planning model

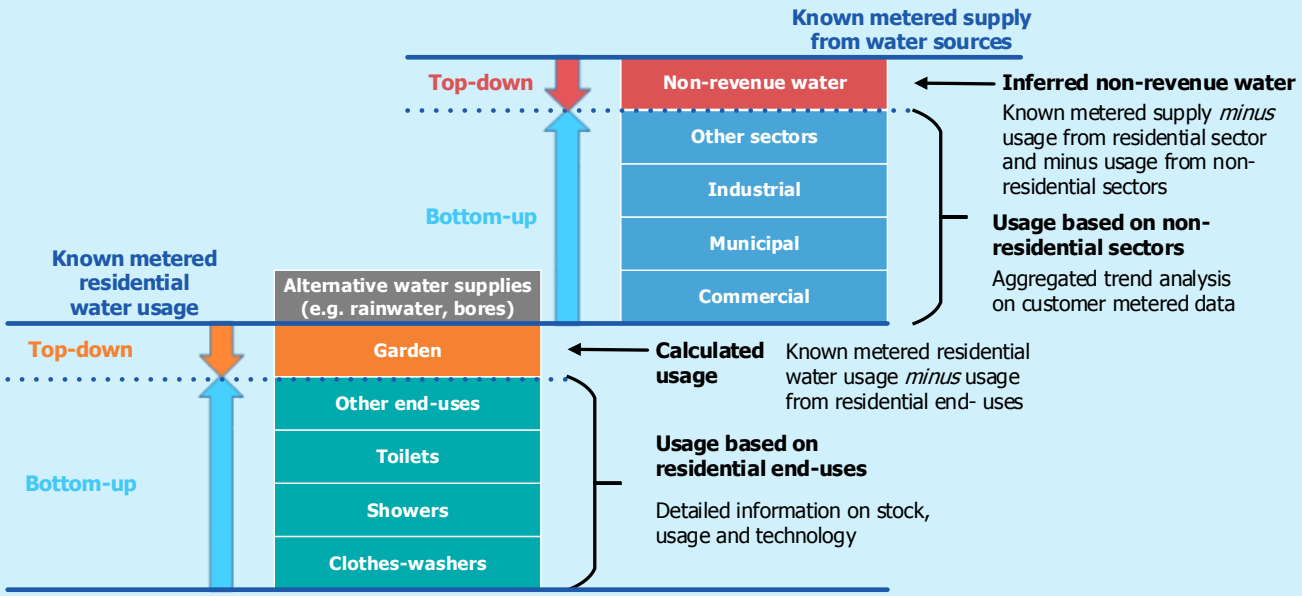
The integrated supply-demand planning (iSDP) model is considered best practice for water demand forecasting. It uses sector trends for non-residential demand while the residential forecast is based on end-uses (activities).

The iSDP model is based on a disaggregated analysis of consumption in individual customer categories (e.g. residential, industrial, commercial and non-revenue water). Individual customer categories are broken down further into individual end uses (e.g. residential toilets, showers, taps, washing machines and gardens). This modelling approach provides a transparent and robust predictive tool to assess the realistic impacts of water efficiency programs.

Water demands have been analysed in the model using a combination of bottom-up and top-down approaches:

- For the residential sector a bottom-up approach estimates demand for each residential end-use except garden use. Garden use is determined using a top-down approach - calculated as a balancing item against actual residential meter data.
- For the non-residential sector a bottom-up approach estimates demand for each individual sub-sector based on meter data trends.
- Non-revenue water (e.g. losses) is calculated using Water Services Association of Australia (WSAA) national reporting methodology.

Disaggregation in the model is represented in the following conceptual diagram.



BOX 1 (continued) **Overview of the integrated supply-demand planning (iSDP) model**

Demographics

Demographic factors such as population growth, number of dwellings/connections and household size are used as global inputs for all sectors. Demographic and connection numbers are updated annually as part of Hunter Water planning processes.

Residential demand

Separate model modules are used to calculate demand for each of the residential end-use components. The end-use demand forecasts use a bottom-up approach that relies on detailed information for installed stock and the frequency of use.

Hunter Water has access to annual sales data for individual appliances as an input into the model. In some cases sales are estimated using data on appliance ownership in each year in combination with assumptions about the duration of time that appliances remain in service prior to being replaced. The average service life of an appliance is needed to determine how long the appliance is likely to remain in stock.

The final component of the residential demand for single dwelling houses and multi-dwelling apartments comes from the difference between the total customer metered demand and the demand from all end use categories. The remainder of customer demand represents the garden end use component.

Non- residential demand

The non-residential demand forecast is based on sector trends using intelligence gained from our Customer Services Group. Economic trends, changes in recycled water demand and water conservation measures are important inputs to the forecast. Both residential and non-residential assumptions are reviewed and updated on an annual basis.

Since implementation of the iSDP, Hunter Water has worked to refine the model through the Monitoring, Evaluation, Reporting and Improvement (MERI) process with the Department of Industry following the 2014 Lower Hunter Water Plan (LHWP). Key improvements include:

- Incorporation of alternative water offsets for forecast recycled water supply
- Downgrading of rainwater tank effectiveness based on industry studies, and
- The purchase of NSW sales data for relevant appliances.

Hunter Water is committed to applying continuous improvement principles to water demand forecasting.

Hunter Water has developed a new 'climate correction' methodology that relies on regression analysis of climatic variables to per capita consumption to better understand the long-term impact of climate on customer demand. The climate correction methodology examines the long-term influence of climate on the current customer profile and associated behaviour.

The new methodology for forecasting annual water demand has been reviewed by the consultant Jacobs on behalf of the Department of Industry (DoI) Water. This review is part of the update to the LHWP and was undertaken in two parts between March and May 2019 and focused on:

- Establish the starting year demand representing 'average conditions' (also known as climate corrected demand), and
- Forecast demand on a disaggregated sectoral basis (residential, non-residential, non-revenue water and bulk exports) using the iSDP model.

The Jacobs review concluded:[1]

- The methodology applied to climate correction was supported – it represents *"a material improvement on the existing process"*. There are some areas of the model that can be refined over the long-term and tracked through reporting measures required under LHWP governance - the Monitoring, Evaluation, Reporting and Improvement (MERI) process.
- Some high priority areas for improvement include using up-to-date NSW appliance sales data in lieu of any regional specific data and a review of assumptions relating to water demands in the commercial sector.
- More evidence is required about the linking process between climate correction and the iSDP.

Hunter Water expects to address these priority issues over the next three to four months.

[1] Jacobs, 2019, Peer Review of Hunter Water Demand Model.

4. Actual and forecast water consumption

Growth in population and housing are key drivers of water consumption and new connections across the Hunter Water customer base. Climatic factors such as storms and drought can also affect outcomes within and between years.

4.1 Current regulatory period

IPART's 2016 Determination accepted Hunter Water's 2015 Price Submission forecasts of water consumption over the period 2016 to 2020. A comparison of Hunter Water's forecasts and actual water demand is shown in Table 4.1.

Water consumption by customers over the first two years of the current price period was 8.7 per cent above forecast. We now expect that total water sales over the full price path period will be about seven per cent above Hunter Water's 2015 water sales forecast.

Lower than expected rainfall over the last three years is the key reason for the increase in sales, coupled with population growth in excess of our 2015 forecasts. In fact, dry conditions in the Lower Hunter were a key reason for water purchases from the Central Coast Council in 2017-18, with around 316 ML in net transfers being supplied north via the two-way pipeline.

Ongoing dry conditions on the Central Coast have seen even greater southward flows during 2018-19. Hunter Water expects net transfers to Central Coast Council to be 1,989 ML over the full year.

Table 4.1 Forecast and actual water sales volumes, 2016-17 to 2019-20, ML

Property type	2016-17	2017-18	2018-19	2019-20
Sales volume forecasts - IPART 2016 Determination (ML)				
Residential	36,890	36,951	37,025	37,118
Non-residential	17,889	18,426	18,880	19,172
Bulk water sales	0	0	0	0
Net Central Coast sales	0	0	0	0
Total	**54,779**	**55,376**	**55,906**	**56,290**
Sales volume – actuals/projected (ML)				
Residential	39,753	43,065	42,025	39,011
Non-residential (including bulk water sales)	17,460	19,650	16,761	19,573
Net Central Coast sales	165	(316)	1,989	0
Total	**57,378**	**62,399**	**60,775**	**58,584**
Sales volumes attributed to Hunter Water customers	**57,213**	**62,715**	**58,786**	**58,584**

Notes:
1. Actual sales volumes (2016 – 18) in the AIR/SIR, Non-financial sheet are based on a water year (April to April) and therefore are different to those reported above.
2. Totals may not add due to rounding.

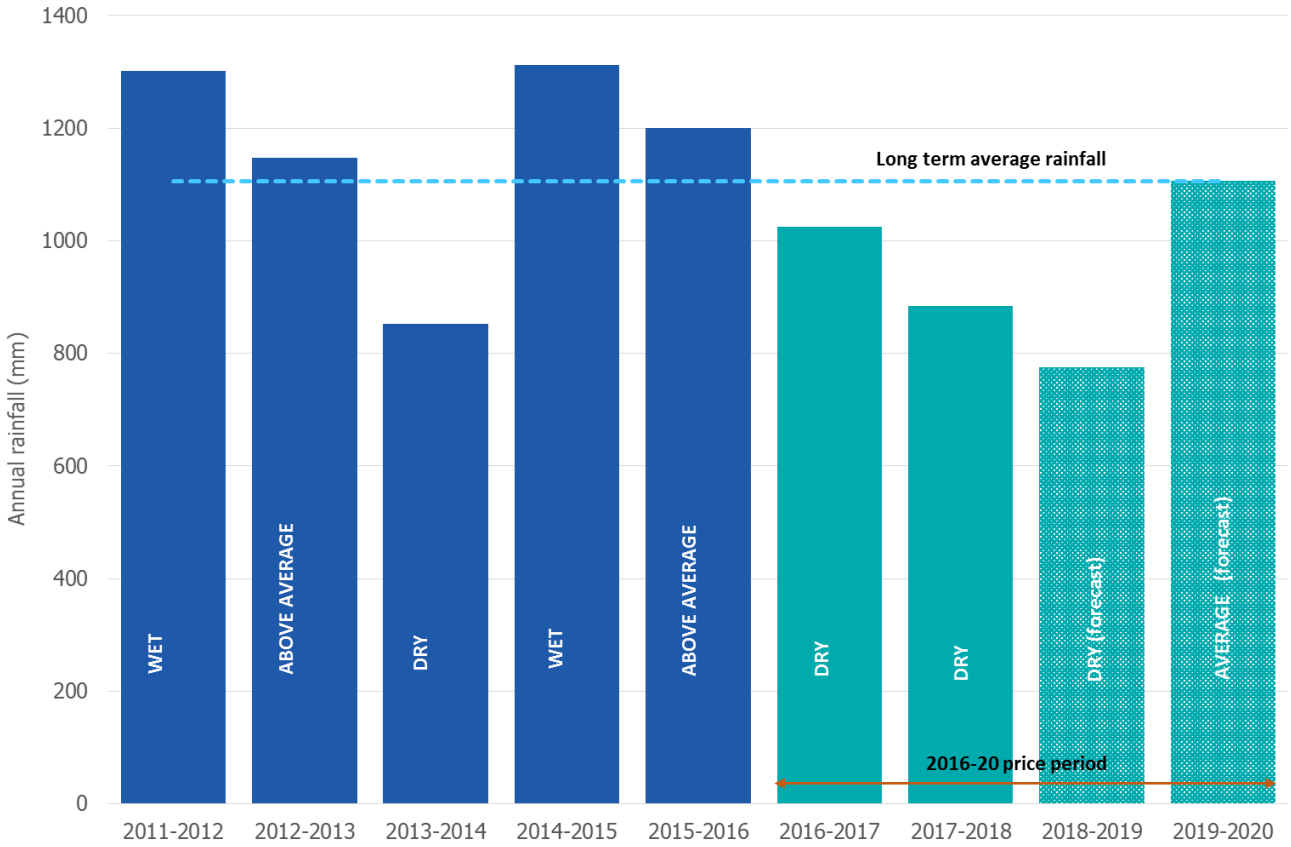
Source: IPART 2016 Final Report, page 89 and Hunter Water. Projected sales volumes (2018 – 20): Hunter Water AIR/SIR, Non-financial, rows 296, 310, 318 less SIR Bulk water, row 48.

Hunter Water's forecast for 2019-20 onwards is based on an assumed return to long-term average rainfall levels (see Table 4.1 and Figure 4.1). The sales volume forecast is based on average conditions and therefore uses long-term average rainfall levels. Hunter Water considers long-term average climatic conditions the most appropriate to forecast water demand so that water usage statistics are not influenced by one or two years of high or low water demand. Sensitivity testing under various climatic scenarios is undertaken by Hunter Water however is not considered appropriate for the calculation of efficient prices and therefore not included in this submission.

In the 2016 IPART Final Report, uncertainty around our water sales forecasts is addressed by IPART through the demand volatility adjustment mechanism. Technical Paper 3 explains the demand volatility adjustment mechanism in greater detail including our performance against the adjustment criteria over the current price period. We consider that the use of long-term average climatic conditions minimises our risk of triggering the demand volatility adjustment mechanism. The use of this mechanism helps protect both Hunter Water and our customers from unanticipated deviations from average weather and demand conditions year to year.

Beyond 2019-20, if background climate assumptions bear out, forecasts for future water consumption will largely reflect the combined effect of population, economic development and water efficiency improvements.

Figure 4.1 Hunter region rainfall, outcomes and expectations to 2019-20, mm



Source: Hunter Water.

4.2 Next regulatory period

Over the period 2020-21 to 2024-25, potable water consumption is expected to increase on 2019-20 levels. These forecasts reflect structural factors underlying water demand such as population growth, water efficiency improvements and consumer behaviour, in addition to advice from major non-residential customers on expected future water needs (see Table 4.2 and Figure 4.2).

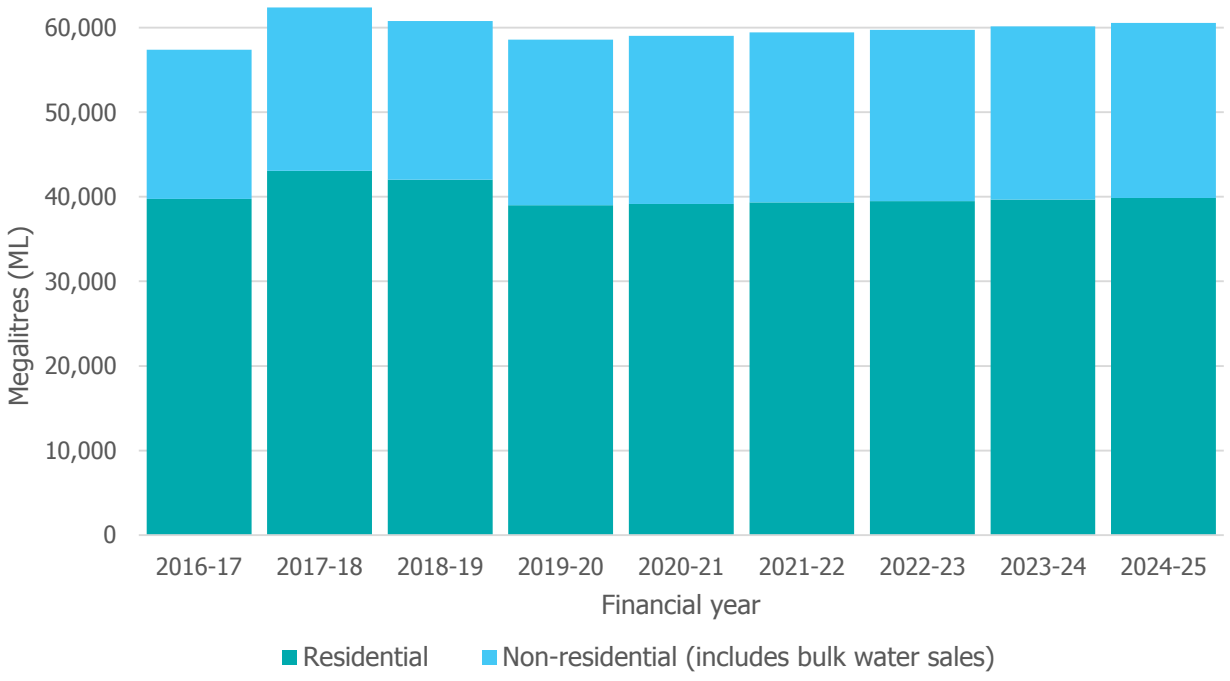
Table 4.2 Forecast water sales volumes (including bulk sales), 2020-21 to 2024-25, ML

Property type	2020-21	2021-22	2022-23	2023-24	2024-25
Sales volume forecasts					
Residential	39,159	39,332	39,493	39,667	39,855
Non-residential	17,999	18,150	18,147	18,222	18,312
Bulk water sales	1,871	1,948	2,097	2,247	2,396
Net inter-region transfers with Central Coast Council	0	0	0	0	0
Total	**59,030**	**59,431**	**59,737**	**60,135**	**60,563**

Notes:
1. Bulk water sales align with Table 7.1.
2. Totals may not add due to rounding.

Source: Hunter Water AIR/SIR, Non-financial, rows 310, 318 and SIR Bulk water, rows 115 and 121.

Figure 4.2 Actual and forecast water consumption volumes, 2016-17 to 2024-25, ML



Source: Hunter Water. 2018-19 onwards is a forecast.

5. Actual and forecast wastewater discharge volumes

Non-residential customers are liable for volumetric wastewater usage charge where their deemed wastewater discharge is above a certain threshold (the discharge allowance). Wastewater discharge volumes are a function of water sales. A sewer discharge factor is applied to water sales to reflect the estimated portion of metered water usage discharged into the wastewater system. Only around 30 of our non-residential customers are separately metered for wastewater discharge. For other non-residential customers, a customer-specific discharge factor is applied based on the nature of the individual customer's business. Technical Paper 8 provides more detail on the deemed wastewater discharge allowance and sewer discharge factors.

Variances between forecast and actual wastewater discharge volumes (Table 5.1) are a reflection of variances in overall non-residential water demand as well as the mix of non-residential customers with different discharge factors.

Table 5.1 Forecast and actual chargeable wastewater discharge volumes 2016-17 to 2019-20, ML

	2016-17	2017-18	2018-19 [1]	2019-20 [1]
IPART 2016 Determination	5,645	5,620	5,595	5,572
Actual/proposed	6,157	6,526	5,296	5,052

Notes:
1. 2018-19 and 2019-20 figures are a forecast.
2. Actual/projected discharge volumes align with those used to calculate billable sewage volumes in the AIR – 'Non-financial' sheet row 377.

Source: Hunter Water.

The forecast of chargeable wastewater discharge volumes includes two different components:

- Forecast volume of non-residential wastewater discharged into our system, and
- Forecast volume of non-residential wastewater included in the deemed usage allowance (120 kL per year per customer).

To forecast the overall volume of wastewater discharged into our system by non-residential customers, we have looked at past trends of non-residential wastewater discharge as a proportion of non-residential water sales. This trend is applied to future water sales forecasts.

To forecast the volume of non-residential wastewater included in the deemed usage allowance, we have taken an average of the allowance over the past three years. We have continued this level of discharge allowance applied as a proportion of future total discharge volumes (calculated at 14.9 per cent).

Table 5.2 Forecast wastewater discharge volumes, 2020-21 to 2024-25, ML

	2020-21	2021-22	2022-23	2023-24	2024-25
Total discharge	5,998	6,047	6,084	6,120	6,156
Discharge allowance	(891)	(899)	(904)	(910)	(915)
Chargeable discharge volumes	5,107	5,148	5,180	5,210	5,241

Note: Chargeable discharge volumes align with those used to calculate billable sewage volumes in the Hunter Water AIR/SIR, Non-financial, row 377.

Source: Hunter Water.

6. Actual and forecast billable connections

Hunter Water's billable connections are used to calculate the level of fixed (service) charges. Forecasts for different customer categories are derived from population and activity growth forecasts for the Lower Hunter. These forecasts draw on regional census information, the advice of local councils, property developers and industry.

Hunter Water prepares these connection forecasts in a number of steps:

- A geographical information system (GIS) allows the multiple layers of growth information to be overlayed across Hunter Water's area of operations.
- Historic connection rates and other growth information are drawn together and balanced at the local and regional scale.
- Connections forecasts for each of the local government areas are reviewed against the respective council growth strategies and Department of Planning and Environment forecasts.

Overall, the increase in water and wastewater connections is in line with housing activity and business growth. This has been as high as 1.7 per cent growth per year in recent years. As Hunter Water anticipates a slowing of development activity in 2019-20 and beyond, connections growth is forecast at around 1.2 per cent per year for water connections and 1.3 per cent per year for wastewater connections – growth rates more reflective of historic trends.

By 2025, we forecast that over 255,500 residential water customers and more than 30,300 (meter equivalent) non-residential customers will be connected to our network (see Figure 6.1).

Figure 6.1 Actual and forecast water and wastewater connections, 2016-17 to 2024-25

Source: Hunter Water. 2018-19 onwards is a forecast.

Connections forecasts provided in this submission are considered the most appropriate for calculation of fixed charges. Customer numbers are billable connections, which differ from property and dwellings numbers and are a more accurate reflection of service charge revenue.

Hunter Water's billable connections have the following rules applied:

- Residential customers are counted by dwellings
- Non-residential customers are counted based on the size of their meter (meter equivalent)
- Wastewater non-residential meter equivalent numbers are adjusted to take account of the sewer discharge factors applying to each individual customer
- Annual connections are the average for each year – a better measure than calculating expected revenue totals at financial year end
- Multi-premises are premises where there are two or more properties, also referred to as apartments
- Dual occupancies are counted as one billable connection
- Residential connections include vacant land and mixed development
- Exempt properties and pensioners are included, and
- Stand pipes are excluded.

Billable connections differs from the dwelling and customer counts contained in the annual information return in two respects:

- Rules outlined above are not applied to dwelling and property counts in the annual information return in the same way. This reflects changes over recent years regarding tariff structures.
- The annual information return counts customers that are active anytime throughout the year. This is a different method to the average used for billable connections.

We have provided a supplementation file to the annual information return which provides our actual and forecast billable connections as outlined in this submission.

The NSW Government makes a community service obligation payment to Hunter Water for exempt properties each year. There are currently 752 exempt properties in our area of operation: two public users, 525 non-residential nursing homes, 77 non-residential religious premises, 119 non-residential commercials, 1 non-residential industrial, 7 residential apartments and 22 residential houses. In line with past practice, we have reported these exempt properties as part of our billable customer base.

Water connection, wastewater connection and stormwater property numbers against 2016 projections and future forecasts for different customer groups are shown in the tables below.

6.1 Water connections

Higher levels of residential growth, and lower than expected growth in the number of non-residential customers, are reflected in our connections data. In the 2016 Determination, IPART adopted our forecast water customer numbers as reported in Table 6.1. At the time of Hunter Water's 2015 price submission, service charges were based on a 25mm meter equivalent (where a customer with a 25mm meter is counted as 1). Meter equivalent figures in Table 6.1 are therefore based on a 25mm meter base.

Table 6.1 Billable water connection forecast – IPART 2016 Final Determination

	Units	2016-17	2017-18	2018-19	2019-20
Billable water connection forecast - IPART 2016 Determination					
Residential					
Houses	No.	189,130	191,076	193,023	194,969
Multi-premises	No.	39,523	40,453	41,383	42,312
Total residential	**No.**	**228,653**	**231,529**	**234,406**	**237,281**
Non-residential					
20mm individual	No.	5,900	5,983	6,066	6,148
Multi-premises	ME	536	544	551	559
25mm and above	ME	14,865	15,074	15,284	15,491
Total non-residential	**ME**	**21,301**	**21,601**	**21,901**	**22,198**

Notes:
1. ME is meter equivalent.
2. Totals may not add due to rounding.

Source: IPART 2016 Final Report, p. 93.

In the 2016 IPART Determination, IPART rebased water and wastewater service charges to a 20mm meter equivalent base. Hunter Water had provided customer numbers on a 20mm base to IPART throughout the price review process. As residential customer counts are based on dwellings, these remained the same. Table 6.2 provides the meter ratios that are applied when a customer is counted with different meter sizes. For example, in Table 6.2, under a 20mm base, a customer with a 100mm meter is counted as 25.00. Under a 25mm base a customer with a 100mm meter is counted as 16.00. As a consequence of moving from a 25mm base to a 20mm base, our non-residential meter equivalent count increased.

Table 6.2 Meter Equivalent ratios – 20mm compared with a 25mm base

Meter size	20	25	32	40	50	80	100	150	200	250	300	350
20mm base	1.00	1.56	2.56	4.00	6.25	16.00	25.00	56.25	100.00	156.25	225.00	306.25
25mm base	0.64	1.00	1.64	2.56	4.00	10.24	16.00	36.00	64.00	100.00	144.00	196.00

Source: Hunter Water analysis based on IPART methodology.

Forecast and actual billable water connections for 2016-17 to 2019-20 are compared in Table 6.3. For ease of comparability, meter equivalent figures are all reported on a 20mm base.

Table 6.3 Forecast and actual billable water connections – 20mm ME base 2016-17 to 2019-20

	Units	2016-17	2017-18	2018-19	2019-20
Billable water connection forecast - IPART 2016 Determination rebased					
Residential					
Houses	No.	189,130	191,076	193,023	194,969
Multi-premises	No.	39,523	40,453	41,383	42,312
Total residential	**No.**	**228,653**	**231,529**	**234,406**	**237,281**
Non-residential					
20mm individual	ME	5,900	5,983	6,066	6,148
Multi-premises	ME	838	850	861	873
20mm and above [2]	ME	23,227	23,553	23,881	24,205
Total non-residential	**ME**	**29,964**	**30,386**	**30,808**	**31,226**
Billable water connections - actuals/projected [1]					
Residential					
Houses	No.	187,563	189,683	191,850	193,797
Multi-premises	No.	41,527	43,196	44,999	46,461
Total residential	**No.**	**229,089**	**232,879**	**236,849**	**240,257**
Non-residential					
20mm individual	ME	5,655	5,652	5,691	5,757
Multi-premises	ME	838	861	887	897
20mm and above [2]	ME	22,020	22,087	22,284	22,544
Total non-residential	**ME**	**28,512**	**28,599**	**28,862**	**29,198**

Notes:
1. 2018–19 and 2019-20 for actuals/projected are a forecast.
2. 20mm and above includes 20mm meters that are connected to a property with multiple meters.
3. ME is meter equivalent.
4. Totals may not add due to rounding.

Source: Hunter Water.

Actual and expected growth in the total number of billable water connections is higher than forecasts adopted by IPART in 2016. This is driven by higher than expected growth in multi-premises, partially offset by lower than forecast growth in residential houses and non-residential connections. By 2019-20;

- We expect to have an average of 46,461 multi-premises connected to our system, just over 4,000 more than the forecast of 42,312 adopted in 2016. Development activity has been particularly high for this group of customers, increasing the proportion of residential connections who are in a multi-premise from 17 per cent to 19 per cent over the period.
- We expect the average number of house connections will be about 1,200 less than the 2016 forecast. Nevertheless, with 193,797 connections, houses will still account for 81 per cent of our residential connections.
- We expect average non-residential meter equivalents will be about 2,000 less than the 2016 forecast at 29,198. Non-residential meter equivalents consistently account for around 11 per cent of total billed connections over the period.

The variance between total actual/current projected connection numbers and the IPART 2016 forecast is expected to be within 0.4 per cent at 2019-20.

Our forecasts for the 2020-21 to 2024-25 price period are provided in Table 6.4. By 2024-25 we expect the number of billable residential water connections to rise to 255,501 and the number of non-residential connections to increase to 30,339 (on a 20mm meter equivalent basis).

Table 6.4 Projected billable water connections, 2020-21 to 2024-25

	Units	2020-21	2021-22	2022-23	2023-24	2024-25
Residential						
Houses	No.	195,515	197,234	198,952	200,826	202,855
Multi-premises	No.	47,794	49,127	50,460	51,645	52,647
Total residential	**No.**	**243,309**	**246,360**	**249,412**	**252,471**	**255,501**
Non-residential						
20mm individual	ME	5,818	5,872	5,913	5,948	5,982
Multi-premises	ME	907	915	922	927	933
20mm and above [1]	ME	22,784	22,994	23,154	23,291	23,425
Total non-residential	**ME**	**29,509**	**29,782**	**29,988**	**30,166**	**30,339**

Notes:
1. 20mm and above includes 20mm meters that are connected to a property with multiple meters.
2. ME is meter equivalent.
3. Totals may not add due to rounding.

Source: Hunter Water.

6.2 Wastewater connections

Actual wastewater connections have grown broadly in step with water connections, particularly in the residential sector. After 2017-18 forecast wastewater connections are based on the trend of total wastewater connections as a proportion of total water connections (prior to meter equivalent and discharge factor adjustments) over the past 5 years. The proportion was originally forecast to be around 94 per cent. Recent experience shows it is actually more than 95 per cent. Total connections for both houses and multi-premises are expected to exceed the 2016 forecast determined by IPART for 2019-20. We now expect to see 229,929 residential connections in 2019-20 against a forecast total of 225,955 (Table 6.5).

Wastewater connection numbers as adopted in the 2016 IPART Final report are based on a 25mm base for non-residential customers (Table 6.5). These connections are converted to a 20mm base in Table 6.6 for ease of comparison to actuals and current projections.

Table 6.5 Billable wastewater connection forecast – IPART 2016 Final Determination

	Units	2016-17	2017-18	2018-19	2019-20
Billable wastewater connection forecast - IPART 2016 Determination					
Residential					
Houses	No.	178,069	179,704	181,335	182,962
Multi-premises	No.	40,113	41,072	42,032	42,993
Total residential	**No.**	**218,182**	**220,776**	**223,367**	**225,955**
Non-residential					
20mm individual	No.	5,164	5,267	5,371	5,476
Multi-premises	ME	432	441	449	458
25mm and above	ME	7,223	7,367	7,513	7,660
Total non-residential	**ME**	**12,819**	**13,075**	**13,333**	**13,594**

Notes:
1. ME is meter equivalent.
2. Totals may not add due to rounding.

Source: IPART, 2016, Hunter Water Price Determination - Final Report, p. 93.

Table 6.6 Forecast and actual billable wastewater connections, 20mm ME base, 2016-17 to 2019-20

	Units	2016-17	2017-18	2018-19	2019-20
Billable wastewater connection forecast - IPART 2016 Determination rebased					
Residential					
Houses	No.	178,069	179,704	181,335	182,962
Multi-premises	No.	40,113	41,072	42,032	42,993
Total residential	**No.**	**218,182**	**220,776**	**223,367**	**225,955**
Non-residential [2]					
20mm individual	ME	4,131	4,214	4,297	4,381
Multi-premises	ME	675	689	702	716
20mm and above [2]	ME	11,286	11,511	11,739	11,969
Total non-residential	**ME**	**16,092**	**16,414**	**16,738**	**17,066**
Billable wastewater connections - actuals/projected [1]					
Residential					
Houses	No.	178,532	180,579	182,727	184,683
Multi-premises	No.	40,902	42,292	43,815	45,246
TOTAL residential	**No.**	**219,434**	**222,871**	**226,542**	**229,929**
Non-residential					
20mm individual	ME	3,933	3,922	3,950	4,016
Multi-premises	ME	669	792	919	935
20mm and above [2]	ME	10,795	10,892	11,050	11,235
TOTAL non-residential	**ME**	**15,397**	**15,606**	**15,919**	**16,185**

Notes:
1. 2018–19 and 2019-20 for actuals/projected are a forecast.
2. 20mm and above includes 20mm meters that are connected to a property with multiple meters.
3. ME is meter equivalent.
4. Totals may not add due to rounding.

Source: Hunter Water

We expect the total number of residential wastewater connections to grow to 245,520 by 2024-25 and the number of non-residential connections to grow to 17,152 on a meter equivalent basis (see Table 6.7).

Table 6.7 Projected billable wastewater connections, 2020-21 to 2024-25

	Units	2020-21	2021-22	2022-23	2023-24	2024-25
Residential						
Houses	No.	186,409	188,177	190,037	192,058	194,188
Multi-premises	No.	46,555	47,865	49,176	50,343	51,332
Total residential	**No.**	**232,964**	**236,042**	**239,213**	**242,401**	**245,520**
Non-residential						
20mm individual	ME	4,078	4,133	4,177	4,217	4,256
Multi-premises	ME	949	962	972	981	990
20mm and above [1]	ME	11,406	11,560	11,685	11,795	11,906
Total non-residential	**ME**	**16,432**	**16,655**	**16,834**	**16,993**	**17,152**

Notes:
1. 20mm and above includes 20mm meters that are connected to a property with multiple meters.
2. ME is meter equivalent.
3. Totals may not add due to rounding.

Source: Hunter Water.

6.3 Stormwater drainage customers

Hunter Water operates stormwater drainage services for properties that are located in areas where rainfall runoff enters the stormwater channels and detention basins. Around 30 per cent of our customers are located in these areas (Figure 6.2).

The number of billable stormwater drainage properties reflects factors such as subdivision, rezoning and unit development. Smaller growth in the number of stormwater connections (than water and wastewater), reflects this. Forecasts and actuals for the current price period are reported in Table 6.8.

Increased apartment development accounts for much of the above-forecast growth in stormwater properties expected between 2016-17 and 2019-20.

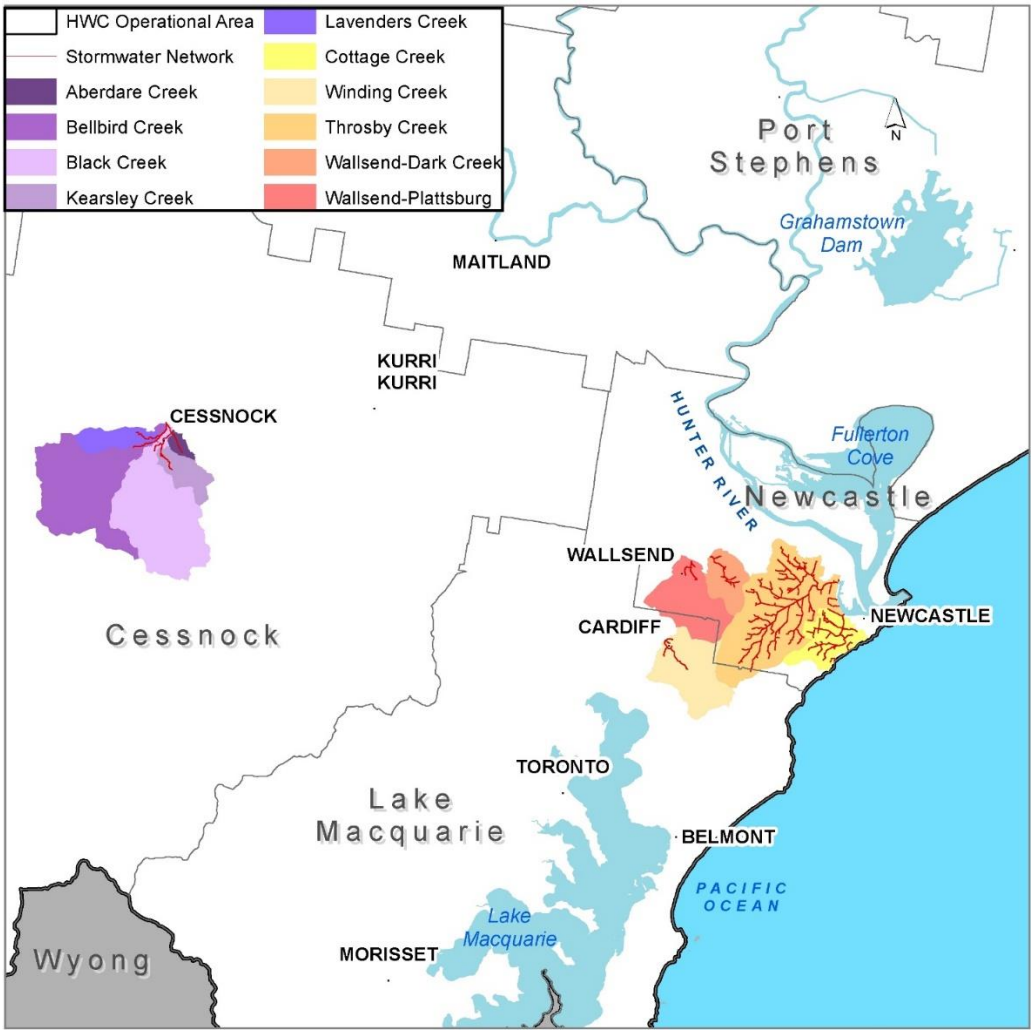
Hunter Water has made a revision that affects the count of stormwater properties from 2019-20 onward. Work undertaken to prepare for the implementation of a new billing system (due to go-live in November 2019), involved the validation of stormwater customer numbers and the land area of properties within stormwater drainage catchments. We found that in some cases that we have not been applying:

- The charge to properties that are located in areas of our network where the charge should have been applied (some customers have not been charged)
- The charge to properties that are not located in areas of our network where the charge applies (some customers have been erroneously charged), or
- The charge correctly to all relevant properties (some customers have been undercharged while others have been overcharged).

We conducted a root-cause analysis after the issue was discovered and found that incorrect data was entered into our billing system in 2006 when it was first commissioned. The analysis has resulted in a number of new control measures being implemented immediately to ensure the error does not re-occur. A review of future controls to be included in our new billing system has also been conducted to ensure the issue will be adequately addressed in the future.

From 1 July 2019, the errors on all properties will have been corrected and correct charges applied to all properties. This results in a one-off increase of around 2,000 stormwater properties from 1 July 2019 (Table 6.8).

Figure 6.2 Stormwater service areas



Source: Hunter Water.

Table 6.8 Forecast and actual billable stormwater properties, 2016-17 to 2019-20

Property type	2016-17	2017-18	2018-19	2019-20
Billable stormwater properties forecast - IPART 2016 Determination				
Residential				
Stand-alone residential	49,011	49,079	49,147	49,215
Multi-premises	14,631	14,810	14,989	15,168
Non-residential				
Small property (<1,000m^2) or low impact	1,999	1,999	1,999	1,999
Medium property (1,001 to 10,000m^2)	908	908	908	908
Large property (10,001 to 45,000m^2)	73	73	73	73
Very large property (>45,000m^2)	12	12	12	12
Billable stormwater properties - actuals/projected [1]				
Residential				
Stand-alone residential	48,878	48,938	49,075	51,064
Multi-premises or residential low impact	15,034	15,631	16,015	16,477
Non-residential				
Small property (<1,000m^2) or low impact	1,960	1,934	1,945	1,958
Medium property (1,001 to 10,000m^2)	902	894	935	968
Large property (10,001 to 45,000m^2)	76	76	86	101
Very large property (>45,000m^2)	13	13	14	15

Notes:
1. 2018–19 and 2019-20 for actuals/projected are a forecast.
2. Totals may not add due to rounding.

Source: IPART, 2016, Hunter Water Price Determination - Final Report, page 94 and Hunter Water.

Our annual projected billable stormwater customers in the period 2020-21 to 2024-25 are shown in Table 6.9. Annual growth in residential properties is forecast at 0.4 per cent per year. No growth is expected in non-residential properties.

Table 6.9 Projected billable stormwater properties, 2020-21 to 2024-25

	2020-21	2021-22	2022-23	2023-24	2024-25
Residential					
Stand-alone residential	51,244	51,424	51,604	51,784	51,964
Multi-premises or residential low impact	16,597	16,717	16,837	16,957	17,077
Non-residential					
Small property (<1,000m^2) or low impact	1,958	1,958	1,958	1,958	1,958
Medium property (1,001 to 10,000m^2)	968	968	968	968	968
Large property (10,001 to 45,000m^2)	101	101	101	101	101
Very large property (>45,000m^2)	15	15	15	15	15
Total (Residential + Non-residential)	**70,883**	**71,183**	**71,483**	**71,783**	**72,083**

Note: Totals may not add due to rounding.
Source: Hunter Water.

7. Bulk water

7.1 Wholesale supply of services

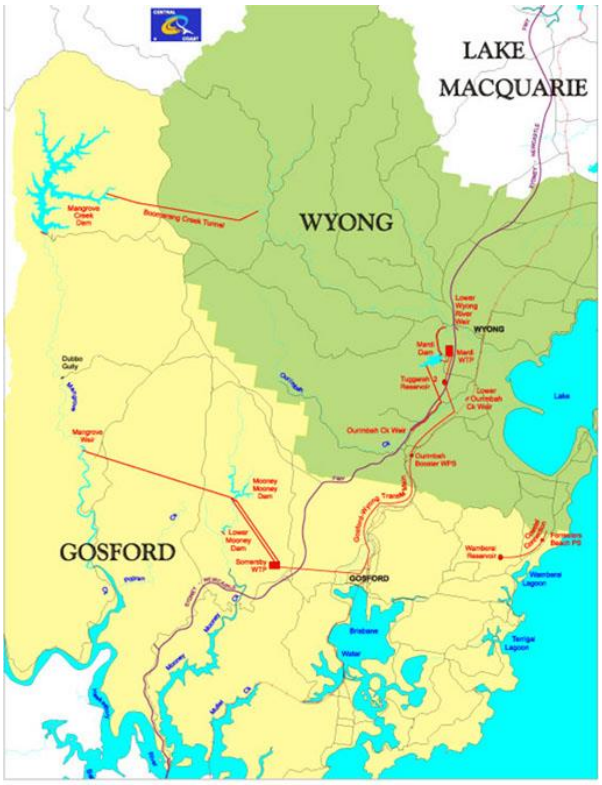
Urban water competition within Hunter Water's area of operations is emerging through developers' use of private network operators to provide self-contained wastewater and recycled water services to greenfields development areas. These activities shift connections out of our direct customer base, but have a minimal impact on aggregate demand within Hunter Water's network. In these circumstances, Hunter Water has effectively moved from being a retail provider to a wholesale provider, supplying an aggregated service to the private network operators concerned.

Our volumetric and connections forecasts have been adjusted to reflect the requirements and forecast growth of private operators in the region. Their entry to the sector has seen a diversion of some of our potable water sales from 'residential' to 'bulk water' and a similar transition for recycled water, due to the sale of the Kooragang Island Water Scheme in 2017.

Growth in overall connection numbers has also declined marginally as a small number of large water customers now service the needs of a large number of smaller customers. For instance, in recent years, we have seen the development of private networks in the Cessnock (Huntlee Water) and Lake Macquarie (Cooranbong Water) areas. As at July 2018, these accounted for around 400 residential connections. Solo Water provides water and wastewater services to a new development at Catherine Hill Bay (Lake Macquarie), with drinking water supplied by Central Coast Council.

7.2 Inter-region transfers

Hunter Water began supplying water to the Central Coast in 2004-05. Under the 2006 Pipeline Agreement, the transfer scheme was intended to provide the capacity for average daily flows of 33 ML per day to the south and 30 ML per day to the north. The southerly flow rate was achieved some years ago. However, northerly flow will remain limited to 20 ML per day until the completion of the Mardi to Warnervale pipeline project, now expected in 2021-22.



The potential of the inter-region connection to help balance water supply and demand conditions experienced by Hunter Water and Central Coast Council will also depend on investment to boost safe storage capacity for the Mangrove Creek Dam. Mangrove Creek Dam is the Central Coast's main water storage – with a capacity of 190,000 ML, it represents about 94 per cent of the region's available storage. However, as the dam cannot currently meet the NSW Dam Safety Committee's flood requirements for the Probable Maximum Flood it is currently not permitted to be filled beyond 80 per cent of capacity. This adds to demand for southerly flows at times of reduced supply on the central coast, and diminishes the scope for northerly flows when Hunter Water customers are facing harsher conditions.

We understand that Central Coast Council is proposing to upgrade the Mangrove Creek Dam's spillway and parapet wall by 2022-2023, providing an increase in effective storage capacity of 38,000 ML.

Dry conditions have seen major transfers from Hunter Water to Central Coast over the last several months. For 2018-19, net southward transfers are estimated at 1,989 ML.

A combined source model has been developed to determine the expected annual transfer volumes. The source model uses the current storage levels, proposed infrastructure upgrades and transfer rules as inputs. The amount transferred in any given year is dependent on weather conditions in each region. The model outputs are updated once a year.

Expected supply and demand conditions for the Lower Hunter and Central Coast regions assume a net transfer of zero in the pipeline over the period to 2024-25. Some flow is required each year to ensure water quality in the pipeline is maintained.

7.3 Bulk water sales

Bulk and recycled water demand are currently expected to make a modest overall impact on our water requirement and aggregate sales (Table 7.1).

Table 7.1 Forecast bulk water sales, 2019-20 to 2024-25

	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Forecast bulk water sales (ML)						
Private –residential development [1]	123	142	162	254	347	439
Private – industrial users [1]	1,666	1,724	1,781	1,838	1,895	1,952
Central Coast (net transfer) [2]	0	0	0	0	0	0
Total	**1,794**	**1,871**	**1,948**	**2,097**	**2,247**	**2,396**

Note: Totals may not add due to rounding.
Source:
1. Hunter Water AIR/SIR, Bulk water, rows 115 and 121.
2. Hunter Water AIR/SIR, Bulk water, row 109 less 48.

8. Abbreviations

Acronym	Term
AIR	Annual information return
IPART	Independent Pricing and Regulatory Tribunal (NSW)
iSDP	Integrated Supply-Demand Planning (water forecasting model)
kL	Kilolitre (ie. 1,000 litres)
LHWP	Lower Hunter Water Plan
ME	Meter-equivalent (count of customer connections)
MERI	Monitoring, evaluation, reporting and improvement (process)
ML	Megalitre (ie. 1,000,000 litres)
SIR	Special information return

9. References

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