REVIEW OF PRICES FOR HUNTER WATER

RESPONSE TO IPART ISSUES PAPER

Hunter Water

21 October 2019

Hunter Water's request for an extension of time – financial impacts of drought

This public submission in response to IPART's Issues Paper for the *Review of Prices for Hunter Water Corporation from 1 July 2020* comments on a range of key questions. We have sought to provide relevant new information and clarify positions outlined in our Price Submission 2019 ('pricing proposal' and 'technical papers' published on 1 July 2019).

Hunter Water requests an extension of time until Wednesday, 6 November 2019 to comment on drought-related matters and possible financial impacts for the next regulatory period.

Hunter Water implemented level 1 water restrictions on 16 September 2019 for the first time in 25 years. The potential impact on our operating costs, forward capital program and water sales is now clearer than at the time of finalising our 2019 Price Submission. Unbudgeted impacts on costs and revenues have the potential to materially impact our credit and financeability metrics in future years.

We would appreciate extra time to respond publicly to IPART's Issues Paper on possible amendments to our pricing proposal in light of this information and analysis coming to hand. Any amendment to our pricing proposal would be consistent with established IPART's positions on the form of regulation and earlier IPART guidance on cost pass-through events.

IPART's public hearing for Hunter Water's price review will take place in Newcastle on 19 November 2019. If possible, we would seek to lodge any supplementary submission on drought-related financial impacts before the extension date of 6 November 2019.

EXECUTIVE SUMMARY

We lodged '*Hunter Water's 2019 Price Submission*' with IPART on 1 July 2019 (our summary 'pricing proposal', ten technical papers and regulatory information returns). This was the first step in IPART's propose-respond regulatory model for the 2019-20 price review.

Our price submission provided a detailed breakdown of the proposed capital and operating expenditure programs over five years, proposed annual revenue requirements and proposed prices for all regulated services. The submission also provided the background to key issues, the rationale for expenditure and pricing proposals, and an analysis of the likely bill impacts for various customer categories.

This submission does not repeat information from the July 2019 package of price submission documents. Our response to the Issues Paper focuses on areas of new information or specific questions posed by IPART.

This executive summary captures the key points in our response.

Revenues, prices and bills

- There are two material changes to the information we provided in the July 2019 Price Submission: a lower WACC estimate and new forecasts for water consumption and wastewater discharges.
- We've updated our forecast of the WACC estimate for the price determination, set by IPART in accordance with the 2018 WACC method in April or May 2020. Our WACC estimate has fallen from 4.1% to 3.2%, reflecting the dramatic fall in Commonwealth Government bond yields in 2019.
- The Department of Planning, Industry and Environment (Water) has overseen an independent review of our water consumption forecasting methodology. The new approach results in higher demand forecasts – by around 1,400 ML each year or 2.3% per year.
- The lower WACC estimate reduces our overall revenue requirement by 8.1% or $150 million over the regulatory period. The higher demand forecasts mean that we expect to recover a greater share of revenues through usage charges, thereby reducing water and wastewater service charges.

WACC scenario - Total	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Target revenue from usage and service charges ($2019-20, million)						
4.1% WACC	343.5	355.9	368.5	381.9	395.9	1,845.8
3.2% WACC	334.1	336.6	338.9	341.6	344.3	1,695.4
Variance	(9.4)	(19.3)	(29.6)	(40.4)	(51.7)	(150.4)
Indicative price increases (%) [1]						
4.1% WACC	2.6	2.6	2.6	2.6	2.6	
3.2% WACC	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	

Source: Hunter Water analysis.
Note: 1. Calculated as the movement in the target revenue taking into consideration forecast growth in connections and demand.
2. Totals may not add due to rounding.

- We have updated our proposed water, wastewater and stormwater charges to reflect the lower revenue requirement and higher demands. The Environmental Improvement Charge still drops off in 2020-21. The key movements are:
    - Water service charges fall substantially, from around $100 per annum to less than $8 per annum for residential customers, and by similar relative amounts for all non-residential customers
    - Wastewater service charges still increase but by far less than the pricing proposal: the annual charge for the owners of houses increases from $652 in 2019-20 to $667 in 2024-25, previously increasing to $777 in the last year; and the annual charge for the owners of apartments increases from $538 in 2019-20 to $633 in 2024-25, previously increasing to $738 in the last year.
    - Stormwater drainage charge increase but by a lower amount: for the owner of a house the charge increases from $30 in 2019-20 to $33 in 2024-25, previously increasing to $39 in the last year.
- These movements in charges result in **lower bills for all typical customer types** in absolute terms (before inflation) in each of the five years, including those customers paying stormwater charges.

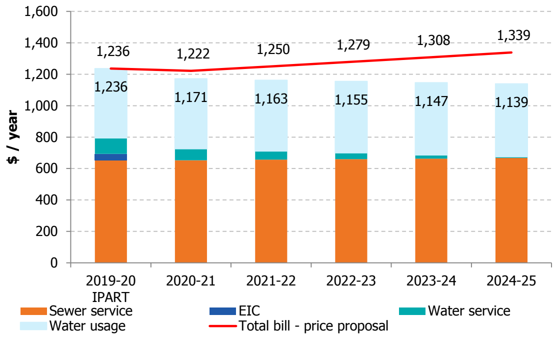
Residential property type and connected service	$ per year in 2019-20	$ per year in 2024-25	Issues Paper – change over 5 years October 2019 estimates		Price proposal – change over 5 years July 2019 estimates	
House – water, wastewater , stormwater	1,316	1,229	(87)	(7%)	129	10%
House – water, wastewater	1,236	1,139	(97)	(8%)	103	8%
Pensioner household (in a house) – water, wastewater	672	620	(52)	(8%)	96	14%
Apartment - water, wastewater , stormwater	984	963	(21)	(2%)	179	18%
Apartment - water, wastewater	955	930	(25)	(3%)	169	18%

Source: Hunter Water analysis.
Note: Bill impacts are provided in current dollar terms $2019-20). We would add actual inflation to prices during each year of the regulatory period.

What this means for customer bills

Stand-alone house

185 kL per year water



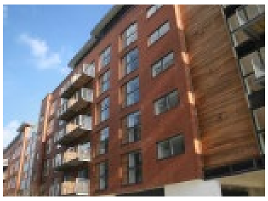
Pricing Proposal July 2019

1.6% per year

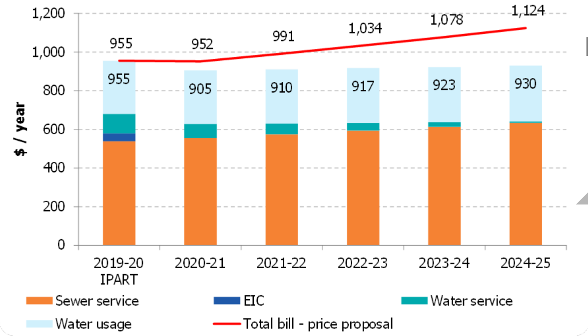
Update October 2019

1.6% per year

Apartment



115 kL per year water



Pricing Proposal July 2019

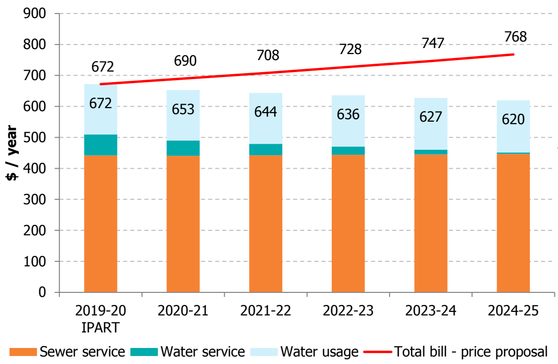
3.3% per year

Update October 2019

0.5% per year

Pensioner (in a house)

100 kL per year water



Pricing Proposal July 2019

2.7% per year

Update October 2019

1.6% per year

Financial metrics

- Hunter Water has updated its calculation of IPART's financial metrics using a 3.2% WACC estimate – for both the 'benchmark' test and 'actual' test.
- Our analysis suggests that we do not pass the benchmark test for 'real funds from operations (FFO) over debt' – we dip under IPART's threshold in 2022-23 and fall further below in the following two years.
- Our analysis suggests that we do not pass the actual test for 'FFO over debt' – we are under IPART's threshold in each of the five years.
- IPART's 2018 financeability test sets out a process and remedies should a utility fail one or more of the metrics. We are unsure what is driving the latest results for the benchmark test, and we would like to discuss this with IPART. We note that IPART's 2018 financeability test suggests a regulatory depreciation allowance adjustment if there is a persistent and worsening problem under the actual test.

Building block components

- Hunter Water sets out the assumptions underpinning the 3.2% WACC estimate, noting the dramatic reduction in current Commonwealth Government bond yields during 2019 and the large cost of debt estimates in the back-end of the historic component.
- We applied IPART's 2018 WACC method to calculate the WACC starting point for the next price determination, from which time IPART's trailing cost of debt method would take effect.
- Our analysis of IPART's new trailing method suggests that an increase in the current cost of debt over the next few years would be roughly offset by the drop in the 10-year historical component. Given this situation, we support an end-of-period true-up approach for the trailing cost of debt, where the adjustment, up or down, is smoothed evenly across the next regulatory period.
- We set aside $129 million in a 'corporate transition RAB' as part of our proposed changes to asset categories, asset lives and regulatory depreciation. This new corporate RAB category captures the past build-up of short-lived corporate intangibles (mainly ICT) and equipment assets, previously depreciated at 100 years when new and 70 years as existing assets.
- We adopted this approach for a number of reasons: moderates overall bill impacts, allows us to apply the right lives to all new assets including corporate assets, and allows adjustments to existing lives for all other assets. Our approach focuses on the past problem with the under-recovery of regulatory depreciation on the shortest lived corporate assets in a separate and explicit category.

Demand forecasts

- Hunter Water is in the process of completing a major demand review as part of the Lower Hunter Water Plan. The NSW Department of Planning, Industry and Environment (Water) is overseeing the review and has engaged a specialist consultant (Jacobs) to examine Hunter Water's revised demand forecast methodology. Hunter Water is addressing the recommendations from the final stage of the review.
- Hunter Water's revised approach introduces a climate-correction methodology to determine the starting year demand for the water consumption forecast. This has removed the effect of short-term

climatic influences. We have also updated the model that we use to forecast demand by sector, from the new starting point.

- Our Issues Paper response sets out our new demand forecasts using the updated methodology. We are forecasting higher demand than our pricing proposal, particularly for the non-residential sector. Overall, water demand is 2.3% higher and wastewater discharges are around 22% higher.
- Our higher demand forecasts will lead to lower water and wastewater service charges, all else being equal. Hunter Water expects to incur increased operating expenditure to meet this demand, relative to our previous forecast. We have used our short-run marginal costs estimates for water and wastewater to calculate the additional operating costs, in the order of $160,000 per year and $230,000 per year.
- IPART's demand volatility adjustment mechanism applies a revenue adjustment for water sales that are above or below a 5% threshold. Using the method set out in IPART's Issues Paper, we calculate an $8.8 million adjustment based off higher actual water sales in the period 2016-17 to 2018-19. We suggest that IPART return this revenue to customers in an NPV-neutral way across the next regulatory period.
- We expect water sales in 2019-20 to be well below IPART's 2016 allowance as the current water restrictions take full effect, possibly by up to $8 million if level 2 restrictions are necessary. Drought events cause two adverse financial impacts for water utilities: higher unbudgeted (operating and possibly capital) costs at the same as restrictions commence and water revenues fall.
- Hunter Water is examining possible changes to the demand volatility adjustment mechanism to account for periods of prolonged water restrictions.

Prices for water, wastewater and stormwater services

- Our 2019 Price Submission proposed a water usage charge of $2.41/kL in 2020-21, rising 1% per year in real terms. We proposed a residential water service charge that remained constant at or just under $100 per annum.
- The fall in the WACC and the higher demand forecasts result in a fall in the residential service charge to under $8 per year in 2024-25, assuming no change to our proposed water usage price.
- We would welcome the opportunity to discuss the mix of water service and usage charges with IPART following the next steps in the expenditure review and IPART's assessment of the long-run marginal cost of water.
- Our updated revenue requirement results in lower typical bills for the owners of apartments over the regulatory period, a material reduction from our pricing proposal. In light of these movements, Hunter Water is now of the view that the transition to a common residential wastewater charge should happen sooner, possibly in the next two or three years.
- We provide data on wastewater discharges by residential and non-residential customers showing almost half of all customers discharge less than 120kL per year. Removing the deemed non-residential allowance for non-residential customers would not have a significant impact on balance of charges between the two customer types. This change would create an inequity between residential and non-residential customers with low water use and low estimated discharges.
- The removal of the discharge factor on wastewater connection charges for non-residential customers would materially change the distribution and incidence of charges within this group. We outline the likely relative and absolute movements for non-residential customers, showing the impact on those with larger meter sizes.

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- We have considered, at a conceptual level, the extent to which the volume and quality of customer wastewater discharges affect capital both the transportation network and wastewater treatment plants. We estimate that discharge volumes for domestic strength wastewater dive approximately one quarter of the proposed investment during 2020-2025.
- In principle, Hunter Water agrees with IPART that these is merit in us both gaining a better understanding of the long-run marginal cost (LRMC) of wastewater. However, there are a range of issues to consider before assessing the appropriateness of using such estimates for setting wastewater usage charges. Substantial work can be progressed in time for the following price review.

Clarifications and corrections

- Hunter Water's 2019 Price Submission contained two errors related to the cost of electricity over the next regulatory period. Hunter Water asks IPART to consider a revised proposal for electricity operating costs, increasing the electricity budget from $62.2 million to $66.9 million over the regulatory period.
- Our 2019 Price Submission detailed our plans to commence quarterly billing from 1 July 2020, replacing the past practice of 4-monthly billing. Given a 3-month delay in introducing our new billing system, we will now move to quarterly billing on 1 July 2021. This results in operating cost savings of $850,000 in 2020-21, offset in part by an increase in the working capital allowance.
- Hunter Water has found that the definitions in IPART's 2016 Price Determination, and earlier determinations, create some interpretation issues. We outline several of these issues in our response and would welcome the opportunity to discuss these points with IPART prior to the draft report.

Contents

1. Introduction

Hunter Water welcomes the opportunity to respond to the Independent Pricing and Regulatory Tribunal's (IPART) Issues Paper*, Review of prices for Hunter Water Corporation from 1 July 2020* (Issues Paper).

IPART's September 2019 Issues Paper for Hunter Water price review summarises the key information in our price submission, sets out IPART's preliminary positions, identifies key issues for the review and invites public feedback from all parties with an interest in Hunter Water's services and prices.

Hunter Water's response to the Issues Paper focuses on a subset of key questions and issues. These are the areas where the Issues Paper outlines a new IPART policy position or invites more detailed commentary on key aspects of our pricing proposal.

Hunter Water would like to commend IPART for a well-written and well-presented Issues Paper. IPART has effectively captured and explained the key aspects of our pricing submission and identified all of the key decision points for the review.

Our submission offers further discussion and information on eight broad topic areas. The topics and relevant section of this document are listed below.

All dollar amounts presented in this paper are shown in real, $2019-20 terms. We would add actual inflation to prices during each year of the regulatory period.

2. Forecast lower revenues, prices and bills

2.1 Movements since our 1 July 2019 Price Submission

Hunter Water has updated its proposed revenue requirements and associated prices to reflect a change in current estimates for two main inputs:

- WACC estimate reduction from 4.1% to 3.2%,
- Higher demand forecasts for water use and wastewater discharges.

Our 2019 Price Submission forecast real bill increases for all customer types. The following section describes how the lower WACC estimate and higher demand forecasts flow through to lower bill outcomes relative to our pricing proposal – and lower bills in absolute terms for most customers (before inflation).

2.1.1 Weighted average cost of capital – a fall in our financing costs

Hunter Water's price proposal incorporated a WACC estimate of 4.1%, consistent with IPART's February 2019 WACC Bi-annual Update – a reflection of market rates at the time. We indicated in our pricing proposal (1 July 2019) that we expected a most likely WACC estimate of 3.5% for April 2020 (around the time that IPART calculates the final WACC estimate).

We have undertaken further analysis on market rates since that time. Our current forecast of the WACC estimate for April 2020 is 3.2% (see section 4.1 for full details).

We have updated our target revenue forecasts and indicative price movements to reflect the lower return on assets (see Table 1). The fall in the WACC from 4.1% to 3.2% reduces our revenue requirement by about 8.1% or $150 million over the five years.

Our target revenue decreases significantly towards the end of the five-year regulatory period. The increasing variance between the target revenue with a 4.1% and 3.2% WACC estimate is due to the net-present-value (NPV) smoothing technique we use to smooth the annual price movement over the period.

Table 1 Target revenue and indicative price increases with a 3.2% WACC

WACC scenario - Total	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Target revenue from usage and service charges ($2019-20, million)						
4.1% WACC	343.5	355.9	368.5	381.9	395.9	1,845.8
3.2% WACC	334.1	336.6	338.9	341.6	344.3	1,695.4
Variance	(9.4)	(19.3)	(29.6)	(40.4)	(51.7)	(150.4)
Indicative price increases (%) [1]						
4.1% WACC	2.6	2.6	2.6	2.6	2.6	
3.2% WACC	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	

Source: Hunter Water analysis.
Note: 1. Calculated as the movement in the target revenue taking into consideration forecast growth in connections and demand.
2. Totals may not add due to rounding.

2.1.2 Demand forecasts

As indicated in our pricing proposal, we have recently reviewed our approach to forecasting water consumption to reflect a climate corrected methodology and the latest water efficiency information (see section 6). We have also updated our wastewater discharge forecasts to reflect changes in forecast water consumption.

Our water consumption and wastewater discharges forecasts increase over the regulatory period. Our residential and non-residential water demand forecasts increase by 2.3% or about 1,400 ML per year. Our forecasts for wastewater discharges increases by about 1,100 ML per year.

2.2 Updated revenue requirement by product

Our latest forecasts of the proposed revenue requirement for water, wastewater and stormwater using the WACC estimate of 3.2% and higher demand forecasts show a material reduction in revenue requirements and indicative prices (see Table 2, Table 3 and Table 4). We have assumed no change to the other key building block inputs: operating expenditure, capital expenditure and regulatory depreciation.

Hunter Water calculates indicative price movements for water, wastewater and stormwater services. These high-level estimates include forecast growth in connections and usage, but do not account for specific changes in price structures for different customer types.

The lower WACC and higher usage forecasts reduce real indicative price movements (before inflation) between the pricing proposal (July 2019) and our Issues Paper update (October 2019) by:

- Water: 1% increase per year to 1.6% decrease per year
- Wastewater: 4% increase per year to 0.9% increase per year
- Stormwater: 5.7% increase per year to 2.4% increase per year.

Table 2 Target water revenue, 2020-21 to 2024-25, ($millions, $2019-20)

Water	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Target revenue from usage and service charges ($2019-20, million)						
4.1% WACC	168.1	171.1	173.8	176.9	180.1	869.9
3.2% WACC	163.8	162.4	160.8	159.4	158.1	804.4
Variance	(4.3)	(8.7)	(13.1)	(17.5)	(22.0)	(65.5)
Indicative price increases (%) [1]						
4.1% WACC	1.0	1.0	1.0	1.0	1.0	
3.2% WACC	(1.6)	(1.6)	(1.6)	(1.6)	(1.6)	

Source: Hunter Water analysis.
Note: 1. Calculated as the movement in the target revenue taking into consideration forecast growth in connections and demand.
2. Totals may not add due to rounding.

Table 3 Target wastewater revenue, 2020-21 to 2024-25, ($millions, $2019-20)

Wastewater	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Target revenue from usage and service charges ($2019-20, million)						
4.1% WACC	169.9	178.9	188.4	198.4	208.8	944.4
3.2% WACC	164.9	168.7	172.5	176.3	180.2	862.6
Variance	(4.9)	(10.3)	(16.0)	(22.1)	(28.6)	(81.9)
Indicative price increases (%) [1]						
4.1% WACC	4.0	4.0	4.0	4.0	4.0	
3.2% WACC	0.9	0.9	0.9	0.9	0.9	

Source: Hunter Water analysis.
Note: 1. Calculated as the movement in the target revenue taking into consideration forecast growth in connections and demand.
2. Totals may not add due to rounding.

Table 4 Target stormwater revenue, 2020-21 to 2024-25, ($millions, $2019-20)

Stormwater	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Target revenue from usage and service charges ($2019-20, million)						
4.1% WACC	5.6	5.9	6.3	6.6	7.1	31.4
3.2% WACC	5.4	5.5	5.7	5.8	6.0	28.4
Variance	(0.2)	(0.4)	(0.6)	(0.8)	(1.0)	(3.0)
Indicative price increases (%) [1]						
4.1% WACC	5.7	5.7	5.7	5.7	5.7	
3.2% WACC	2.4	2.4	2.4	2.4	2.4	

Source: Hunter Water analysis.
Note: 1. Calculated as the movement in the target revenue taking into consideration forecast growth in connections.
2. Totals may not add due to rounding.

2.3 Updated prices for water, wastewater and stormwater services

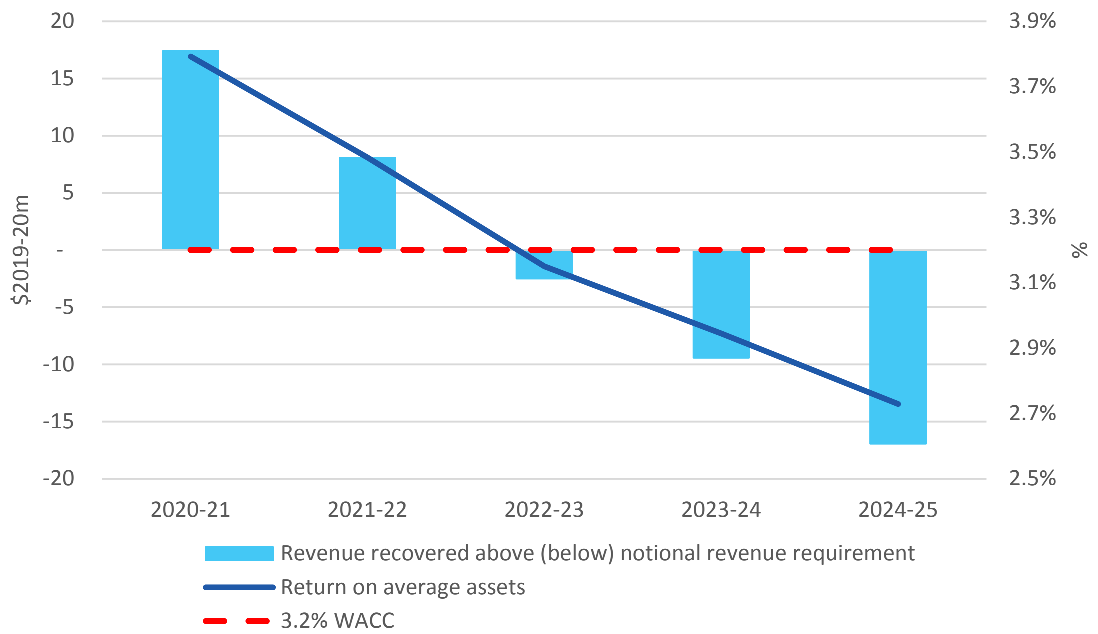
Our 2019 Price Submission applied a 'net-present-value (NPV) smoothing' technique to smooth the annual price movement over the five-year period. This is consistent with the smoothing approach used in IPART's 2016 Determination. We have maintained this approach to update prices for our Issues Paper update however recognise that there may be another approach that is more appropriate given the large variance between the 4.9% WACC from IPART's 2016 Determination and our latest WACC estimate for April 2020 of 3.2%.

The current effects of revenue smoothing are shown in Figure 1:

- We over-recover the notional revenue requirement in the early years of the price period and under-recover the revenue requirement in the later years of the price period (up to $17 million in both directions), and
- The return we receive on average assets decreases from 3.8% in 2020-21 to 2.7% in 2024-25.

We would like to further consider impacts of revenue smoothing on prices and financial metrics in the next and following price periods. We welcome the opportunity to discuss price smoothing options with IPART prior to the release of the draft report.

Figure 1 Revenue recovered and return on average assets under net-present-value smoothing



Source: Hunter Water analysis.

2.3.1 Water service charge and usage price

Our 2019 Price Submission proposed an annual 1.0% real increase in the water revenue requirement (see Table 2). We proposed a real increase in the water usage price from $2.37/kL to $2.51/kL over the regulatory period to recover this additional revenue, consistent with our range of long-run marginal cost of water estimates and feedback from our residential customer tariff survey.

We have re-modelled our water service charge holding our water usage price at the level we proposed (rising to $2.51/kL in 2024-25).

The higher usage revenue substantially reduces the revenue we recover from service charges – the balancing item. Our updated annual water service charge falls from $100.88 per residential dwelling in 2019-20 to $7.88 per dwelling in 2024-25 (see Table 5). The service charges for non-residential customers, shown by meter size, fall by the same relative amounts. Of the total reduction from our pricing proposal, 88% relates to the lower WACC and 12% relates to the higher forecast water sales.

Table 5 Updated water service charge ($2019-20)

	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Residential						
All dwellings	100.88	72.67	54.88	39.76	22.69	7.88
Non-residential						
20mm	100.88	72.67	54.88	39.76	22.69	7.88
25mm	157.63	113.55	85.76	62.13	35.46	12.32
32mm	258.26	186.04	140.50	101.79	58.10	20.19
40mm	403.53	290.68	219.54	159.05	90.78	31.54
50mm	630.51	454.20	343.02	248.52	141.84	49.28
80mm	1,614.10	1,162.74	878.14	636.21	363.10	126.16
100mm	2,522.04	1,816.78	1,372.09	994.08	567.35	197.12
150mm	5,674.59	4,087.76	3,087.21	2,236.68	1,276.54	443.52
200mm	10,088.17	7,267.12	5,488.38	3,976.32	2,269.40	788.48
250mm	15,762.53	11,354.88	8,575.59	6,213.00	3,545.93	1,232.00
300mm	22,698.05	16,351.03	12,348.85	8,946.72	5,106.15	1,774.08
350mm	30,894.56	22,255.57	16,808.16	12,177.47	6,950.03	2,414.72

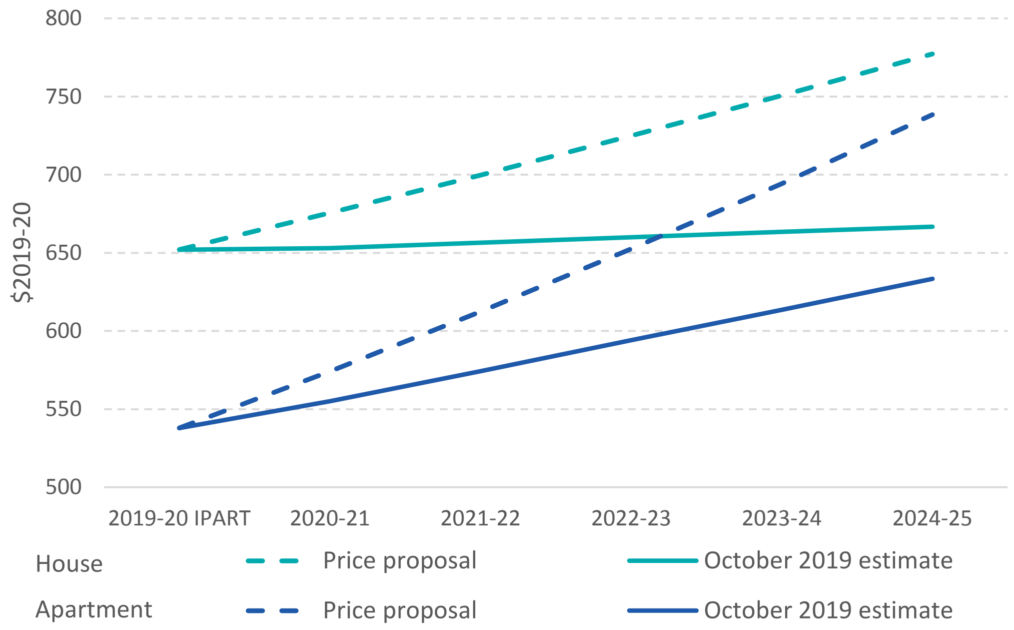
Source: Hunter Water analysis.
Note: 2019-20 is the IPART determined charge.

2.3.2 Wastewater charges

We have re-modelled wastewater charges using the updated estimates of the annual wastewater revenue requirement (see Table 3). To calculate new service charges we kept the wastewater usage charge constant at $0.67 per year ($nominal) and the deemed usage allowance at 120kL per year for all customers - as per our pricing proposal.

Relative to our pricing proposal, the base meter connection charge, prior to any application of discharge factors, decreases by $30 in 2020-21 and $147 in 2024-25. The updated meter connection charges are shown in Table 6. Of the total reduction from our pricing proposal, 98% relates to the lower WACC and 2% relates to the higher discharge volumes.

Figure 2 Movement in residential wastewater service charges ($2019-20)



Note: Total wastewater service charge includes meter connection charge and deemed usage allowance. Meter connection component has been multiplied by a discharge factor of 0.75.

Table 6 Updated wastewater meter connection charge ($2019-20)

	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Residential						
Apartment	628.74	651.56	676.19	702.72	727.83	754.92
House	762.11	766.54	772.79	780.80	786.84	794.65
Non-residential						
20mm	762.11	766.54	772.79	780.80	786.84	794.65
25mm	1,190.79	1,197.72	1,207.48	1,219.99	1,229.44	1,241.64
32mm	1,950.98	1,962.34	1,978.34	1,998.84	2,014.32	2,034.31
40mm	3,048.42	3,066.16	3,091.16	3,123.18	3,147.37	3,178.61
50mm	4,763.16	4,790.88	4,829.94	4,879.98	4,917.77	4,966.57
80mm	12,193.67	12,264.65	12,364.63	12,492.74	12,589.49	12,714.43
100mm	19,052.62	19,163.52	19,319.74	19,519.90	19,671.07	19,866.30
150mm	42,868.39	43,117.92	43,469.42	43,919.78	44,259.92	44,699.17
200mm	76,210.46	76,654.07	77,278.97	78,079.61	78,684.29	79,465.20

Source: Hunter Water analysis.
Notes:
1. 2019-20 is the IPART determined charge.
2. For the purposes of calculating the actual charge paid by customers, residential charges above are to be multiplied by the 75% deemed sewer discharge factor. Non-residential charges are to be multiplied by the customer specific sewer discharge factor.

2.3.3 Stormwater charges

Hunter Water had proposed a 33% real increase in stormwater revenues over the regulatory period, whereas the updated figure is 13% over the period. The lower stormwater revenue requirement is driven solely by the lower WACC (see Table 4). Relative to our pricing proposal, the owners of houses in stormwater drainage areas pay $3 per year less in in 2020-21 increasing to $16 per year less in 2024-25.

Our updated stormwater charges are shown in Table 7.

Figure 3 Movement in stormwater service charges ($2019-20)

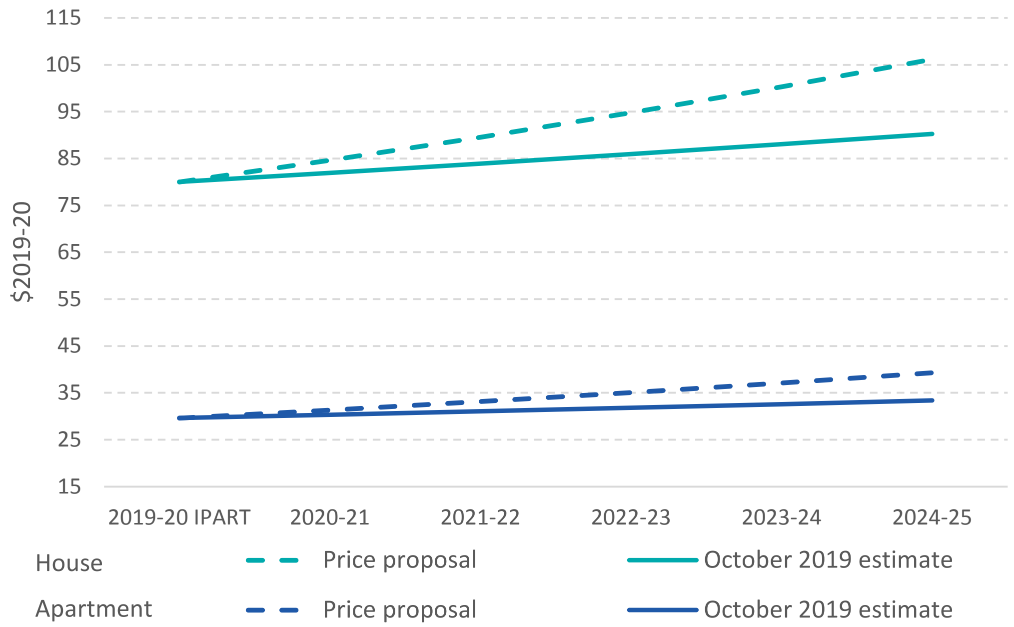


Table 7 Updated stormwater charges ($2019-20)

Property type	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Residential						
Apartment	29.61	30.32	31.06	31.82	32.60	33.39
House	80.01	81.93	83.93	85.98	88.08	90.24
Non-residential						
Small or low impact	80.01	81.93	83.93	85.98	88.08	90.24
Medium	261.31	267.56	274.11	280.81	287.68	294.71
Large	1,661.94	1,701.72	1,743.35	1,785.98	1,829.64	1,874.36
Very large	5,280.39	5,406.78	5,539.04	5,674.49	5,813.22	5,955.31

Source: Hunter Water analysis.
Note: 2019-20 is the IPART determined charge.

2.4 Updated bill impacts

In our pricing proposal, we forecast increases in average residential customer bills across the five-year regulatory period: 1.6% per year for the owners of houses, 3.3% per year for the owners of apartments and 2.7% per year for pensioners.[1]

Our updated bill analysis shows real reductions in average residential bills over the regulatory period: minus 1.6 % per year for the owners of houses, minus 0.5% per year for owners of apartments and minus 1.6% per year for pensioners (excluding the effects of inflation). The combined effect of these movements over five years, for the July 2019 pricing proposal (blue-shaded) and our updated October 2019 estimates, is shown in Table 8.

Table 8 Bill impacts for typical residential customers ($2019-20)

Residential property type	2019-20	2024-25	Change over 5 years October 2019 estimates		Price proposal – change over 5 years July 2019 estimates	
House - including stormwater	1,316	1,229	(87)	(7%)	129	10%
House - excluding stormwater	1,236	1,139	(97)	(8%)	103	8%
Pensioner household - excluding stormwater	672	620	(52)	(8%)	96	14%
Apartment - including stormwater	984	963	(21)	(2%)	179	18%
Apartment - excluding stormwater	955	930	(25)	(3%)	169	18%

Source: Hunter Water analysis.

The following charts show updated average residential bills by charge (columns) compared with the total average bill per our price submission (red line) for the owners of houses (see Figure 4), the owners of apartments (see Figure 5) and pensioners (see Figure 6).

[1] Based on average consumption of 185kL per year for houses, 115kL per year for apartments and 100kL per year for pensioners in a house. Excluding drainage.

Figure 4 Average bill – owners of stand-alone house with 185kL water consumption

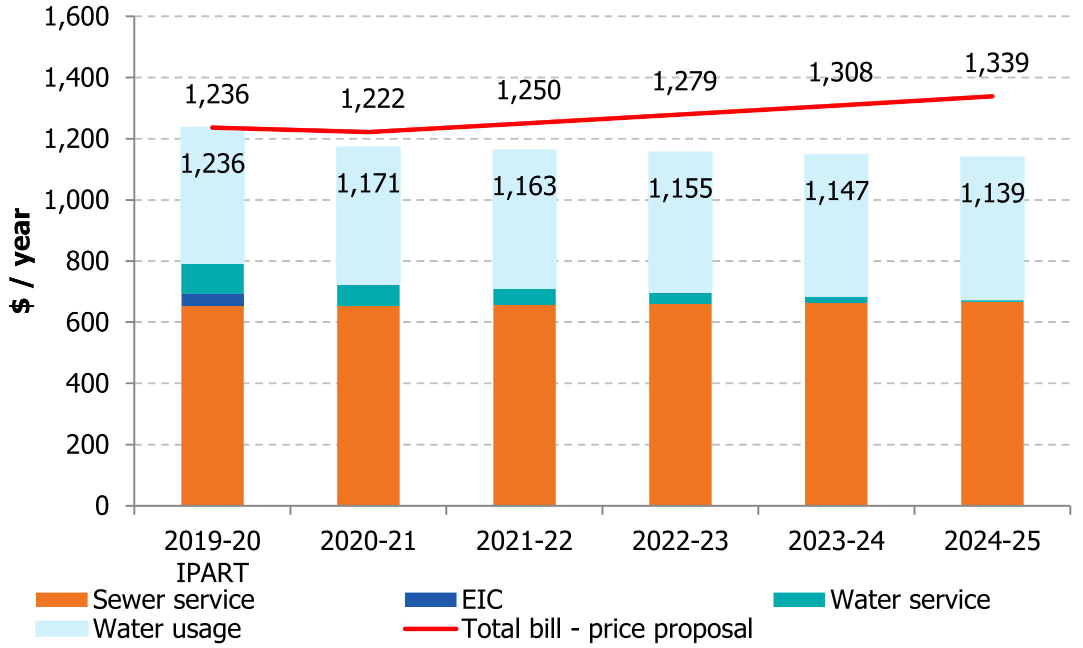


Figure 5 Average bill – owner of an apartment with 115kL per year water consumption

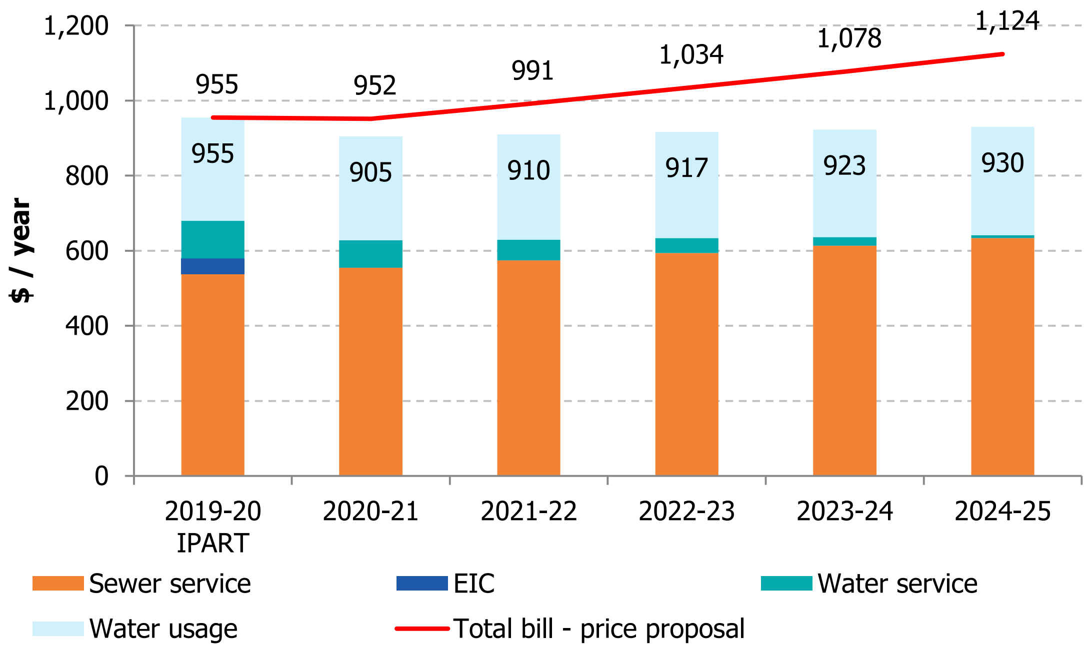
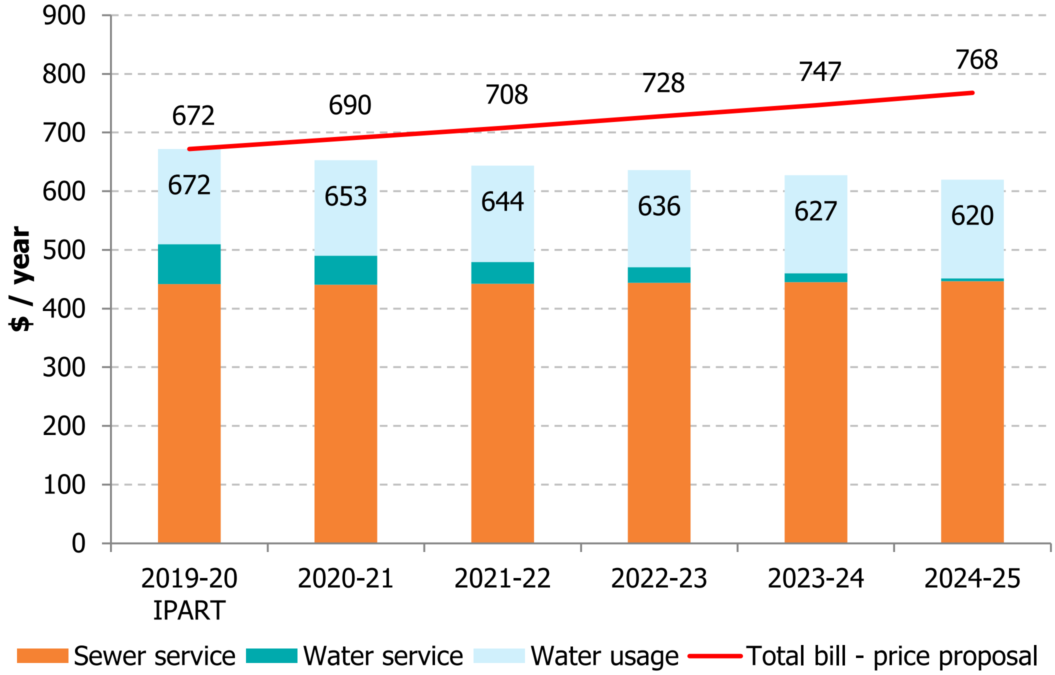


Figure 6 **Average bill – pensioner with 100kL per year water consumption**



3. Financial metrics

3.1 Hunter Water's performance against IPART's metrics

We have replicated IPART's financeability methodology to test the outcomes of a 3.2% WACC on our financial metrics for both the benchmark test (see Table 9) and actual test (see Table 10).

We previously presented outcomes of the financeability test at a 4.1% WACC in our Price Submission. The lower 3.2% WACC has the following impacts on our underlying benchmark regulatory financials:

- Target revenues decrease by $150 million ($2019-20) over the regulatory period. This is weighted to the end of the price period (see Table 1).
- Return on debt forecasts (interest expense) decrease by around $20 million ($2019-20) per year across the price period.
- Operating cost, Debt, RAB and depreciation allowance forecasts are not impacted. This includes our proposed transition to new asset lives for regulatory depreciation.
- Tax expense moves slightly to reflect changes in target revenues and expenses.

To perform the actual financeability test, we made an assumption that the current gearing ratio will continue. We have also adjusted our forecast actual cost of debt to recognise that a lower WACC is likely to be the result of lower borrowing costs.

3.1.1 IPART's benchmark test

Hunter Water satisfies IPART's benchmark test using the 4.1% WACC on each of the metrics in each of the years, apart from real funds from operations (FFO) over debt in 2020-21 (and is marginally below in 2021-22).

Using a 3.2% WACC estimate, Hunter Water fails the real FFO over debt metric in the period 2022-23 to 2024-25, and our performance steadily deteriorates through time.

IPART's 2018 financeability test sets out a process and remedies to address a 'financeability concern', depending on the test applied, performance against each of the ratios and trends across the regulatory period. IPART suggests that a utility could only fail the benchmark test if the 'regulatory allowances' were too low, implying that a utility should never fail any metric over a period of years:

> *… we can use the benchmark financeability test to provide some confidence that the regulatory allowance is appropriate. If this benchmark test identifies a concern, then we would seek to pinpoint the cause and revise the pricing calculation. We anticipate doing this before the pricing decision is publicised.*[2]

Hunter Water recently completed the financeability calculations shown below. We note the poor performance of the real FFO over debt metric, influenced by the change to the lower WACC and the NPV smoothing methodology applied. We would welcome the opportunity to compare and discuss results with IPART prior to the draft report. We are particularly interested in understanding the performance against benchmark financial metrics considering the changes we propose to our regulatory depreciation allowance and the increase in revenues (as compared to prior determinations) that this allows.

[2] IPART, ibid, page 65.

Table 9 Financeability metrics against targets – 'benchmark test'

Financial metric	2020-21	2021-22	2022-23	2023-24	2024-25
4.1% WACC					
Real interest cover	3.2	3.3	3.3	3.5	3.6
Target >2.2	✓	✓	✓	✓	✓
Real FFO over debt	6.7%	7.0%	7.2%	7.6%	8.0%
Target >7.0%	✗	✗	✓	✓	✓
Gearing	60%	60%	60%	60%	60%
Target <70%	✓	✓	✓	✓	✓
3.2% WACC					
Real Interest Cover	4.5	4.4	4.2	4.2	4.1
Target >2.2	✓	✓	✓	✓	✓
Real FFO over debt	7.2%	7.1%	6.8%	6.7%	6.5%
Target >7.0%	✓	✓	✗	✗	✗
Gearing	60%	60%	60%	60%	60%
Target <70%	✓	✓	✓	✓	✓

Source: Hunter Water analysis.

3.1.2 IPART's actual test

Using IPART's actual test and a 4.1% WACC, Hunter Water performs well on all metrics across the regulatory period, albeit we are slightly under on FFO over debt in 2020-21. Our performance on interest cover and FFO over debt steadily improves year on year.

Using IPART's actual test and a 3.2% WACC, Hunter Water fails the FFO over debt metric, and our performance deteriorates through time.

Hunter Water notes that IPART's financeability test applies different remedies if there is a persistent and worsening problem with one or more metrics in the 'actual test'. IPART suggests increasing prices in the regulatory period by providing a higher regulatory depreciation allowance.[3]

Hunter Water notes that its 2019 pricing proposal included a 'corporate transition' RAB (see section 4.2), reflecting the build-up of regulatory depreciation on short-lived (mainly ICT) corporate assets in past determinations. Hunter Water had not contemplated any need to use this 'stored' regulatory depreciation when considering the actual test results under a 4.1% WACC.

[3] IPART 2018, Review of the financeability test, page 68.

Table 10 Financeability metrics against targets – 'actual test'

Financial metric	2020-21	2021-22	2022-23	2023-24	2024-25
4.1% WACC					
Interest cover	2.2	2.2	2.2	2.2	2.3
Target >1.8	✓	✓	✓	✓	✓
FFO over debt	5.9%	6.1%	6.3%	6.6%	6.9%
Target > 6.0%	✗	✓	✓	✓	✓
Gearing	54%	54%	54%	54%	54%
Target <70%	✓	✓	✓	✓	✓
3.2% WACC					
Interest Cover	2.3	2.3	2.3	2.3	2.2
Target >1.8	✓	✓	✓	✓	✓
FFO over debt	5.8%	5.9%	5.8%	5.8%	5.7%
Target > 6.0%	✗	✗	✗	✗	✗
Gearing	54%	54%	53%	53%	53%
Target <70%	✓	✓	✓	✓	✓

Source: Hunter Water analysis.

3.1.3 Return on capital employed

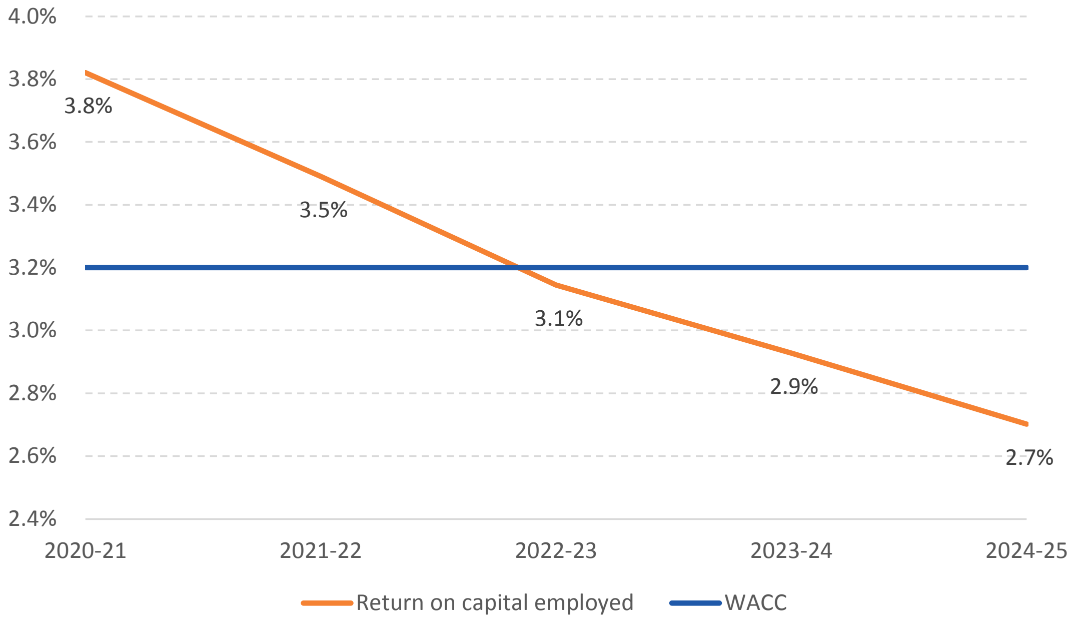
Hunter Water has calculated the return on capital employed as outlined in IPART's 2018 'financeability test'. IPART states that this metric is a calculation check against the WACC to provide confidence that the target revenue has been set appropriately.[4] Hunter Water's return on capital employed decreases over the price period from 3.8% to 2.7% compared to the WACC estimate of 3.2% (see Figure 7).

The movement in the return on capital reflects the NPV smoothing technique we have over the five-year period. This approach allows us to achieve full cost recovery over the regulatory period in NPV terms whilst smoothing the bill increase in each year.

As our WACC decreases from 4.9% (2016 Determination) to an estimated 3.2% estimate for the start of the next period, there is significant variability between the return on capital implied by the WACC and the actual return on capital employed based on smoothed target revenues. This is evident in our benchmark financial metrics which deteriorate materially each year (see Table 9).

[4] IPART 2018 Review of our financeability test page 47.

Figure 7 'Return on capital employed' over the next price period



Source: Hunter Water analysis.

4. Building block components

The following section provides details on Hunter Water's latest forecast for the WACC, some observations on the disaggregation of the regulatory asset base, possible transitional arrangements for the regulatory depreciation allowance, and an update on Hunter Water's billing cycle (working capital allowance).

4.1 Return on assets

IPART's Issues Paper (page 44) observed that:

> *"... we are in an environment of low returns on capital, which mitigates the impact of RAB increases in the 2020 determination period. However, we also recognise that the WACC will likely increase over time, which in the future would magnify the impact of Hunter Water's proposed capital expenditure increases for the 2020 period."*

Hunter Water's current best forecast of IPART's WACC estimate for the final determination is 3.2%. Hunter Water's current estimate is substantially lower than the WACC estimate of 4.1% we used when preparing our pricing proposal.

Hunter Water's WACC estimate of 3.2% incorporates IPART's 2018 WACC method statement on the transition:

> *At the beginning of the next regulatory period when our new WACC method applies, we will initially set the current cost of debt as a 40-day average, in line with our 2013 method. At the beginning of the second year, we will begin updating the current cost of debt, by taking the average across the interest rates in each tranche of debt ...*
>
> *We will pass through the change in the 10-year trailing average to prices with an annual update, or via a regulatory true-up in the following period.*[5]

We made the following adjustments to IPART's August 2019 WACC update to calculate a WACC estimate for 2020 – noting that IPART's 2018 debt cost trailing method starts at the beginning of this price determination:

- Using a nominal risk-free rate of 1.1% for the current data, assuming that 10-year Commonwealth Government bond yields remains constant until IPART makes its final calculation in 2020.
- Using the current debt margin of 2.1% for the current market data, assuming the debt margin remains constant until IPART makes its final calculation in 2020.
- Replacing one year of the 10-year trailing cost of debt with the current 10-year bond yield and current debt margin for the latest tranche.

Hunter Water did not adjust any of the other input parameters in IPART's August 2019 WACC update: gearing levels, equity beta, equity risk premiums, tax rates or the like (see Table 11).

[5] IPART 2018, Review of our WACC method, Final Report, February, (page 35).

Table 11 IPART WACC parameters, Hunter Water's forecast for April 2020

Parameter	Current market data	Mid-point	Long term averages
Nominal risk free rate	1.1%		3.1%
Inflation	2.3%		2.3%
Implied debt margin	2.1%		2.5%
Market risk premium	8.8%		6.0%
Debt funding	60%		60%
Equity funding	40%		40%
Gamma	0.25		0.25
Corporate tax rate	30%		30%
Equity beta	0.7		0.7
Post tax real WACC	2.5%	3.2%	3.9%

Source: Hunter Water analysis.

4.1.1 Equity beta

> ***10 In determining the equity beta to feed into the WACC, what comparable industries should we include to establish the proxy companies that we use in the review?***

IPART's 2018 WACC method provides for a review of the equity beta at each price review. IPART has used an equity of beta of 0.7 for water utilities for many years, the mid-point in IPART's equity beta range (0.6 to 0.8).

IPART's April 2019 Fact Sheet, *Estimating Equity Beta*, set out a process for measuring the equity beta using a comparator set of publicly-traded utilities from international equity markets. IPART has developed a sophisticated equity beta estimation method that details the process for selecting firms, screening rules, and data quality and liquidity filters.

Hunter Water's July 2019 response to the fact sheet supported IPART's ongoing work to develop and refine empirical estimates of feasible equity beta estimates. Hunter Water was comfortable with IPART's equity beta estimate of 0.74 at the time. Our response concluded:

> *We support IPART's WACC method and periodic WACC reviews, underpinned by the principles of accuracy, stability and replicability. We understand that IPART would apply expert regulatory judgement, incorporating multiple sources of evidence, before making any decision to depart from the mid-point equity beta estimate.*[6]

The Issues Paper invites comment on the scope of comparator firms:

> *We will use the broadest possible selection of proxy companies to estimate the equity beta (but exclude thinly traded stocks). In forming this selection, we seek stakeholder feedback on the comparable industries we should include to establish the proxy companies we use in this review.*[7]

[6] Hunter Water, Estimating Equity Beta, letter in response to IPART's Fact Sheet, 5 July 2019, page 4.
[7] IPART Issues Paper, page 46.

Hunter Water has not engaged expert advice on this specific question. Sydney Water provided a comprehensive submission to IPART's April 2019 Fact Sheet that addressed this technical issue. We agree with the following key points in Sydney Water's response:

- The sample should be extended to include firms that are listed on the ASX that face similar systematic risk to the benchmark firm.
- It is not possible to directly observe the equity beta of the Australian benchmark water utility from market data as there are no listed Australian water utilities.
- IPART should sample infrastructure stocks listed on the ASX (e.g. energy utilities, transport and telecommunications) in addition to water utilities listed on overseas exchanges.
- Providing water services is not necessarily the defining characteristic for determining a comparable firm. Country and industry are both relevant, with industry defined broadly to encompass non-water infrastructure businesses on the basis of their capital intensity, asset life, monopoly position, and inelastic demand.

4.1.2 Annual or end-of-period adjustment for debt costs

11 Should we update prices annually for the cost of debt, or pass these changes through via a true-up in the subsequent regulatory period?

IPART's 2018 WACC method introduced a trailing average approach for calculating the historic and current cost of debt (risk-free rate and implied debt margin) through time. The trailing method will result in a different cost of debt and different revenue requirement in each year of the regulatory period given any movement in the risk-free rate or debt margin for the current (40-day) cost of debt. The annual update to the historic cost of debt, dropping out a one-tenth tranche for the earliest of the ten years, will also impact the cost of debt in any year.

Hunter Water's 2019 Price Submission (Technical Paper 3) discussed the merits of annual price adjustments or an end-of-period true up as part of the subsequent price determination. We identified factors like the dramatic drop in risk-free rates during 2019, possible movements in borrowing costs over the next few years, the process of making annual adjustments and explaining price movements to customers.

Hunter Water has modelled a number of scenarios examining potential movements in the cost of debt over the regulatory period, consistent with IPART's 2018 WACC method (Appendix B). We assumed that the current cost of debt would rise from today's historic lows – increasing by 100 to 250 basis points across five years. At the same time, the model dropped off the earlier one-tenth tranche of debt costs in the trailing ten-year component. The model effectively replaced higher earlier numbers (e.g. 7.9% in 2011 and 7.7% in 2012) with our best estimates of the current cost of debt (below 4%), rising through time in line with our scenarios.

Hunter Water's modelling showed that the two effects, increasing current costs and decreasing historic costs, tend to cancel each other out. This analysis is founded on the cost of debt rising over the next few years – a reasonable but far from certain assumption.

After reflecting on the modelling results, Hunter Water supports an end-of-period true up of debt costs for the 2020 price determination. We note IPART's preference for an approach that provides price certainty to customers over the regulatory period. The revenue adjustment at the end of the period would be NPV-neutral (a true up or true down), and IPART is likely to smooth the adjustment across each year of the following regulatory period. This approach is unlikely to materially affect our financeability metrics.

4.2 Regulatory depreciation allowance

Hunter Water's 2019 Price Submission (Technical Paper 6) set out our approach to disaggregating the regulatory asset base by asset class for existing and new assets. IPART's Issues Paper recognises the benefits of such an approach over the past practice of using a single asset life for all existing assets (70 years) and all new assets (100 years):

> *It is important that the asset lives we use in calculating Hunter Water's depreciation allowance are accurate – ie, they reasonably reflect the consumption of its assets. If they are too short, today's customers will over pay (ie, pay for future customers' consumption of the assets). If they are too long, today's customers will pay less but future customers may pay for assets that they don't use, and the utility may also face financeability concerns for a period of time. Therefore, in principle, we support approaches that result in more accurate asset lives and the calculation of regulatory depreciation. However, in implementing new approaches, we are also mindful of bill impacts, and hence the potential need to transition to new approaches.*[8]

12 ***Has Hunter Water appropriately classified its assets into the different categories? Is there a better approach or can improvements be made?***

IPART's Issues Paper notes that Hunter Water's proposed asset lives are shorter than Sydney Water's proposed lives on a weighted average basis – for example, Hunter Water's proposed new asset lives of 56 years and Sydney Water's proposed new asset lives of 71 years.

Hunter Water has examined the composition of the forward capital program of both utilities. Our capital program has a higher proportion of expenditure within the shorter-life asset categories (i.e. intangibles, equipment, electrical and mechanical) (see Table 12). Sydney Water has a higher proportion of new capital expenditure on civil and non-depreciating assets. Hunter Water also has a higher proportion of new capital in the short asset life corporate regulatory asset base (RAB), as expected with our proposal to address legacy information and telecommunications technology issues through increased investment in the next price period (see Table 13).

Table 12 Proportion of forward capital program by asset class

Capital Program	Sydney Water	Hunter Water
Civil	60.6%	53.9%
Electrical & Mechanical	19.9%	26.0%
Equipment/Intangibles (Electronic)	14.9%	18.3%
Non-Depreciating	4.6%	1.8%

Source: Hunter Water analysis.

[8] IPART 2019, Issues Paper, page 47.

Table 13 Proportion of forward capital program proposed in 'corporate' RAB

Corporate Spend/ Capital Program	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Sydney Water	13%	11%	7%	6%		9%
Hunter Water	19%	23%	13%	16%	13%	17%

Source: Hunter Water analysis.

14 Is it appropriate to manage the price impacts with the 'corporate transition' category? Is there a better approach?

Hunter Water considers that the proposed 'corporate transition RAB' offers the simplest and most transparent method for phasing in the proposed changes to asset categories, asset lives and the regulatory deprecation allowance.

IPART's 2009 Determination introduced and established Hunter Water's 'corporate' regulatory asset base. IPART has depreciated the corporate RAB on the same basis as the water, wastewater and stormwater RABs, using the straight-line method and 100 years for new assets, defaulting to 70 years for existing lives in the subsequent determination. In contrast, Hunter Water proposes new asset lives of five years for corporate intangibles and 11 years for corporate equipment.

The corporate RAB includes all of Hunter Water's intangibles and a large share of all equipment assets. The corporate intangibles category include assets like ICT software, our quality management system and intellectual property. Corporate equipment includes water meters (post-2009), standpipes, telemetry, ICT hardware, desktop IT equipment, radio base, and the like.

Hunter Water's proposed corporate transition approach effectively quarantines most of the past investment in those assets with the shortest lives into a separate, explicit category. We have identified a total current value of the past corporate RAB of $128.7 million and have assumed a 50-year remaining life for those assets as a form of 'grandfathering' mechanism.

Hunter Water's 2019 Price Submission explained the likely material bill impacts had we sought to depreciate these assets in line with the gross replacement cost (GRC) methodology and remaining lives across the next regulatory period – the difference between deprecating the $128.7 million at 2% per year or 20% per year.

Hunter Water's proposed approach has the advantage of allowing an immediate transition to the correct remaining use lives for the existing water, wastewater and stormwater assets, comprising the majority of our existing asset base. Our approach also ensures that all new capital investment, including new corporate assets, have the right lives from the time they are rolled into one of the regulatory asset bases in the next regulatory period.

Hunter Water considers that all other transition methods are likely to be more complex and less transparent. Other phasing methods would require arbitrary assumptions about the proportion of different asset categories that are depreciated over different time periods.

5. Our expenditure proposal

5.1 Operating expenditure

2 ***Should we include an adjustment factor to recognise that Hunter Water should be realising ongoing efficiency gains over time?***

Hunter Water's price submission (Technical Paper 5: Operating Expenditure) demonstrates our pursuit of efficiencies in the current regulatory period. We documented ongoing efficiencies and savings in six areas: energy management, spoil management, maintenance productivity, security expenditure, meter reading contract and providing services to the development community.

Technical Paper 5 identified several efficiency programs for the next regulatory period, where we forecast substantial savings from these programs (see Table 14). [9]

Table 14 Efficiency programs and expected savings ($millions, $2019-20)

Category	2020-21	2021-22	2022-23	2023-24	2024-25	Total savings
Energy – renewables	0.4	1.1	1.2	1.2	1.2	**6.0**
Workforce management project	0.1	0.2	0.8	0.9	1.0	**3.0**
Electronic billing	0.2	0.4	0.6	0.7	0.7	**2.6**
Energy – SIPS	0.4	0.5	0.5	0.5	0.5	**2.4**
Spoil management	0.2	0.4	0.4	0.4	0.4	**1.8**
Contact centre (in-house)	-	-	0.2	0.2	0.2	**0.6**
Total expected savings	**1.2**	**2.6**	**3.7**	**3.9**	**4.0**	**15.4**
Percentage reduction (%)	**0.76**	**1.64**	**2.30**	**2.44**	**2.50**	**1.93**

Source: Hunter Water price submission, Technical Paper 5: Operating expenditure, Figure 7.8.
Note: Savings from renewable energy in 2020-21 and 2021-22 have been revised downward since our submission due to a mistake relating to timing of the investment (see section 9.1).

The savings comprise an efficiency target of approximately 1.9% total operating expenditure over the next regulatory period – this is already built into our operating expenditure forecast and equates to a continuing efficiency target of 0.65% per year. Continuing efficiency targets are typical practice in pricing reviews for regulated water utilities and mimic the rate at which an 'efficient frontier' firm becomes even more efficient. Our built-in target is at the upper-end of the range of continuing operating expenditure efficiency factors that have been applied in past pricing reviews (Table 15 provides a summary of these).

We consider that any additional continuing efficiency factor that may be applied to Hunter Water should only apply to components of our operating expenditure that are controllable. In recognition of the considerable efficiency target already built-in to our operating expenditure proposal, we believe the value of any additional factor should not exceed 0.25% p.a. - this is the lower-end of the range shown in Table 15 and also the value most commonly applied in previous reviews.

We will continue to explore opportunities to improve efficiency beyond our built-in target – through both capital investment and operational improvements. Hunter Water supports the retention of IPART's efficiency carryover mechanism for operating expenditure as it incentivises us to continue to seek efficiencies throughout the next regulatory period.

[9] Technical Paper 5: Operating Expenditure, page 48

Table 15 Review of continuing efficiency targets applied in water utility price reviews

Regulator – jurisdiction	Price review	Continuing efficiency (%p.a.)	Comment
Ofwat [1]	2004	0.3-0.5	Wholesale opex
Ofwat [1]	2009	0.25	Wholesale opex
Economic Regulation Authority (ERA) - Western Australia [1]	2012	2.0	Controllable opex
IPART – Hunter Water and Sydney Water [1]	2012	0.25	Controllable opex
Essential Services Commission of South Australia (ESCOSA) [2]	2013	1.0 – 2.0	Opex
Queensland Competition Authority (QCA) [1]	2015	0.25	Maximum allowable revenue (CPI-X)
Essential Services Commission (ESC) [1]	2016	2.0	Controllable opex
IPART – Hunter Water [3]	2016	0.25	Controllable opex
IPART – Sydney Water [4]	2016	0.25	Controllable opex
IPART – WaterNSW [5]	2016	0	Opex
Essential Services Commission of South Australia (ESCOSA) [6]	2016	1.0 – 1.5	Opex
IPART – Central Coast Council [7]	2019	0.25	Opex
IPART – Essential Energy [8]	2019	1.0	Non-labour direct opex
ESC [9]	2019	1.0 – 3.1	Opex

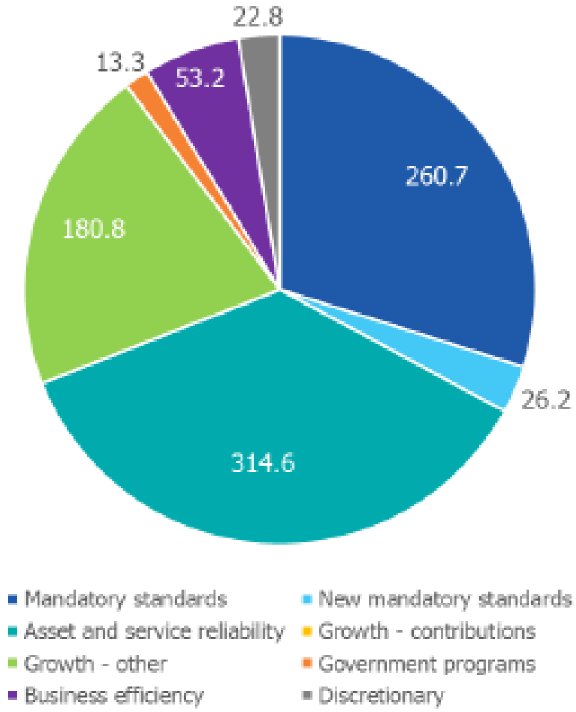
Notes:
1. Reported in Jacobs (2016), Hunter Water Expenditure Review Final Report.
2. ESCOSA (2013), SA Water's water and sewerage revenues 2013/14 – 2015/16, Final Determination, Statement of Reasons.
3. Jacobs (2016), Hunter Water expenditure review – Final Report (Public).
4. IPART (2016), Review of prices for Sydney Water Corporation, from 1 July 2016 to 30 June 2020, Water – Final Report. Continuing efficiency target of 0.25% p.a. recommended by Atkins-Cardno for Sydney Water, instead IPART accepted Sydney Water's revised operating expenditure forecasts submitted in response to IPART's Draft Report.
5. IPART (2016), Review of prices for WaterNSW from 1 July 2016 to 30 June 2020, Final Report.
6. ESCOSA (2016), SA Water Regulatory Determination 2016, Final Determination.
7. IPART (2019b), Review of Central Coast Council's water, sewerage and stormwater prices, Final Report.
8. IPART (2019c), Review of Essential Energy's prices for water and sewerage services in Broken Hill from 1 July 2019, Final Report.
9. Under PREMO method.

5.2 Capital expenditure

4 Has Hunter Water proposed a fair share of risk between the organisation and customers in developing its capital expenditure programs?

The breakdown of Hunter Water's proposed capital program by driver is shown in Figure 8. The vast majority of our proposed expenditure is driven by the need to meet existing mandatory standards, maintain asset and service reliability, and cater for new growth. In developing our proposal, we carefully assessed the risk of non-compliance with regulatory and statutory requirements stemming from the above drivers and the consequences of not investing.

Figure 8 Total proposed capital expenditure, by driver ($millions, $2019-20)



Source: Hunter Water price submission, Technical Paper 4: Capital expenditure, Figure 5.4

Hunter Water's compliance obligations are set by legislative means in a variety of ways. Key compliance areas driving expenditure are:

- Environmental – including protection of the environment by meeting Environment Protection Licence requirements.
- Water quality – involving protection of public health by providing the community with safe and good aesthetic quality drinking and recycled water.
- Operating Licence system performance standards – meeting mandated minimum standards of service for customers in relation to water pressure, water continuity and wastewater overflows.
- Safety legislation – to protect the community and Hunter Water's employees and contractors.

Direct consequences to Hunter Water of non-compliance - for instance legal or regulatory action or penalties - are generally reflective of the risks being posed to the environment, customers and the community. As such, we views risks borne by the organisation and risks borne by customers as corresponding or common - rather than opposing and divided. We do not see our capital expenditure program as a matter of determining who should bear the risk.

We believe that our Board's appetite for risk is set to reflect the expectations of our stakeholders. Our risk appetite is lowest for potential events with the highest level impact, including critical community safety risks, or running out of drinking water. We are more willing to accept a higher level of risk in some other areas. Hunter Water works closely with stakeholders including the EPA and NSW Health to carefully assess risks and required actions.

Customer impacts are front-of-mind when we assess our expenditures. In consideration of customer bill impacts, we are choosing to tolerate a longer timeframe to reduce less critical risks. We must strike the right balance between investing to prevent the realisation of risks and only acting once risks have been realised (i.e. consequences occur). Overinvestment will minimise the risk of non-compliance but may impose unjustifiably higher bills on customers than is necessary. Underinvestment may expose Hunter

Water and the community to excessive risks. We always look for non-capital, low-cost solutions that can reduce risk without requiring significant investment, and we seek to minimise lifecycle costs.

5 Is it appropriate to move from reactive to proactive asset management, given the additional cost?

Hunter Water's asset management approach involves both reactive and proactive asset maintenance - we seek to optimise our maintenance schedules and renewals to achieve required service and compliance outcomes at the minimum lifecycle cost. Getting the balance right between reactive and proactive maintenance helps ensure that service performance is achieved and customer bill impacts are minimised.

IPART's Issues Paper (page 30) implies that Hunter Water has moved from a reactive to proactive asset management framework and this has partly influenced our asset renewals expenditure. This statement is likely due to a misunderstanding, as overall, we have not shifted our focus from reactive to proactive asset maintenance.

Our proposed renewal expenditure is primarily influenced by increased asset deterioration and existing statutory non-compliances that have resulted in increased failures of critical equipment. This involves replacement of assets that have failed or are at near risk of failure that may cause safety, operational or environmental non-compliances and impacts on the community. Hunter Water continues to have a proactive approach to maintenance on critical equipment - this approach is unchanged and not influencing our proposed increase in asset renewal expenditure.

In our price submission, we did describe a shift in maintenance approach.[10] This referred specifically to a change in management strategy for one type of asset – sludge lagoons at our wastewater treatment plants. For these assets, we developed an optimised program of long-cycle preventative maintenance in order to improve asset reliability, optimise the asset life of treatment plant infrastructure and reduce lifecycle asset costs. Historically, we had not emptied sludge lagoons until problems arose and became much more costly to resolve.

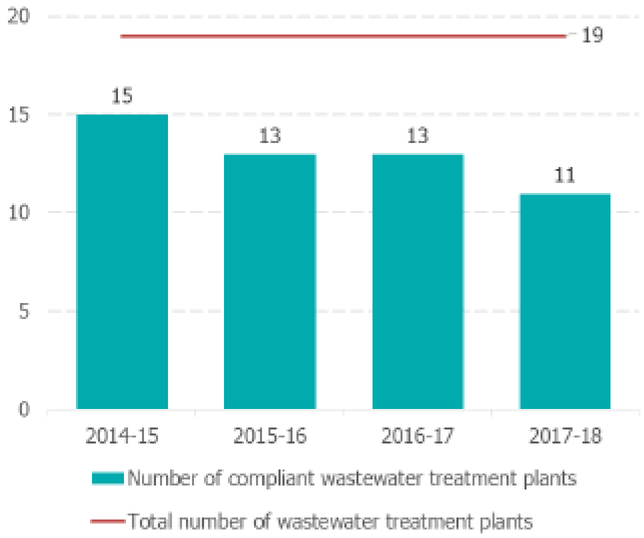
6 How significant was the reduced compliance with Environmental Protection Licences? Does this reflect a systematic or one-off issue?

7 Is the forecast reduction in compliance levels based on reasonable evidence?

Hunter Water considers any non-compliance with a condition in our Environment Protection Licences (EPLs) to be significant. In our price submission, we provided the chart below (Figure 9) showing a declining trend in compliance with EPLs at wastewater treatment plants.

[10] Technical Paper 5 – Operating Expenditure (pages 17, 21 and 22)

Figure 9 Number of compliant wastewater treatment plants each year



The historical compliance performance of our wastewater treatment plants is shown in Figure 5.2.

In 2017-18, 11 treatment plants were compliant. 'Compliant' is defined here as the treatment plant meeting all conditions set out in the EPL. Non-compliances are described in public annual EPL reporting. The non-compliances reported here are for the financial year. As such, they are not aligned with annual EPL reporting which is based on the licence period (typically not financial year).

Source: Hunter Water price submission, Technical Paper 2 – Service levels, Figure 5.2

The reasons for the eight non-compliant wastewater treatment plants in 2017-18 were varied. The compliance performance shown in the chart above does not provide a direct representation of future capital investment requirements. Some of these compliance issues can be described as 'one-off' issues that are not expected to reoccur, and therefore no investment response is required. Other issues could be described as 'systemic' and requiring investment to address.

In many cases, we need to upgrade our wastewater treatment plants in order to ensure we continue to meet existing mandatory standards, rather than rectify existing non-compliances. Compliance risk against these existing mandatory standards is driven by a combination of customer growth, asset condition/deterioration, and outdated treatment technology that is unable to deliver outcomes that meet EPA requirements.

We have also proposed investment to ensure compliance with other obligations including environmental and Operating Licence conditions for our water and wastewater networks, and statutory obligations such as ensuring community and employee safety. Many of these investments are necessary to ensure that existing risks are not realised. In the case of our proposed investment to improve our storage and handling of hazardous chemicals, the investment is driven by a need to rectify systematic risks that were previously realised and resulted in regulatory action and prosecution.

Our capital expenditure is planned and delivered through a robust and mature 'gateway approval process'. The gateway process provides formal review points to document and review key information for a capital project. The process ensures that at each gate, the business case for the proposed investment remains valid, worthy of continuation and that the intended benefits are achieved.

All capital expenditure proposed in our price submission for the next price period has passed through at least gateway 1 and is substantiated by business case documentation and evidence. In developing business cases, we undertake detailed analyses to determine the best investment decision based on robust evidence. This may include site-specific scientific studies on receiving waters and engineering studies of process and equipment performance. We validate theoretical analyses with learnings from actual performance. We seek to optimise our investments and consider financial impacts on our customers by undertaking lifecycle cost analysis and staged upgrades where possible.

8 How much emphasis should be put on benchmarking with other utilities in terms of performance standards and hence required capital expenditure?

Benchmarking between utilities requires considerable care. Many factors influence or constrain comparative utility performance including material differences in the utilities' operating context and environment, geography, and their interpretation of benchmarking indicator definitions. It is entirely possible that a utility could be ranked last in its cohort according to a benchmark indicator, but it may still be inefficient for the utility to invest to improve its comparative performance.

Notwithstanding the above caveats, benchmarking - in particular the National Performance Report (NPR) - is useful for Hunter Water to understand how our performance compares year to year, relative to other utilities. We use benchmarking to help identify areas where our performance may require further internal investigation - benchmarking results are, on their own, not a sufficient rationale for investment.

For example, our recent comparative performance in NPR indicators related to water loss indicated a need for us to investigate further. An internal working group was established to investigate reasons for our performance and to determine what actions were required, if any.

In-depth analysis identified that Hunter Water should invest ($32.8 million during the next pricing period) in reducing water loss. The investment was assessed to be efficient and justified under Hunter Water's Economic Level of Water Conservation methodology. This involved comparing the levelised cost of the water savings (i.e. dollar per kilolitre of saved) against the applicable value of water.

The proposed capital investment to reduce wastewater overflows (by limiting wastewater main breaks and chokes) is essential to meet our compliance obligations and is based on robust analysis of asset condition and performance. NPR benchmarking data helped us to understand our relative performance and the drivers behind that performance.

Hunter Water is not proposing any capital investment in the next pricing period that is driven by an intent to improve our comparative performance relative to other utilities. However, we are proposing to catch-up to other modern businesses and 'meet the market' by delivering several projects including e-billing, self-service functionality and web applications that allow customers to perform tasks with ease and speed. In addition to benefits for customers, we expect there will be savings to Hunter Water from these initiatives once adopted. Due to the relatively lower cost and 'common practice' nature of the proposed expenditure, we consider that customer feedback and survey results are sufficient to justify this investment.

5.3 Output measures

9 Are Hunter Water's proposed new output measures reasonable?

Our capital investment reflects the expenditure needed to meet our legislative and regulatory obligations and deliver required service outcomes within specified levels of risk. Consideration is also given to the impact on customer bills and Hunter Water's financial sustainability in prioritising our expenditure proposal.

Once our proposed capital program is developed, in order to fulfil IPART's reporting requirement, we estimate the physical outputs that correspond with this investment. For our 2019 pricing submission, we did not consider whether changes to the categories or types of outputs determined during IPART's 2015 price review were necessary or appropriate. During each pricing period, Hunter Water does not strive to achieve its set output measures. During a price period, we routinely re-prioritise and reassess investment needs to ensure optimal investment and decisions, as dictated by changing needs and circumstances. The achieved outputs reflect this final investment profile.

We suggest that IPART consider reviewing the role that output measures play in pricing and in price reviews. A potential review could reflect on:

- What is the problem to be solved that drives the need for a requirement?
- What are the objectives to be achieved by the requirement?
- Are outputs, outcomes or other measures most suitable for achieving the objectives?
- Should output/outcome or other measures be linked to a future pricing scheme that rewards or penalises utilities for achieving or failing to achieve the set measures.

The output measures that we proposed in our pricing submission represent measureable outputs for set categories that best correspond to our proposed investment program.

6. New demand forecasts and the demand volatility adjustment

18 Is Hunter Water's demand forecasting model appropriate? Are the inputs used to estimate the model also appropriate?

19 Do you agree with Hunter Water's proposal to use a new climate correction methodology to generate a climate corrected demand starting point?

The Lower Hunter Water Plan (LHWP) sets out how we will ensure there is enough water to supply homes, business and industry in the region, as well as how we will respond to drought conditions. The NSW Government developed the first LHWP in 2014, in collaboration with Hunter Water and with input from other stakeholders and our community.

Hunter Water's existing methodology for forecasting water demand was established in 2012 and developed as part of the 2014 LHWP. The methodology can be separated into two distinct parts:

- Establishing the starting year total demand representing 'average conditions'.
- Forecasting this demand on a disaggregated, sectoral basis (residential, non-residential, non-revenue water and bulk exports) using the integrated supply-demand planning (iSDP) model.

Hunter Water reports annually on the water demand as part of the Monitoring, Evaluation, Reporting and Improvement (MERI) framework with the NSW Department of Planning, Industry and Environment (DPIE). This reporting process reflects on observed demand as compared to the demand forecast in the LHWP.

We are currently working with stakeholders on a major review of the LHWP. The review will consider a wide range of demand management, operating policy and infrastructure options to ensure a resilient and sustainable water system for our region. To inform the new LHWP, we have undertaken a major demand review involving updates to our demand forecasting methodology by:

- Developing a new methodology for determining the starting year demand that incorporates climate-correction (see section 6.2).
- Making updates to the iSDP model that we use to forecast demand by sector from this starting point (see section 6.3).

We have produced an updated demand forecast for water and wastewater using our new methodology (provided in section 6.4). This is currently our best estimate of customer demand – however, the numbers provided are subject to minor variations as described in section 6.1.

6.1 Major demand review process and remaining actions

The DPIE is overseeing the major demand review. DPIE independently engaged Jacobs (a specialist consulting firm) to review and assess Hunter Water's work in three areas:

- Climate-correction methodology
- Forecast of demand using the iSDP model
- Linking of climate-correction to the iSDP

At each stage, Jacobs has provided a separate review report based on inputs (data and reports) provided by Hunter Water. Each of these review reports contained recommendations that were of differing levels of priority and materiality. Jacobs has recently provided their review report for the third stage (mid-October 2019). DPIE have closely overseen Jacobs' review and Hunter Water has worked closely with DPIE on a program for addressing Jacobs' recommendations.

We have addressed all high priority recommendations from stage 1 and 2. Hunter Water is currently negotiating with DPIE on the timing of a program for resolving the stage 3 recommendations. Remaining recommendations that may have an impact on the forecasted demand values are:

- *"Use total water use (including water tank use) as residential water use, rather than metered water use only."* (Recommendation #2).
- *"Collecting relevant evidence and/or academic literature to support the watering behaviour assumptions or undertake pilot study."* (Recommendation #5).

Hunter Water anticipates that recommendation number two will be complete by early November 2019. This change is expected to only have a minor effect on the forecasted demand values - by slightly increasing climate-corrected garden watering demand. An updated demand forecast will be provided to IPART at that time.

Hunter Water believes that recommendation number five is best addressed by the end-use study that we plan to undertake after the current LHWP review (over the next 3-5 years) in the agreed program. Updating end-use behaviours and revising these assumptions does have potential to materially impact future demand forecasts.

6.2 Climate-correction methodology

We have established climate-corrected demand for our current customer base (and their water use behaviours) using a regression model that predicts daily demand based on climatic parameters (temperature, rainfall, evaporation and soil moisture). The regression model chosen is the Water Demand Trend Tracking and Climate Correction Model (DTM). This model and its variants have been used across Australia and internationally to meet similar objectives to this study.

The model consists of the followings steps:

1. A daily time step demand string is used as an input,
2. The fitting of either per capita or per connection demand to climatic variables (including a calculated soil moisture index) over a calibration period (referred to as the baseline period),
3. The extrapolation of the calibrated model over a longer climatic period,
4. The application of trend-tracking, where the departures of the observed demand from those predicted by the baseline model are analysed.

We used a two-year (1 July 2016 to 25 July 2018) calibration period for the regression. This is a period that:

- Contains both wet/cool and hot/dry conditions to minimize the occurrence of prediction outside of weather conditions experienced in the baseline period.
- Represents static customer behaviour with minimal external factors (e.g. pricing change, water restrictions, and enhanced levels of community engagement or education).

The two-year period (shown in Figure 10) is sufficiently short to minimise the potential for customer behaviour change, but sufficiently long to be informed by both wet/cool and hot/dry periods.

In calibrating the model, we made an adjustment by removing non-revenue water and supply to a single major non-residential customer – these 'demands' are climatically independent. The demands had varied significantly during the calibration period and could lead to an over-prediction of demand when extrapolated to a longer climatic sequence.

Rainfall was eventually removed from the selected model due to its poor explanatory power as an influencer on water demand. However, rainfall is still indirectly included in the model as it is a key input to the calculation of the 'soil moisture index'. The output summary regression model output is provided in Table 16.

The calibrated model is then simulated over a longer climatic sequence (1970 to 2019) in order to establish the climate-corrected demand. The concept of climate correction represents the long-term influence of climate on the current level of customer behaviour and our connection profile.

Climate-correction replaces our current methodology of averaging the seven-year estimated residential garden demand to inform the 'average' demand. This has removed risks associated with a short-term understanding of climatic influence on the average. This method also helps determine if intervention measures (e.g. water conservation programs) are effective in influencing customer behaviour, as well as improve our understanding of short term variations in revenue.

Figure 10 A time-sequence of climatic parameters during the calibration period

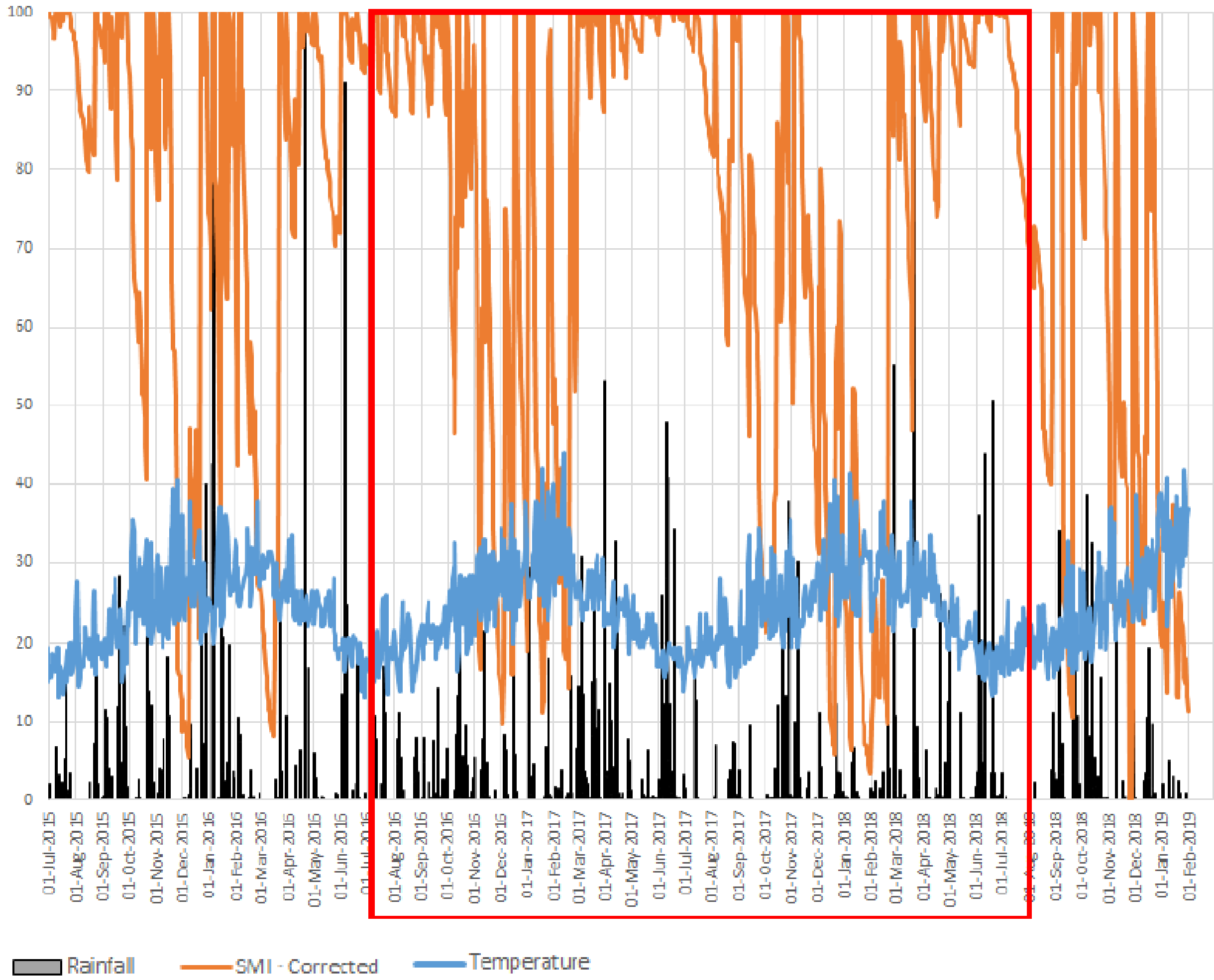


Table 16 Output summary for the calibration of the selected regression

Parameter	Model 2 - Corrected for NRW and Orica
R squared	0.79
Standard Error of Y Estimate	26.4
F Statistic	947.7
Degrees of Freedom	751
Durbin Watson Statistic	1.34

Source: Hunter Water analysis

6.3 Integrated Supply-Demand Planning (iSDP) model

Hunter Water's iSDP model uses a best practice approach of forecasting demand using non-residential sector trends and a residential forecast based on end-use activities. Our iSDP model was developed in 2012 and provides a robust predictive tool to assess the impacts of water efficiency programs.

Jacobs' made recommendations as part of their review of Hunter Water's iSDP model:

- Incorporating the most up-to-date NSW water efficiency stock data for estimation of internal residential demand. This data would be used in lieu of completing a planned end-use study to establish regionally specific data.
- Reviewing assumptions for commercial sector demand to factor in recent downward usage trends.

Hunter Water's updates to the iSDP model address these recommendations.

6.4 Updated demand forecasts

We have linked the climate-correction model with the iSDP to produce an updated demand forecast, provided below in Table 17 (water) and Table 18 (wastewater). These values replace the forecast water and wastewater volumes previously provided in our price submission (Table 4.2 and Table 5.2 of Technical Paper 7: Demand for services).

Table 17 Forecast water sales volumes (including bulk sales), 2020-21 to 2024-25, ML

Sales volume forecast (ML)	2020-21	2021-22	2022-23	2023-24	2024-25
Issues paper update					
Residential	38,855	39,021	39,176	39,344	39,525
Non-residential	19,671	19,842	19,859	19,954	20,064
Bulk water sales	1,849	1,948	2,097	2,247	2,396
Net inter-region transfers with Central Coast Council	0	0	0	0	0
Total	**60,375**	**60,811**	**61,132**	**61,544**	**61,985**
Price proposal					
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**
Variance					
Residential	(304)	(311)	(317)	(323)	(330)
Non-residential	1,672	1,692	1,712	1,732	1,752
Bulk water sales	(22)	0	(0)	0	0
Net inter-region transfers with Central Coast Council	0	0	0	0	0
Total	**1,345**	**1,380**	**1,395**	**1,410**	**1,422**
Overall variance	**2.3%**	**2.3%**	**2.3%**	**2.3%**	**2.3%**

Source: Hunter Water.
Notes: 1. Totals may not add due to rounding.

Table 18 Forecast wastewater discharge volumes, 2020-21 to 2024-25, ML

Discharge volume forecast (ML)	2020-21	2021-22	2022-23	2023-24	2024-25
Issues paper update					
Total discharge	7,052	7,134	7,218	7,301	7,383
Discharge allowance	(892)	(903)	(913)	(924)	(934)
Chargeable discharge volumes	**6,159**	**6,232**	**6,305**	**6,377**	**6,449**
Pricing proposal					
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**
Variance					
Total discharge	1,054	1,087	1,134	1,181	1,227
Discharge allowance	(1)	(4)	(9)	(14)	(19)
Chargeable discharge volumes	**1,053**	**1,083**	**1,125**	**1,167**	**1,208**
Overall variance	**21%**	**21%**	**22%**	**22%**	**23%**

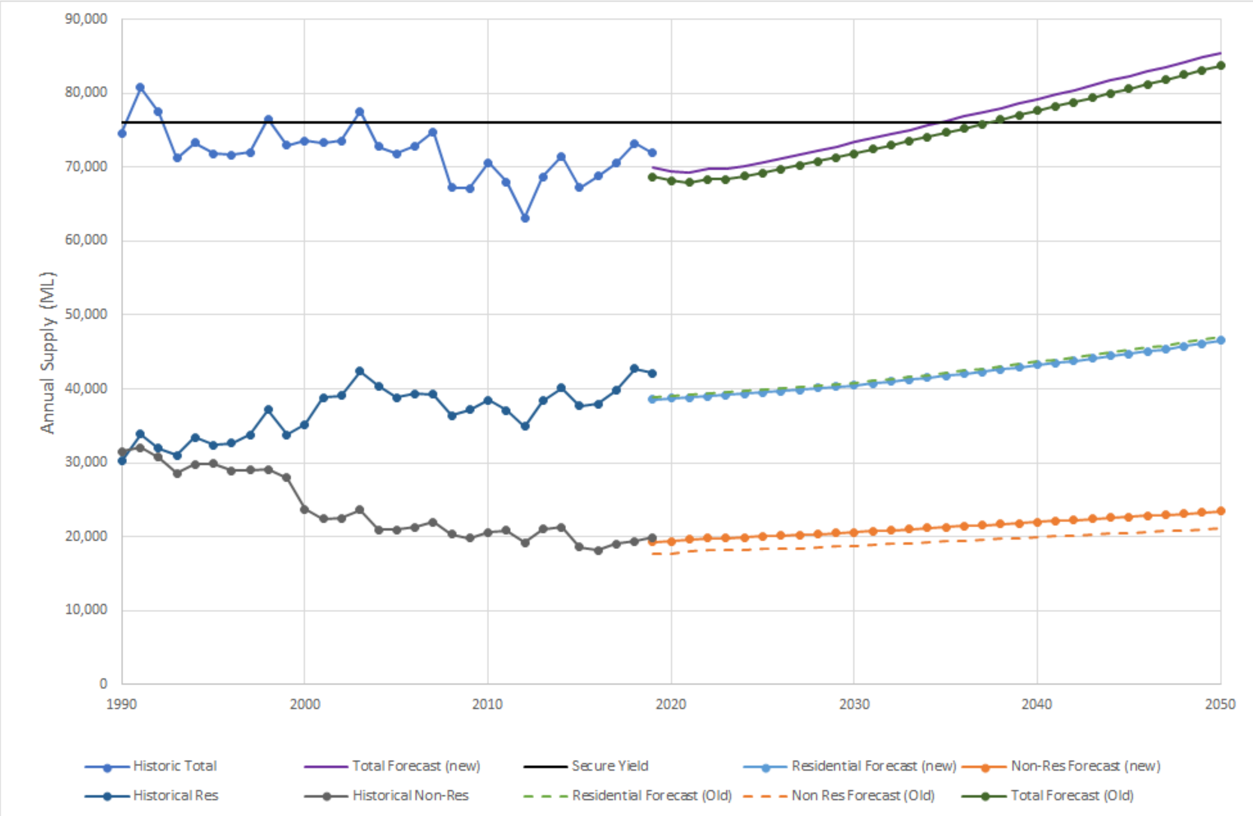
Source: Hunter Water.
Notes:
1. Totals may not add due to rounding.

Reasons for variation

The main difference between the old and new demand forecast methodology is that the new methodology has a more informed view of the influence of climate on average demand. This has led to a slight decrease in the residential forecast.

The previous methodology for estimating non-residential demand did not appropriately account for the climate-dependent aspects of this demand (e.g. sports field irrigation and air-conditioning cooling tower use). Subsequently, the improved approach has led to a material increase in forecast non-residential demand, providing a more accurate representation of average non-residential demand. Figure 11 shows the residential, non-residential and total water demand under the old and new methodology.

Figure 11 Forecast residential, non-residential and total demand using the old and new demand forecast methodology



Source: Hunter Water analysis.

6.5 Impact of higher demand forecast on operating costs

In our submission, we advised that our demand forecast was subject to change based on the major demand review that was underway as part of the LHWP. We understand that IPART will use the updated demand forecast to calculate customer prices, which will lead to lower service charges than previously proposed, because our revenue requirement is now spread over a larger demand base.

The operating expenditure proposal in our pricing submission reflected our previous demand forecast. Supplying more water and treating more wastewater comes at a cost. The Short-Run Marginal Cost (SRMC) of water and wastewater represents the change in short-run total cost for a small change in output. We reported values for the SRMC of water and wastewater in our price submission. [11]

Multiplying the estimated increment between the previous and new demand forecast by the SRMC is an appropriate proxy for estimating the additional (operating) costs to Hunter Water of meeting higher water and wastewater demand. Based on this approach, we provide an estimate of additional operating costs ($2019-20) for water and wastewater in Table 19 and Table 20.

[11] Technical Paper 8 - Pricing of water, wastewater and stormwater services

Table 19 Calculation of additional water operating costs

Water	2020-21	2021-22	2022-23	2023-24	2024-25
Additional water demand (kL)	1,345,000	1,380,000	1,395,000	1,410,000	1,422,000
SRMC ($cents/kL, $2019-20)	11.3	11.3	11.3	11.3	11.3
Additional operating cost ($dollars, $2019-20)	**151,985**	**155,940**	**157,635**	**159,330**	**160,686**

Source: Hunter Water analysis.

Table 20 Calculation of additional wastewater operating costs

Wastewater	2020-21	2021-22	2022-23	2023-24	2024-25
Additional discharge volume (kL)	1,054,000	1,087,000	1,134,000	1,181,000	1,227,000
SRMC ($cents/kL, $2019-20)	19.8	19.8	19.8	19.8	19.8
Additional operating cost ($dollars, $2019-20)	**208,692**	**215,226**	**224,532**	**233,838**	**242,946**

Source: Hunter Water analysis.

6.6 Demand volatility adjustment mechanism

20 Do you agree with our proposed approach to determining whether and how to implement the demand volatility adjustment mechanism for the 2020 Determination?

The Issues Paper states that IPART considers it appropriate to apply a demand volatility adjustment mechanism for larger variations between forecast and actual water sales (plus or minus 5%). This would ensure that prices are cost-reflective over the medium term:

> *If actual consumption is much higher or much lower than forecast, this could result in customers paying too much, or conversely, affect the financeability of the utility.*[12]

IPART Issues Paper sets out a mechanical approach to calculate the demand volatility adjustment:

1. Limit the analysis to the three years of actual water sales data in the current regulatory period (2016-17, 2017-18 and 2018-19). The IPART 2016 Determination sales allowance for the three years was $393.5 million. Hunter Water's actual water sales over the period was $422.6 million – a difference of $29 million (see Table 21).
2. Calculate the revenue raised from water sales over the three years to 30 June 2019 and, if the value is greater than 5%, calculate the increment of revenue above the threshold. Our revenue from water sales for the three year period 2016-17 to 2018-19 was 7.4% or $29 million higher than IPART 2016 Determination allowance. The additional 2.4% in revenue above the 5% demand volatility threshold equates to $9.4 million in total.

[12] IPART Issues Paper, p.74.

3. Calculate the additional efficient operating costs of serving customer demand above the 5% threshold by:

   a. Applying our short-run marginal cost of $0.11/kL to total additional water sales above the IPART 2016 Determination: total additional water sales of 15,700ML. In aggregate, Hunter Water incurred an additional $1.8 million in operating costs to earn an additional $29 million in extra revenue from water sales.

   b. Apportioning these operating costs to the water sales associated with the $9.4 million above the 5% adjustment threshold (i.e. 32% of costs would relate to sales above the 5%). This results in a net adjustment of $600,000 over the three years.

Table 21 Revenue from water sales compared with IPART's forecasts, 2016 to 2019 ($millions, $2019-20)

Revenue from water sales ($2019-20m)	2016-17	2017-18	2018-19	3-year total
IPART 2016 Determination	130.0	131.2	132.3	393.5
HW actual/forecast	131.8	147.1	143.7	422.6
Variance $	1.9	15.8	11.3	29.0
Variance (%)	1.4	12.1	8.6	7.4

Source: Hunter Water analysis.
Note: Actual inflation for the 2018-19 year was 1.6%, as compared to a forecast of 2.2% in the price proposal. This effects the index applied to convert figures to $2019-20. Figures for 2016-17 and 2017-18 have changed to reflect this.

Revenue adjustment

Hunter Water calculates the net revenue adjustment for water sales above the 5% threshold over the three years to 30 June 2019 at $8.8 million (see Table 22).

The Issues Paper outlines IPART's preliminary position of "staggering the revenue adjustment over the regulatory period" in an NPV-neutral manner.

Table 22 Net revenue from water sales compared with IPART's forecasts, 2016 to 2019 ($millions, $2019-20)

Demand volatility adjustment ($2019-20m)	Total
Revenue from water sales above the demand adjustment threshold	9.4
Less: Additional efficient operating costs [1]	(0.6)
Revenue to be taken from the 2020 determination period	8.8

Source: Hunter Water analysis.
Note: Additional efficient operating costs calculated as 15.7GL additional water x $0.11 per kL SRMC x 32% related to those sales above the adjustment threshold.

Water restrictions in 2019-20

Hunter Water implemented stage 1 water restrictions on 16 September 2019 for the first time in 25 years. The relatively hot and dry conditions over the past few years have resulted in declining water storages, currently below 65% of system capacity. The Lower Hunter has experienced fewer rainfall events to replenish supplies and relatively high demand over the period, particularly over summer months (taking into account the revised forecasting methodology).

IPART's 2016 Final Report for the review of Hunter Water's prices suggested that IPART would apply the demand volatility adjustment mechanism over the full four-year regulatory period. Hunter Water accepts IPART's reasoning for applying the mechanism using only those years of actual water sales. Nonetheless, IPART's revised approach excludes the one year in the current regulatory period where water sales are likely to fall well below IPART's 2016 allowance.

Using Hunter Water's new climate correction forecasting methodology, our current forecast water sales for 2019-20 are about $2.0 million below IPART's allowance. This 2019-20 forecast assumes that water restrictions remain in place until the end of February 2019, before a return to more normal conditions and the lifting of restrictions. An alternative scenario where storages do not recovery and level 2 water restrictions are in place during February to June 2020 would see a further fall in water sales: a reduction of $7.5 million. This scenario would largely offset the revenue adjustment for the first three years of the regulatory period.

Revenue adjustments during drought events

22 ***Should we maintain the demand volatility adjustment mechanism for future price determinations?***

Hunter Water has a relatively predictable operating environment during business-as-usual conditions. Connections growth is remarkably stable through time and we are always looking at ways of improving our understanding of customer water use and likely water sales.

Drought events are disruptive. Water utilities face unanticipated and unbudgeted costs at the same time as water sales are falling. The two forces can have a significant financial impacts in any year. IPART's 2016 Determination of Hunter Water's price did not factor in any drought event into costs or revenues during the current regulatory period, as it was not possible to foresee the current circumstances.

Hunter Water would welcome the opportunity to comment further on the interplay of IPART's demand volatility adjustment mechanism and the impact of water restrictions on water sales. Hunter Water has requested an extension of time until 6 November 2019 to comment on the impact of drought on Hunter Water's financial position and credit metrics. This response may look at a separate or modified mechanism to account for any substantial forgone water sales revenue during prolonged periods of water restrictions.

7. Prices for water, wastewater and stormwater services

7.1 Water charges

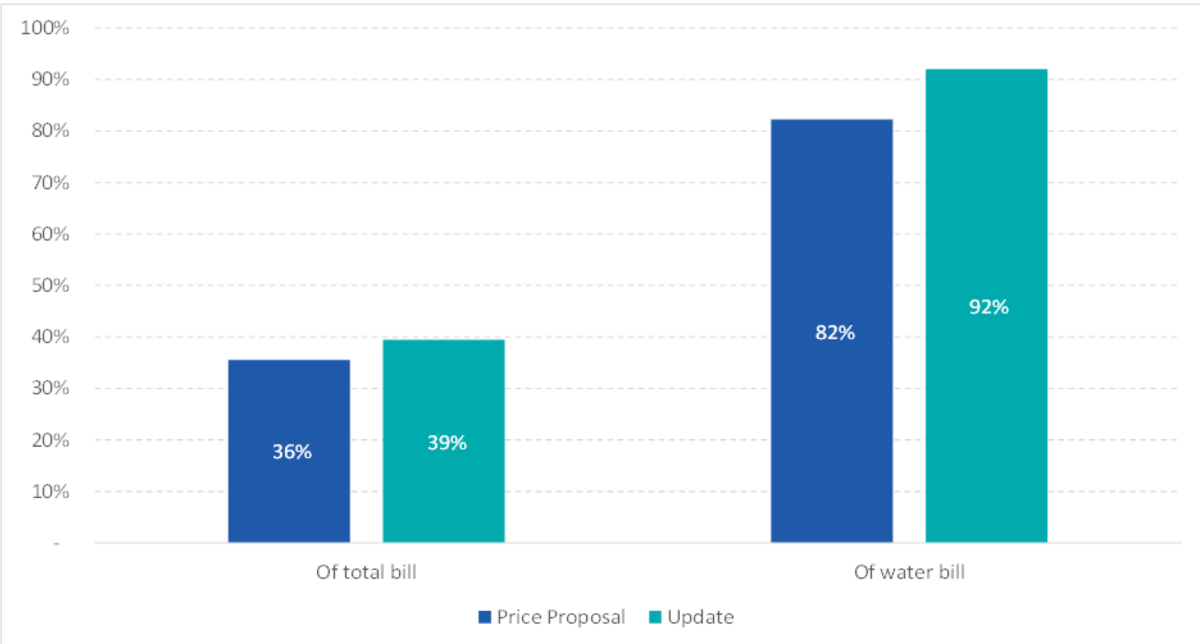
***24** If a revised estimate of the LRMC of water supply for Hunter Water is lower than the current estimate, should the water usage price be reduced over the 2020 determination period to reflect this lower LRMC?*

7.1.1 Mix of service and usage charges

Hunter Water's 2019 Price Submission proposed a water usage price that increased by 1% per year in real terms over five years. Our proposed usage price fell within the feasible range of long-run marginal cost of water estimates, and was consistent with feedback from our residential customer tariff survey.

The reduction in the water revenue requirement and water service charges (see Table 5) alters the proposed mix of fixed and usage charges on typical bills. The movement in the variable component of the bill compared with the pricing proposal is shown in Figure 12, where the variable component on the combined water and wastewater bill increases from 36% to 39% and the variable component of the water only bill increases from 82% to 92%, averaged over five years. By 2024-25, the higher real water usage price makes up 98% of the typical water only bill.

Figure 12 Variable component of the typical water bill and total bill, average over 5 years



IPART's Issues Paper flags a review of our modelling of the long-run marginal cost of water. At the same time, IPART is reviewing the efficiency of our proposed expenditure programs. As the results of this work become clearer, Hunter Water would welcome the opportunity to revisit the balance of usage and service charges with IPART. While there are good reasons to maintain a high variable component on water bills, particularly as a water conservation signal during times of low storages, Hunter Water had not anticipated such a marked fall in the water service charge when preparing the price submission.

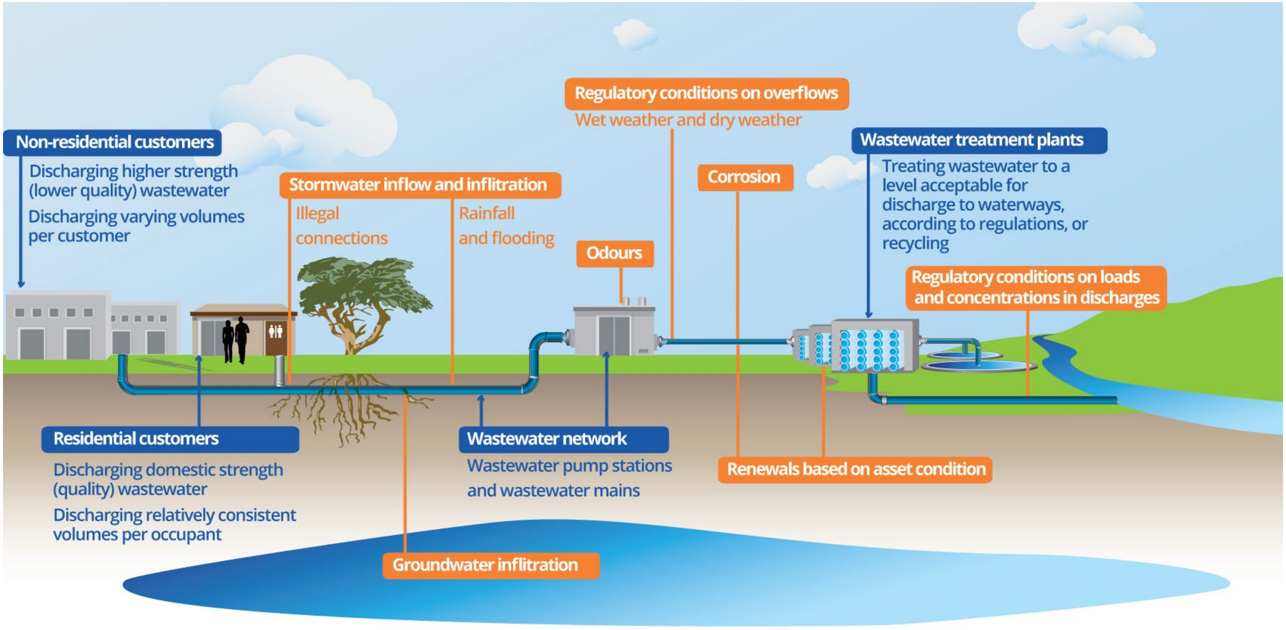
7.2 Wastewater charges

7.2.1 Wastewater capital cost drivers

***29** To what extent does the direct discharge of wastewater from customers affect capital costs, and how should this be taken into account in estimating the LRMC and setting the wastewater usage charge?*

We have considered, at a conceptual level, the extent to which customer discharges affect capital costs both in the transportation network and wastewater treatment plants. This is shown graphically in Figure 13.

Figure 13 Drivers of capital expenditure in wastewater networks and at wastewater treatment plants (shown in orange)



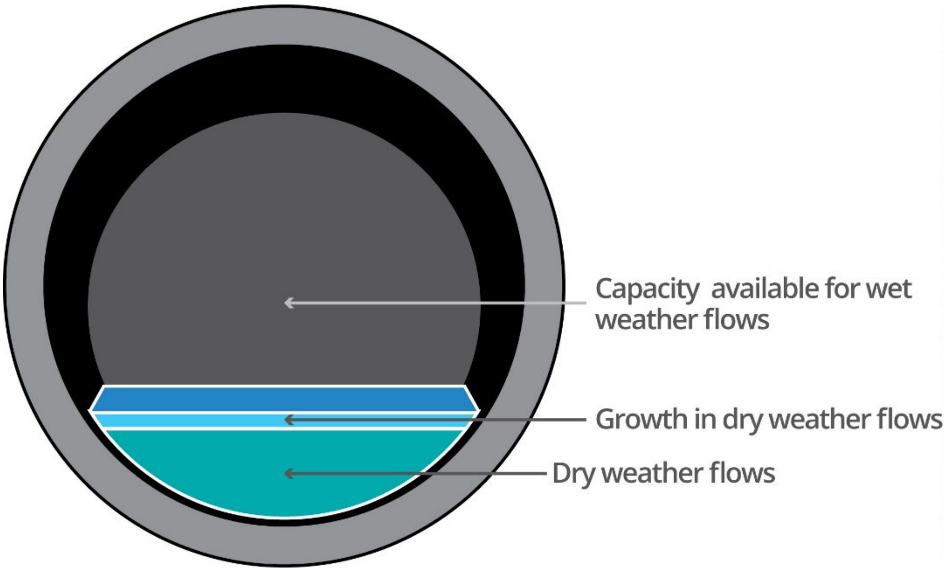
Source: Hunter Water.

In the wastewater transportation network, capital expenditure may be required to:

- Maintain appropriate levels of service continuity (renewing ageing assets that are in poor condition due to many years of use).
- Reduce odours and manage corrosion (e.g. chemical dosing facilities at wastewater pump stations).
- Reduce dry weather overflows, which are generally caused by blockages due to inappropriate disposal of materials, such as wet wipes, and most frequently because of tree root invasion of the pipes. Customer discharge volumes and the slow infiltration of groundwater into fittings or cracked pipes do contribute to dry weather overflows however they are not the main causal factor.
- Reduce wet weather overflows, which are caused by a combination of customer discharge volumes, slow groundwater infiltration into fittings or cracked pipes, rapid stormwater infiltration into the wastewater network, and illegal connections on customers' properties that divert roof runoff into the wastewater system.

The design of wastewater networks is largely based on wet weather flow conditions set by the NSW Environment Protection Authority (EPA). Sizing of pipes for wet weather flows, allows capacity for dry weather flows including some provisions for growth (see Figure 14).

Figure 14 Wastewater main sizing (cross-section)



Source: Hunter Water.

Wastewater treatment investment planning is based on projections of the volume and quality of wastewater discharges from existing customers and projected growth, expressed in terms of the equivalent population served. That is, conversion factors are applied to non-residential customers discharging wastewater that contain more pollutants than residential wastewater.[13] At wastewater treatment plant, capital expenditure may be required to:

- Maintain appropriate levels of service continuity (renewing ageing assets that are in poor condition due to many years of use).
- Treat biosolids to a new standard to meet tightening regulatory requirements or meet beneficial reuse market requirements for disposal. These costs are largely driven by customer discharge quality, in particular chemical contaminant levels.
- Improve the quality of effluent so that it is acceptable for the EPA-approved disposal mechanism. Environment Protection Licences typically contain annual load limits (e.g. kilograms) and concentration limits (e.g. mg/L) across a range of pollutants such as BOD, nutrients (nitrogen and phosphorus), suspended solids, oil and grease, and pathogens. Expenditure is driven by customer discharge volumes and quality but the sensitivity of the nearby receiving waters is also a key determinant. The EPA's promotion of continuous improvement is another determinant. As growth in the wastewater catchment increases customer connections, the increasing volumes of wastewater and increasing pollutant load from customer discharges increases the risk of breaching an EPL condition and eventually triggers an upgrade. Hunter Water ensures the efficiency of its expenditure by taking both asset condition and growth into account in the timing and scope of upgrades.

We estimate that approximately one quarter of the capital expenditure on wastewater networks and treatment plant proposed for 2020-2025 relates to the volume and quality of customers.[14]

[13] Typically expressed in terms of biochemical oxygen demand (BOD).
[14] That is, it has been categorised as growth-related in Hunter Water's AIR/SIR.

Ideally customer discharge volumes and quality should be taken into account in estimating the LRMC of wastewater. Some utilities (e.g. SA Water) have separately estimated the quality-based LRMC and considered setting trade waste prices with reference to this figure. We see economic efficiency merit in this approach, particularly as trade waste customers are likely to be able to influence their discharge quality (e.g. by installing on-site pre-treatment, if it is more cost effective). If quality parameters are accounted for in trade waste prices then wastewater usage charges only need to consider domestic strength wastewater (i.e. volume-based LRMC). As described in section 7.2.2, we are cautious about setting wastewater usage charges with reference to the volume-based LRMC of wastewater in the absence of clarity on which LRMC to apply (system wide average or catchment-based) and how it would be used in practice.

7.2.2 Long-run marginal cost of wastewater

28 Is LRMC a more appropriate basis for setting wastewater usage prices than variable operating cost for Hunter Water?

IPART's Issues Paper describes various ways of using estimates of the LRMC of wastewater to set charges:[15]

1. Identifying locations where recycling or distributed solutions may be cost-effective, in which case the LRMC could inform:
    a) The calculation of avoided costs associated with recycling schemes
    b) The calculation of wholesale prices for wholesale customers
2. Informing retail wastewater prices, particularly wastewater usage charges.

In principle, Hunter Water agrees with IPART that there is merit in us both gaining a better understanding of the LRMC of wastewater in the Lower Hunter. In assessing the appropriateness of using the LRMC of wastewater for retail pricing, it is necessary to clarify which LRMC applies (system wide average or catchment-based) and how it would be used in practice.

We would welcome clarification from IPART on the following:

- Would the allowance for deemed annual usage in the residential wastewater service charge, and the explicit wastewater usage charge for non-residential customers discharging more than the deemed amount both be set with reference to the LRMC?
- What approaches could be taken in setting wastewater usages charges with reference to catchment-specific LRMCs, given the NSW Government's policy of postage stamp pricing?
- If the intention is to *"send important signals to customers – particularly, for example, larger non-residential customers…"*:[16]
    - How would 'larger' be defined? If a water usage or imputed wastewater discharge threshold is used to define eligible/liable non-residential customers, how is such a price structure consistent with IPART's views on differential (location-based) water prices being available only to larger non-residential customers?[17]

[15] P. 89.
[16] P. 89
[17] P. 83. *"In principle, we support cost-reflective prices. However, Hunter Water's discounted price for the specific 19 large customers is not a differential price available to all customers based on their location. If there is no basis for water price discounts or variations to large customers on the basis of cost, our preliminary view is to accept Hunter Water's proposal to phase out its location-based usage prices."*

- To what extent are different types of customers (residential, small to medium non-residential and large non-residential) able to respond to price signals? Is this a short-term or long-term response?

  Evidence from other jurisdictions suggests the benefits of applying a marginal-cost based wastewater usage charge to residential customers are small. For example, in Sapere's report to ESCOSA it notes *"indoor water use is relatively price inelastic (e.g. compared to outdoor use), and there has been an increased use of water efficient fixtures".*[18]

  We are also yet to be convinced that signalling the long-term cost of wastewater service provision is the best way to encourage non-residential development in efficient locations. In the Issues Paper IPART asserts that *"larger non-residential customers … may have discretion in terms of where they locate"*.[19] Prior to establishment of a business, there is already a regulatory pricing mechanism to signal the different costs of providing services to different locations - i.e. developer charges. In 2008, the NSW Government set water, sewerage and stormwater developer charges for Sydney Water and Hunter Water to zero. However, the mechanism still exists and could be reactivated in the future. Once a business is established, the costs of relocation are likely to far exceed the potential saving in wastewater usage charges.

- What are the implications of system-wide or catchment-based wastewater LRMCs for volumetric charges to tankered customers discharging trade wastewater directly at wastewater treatment plants?
- Are there any potential unintended consequences associated with setting wastewater usage prices with regard to system-wide average LRMC or catchment-specific LRMCs? (e.g. illegal discharge, inefficient bypass via tankers or public health considerations)
- Do the potential bill impacts or implications for price stability outweigh the potential benefits of signalling the economically efficient level of discharge?

There is not a clear case for addressing the relationship between wastewater usage charges, SRMC and LRMC during this price review. Moreover, *prima facie*, there are as many methodological considerations for calculating wastewater LRMC(s). The methodology for calculating developer charges raised similar complexities and the latter warranted its own IPART review. A high-level assessment of the key issues and options for developing LRMC for wastewater by Marsden Jacob Associates is provides in Attachment A.

Hunter Water is of the view that the most practical and least distortionary approach would be to maintain the current wastewater usage charge in real or nominal terms for the upcoming price period.

7.3 Residential wastewater charges

32 Is Hunter Water's proposal to not equalise the wastewater service charge for apartments with houses until the next regulatory period (ie, the next determination period commencing 2025-26) reasonable?

Hunter Water's price proposal maintained the transition rate that IPART applies to wastewater service charges for the owners of apartments at 2.5% per year. Currently, the owners of apartments pay 82.5% of the charge that applies to owners of houses. Increasing the charge for owners of apartments by 2.5% per year, it would take seven years to get to a common meter connection charge for the owners of apartment and houses – beyond one regulatory period.

[18] Sapere, 2014, LRMC of SA Water's sewerage services: Report for the Essential Services Commission of South Australia, p. vii.
[19] P. 89.

With the higher proposed wastewater revenue requirement in the 2019 Price Submission, we considered a transition period would help provide price stability and mitigate bill impacts for apartment owners. Feedback from our residential customer tariff survey indicated a preference to maintain the current transition rate, with 40% of survey respondents supporting the 2.5% annual increment.

We have reconsidered the 2.5% annual transition path in the context of the total bill movement for apartment owners under our updated numbers in this submission. There are a few factors at play: the impact of the lower WACC on water and wastewater revenues, a much lower (common) water service charge for all residential customers and the removal of the Environmental Improvement Charge from 2020-21 (a $40 reduction for all wastewater customers).

Under our proposed transition path, the wastewater service charge would increase steadily across the regulatory period for all residential customers, even with the lower wastewater revenue requirement (see Table 23). The wastewater service charge for apartment owners would increase from $538 per year in 2019-20 to $633 in 2014-25.

Table 23 Residential wastewater service charges, 3.2% WACC, $2019-20

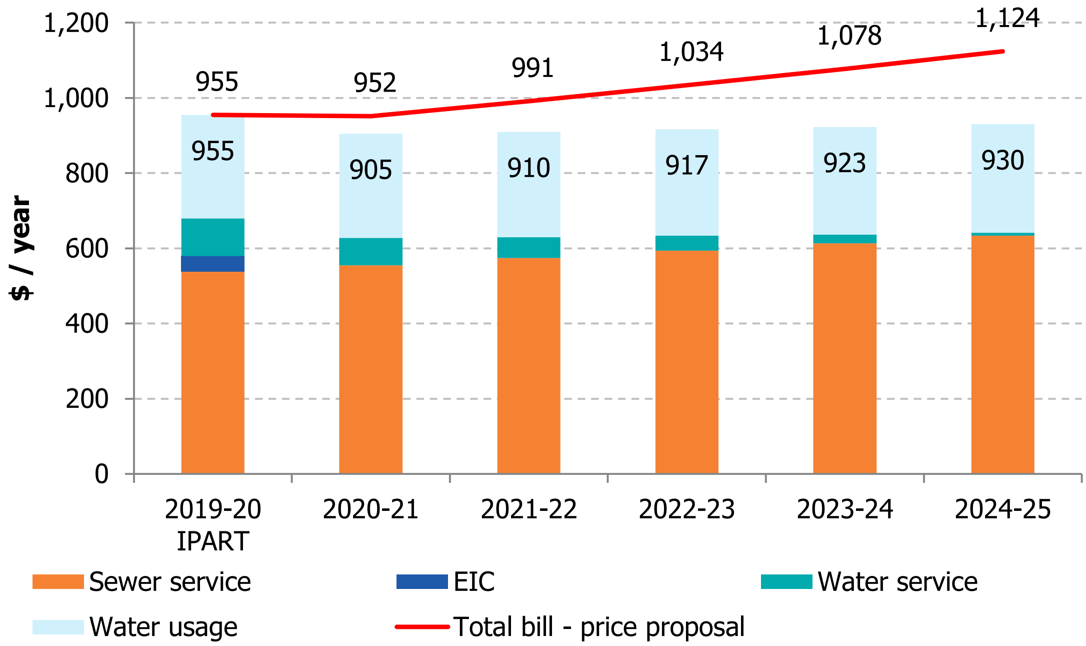
	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Meter Connection Charge [1]						
Houses	571.58	574.91	579.59	585.60	590.13	595.99
Apartments	471.56	488.67	507.14	527.04	545.87	566.19
Deemed usage allowance						
Houses	80.40	78.00	76.80	74.40	73.20	70.80
Apartments	66.33	66.30	67.20	66.96	67.71	67.26
Total wastewater service charge						
Houses	651.98	652.91	656.39	660.00	663.33	666.79
Apartments	537.89	554.97	574.34	594.00	613.58	633.45

Source: Hunter Water analysis.
Notes: 1. Meter connection charge has been multiplied by a deemed discharge factor of 0.75

If we were to retain the 2.5% annual increment, typical total bills for apartment owners would decrease from $955 per year in 2019-20 to $905 in 2020-21 as the EIC rolls off and water service charges come down. Typical bills would then increase annually to $930 per year in 2024-25, driven by the 2.5% adjustment (see Figure 15).

Given there is a real reduction in bills for apartments from 2019-20 onwards, we can see merit in a faster transition period for aligning residential wastewater service charges. Completing the transition in two or three years over the next regulatory period would seem reasonable. This would achieve alignment of residential wastewater service charges within this regulatory period.

Figure 15 Average residential customer bill – apartment with 115kL water consumption



Deemed wastewater discharge allowance

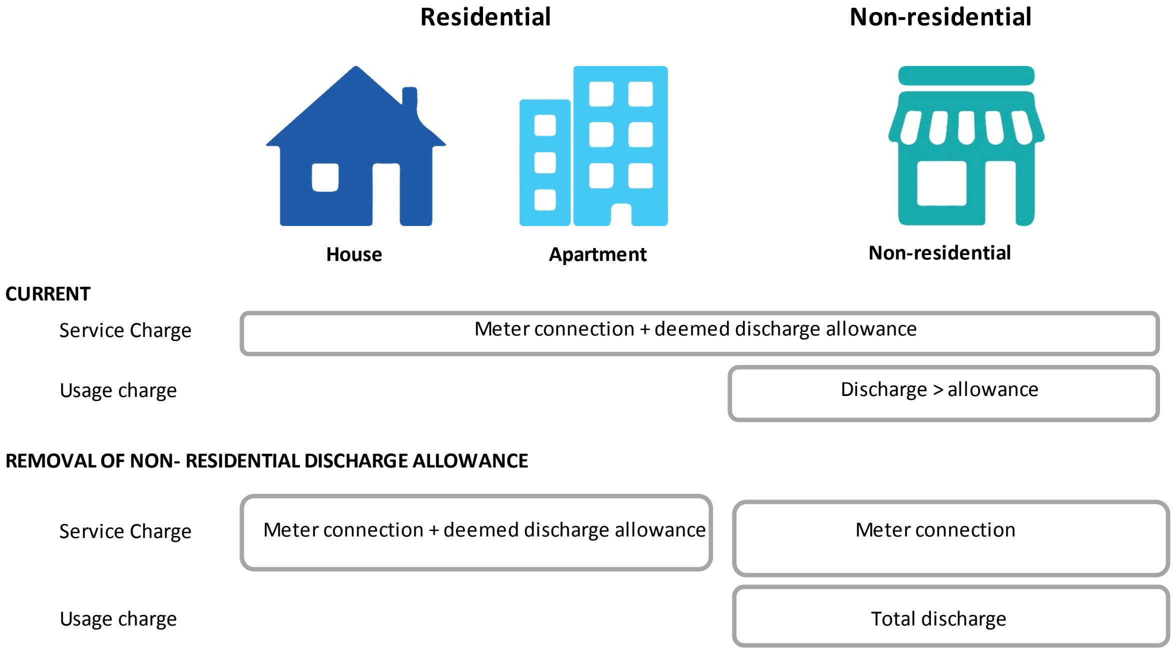
34 Is there value in retaining the deemed discharge allowance for non-residential customers?

Hunter Water's current wastewater service charges contain a deemed discharge allowance for non-residential customers of 120kL per year. This is consistent with our residential wastewater service charge. Non-residential customers are then charged for any discharge above this allowance at the wastewater usage price.

IPART's Issues Paper (page 92) explores the option of completely removing the 120kL deemed discharge allowance for non-residential customers. Under this approach, all non-residential customers would pay a wastewater service charge and a usage charge based on estimates of actual wastewater discharges. As wastewater discharge volumes are not metered, discharge volumes are estimated by applying a sewer discharge factor to metered water consumption. For our non-residential customers, a customer-specific discharge factor is applied based on the type of non-residential customer.

IPART contends that this could simplify bills and be more cost reflective and suggest that the number of non-residential customer consuming less the 120kL deemed allowance per year would be 'rare'. IPART said that it would consider the merits of changing the price structure, taking into account the potential price impacts on customers.

Figure 16 Wastewater service and usage charges for residential and business customers

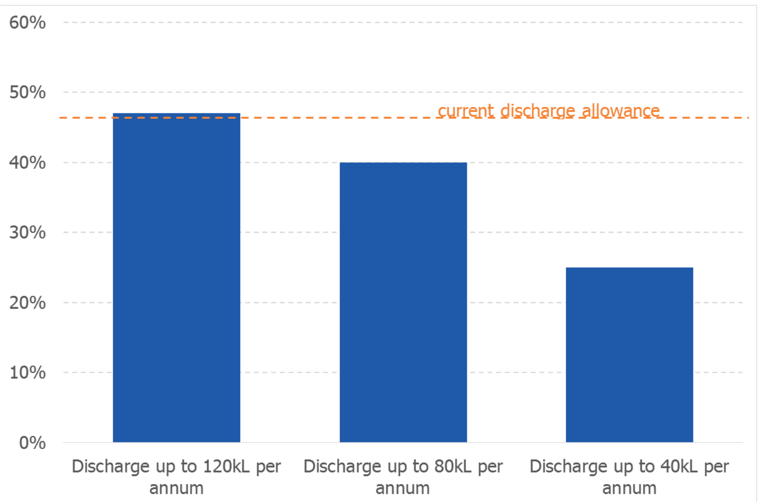


Hunter Water has collated data on wastewater customers to help inform the discussion of wastewater price structures. We have looked at:

1. How current levels of wastewater discharge from our non-residential customers relate to the deemed discharge allowance, and
2. Likely customer impacts from the removal of the non-residential deemed discharge allowance.

Our analysis of non-residential wastewater discharges shows that, on average, nearly half of our non-residential customers discharge less than the 120kL per year allowance (see Figure 17). Advice from our billing team suggests that many small business customers, a significant proportion of non-residential customers, would typically have a small kitchenette and toilet facilities (but no shower or outdoor use).

Figure 17 Proportion of non-residential customers who discharge the deemed allowance



Source: Hunter Water analysis.
Note: Discharge volumes are estimated by applying a sewer discharge factor to metered water consumption.

The removal of 120kL deemed discharge allowance would result in:

- A decrease in revenue recovered for non-residential wastewater discharges (whether charged implicitly through the deemed component of the service charge or explicitly through the usage charge).
- An increase in revenue to be recovered through the meter connection charge, impacting both residential and non-residential customers.

We have modelled the likely movement in wastewater charges assuming the removal of the deemed discharge allowance for non-residential customers. Overall the impact is minor: an annual increase of $200,000 recovered through the meter connection charge. This would increase the meter connection charge by 0.15% in 2020-21.

We show the dollar variance for each residential and non-residential customer category in Table 24. The residential customer category picks up all of the $200,000 movement (rounded), due to the far larger number of customers in this category.

Table 24 Meter connection charge scenario – removal of non-residential discharge allowance

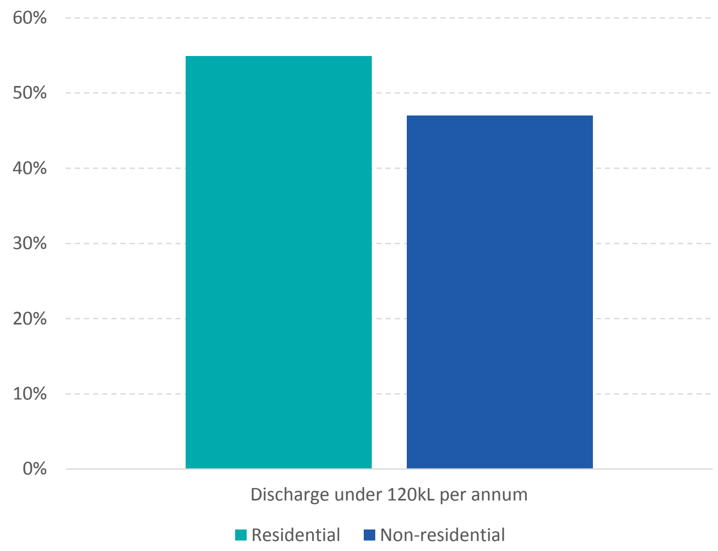
Wastewater meter connection charge	Charge per July 2019 price submission [1]	Charge with no non-residential discharge allowance	Variance	Customers	Change in revenue
2020-21	$2019-20	$2019-20	$2019-20	**no.**	$2019-20m
Residential					
Houses	796.79	797.94	1.16	186,409	0.2
Apartments	677.27	678.25	0.98	46,555	0.0
Non-residential					
20mm	796.79	797.94	1.16	5,807	0.0
25mm	1,244.98	1,246.79	1.81	2,343	0.0
32mm	2,039.77	2,042.73	2.96	446	0.0
40mm	3,187.14	3,191.77	4.63	943	0.0
50mm	4,979.91	4,987.14	7.23	680	0.0
80mm	12,748.58	12,767.09	18.51	99	0.0
100mm	19,919.65	19,948.57	28.92	46	0.0
150mm	44,819.21	44,884.29	65.08	12	0.0

Source: Hunter Water analysis.
Notes: 1. Prior to the application of the sewer discharge factor.

A comparison between deemed discharge levels of our residential and non-residential customers shows that just over half of our residential customers are estimated to discharge less than the 120kL per year allowance (see Figure 18). We approximated residential wastewater discharge volumes by applying the deemed 75% residential discharge factor to metered water consumption.

The removal of the deemed discharge allowance may be slightly more cost reflective for non-residential customers who discharge less than the 120kL deemed allowance. Nonetheless, the change would introduce an inequity between residential and non-residential customers, as residential customers discharging less than 120kL of wastewater would pay the full allowance.

Figure 18 Proportion of customers who are estimated to discharge less than the allowance



Source: Hunter Water analysis.
Note: Discharge volumes are estimated by applying a sewer discharge factor to metered water consumption.

Applying discharge factors to wastewater service charges

35 Should we remove the discharge factor applying to wastewater service charges?

Hunter Water's non-residential customers currently pay a wastewater service charge based on the size of their water meter and a sewer discharge factor (through the meter connection component of the service charge).

IPART's Issues Paper flags a review of the merits of removing the discharge factor applied to residential and non-residential wastewater service charges. IPART notes that it will consider a number of factors, including the potential price impacts on customers.

Hunter Water has analysed the impact on customer charges of removing the discharge factor. This would mean that all non-residential customers with the same sized meter would pay the same service charge regardless of their actual use of water and subsequent discharge. Those customers who discharge a small proportion of their metered water to the sewerage system (such as nurseries) would pay the same service charge as those customers who discharge most, if not all, metered water to the sewerage system (such as hotels or restaurants).

We have analysed the difference between our proposed 2020-21 wastewater meter connection charge (after applying the deemed residential or an average non-residential sewer discharge factor) and a meter connection charge calculated in the absence of sewer discharge factors (see Table 25). Key observations include:

- A minimal impact on residential customers – in the order of $0.50 to $0.60 per customer per year.
- A significant change in the distribution of revenue received from non-residential customers. We would recover less revenue from those customers with a meter size below 40mm and more revenue from those customers with a meter size above 50mm.
- On average, those non-residential customers with the largest meter sizes have the largest price increases.

Table 25 Meter connection charge scenario – removal of discharge factor

Wastewater meter connection charge 2020-21	Average charge per July 2019 price submission [1] $2019-20	Charge with no sewer discharge factor $2019-20	Variance $2019-20	Customers no.	Average discharge factor %
Residential					
Houses	597.59	596.98	(0.61)	186,409	75
Apartments	507.95	507.43	(0.52)	46,555	75
Non-residential					
20mm	642.03	596.98	(45.06)	5,807	81
25mm	1,004.38	932.78	(71.60)	2,343	81
32mm	1,619.64	1,528.27	(91.37)	446	79
40mm	2,422.31	2,387.92	(34.39)	943	76
50mm	3,537.07	3,731.12	194.05	680	71
80mm	8,185.26	9,551.67	1,366.41	99	64
100mm	11,336.78	14,924.49	3,588.37	46	57
150mm	21,871.78	33,580.10	11,708.32	12	49

Source: Hunter Water analysis.
Notes: 1. The base meter connection charges have been multiplied by the relevant discharge factor - deemed 75% for residential and the average discharge factor for each non-residential meter size. This therefore represents the average charge for a non-residential customer who has that meter size.

The average figures in Table 25 do not show the full picture for individual customers. There would be higher variances for those with low and high discharge factors, particular for those customers with the largest meter sizes. We show the minimum and maximum meter connection charge from our pricing proposal in Table 26 compared with our estimates with no sewer discharge factor.

Table 26 Non-residential meter connection charge range

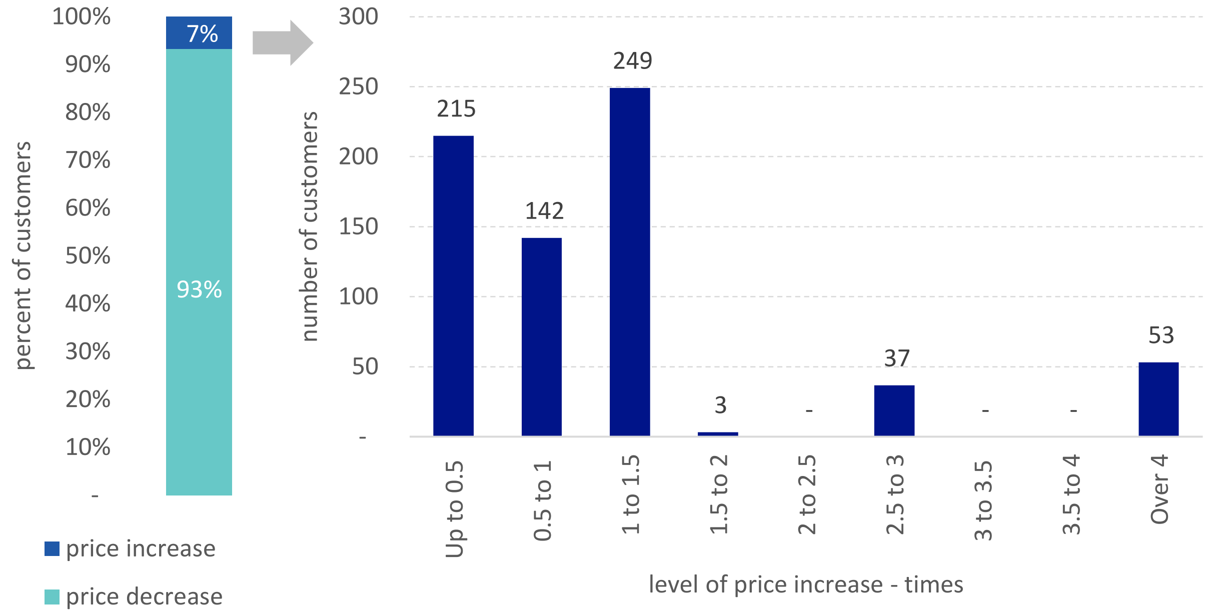
Wastewater meter connection charge	Minimum charge per price submission [1]	Maximum charge per price submission [2]	Charge with no sewer discharge factor
2020-21	$2019-20	$2019-20	$2019-20
20mm	597.59	717.11	596.98
25mm	597.59	1,182.73	932.78
32mm	597.59	1,937.78	1,528.27
40mm	597.59	3,187.14	2,387.92
50mm	597.59	4,979.91	3,731.12
80mm	597.59	12,748.58	9,551.67
100mm	597.59	19,919.65	14,924.49
150mm	597.59	44,819.21	33,580.10

Source: Hunter Water analysis.
Notes:
1. The lower of the residential meter connection charge and the base meter connection charge multiplied by the lowest applicable discharge factor.
2. The base meter connection charge multiplied by the highest applicable discharge factor.

We show the number of non-residential customers impacted by higher meter connection charges if there is no sewer discharge factor adjustment in Figure 19. Most non-residential customers (93 per cent) would pay lower wastewater charges, up to 25% lower, as they have a sewer discharge factor of 75% or higher. Price impacts are more significant for customers who would pay more. Wastewater service charges would increase by more than 50% for about 480 customers, relative to the wastewater charges set out in our pricing proposal.

Hunter Water notes the potential material change in the distribution of revenues and charges across non-residential wastewater customers. While they are a small proportion of the customer base, we would expect enquiries from large customers given the materiality of the bill movement. We would need to explain, in basic terms, the rationale for IPART's change in charging methodology.

Figure 19 Number of non-residential customers impacted by higher prices if sewer discharge factor is removed, and extent of price movement



Hunter Water does not consider that removing the discharge factor would completely solve any one problem related to wastewater service charges. It may result in less cost reflective charges where the water meter is too large or too small to be an accurate proxy for a customers' wastewater discharge volume.

Hunter Water's billing team has identified a number of situations where wastewater service charges based on the water meter size with a discharge factor applied can provide a poor proxy for the capacity taken up in our wastewater system.

Wastewater discharge comes from sources other than metered water usage

Some non-residential customers have a relatively small water meter size and use a relatively small quantity of metered water. However, they have high wastewater discharge volumes that primarily comes from sources other than metered water usage. Examples include:

- Landfill sites (large site area catches rainfall and contaminated leachate/rain drains to sewer).
- Sites with large rainwater tanks (minimal water usage is not reflective of large wastewater discharge).
- Businesses that receive wastewater from other businesses (e.g. via tanker) and then discharge to sewer.

These customers have an effective discharge factor over 100%. In these instances, the water meter size also provides a poor proxy for the capacity that they require in the wastewater system.

Small discharge factor with very high metered water usage

These non-residential customers use a large quantity of metered water. They also discharge a large volume of wastewater to sewer (hundreds of times more volume than the average residential house).

In some cases, the effective discharge factor is very small (<5%) due to the large quantity of water used on-site for various business purposes that is not discharged to sewer. Despite requiring hundreds of times more capacity in our wastewater system than a house, depending on the size of their water meter, they may pay roughly the same wastewater service charges as the owner of a house.

8. Discretionary expenditure

8.1.1 Validity of willingness to pay study

Hunter Water's willingness to pay study on seven discretionary expenditure areas was designed, conducted and finalised in the first half of 2018 (see Technical Paper 1 of our 2019 Price Submission).

We consider that the willingness to pay study was designed and executed in accord with the Productivity Commission report detailing best practice principles for using a contingent valuation approach to stated preference surveys.[20] We explain how our willingness to pay study aligned with each of these principles in Table 27.

Table 27 Alignment between Hunter Water's study and the Productivity Commission's best practice principles for demonstrating willingness to pay

Best practice principle	Hunter Water study
Participants are given the impression that their answers are consequential.	The survey explicitly named Hunter Water as the service provider – a credible organisation within the region. Feedback from the two focus groups validated the impression of consequentiality. The payment vehicle was the water and wastewater bill charged by Hunter Water with prices set by IPART following a review of prudent and efficient costs. Hunter Water's ownership and the price setting process were described within the survey. As the payment vehicle was specific, within the influence of the provider who was also the survey proponent, it was more incentive compatible than a general payment vehicle such as income taxes. Consequentiality was also emphasised in several ways in the survey. For example, the survey invitation and preamble reinforced links between the timing of the survey, survey results and investments to be included in Hunter Water's price submission. The significant majority of respondents believed the survey was consequential. Using questions at the end of the survey, we found that 90% of respondents said yes to the question *"I think my choices will impact on whether the investments Hunter Water asked me about in this survey will happen"*. Almost 100% of respondents were consequential for the question *"I think Hunter Water customers' water bills will increase if Hunter Water makes some or all of the investments"*.
The non-market outcomes (external benefits) in the survey are expressed in terms of outcomes that people directly value.	The potential benefits of investing in each service was described, taking care to avoid normative statements. We described the outcomes using a combination of succinct text and graphics. Service levels were expressed in technical terms and everyday units (e.g. CO_2e, equivalent cars off roads and percentages). Content validity was tested using customer focus groups that trialled the survey using smart mobile electronic devices. This confirmed the survey descriptions and questions were clear, reasonable and unbiased such that respondents were motivated to answer seriously, thoughtfully and truthfully. In follow up questions at the end of the full survey 96% of respondents reported that they understood the outcomes described.

[20] Productivity Commission, 2014, Environmental Policy Analysis: A Guide to Non-Market Valuation, pp 44-47.

There is alignment between the external benefits being valued and the likely investment outcomes. The investment outcomes should not be overly optimistic and major uncertainties should be made clear.	The service levels and costs for each environmental and amenity service were based on forward look maximum and minimum estimates of what could realistically be delivered within the price period. This meant that survey respondents understood that there was some uncertainty in the final level of service that would be provided in the next pricing period, and the final cost to the household. Survey respondents made their preferred choices with this understanding.
The information provided to participants is clear, relevant, easy to understand and objective.	For example, this can be tested with the use of focus groups and pilot surveys, consultation with stakeholders, and inclusion of appropriate maps and diagrams.
Participants are encouraged to consider the context of their decisions	At the end of the willingness to pay questions survey respondents were shown a detailed estimate of the impact of their choices on their future water bill and the levels of service that would be provided during 2020-25. Customers could choose to have their costs presented as a 'representative' household water bill, or they could have their historical water usage information piped in to the survey and reflected in volumetric charges. The fixed (service) charges for wastewater also reflected the customer's premise type (e.g. house or apartment). Where applicable, customers also saw pensioner rebates that applied to their bill. The bill presentation approach ensured considered survey responses. Survey respondents could see the impacts of their choices in the context of their overall future water bill. A feedback loop allowed survey respondents to change the level of discretionary services they wanted until the respondent was comfortable with the bill impacts. The survey also included reminders about budget constraints beyond household water bills.
The valuation questions require participants to make discrete choices.	A status quo level was offered as well as three different increased levels for most services.
Follow-up questions are used to detect potential sources of bias.	Survey comprehension was tested through follow-up questions at the end of the survey. Survey comprehension, understanding and consequentiality were all high. Most respondents (> 90%) reported that they understood the information provided to them in the questionnaire, had enough information to make an informed decision, and said they could make the trade-offs required in the willingness to pay tasks. Statistical evaluation of survey responses found that there were no systematic differences in levels of understanding or hypothetical bias across respondent groups (e.g. age, education, household income).
The sample of people surveyed is representative of the broader customer.	A split sampling regime was used, consisting of (a) a reputable online internet panel (limited to respondents living within postcodes serviced by Hunter Water), and (b) invitations to customers that had provided their contact details. The split sampling approach was used as a type of convergent validity test. Content-neutral invitations were sent to 3,500 households that had provided Hunter Water with their content details. The sample was randomly selected from a larger pool of households such that it reflected the same proportion of each customer segment as the customer base.

	The survey responses were reweighted using rim weighting based on gender, income, age, household type and whether English or another language was spoken at home.[1]
Estimates of average willingness to pay are supplemented with confidence intervals to indicate the precision of the estimates.	A sample population of 680 completed surveys achieves a better than +/- 5% margin of error at a 95% confidence level. Moreover, average willingness to pay was used along with the distribution of responses to inform decision-making. For example, for stormwater channel amenity works, Hunter Water elected to base its proposal on a lower bill increase than the average willingness to pay as this level was acceptable to more respondents.
Population-wide estimates of willingness to pay for external benefits are calculated in a transparent and appropriate way. Potential reasons for non-response to the survey should be identified.	Debriefing questions were used to test for respondents protesting, or who did not believe the survey was consequential. There were very low rates of protest votes. These responses were removed from the analysis to reduce bias risk.
Survey questions are designed and analysed using appropriate statistical techniques. For example, payment levels need to cover the likely range of amounts that customers might be willing to pay, no option should clearly dominate the others, and participants should not be burdened with too many choices.	Participants were not burdened by too many choices, as evidenced by the average completion time of 19 minutes and 93% completion rate. As noted above, focus group testing of the draft survey confirmed the descriptions and questions were clear, reasonable and unbiased such that respondents were motivated to answer seriously, thoughtfully and truthfully.

Source: IPART's Issues Paper, p.62. Hunter Water analysis.
Notes: 1.A description of the weighting process is provided at https://rmsresults.com/2014/06/24/what-is-rim-weighting/

8.1.2 Engagement with non-residential customers is challenging

16 Is there another way to gauge support from non-residential customers whose willingness to pay has not been tested, or should non-residential customers be excluded from paying for the proposed discretionary expenditure?

It is challenging to undertake representative engagement with non-residential customers, especially outside of capital cities. One particular challenge is capturing the attention of the person responsible for water and wastewater bills at each business.

We are aware that other water utilities have engaged with the non-residential sector through focus groups, in-depth interviews and other deliberative-type approaches. Sometimes this has been supplemented through quantitative surveys with samples drawn from reputable online survey panels.

We were concerned that deliberative-type approaches alone would be viewed by IPART as inconsistent with their customer engagement principle of representativeness.[21] IPART has previously disregarded Hunter Water's customer survey results due to a lack of representativeness.[22]

[21] IPART's November 2018 Guidelines for Water Agency Pricing Submissions describes the characteristics of representative surveys.
[22] See IPART, 2013, Hunter Water Corporation's water, sewerage, stormwater drainage and other services: Review of prices from 1 July 2013 to 30 June 2017, Final Report, p 35.

Subsequent customer engagement activities targeting non-residential customers confirmed it is challenging to recruit from this segment. In our customer survey on water and wastewater pricing structures, we achieved a sample of 51 non-residential completions despite concerted effort to recruit through multiple channels (see Table 28).[23] We were unable to achieve a statistically significant sample size from online panels. While online panels can provide samples of up to 300 businesses in Sydney, they were only able to offer a sample of 15 businesses in the Hunter Water operating area.

Table 28 Efforts to achieve non-residential customer survey sample

Channel	Reach	Survey completions
Direct email to a sample of businesses with an address in our area of operations from the Australian Business Register	4,000 emails	49
Advertising on: • Hunter Water's website • Newcastle Herald online • Hunter Business Review online • LinkedIn	More than 1,000 of impressions	2

Source: Hunter Water.

As we look to increasingly engage with customers, to inform our operational and strategic plans, we recognise that it is important to involve non-residential customers. We look forward to working with IPART and other stakeholders to strengthen our approach to achieving input from this segment, whilst adhering to the principles of good practice engagement.

8.1.3 Low response rate does not infer zero willingness to pay

In the absence of relevant, representative, proportionate, objective, clearly communicate and accurate customer engagement results from non-residential customers, it should not be assumed that these customers are unilaterally unwilling to pay for discretionary expenditure. This view is based on three factors:

1. Non-residential customers may be indirect beneficiaries of the discretionary projects.

   For example, improvements to local amenity due to stormwater bank work and landscaping would attract additional visitors, with an associated increase in patronage of local businesses.

2. Non-residential customers may be willing to pay for liveability projects to exhibit corporate social responsibility or as a contribution towards an informal 'social licence to operate'.

3. The results of surveys in other jurisdictions indicates that non-residential customer preferences tend to be similar to residential customer preferences.

   For example, in Sydney Water's price structures online surveys, residential and business customers gave the same main consideration when choosing their preferred mix between fixed and variable charges.[24] Similarly, in City West Water's engagement activity testing customer value the residential customers' optimal service mix at current price and non-residential customers' optimal service mix at current price were very similar (three differences across 18 activities).[25]

[23] See Technical Paper 1, Attachment B of Hunter Water's Price Submission.
[24] Sydney Water Price Submission, Appendix 3C
[25] City West Water, 2018 Price Submission, p. 19-20.

8.1.4 Tariff options

17 Should the costs of discretionary expenditure be recovered though a separate charge on customer bills?

Hunter Water agrees that recovering the costs of discretionary expenditure through a separate charge on customer bills would improve transparency for customers. It also has the benefit of preserving the relevant charging equivalence between residential customer dwellings and 20mm non-residential properties, in the event that IPART decides non-residential customers should be excluded from paying for the proposed discretionary expenditure.

There are several other factors that we recommend IPART also consider:

- The administrative cost would be small should a separate single charge apply covering all proposed discretionary projects (i.e. two projects for Hunter Water). If each project is listed separately, the administrative cost is likely to be higher and the bill may become confusing for customers.
- Administrative complexity and confusion may also arise if the cost of discretionary projects for the upcoming price period are recovered over multiple price periods, with new discretionary projects also added. (e.g. If two projects with costs recovered through prices from 2020 continue their cost recovery post 2025 and, say, an additional two discretionary projects are added from 2025, would the costs be listed as four, two or one separate charges on customer bills?).
- IPART should provide clarity on the cost recovery approach. This would assist water utilities in appropriately designing willingness to pay studies and formulating proposals. Some alternative cost recovery approaches are:
    - Building block model, whereby the discretionary projects is allocated to an existing regulated asset base or has its own asset base with bespoke asset lives. Prices would apply until the assets are fully depreciated.
    - Present value of costs (capex and opex) are recovered over a set period of time (e.g. one or more price periods or a 30 year project outlook period), similar to Hunter Water's Environmental Improvement Charge for backlog sewerage projects.
- IPART should provide clarity on the sharing of costs across customer groups. This would assist water utilities in appropriately designing willingness to pay studies and formulating proposals. The two main alternatives are:
    - Meter-based charges similar to water service charges and wastewater service charges whereby customers with larger meter sizes pay a larger share of costs.
    - A fixed charge per premise, regardless of meter size or customer type (residential/non-residential).

9. Clarifications and corrections

9.1 Electricity budget forecast

Hunter Water's 2019 Price Submission contained two errors related to the cost of electricity over the next regulatory period: a mistake in the calculation of electricity costs at small sites and a mistake in calculating the operating cost savings associated with our solar project.

Hunter Water asks IPART to consider a revised proposal for electricity operating costs over the period 2020-21 to 2024-25, from $62.2 million to $66.9 million, a total of $4.6 million (see Table 29).

Table 29 Revised total electricity operation costs ($2019-20, $million)

Total Energy Submission	FY21	FY22	FY23	FY24	FY25	Total PP2025 Submission
Price Submission July 2019	12.53	12.27	12.5	12.44	12.45	62.24
Adjustments	1.64	0.86	0.72	0.71	0.71	4.64
Revised	**14.17**	**13.13**	**13.26**	**13.16**	**13.16**	**66.88**

Source: Hunter Water analysis.

Small market sites

Hunter Water has projected expenditure for electricity over the 2020 price path period as part of its operating expenditure proposal using forecast electricity prices and consumption on a site-by-site basis across all electricity consuming sites. The electricity costs and savings from capital delivery improvement / efficiency projects are then applied to get to a total electricity cost for the period.

Sites are classified as large-market or small-market accounts based on their nominal annual consumption. Large market sites are those that consume greater than 160 MWh of electricity per year, and small market sites are those that consume less than 160 MWh of electricity per year. Hunter Water has 497 small market accounts that are further classified into different tariff price structures. Tariff structures are allocated based on typical annual consumption volumes, types of meters and types of connection to the electricity network.

Hunter Water engaged a specialist energy management consultant (September 2018) to provide market price forecasts across various small-market tariff price structures over the 2020 price path period. The consultant forecast expected electricity transmission and network charges, environmental charges and wholesale electricity prices.

During the modelling process for small-market sites, an error was made in the transfer of small market tariff data into Hunter Water's electricity expenditure model. This error resulted in a lower calculated value for the total operating cost of electricity in Hunter Water's price submission across each year of the price path. We detected the modelling error during market testing undertaken in July 2019 when preparing for the renewal of Hunter Water's small market contract.

We have undertaken a review of the tariff price data provided by the energy management consultant and the transfer of this data to the electricity forecast model. We have prepared a revised forecast following this review of the model.

The impact of the pricing correction for the small market sites is $3.64 million over the period from 1 July 2020 to 30 June 2025. The total adjustment is shown in Table 1 below.

Table 30 Small sites electricity pricing adjustment ($2019-20, $million)

Small sites	FY21	FY22	FY23	FY24	FY25	Total PP20 submission
Price Submission July 2019	1.08	1.06	1.04	1.03	1.01	5.22
Adjustments	0.77	0.73	0.72	0.72	0.71	3.64
Revised	**1.85**	**1.79**	**1.76**	**1.75**	**1.72**	**8.86**

Source: Hunter Water analysis.

Renewable energy savings

We are planning to reduce our energy costs and associated greenhouse gas emissions through a portfolio of on-site solar PV systems at our treatment and pumping assets. Our pricing proposal included a capital allowance of $16 million for the project and forecast operating cost savings of $1.23 million in each year of the price period (commencing July 2020). This capex estimate was based on the Gateway 1 business case that was the latest available at the time our capex and opex program was locked down for use in our pricing proposal and AIR/SIR.

We have since identified a mistake in our calculation of operating costs for electricity during the next regulatory period. Our operating cost budgets for the pricing proposal had assumed that the $1.23 million annual operating cost saving would start from 1 July 2020. This saving did not align with the original project scope where we assumed the project would be commissioned during 2020-21 ($4 million) and 2021-22 ($12 million).

In June 2019, our Management Investment Committee approved the Gateway 2 business case for onsite renewable energy. This business case includes updated capex costs of $12.1 million (2019-20: $1 million; 2020-21: $8.7 million; 2021-22: $2.5 million).

We are delivering this project as expeditiously as possible, within acceptable risk tolerances. Hunter Water's procurement plan starts with the roll-out of low complexity sites prior to larger, higher complexity sites that may have longer assessment and approval timelines.

We have provided the latest estimates of the likely roll out and commissioning dates for the solar project (see Table 2). All of the solar is in place by the end of June 2022 – and the annual operating cost saving of $1.23 million ($2019-20) for 2022-23 to 2024-25 remains correct. We have made a conservative (optimistic) assumption about the eventual annual operating cost savings ($1.23 million) by not reducing this figure to reflect the lower capital expenditure ($16 million to $12 million).

Our revised estimate of the operating cost savings from the solar project is $355,000 for 2020-21 (no saving Q1, $57,500 in Q2, $110,000 in Q3 and $187,500 in Q4). The operating cost saving is $1.1 million in 2021-22 ($245,000 in Q1, $270,000 in Q2, $287,500 in Q3 and $305,000 in Q4).

Table 31 Renewable energy savings adjustment ($2019-20, $million)

Commissioning date		Estimated solar array size		Portion delivered		Quarterly saving (0.25 times previous quarter annual saving) ($million)
CY Quarter	Year	Total Commissioned (kW)	Cumulative (kW)	%	Annualised saving ($million)	
Q1	2021	1616	1616	19%	**$0.23**	**0**
Q2	2021	1481	3097	36%	**$0.44**	**$0.06**
Q3	2021	2190	5287	61%	**$0.75**	**$0.11**
Q4	2021	1620	6907	80%	**$0.98**	**$0.18**
Q1	2022	690	7597	88%	**$1.08**	**$0.25**
Q2	2022	550	8147	94%	**$1.15**	**$0.27**
Q3	2022	490	8637	100%	**$1.22**	**$0.29**
Q4	2022	42	8679	100%	**$1.23**	**$0.31**

Source: Hunter Water analysis.

Hunter Water's revised annual operating cost saving from the solar project is shown below.

Table 32 Renewable energy adjustment ($2019-20, $million)

Small sites	FY21	FY22	FY23	FY24	FY25	Total PP20 submission
Price Submission 2019	1.23	1.23	1.23	1.23	1.23	6.15
Revised	0.36	1.1	1.23	1.23	1.23	5.15
Adjustment	**0.87**	**0.13**	**0.0**	**0.0**	**0.0**	**1.00**

Source: Hunter Water analysis.

9.2 Quarterly billing

Our 2019 Price Submission detailed our plans to commence quarterly billing from 1 July 2020, replacing the past practice of 4-monthly billing. The Issues Paper states that IPART has no concerns with the 3-montly billing cycle. Research has shown that more frequent bills increase a customer's knowledge of their water use, providing a more regular reminder to conserve water. It allows us to match the billing frequency of our peer utilities.

Our new billing system will go live on 1 March 2020, a few months later than previously planned. We need at least one billing cycle after introducing the new billing system to change billing cycles. As a result, we have delayed the introduction of 3-montly billing until 1 July 2021. This change will reduce operating expenditure, bill preparation and postage costs, by $850,000 in 2020-21, offset in part by an increase in the working capital allowance in the same year.

9.3 Cottage Creek stormwater amenity improvements

Hunter Water is currently undertaking design work for amenity improvements to Lower Cottage Creek, in the Newcastle CBD. Our pricing proposal included estimated total project costs of $2.3 million. We were successful in accessing a Newcastle Port Community Contribution Fund for $450,000. This will reduce Hunter Water's project costs to $1.8 million. We will spend $250,000 on design in the current financial year. Hunter Water would like to clarify that construction works will begin in 2020-21, once adjacent bridge works are complete. Whilst the AIR accompanying our proposal listed the Lower Cottage Creek works separately, we propose that the expenditure for this project in the next price period be included in the proposed $11.3 million for stormwater amenity improvement.[26]

9.4 Trade wastewater pricing

Technical Paper 9 of our price submission ('pricing of other services') set out our proposed trade wastewater charges. We made a minor calculation error that affects several of our load-based high-strength/incentive charges for moderate/major customers, and also fees and charges for tankered wastewater customers. This error involved incorrect application of inflation rates (CPI) to escalate our proposed charges into today's dollar terms ($2019-20). The impact of this error on our proposed charges is small.

We provide the corrected charges (shown in red) in Table 33 and Table 34. All other proposed trade wastewater charges remain as presented in Technical Paper 9 – Pricing of other services.

Table 33 Proposed high-strength and incentive charges for moderate/major customers

	Proposed charges for 2020-21 to 2024-25 ($2019-20 per kilogram)			
Wastewater Treatment Plant	**BOD base charge [3]**	**TSS base charge [3]**	**BOD incentive charge [2]**	**TSS incentive charge [2]**
Cessnock WWTP	1.62	~~0.25~~ 0.26	4.86	~~0.75~~ 0.78
Clarence Town WWTP	4.88	~~4.06~~ 4.07	14.64	~~12.18~~ 12.21
Dora Creek WWTP	1.94	~~0.19~~ 0.18	5.82	~~0.57~~ 0.54
Farley WWTP	~~1.45~~ 1.46	0.36	~~4.35~~ 4.38	1.08
Karuah WWTP	~~7.18~~ 7.19	~~1.23~~ 1.24	~~21.54~~ 21.57	~~3.69~~ 3.72
Toronto WWTP	1.63	~~0.24~~ 0.25	4.89	~~0.72~~ 0.75

Source: New prices previously reported in Hunter Water's price submission, Technical Paper 9 – Pricing of other services, Table 1.4.

[26] Hunter Water AIR/SIR, SIR Capex 3, Table 7.3 R12 and Table 7.4 C74.

Table 34 Proposed volumetric and administration fees for tankered wastewater customers

Charge	2020-21 to 2022-23	2023-24 to 2024-25
Volumetric charges		
Average strength per kL for tankers	~~5.68~~ 5.95	~~8.85~~ 9.20
Administration fees		
Overtime costs for after-hours access to wastewater treatment plant (up to four hours)	~~440.00~~ 451.00	~~440.00~~ 451.00
Hourly rate for after-hours access that is required to extend beyond four hours	~~83.00~~ 85.08	~~83.00~~ 85.08

Source: New prices previously reported in Hunter Water's price submission, Technical Paper 9 – Pricing of other services, Table 1.6 and Table 1.7.

9.5 Stormwater customer numbers

Hunter Water's 2019 Price Submission (Technical Paper 7) reported the discovery of errors in stormwater property counts and subsequent revision of data to form an appropriate basis for forecasting billable stormwater properties over the next price period. IPART's Issues Paper notes *"We will consider the scale and scope of the updated customer information and whether prices should be adjusted for any historical differences".*[27]

Since amending the application of Stormwater Drainage charges to correct the previously identified errors, a small number of enquiries from customers has highlighted potential gaps in the gazetting information held by Hunter Water and used to determine ongoing eligibility for these charges. In order to ensure the previous errors are corrected accurately, and that no new charges are applied in error, further analysis is being undertaken on the gazetting information to ensure it is completely accurate. As a result, the final numbers of impacted customers may change slightly from those previously submitted. The analysis on this information is expected to be completed by 30 November 2019, with updated stormwater customer numbers provided to IPART as soon as possible thereafter.

9.6 Legal drafting of IPART's pricing determinations: multi-premises

IPART's 2016 Determination, *Hunter Water Corporation, Maximum prices for water, sewerage, stormwater drainage and other services from 1 July 2016* sets out a legally binding determination of charges and prices. Hunter Water, under its Operating Licence 2017-2022, must bill customers in accordance with IPART's determinations.

Hunter Water has found that the definitions in the current price determination, and earlier determinations, create some interpretation issues. This is particularly the case for properties defined as a 'multi-premise' where the application of charges depends on whether they have an individual (sub) meters connection or not.

These scenarios can apply in strata developments, community title developments and historical meter networks (typically in rural areas).

[27] IPART (2019), p 72.

To manage these issues, we create multiple billing structures within the data to ensure we apply prices correctly. This is complicated and difficult to maintain from a data integrity perspective as it relies on human interpretation and actions to bill accurately.

Residential community title developments

In 'residential community title developments' there is a disparity in the application of water, wastewater and stormwater drainage charges. Most community developments have direct connections and are treated the same as a 'Torrens title subdivision'. They are charged according to the type of development of each lot (e.g. house).

For community title developments that have one connection supplying multiple lots in the development (whether individually metered or not) it is unclear how IPART intends to charge for water, wastewater and stormwater drainage services. IPART's definitions do not specifically address community title developments. As such, these properties get caught up in IPART's definitions of a multi premise and common/individual meter requirements. We apply a lower charge than the direct connection (i.e. treated like flats & units), whereas the other lots are charged as a freestanding house. This is not equitable given they are developed the same property types, and differ only in their metering arrangements.

Non-residential community title developments

A similar disparity exists with 'non-residential community developments' depending on whether there is a common or individual meters, and the same situation can arise with 'strata titled' developments.

The owners of individually metered properties pay based on the meter size, consistent with other non-residential properties. Where there is a common meter (no individual meters), each property pays a portion of the common meter size charges, with no minimum charge. In some instances, the calculated charge can be a small fraction of the charge that the owner of a freestanding house would pay. Those owners in the common meter scenario have no incentive to install individual meters as this would materially increase service charges.

Taking an actual example, there is a 39 unit non-residential development with a 50 mm common meter. Each property owner pays a portion of the common charge each four-months: water service charge $2.59 per bill (house $33.19); wastewater service charge $16.98 per bill (house $214.65); and stormwater drainage $1.07 per bill (house $26.33).

We consider that IPART should apply a minimum charge for water and wastewater services in these scenarios – that is, where the service charge price falls below the charge for a standalone when it is apportioned.

Definition of 'mixed-multi premises'

IPART's definition of 'mixed multi premises' is unclear. We think this was only ever intended for 'strata developments' where it makes most sense. Hunter Water has a number of 'historical meter networks' where there is a common meter and downstream individual meters servicing various combinations of houses, farms, commercial and industrial properties.

IPART's definition appears to require Hunter Water to charge all properties that share in a mixed metering configuration the same as a flat and unit. In one example, Hunter Water has a major customer that shares a metered network with six freestanding houses. Based on our interpretation of IPART's 2016 Determination, we apply one water service charge equivalent to a flat and unit. This major customer has multiple water meters of various sizes and is a large water user.

Summary

Hunter Water considers that IPART could better define charge practices for specific development types, particularly as they relate to 'mixed multi premises'. We suggest a minimum charge on shared common meter connections (no individual meters) for non-residential properties in any type of development. Similarly, IPART should charge the owners of a freestanding house as a freestanding house, no matter what the development type or metering arrangement. We would welcome the opportunity to discuss these points with IPART prior to the publication of the draft report.

10. Abbreviations

Acronym	Term
AIR	Annual information return
CPI	Consumer price index
DPIE	NSW Department of Planning, Industry and Environment
EIC	Environmental improvement charge
EPA	NSW Environment Protection Authority
FFO	Funds from oeprations
GL	Gigalitres (ie. 1,000,000,000 litres)
GRC	Gross replacement cost
IPART	Independent Pricing and Regulatory Tribunal (NSW)
kL	Kilolitre (ie. 1,000 litres)
LRMC	Long-run marginal cost
mm	millimetres
ML	Megalitres (ie. 1,000,000 litres)
NPV	Net present value
RAB	Regulatory asset base
SIR	Special information return
SRMC	Short-run marginal cost
WACC	Weighted average cost of capital

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economics
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Hunter Water Long run marginal cost of wastewater

Introduction

Hunter Water currently recovers its wastewater costs through wastewater service charges for residential and non-residential customers and a wastewater usage charge for non-residential customers. The variable wastewater charge has been intended to cover short run variable costs such as power, chemicals and waste disposal, consistent with the Independent Pricing and Regulatory Tribunal (IPART) preferred price structures for metropolitan water utilities[1]. The non-residential charge is set on an estimated discharge to the wastewater network imputed based on metered water usage using discharge factors.

IPART's price submission guidance required Hunter Water to consider the option of long run marginal cost (LRMC) pricing for wastewater usage. In response, Hunter Water proposed to continue with its current approach to wastewater pricing, committed to reviewing the LRMC of wastewater, and suggested further work was required to agree on a methodology for calculating the LRMC of wastewater during the next regulatory period.

IPART noted in its issues paper, accurate LRMC estimates can inform Hunter Water's expenditure planning, calculation of avoided cost associated with recycling schemes, and calculation of wholesale price to wholesale customers. While there are limitations in sending price signals, under current postage prices, IPART also sees merit in understanding how LRMC vary across each catchment. IPART in its issues paper on Hunter Water's 2019 price submission also sought comments on the following:

- Is LRMC a more appropriate basis for setting wastewater usage prices than short run variable operating cost for Hunter Water?
- To what extent does the direct discharge of wastewater from customers affect capital costs, and how should this be taken into account in estimating the LRMC and setting the wastewater usage charge?
- Are Hunter Water's proposed wastewater usage charges reasonable?

In this paper we provide a high-level assessment of the key issues and options for developing LRMC for wastewater, including:

- Overview of Hunter Water's current wastewater system
- Methodological issues and data requirements for system-wide and catchment-by-catchment wastewater LRMCs for Hunter Water
- A review of LRMC approaches currently being used for wastewater pricing in other jurisdictions, and implications for Hunter Water.
- How the methodological issues could be addressed and options for consideration in developing wastewater LRMCs for Hunter Water.

[1] IPART, March 2012, Review of price structures for metropolitan water utilities, Water – Final Report, Box 1.1

Hunter Water's wastewater network

Hunter Water's wastewater network comprises 19 wastewater treatment and transfer systems. Most of these wastewater systems have a single wastewater catchment that is not connected to the other wastewater networks; although there are partial interconnections of a few systems including Dora Creek, Toronto, Edgeworth and Belmont systems.

Table 1 provides annual inflows for 2018-19. It shows a significant range of annual inflows to treatment plants from Clarence Town at 55 ML to Burwood Beach at 19,181 ML. The data also shows that 70 per cent of inflows are treated by the 5 largest treatment plants in central Newcastle, Belmont, Burwood Beach, Edgeworth, Shortland and Toronto. Other high growth areas include Morpeth, Farley and Shortland treatment systems.

Table 1: Hunter Water's wastewater treatment plants total annual inflows for 2018-19

WWTP	Total (ML)	Proportion of total inflows	Number of dwelling serviced
Belmont	10,478	16.7%	32,939
Boulder Bay	2,375	3.8%	16,386
Branxton	596	1.0%	2,342
Burwood Beach	19,181	30.6%	71,422
Cessnock	1741	2.8%	9,406
Clarence Town	55	0.1%	377
Dora Creek	1,843	2.9%	8,389
Dungog	224	0.4%	1,101
Edgeworth	5,594	8.9%	20,915
Farley	2,813	4.5%	13,361
Karuah	125	0.2%	529
Kearsley	79	0.1%	345
Kurri Kurri	1,296	2.1%	7,097
Morpeth	4,095	6.5%	21,426
Paxton	128	0.2%	947
Raymond Terrace	2,146	3.4%	8,987
Shortland	5,283	8.4%	11,519
Tanilba Bay	508	0.8%	3,206
Toronto	4,101	6.5%	13,521
Total (ML)	62,662		244,215

Key data requirements for estimating LRMC for wastewater

A number of key inputs are required to develop LRMC estimates for each system within Hunter Water's wastewater network using either the Turvey or Average incremental approach. These include:

- An efficient forecast capital expenditure related to meeting growth over the medium to long-term
- Forecast operating costs to meet existing capacity
- Forecast operating costs related to growth capex over the relevant time horizon
- Forecast base case wastewater volumes for each treatment plant over the assessment period
- Demand increment (Turvey model only) - To calculate an LRMC under the Turvey approach, a demand/wastewater volume increment needs to be selected which is large enough to cause a shift in augmentation timing, and also provides a stable estimate across different demand and supply scenarios.[2]

The following outlines the inputs Hunter Water currently has available and whether additional data would be required to develop LRMC estimates for each catchment and for its overall wastewater network.

Table 2: Current status of Hunter Water key inputs for estimating wastewater LRMC

Key LRMC inputs	Current inputs available
Forecast capital expenditure related to new augmentations over the medium to long-term	• Hunter Water currently develops 15-year capital projections to meet future requirements for each of its 19 major wastewater systems. This includes forecast upgrades for both treatment plants and networks. • Growth driven capex for each treatment plant is based on projected flow and loads, while growth-related network augmentations are based on projected flow only. • Design flow that drives capital expenditure at each treatment plant and for each transfer network is based on wet weather containment standards. This standard differs for each catchment and treatment plant and network. For treatment plants, planning approvals and Environment Protection Licences (EPL) generally require sizing of plant processes to meet a multiple of average dry weather flows (ADWF) (e.g. 2.5 x ADWF or 3 x ADWF). For sewerage networks, some assets may be required to contain a 1 in 3-month wet weather event, while others may require a 1 in 6-month wet weather event. • Growth capex for each treatment plant is also driven by pollutant load limits at each treatment plant set by EPL requirements • Each system's treatment plant and transfer network have different levels of spare capacity and therefore the timing of growth-related capex differs across each component. In some new growth area catchments such as Clarence Town (recently completed backlog sewer area), no significant additional growth is forecast and therefore the wastewater the treatment plant would not require upgrading in the foreseeable future • Where augmentations are driven by multiple objectives, Hunter Water makes assumptions on the cost allocation. The allocation segments the forecast to link it to growth or compliance drivers. • The current estimation of capital expenditure forecast is based on known regulatory requirements for environmental and health standards. Forecast costs may change as these regulations are revised.

[2] NERA Economic Consulting, An Economic Framework for Estimating Long Run Marginal Cost in the Victorian Water Industry – Report for the Smart Water Fund, 2012, p.29.

	• Hunter Water could consider whether longer-term high-level capital expenditure forecasts could also be developed for the purpose of generating LRMC to align with 30-year demand projections.
Forecast annual operating costs to meet existing capacity	• Hunter Water has projected ongoing fixed and variable costs for each wastewater catchment. Fixed costs include labour to operate the treatment plant. Variable costs include chemicals and electricity that vary with flow and load
Forecast operating costs related to growth capex over the relevant time horizon	• Hunter Water develops high-level estimates for operating expenditure driven by with growth related infrastructure. These estimates would need to be reviewed and extended for the purposes of generating reasonable LRMC estimates.
Forecast base case wastewater volumes for each treatment plant over the assessment period	• Hunter Water currently forecasts wastewater flows and loads over a 30-year time horizon for each catchment. These forecasts would be suitable inputs for estimating LRMCs for each catchment • Growth in flow and loads are generally consistent with population projections in each system • These forecasts could also be used to generate high level 30-year growth expenditure forecasts for the purposes of developing LRMCs over a 30-year assessment period.
Demand increment and impact on augmentation timing (Turvey approach only)	• For the Turvey approach, Hunter Water would need to review wastewater inflow load and flow scenarios to establish a realistic permanent change in flow and load that are material enough to change the timing of augmentations • Hunter Water would also need to assess the impact of changing flows and loads on the timing of augmentations, given a number of other factors may drive the augmentation in each system.

Approach to wastewater usage pricing in other jurisdictions

To gain an understanding of how LRMC of wastewater could be developed and incorporated into wastewater pricing, we undertook a high-level review of approaches to wastewater usage pricing in other jurisdictions.

Table 3: Approach to wastewater usage pricing in other jurisdictions

Jurisdictions	Approach to wastewater pricing

Melbourne Water bulk wastewater charges to City West Water, South East Water and Yarra Valley Water	• Melbourne Water treats the large majority of Melbourne's wastewater at two treatment plants, Eastern and Western treatment plants. The catchments of each plant are separately defined areas of Melbourne, with about 10 per cent of total volumes divertible between the two plants.
	• Melbourne Water currently charges bulk treatment variable costs for Eastern and Western Treatment Plants to the metropolitan retail businesses based on LRMC at the treatment plant for the following key components:
	    o All flow volumes
	    o Trade waste – Biochemical oxygen demand (BOD) load volumes
	    o Trade waste – Suspended solids
	    o Trade waste – Total kjeldahl nitrogen.

- Load-based LRMCs are calculated using total sewage loads (not just trade waste) as treatment plant capacity is a function of total loads. However, the variable (LRMC) costs are only applied to the trade waste customer loads from the Retailers and not the total plant loads. The rationale is that it is only the trade waste dischargers that are able to influence/reduce their discharges based on price signals.
- Wastewater network transfer charges are based on the short run marginal cost (SRMC) for the Eastern and Western system. This is on the basis that there is potential for variation in growth across the network there is potential for significant change in the long-term cost drivers across the network.
- The shortfall between total revenue requirement and variable cost recovery is recovered through fixed (availability) charges.
- To develop LRMC estimates, Melbourne Water develops 20-year growth capital programs at each treatment plant for each component. Melbourne Water also assess the interdependencies of each component in determining each capital program. For example, some upgrades may deliver multiple benefits, and therefore may delay the need for the next augmentation of that component.
- Baseline and new fixed and variable operating expenditure is developed based on key planning assumptions for each growth augmentation and is incorporated into the LRMC analysis.
- Flow and load forecasts are developed by retail water utilities (CWW, SEW, YVW) based on Victorian Government Victoria in the Future population projections.
- Melbourne Water monitors total loads received at the treatment plants. These 'actuals' are used as the top down number to refine the bottom-up sewage load forecasts. Discrepancies between actual loads observed at the plants and the forecasts are solved by balancing items which can be positive and negative.
- Melbourne Water uses the Turvey approach to calculate LRMCs on the basis that they are looking at lumpy capital programs at each treatment plant. The demand increment is selected based on material change in the timing of future augmentations. For example, a shift of a major project in/out of the price determination period (5 years).
- LRMCs are estimated for each parameter assuming that the demand increment applies to the treatable parameter alone (e.g. BOD increment or flow increment), not to the other parameters. Thus, each parameter requires planning of a unique treatment train augmentation for that specific scenario. The demand increment typically changes the timing of the augmentation, but not the augmentation infrastructure sequence.
- This approach to pricing was introduced in 2016. During the 2016 price review process, Melbourne Water recognised the need to ensure that the estimation process was better aligned with the actual infrastructure planning process. Since the 2016 price review, in order to improve the forecasting process, Melbourne Water developed an improved platform for wastewater characteristics forecasting simulation with retailers, which took approximately 18 months. In addition, planning and pricing departments work closely together in the LRMC development.

	• LRMCs used for pricing purposes are a point in time estimate and are updated every 5 years for the resetting of prices.[3]
City West Water, South East Water and Yarra Valley Water	• Metropolitan Melbourne retail water businesses currently charge variable wastewater prices to residential and non-residential customers. Remaining wastewater costs are recovered through fixed charges. • As wastewater is not metered, variable charges are based on water usage by applying a discharge factor and vary according to the type of customer. • For residential customers the discharge factor ranges between 75 per cent for houses to 85 per cent for apartments. • For non-residential customers each customer is classified into an industry type and the discharge factor is based on expected outdoor usage. • To be consistent with ESC's pricing principles, these charges are to have regard to LRMC or SRMC, while also balancing customer preference for high variability in their water and wastewater bills.
Unity Water	• Unity Water currently charges a residential and non-residential wastewater usage price across each of its three Council areas. • All wastewater usage charges are the same across each Council. • The wastewater usage charge is currently equal to the tier 1 water usage price.
Gold Coast Council	• Currently charges non-residential customers a volumetric charge for wastewater. • Charges are only applied to non-residential customers which have usage greater than a domestic level of consumption. • The current wastewater usage charge was set a number of years ago and has had CPI applied.
Sydney Water	• Wastewater usage prices currently set based on SRMC. Sydney Water proposed to maintain this approach in its 2019 price submission, noting this approach is also being considered as part of IPART's current price review for Sydney Water.
Central Coast Council	• Central Coast Council applies a wastewater usage charge to residential and non-residential customers. • IPART in its recent decision set a wastewater usage charge above SRMC with the aim of incorporating LRMC into future wastewater usage pricing. • Uniform residential and non-residential wastewater prices are applied to all Central Coast Council customers, rather than location specific charges.

[3] Based on interviews with Melbourne Water staff who have developed Melbourne Water's sewerage LRMCs, October 2019

Key considerations in developing and applying wastewater LRMCs for Hunter Water

Based on our assessment of current status of Hunter Water's wastewater augmentation planning and demand forecasting, as well as the approaches to variable wastewater pricing in other jurisdictions, the following provides some key considerations for Hunter Water in developing wastewater LRMCs:

- The need to define what the LRMC is being estimated for at each catchment. This being whether separate LRMCs are developed for:
    - Flow at the treatment plants
    - Loads at the treatment plants
    - Flow on the networks.
- Whether it develops system wide LRMC estimates as well as catchment-based LRMCs. A system-based approach would require an aggregation of individual catchments as each have different drivers of growth expenditure.
- Review of current 15-year growth-related capital forecasts and allocation of growth expenditure driven by flow and load for the purpose of developing LRMC estimates across each system
- Assessment period – given 30-year estimates are developed for wastewater flows, Hunter Water would need to assess whether longer-term high-level expenditure forecasts could also be developed to align with demand projections. Scenarios could also be tested for shorter or longer timeframes.
- Review of fixed and variable operating expenditure associated with each new augmentation identified for each system
- Review of forecast flows and loads for each catchment, including development of high and low scenarios.
- LRMC methodology – whether the Turvey or the Average Incremental Cost approaches or both should be developed. We note that Melbourne Water develop its LRMC at each of its treatment plants based on the Turvey approach, as they generally require large one-off upgrades. This is consistent with NERA's 2012 report which recommends that for expenditure profiles with a lumpy profile of capital expenditure, LRMC should be estimated using the Turvey approach[4]. However, the preferred approach may depend on the profile of augmentations Hunter Water includes for each component of the sewerage system
- Assessment of plausible demand increments in flow and load that are material enough to shift the timing of augmentations. This would require an assessment separately identifying the impact of changes in flow and the impact of individual pollutant loads has on the timing of future augmentations for each system
- Hunter Water could initially focus the development of LRMCs for its major wastewater systems, and those where major augmentations have been identified as part of its 15-year capex projections
- We note Melbourne Water developed its current approach to basing wastewater treatment plant pricing on LRMC over approximately a three-year period. While it is a larger network, given that Hunter Water has 19 individual wastewater systems and different cost drivers across each network, a similar timeframe should be considered for Hunter Water.

Taking into account the above points, we consider it is possible for Hunter Water to develop individual LRMCs for each of its wastewater systems during the next regulatory period. We consider these estimates would be beneficial for internal business planning purposes, and for understanding avoided costs associated with recycled water schemes.

Once LRMCs for each wastewater system have been established, Hunter Water could undertake an assessment, as part of its next price submission process, as to whether incorporating LRMCs into wastewater usage pricing would be an effective way of sending price signals of long run wastewater costs to customers. As part of this assessment, Hunter Water would need to consider:

- Whether location based or system wide LRMCs to wastewater usage pricing could be applied

[4] NERA Economic Consulting, 2012, p.26

- Which elements of the wastewater system including load and flow at the treatment plant as well as flow in each transfer network would be incorporated into wastewater usage pricing. It may be preferable to incorporate load based LRMCs into trade waste pricing, which is consistent with Melbourne Water's approach to trade waste pollutant charging
- Customer preferences for higher variable charges
- Customer impacts and potential need for transitioning in price changes over time
- Whether signalling long run wastewater costs may be more effective through other pricing options such as developer charges or through modifying fixed wastewater charges.