Hunter Water expenditure review

A review of capital and operating expenditure and demand forecasts

A Final Report prepared for the Independent Pricing and Regulatory Tribunal

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Executive summary

Overview

Aither was engaged by the New South Wales Independent Pricing and Regulatory Tribunal (IPART) to undertake a detailed assessment of demand and expenditure forecasts for Hunter Water's 2020 Pricing Determination. The objectives for this review were to undertake:

- a strategic review of the utility's long-term investment plans and asset management systems and practices for its water and sewerage business
- a detailed review of the utility's past and proposed operating and capital expenditures
- a review of performance against past output measures and to propose new output measures for the next determination period if appropriate
- a review of the reasonableness of the utility's long-term growth projections
- a review of the reasonableness of the utility's demand and customer connection forecasts over the 2020 determination period.

The review of Hunter Water's past and forecast capital and operating expenditure has been based on information provided by Hunter Water and interviews conducted with its staff. Hunter Water's proposed average annual operating expenditure for the next period is $157.6 million, representing an increase on the average actual expenditure from the current regulatory period of nearly $10 million. For capital expenditure, Hunter Water is proposing an average spend of $174.3 million, representing an increase on the average actual expenditure from the current regulatory period of just over $50 million. As part of this review, Aither also assessed Hunter Water's forecast demand over the upcoming regulatory period.

Strategic review

The main findings of our review of Hunter Water's strategic planning are as follows:

- Hunter Water's governance, strategic and investment planning, risk and asset management arrangements appear robust and appropriate.
- Although these arrangements are underpinned by sound foundations, Hunter Water has also identified and responded to a number of improvement opportunities during the period, including the development of a four-year strategy, implementation of a more substantive Enterprise Risk Management Framework, and refinements to cost estimating processes.
- Hunter Water aspired to develop a long-term plan in parallel, which has not eventuated. Although the 2017+3 Strategy provides a strategic direction and a substantive list of initiatives, these will be given greater clarity by the completion of a long-term plan. Hunter Water maintains this will be more appropriate once the outcomes of key inputs – including their price determination and key strategies such as the Biosolids Strategy and Lower Hunter Water Plan – are known, as well as a permanent Managing Director appointed.
- The implementation of the ERM is indicative of Hunter Water's maturing approach to risk management. The framework appears appropriate and robust. However, when observing the application of the ERM to specific projects, Aither identified some instances where the risk assessment was not completely transparent, relied upon subjective assessment and adopted a

conservative risk position that contributed to driving investment. There is an opportunity for Hunter Water to continue to adopt greater sophistication in its consideration of risk – including more objective methodologies – to drive more efficient outcomes in future.

- Hunter Water has recently reviewed and improved its cost estimation processes. The need for these improvements has been observed in the course of Aither's review. Hunter Water is still finalising the improvements to its processes, so the success of these changes in addressing some deficiencies in cost estimation will be observable over time.

As part of this strategic review, Aither reviewed the output measures proposed by Hunter Water for the upcoming regulatory period. It was noted that without defined outcomes it was difficult to determine the appropriateness of the output measures in achieving successful outcomes for customers. In the absence of these defined outcomes, Aither proposed to maintain the proposed output measures and targets from Hunter Water, with two additional measures (related to discretionary projects). The additional measures are similarly based on outputs and designed to provide a 'safeguard' to customers that Hunter Water will undertake the level of investment that it is proposing.

Capital expenditure

Summary findings

Aither has identified that Hunter Water's proposed capital expenditure for the upcoming regulatory period is generally efficient, with some recommended adjustments to the forecasts. Additionally, the review has found a minor adjustment is also required to Hunter Water's 2019-20 estimated capital expenditure for it to be deemed efficient.

As part of this review Aither has considered various factors relating to the efficiency of Hunter Water's capital delivery, including asset management, strategic planning, governance and risk, as well as part of the review of individual projects and programs. In general, Hunter Water's systems and processes have been assessed as robust and conducive to efficient investment decision making. Aither has made recommendations where specific issues have been identified in relation to projects or programs.

The only broader efficiency issue that has been identified relates to the process of project scoping and decision-making where there is a material dependency on subjective risk assessment. Aither has identified that in some cases, a risk averse approach to project scoping and decision-making has been adopted that has resulted in a higher-cost option being preferred. This approach may inappropriately shift risk away from Hunter Water and onto its customer base via higher pricing to recover the costs associated with the higher-cost option.

In relation to capital project delivery, Aither found that Hunter Water is generally considered to have good practices that align with standard industry approaches. It has undertaken internal reviews to ensure that outcomes for ongoing programs align with the benchmark of comparable utilities in the water industry.

Hunter Water adopts project delivery practices that are considered reasonable to achieve optimal outcomes for cost, typically commensurate with risk. Examples of this include:

- using consultants for concept development and pre-tender cost estimates that are independent of contractors appointed for project delivery
- the use of design and construct contracts for major treatment works

- packaging similar works across multiple facilities into larger programs, enabling economies of scale on material purchases and project management, but leveraging lower-margin, smaller subcontractors for installation
- separate design and construct packages to optimise risk allowances in construction tenders.

Review of past and estimated capital expenditure for the current regulatory period

From our review of the 2015-16 to 2019-20 period capital expenditure, Aither considered most of the expenditure to be efficient. It was noted that Hunter Water's asset performance generally met required service standards during the current period, however Hunter Water noted that the period also required them to respond more quickly to general deterioration in the condition of ageing assets across their systems.

Aither's recommended adjustments in relation to the estimated capital expenditure for 2019-20 are:

- a deferral of $5 million from 2019-20 to 2020-21 (non-discretionary expenditure) based on Aither's assessment regarding limitations on Hunter Water's capacity to deliver the substantially increased program during the year. This deferral is based on the progress of the Farley WWTP upgrade – while there is $14 million forecast to be invested in 2019-20, the works have only recently been tendered and will not be awarded before January. By the time works commence, the level of expenditure proposed will be difficult to achieve in the remaining months of the financial year.
- a reduction of $2.1 million in 2019-20 (discretionary expenditure) to reflect the movement of the Lower Cottage Creek Stormwater Naturalisation project into the Stormwater Naturalisation Program which will commence in 2020-21. This shift reflects delays in the Lower Cottage Creek project and the alignment between the objectives of this project and the broader program. This was discussed by Hunter Water during the review and subsequently proposed within its response to IPART's Issues Paper.

There are no other recommended adjustments for the current regulatory period.

Review of future capital expenditure

In reviewing the capital expenditure proposed by Hunter Water, Aither considered both the non-discretionary and discretionary programs separately. The following outlines the recommendations from our review of each of these two types of programs separately.

Hunter Water's proposed capital expenditure (non-discretionary)

The following provides a summary of Aither's recommended adjustments following our detailed review of the proposed non-discretionary capital expenditure. Those projects and programs that were deemed efficient have not been discussed in this section however detailed assessments for each of the projects can be found in Appendix A.

Aither's recommended adjustments are:

- **Water network capacity upgrades** – a reduction of $6.8 million to the proposed expenditure based on the absence of specific evidence that would support a higher cost for existing capacity upgrades compared to Greenfield development costs which Hunter Water state should be higher per dwelling. The reduction is based on bringing existing network capacity upgrades in line with the cost estimates associated with Greenfield developments.

- **Minor wastewater asset renewals program**:
    - Wastewater structures – a reduction of $6 million to align forecast expenditure with the current regulatory period
    - Mechanical and electrical network and treatment assets – a reduction of 10 per cent for each sub-program to account for less risk-averse positions that could be taken for the outcomes of the appropriate, but subjective, risk assessment process. This equates to $3.2 million for treatment and $2.6 million for network mechanical and electrical assets.
- **Treatment plant chemical containment and safety upgrades program** – a reduction of $9 million ($4.5 million each for the water and wastewater programs) based on the adoption of a risk averse approach that results in a higher cost than other options that adequately address the current directives from the EPA.
- **Major wastewater treatment works upgrade program** – a deferral of $24 million to the following period on the basis that there is insufficiently robust information (i.e. unconfirmed growth driving future risk of non-compliance with licence conditions) to proceed with two of the seven projects within the forecast period.

Following the detailed review of the capital projects, Aither has considered the appropriateness of applying our findings across other, comparable programs within Hunter Water's capital portfolio. The following outlines our assessment of these similar programs where we have proposed an adjustment:

- **Water treatment minor works** – a reduction of $1.7 million based on an assessment that the preferred approach was, in some instances, unreasonably risk averse and therefore imposing higher costs. This reduction is based on the earlier assessment of the equivalent minor wastewater asset renewals as both programs used the same analytical approach to develop forecast costs.
- **Water network (critical mains)** – a deferral of $3.8 million to the next regulatory period, with the overall expenditure (excluding investigation funding) for the program to occur in the final three years of the upcoming regulatory period.
- **Water network (minor network asset renewals):**
    - A reduction of $1.3 million for minor mechanical and electrical network assets based on an assessment that the preferred approach was, in some instances, unreasonably risk averse and therefore imposing higher costs. This reduction is based on the earlier assessment of the equivalent minor wastewater asset renewals as both programs used the same analytical approach to develop forecast costs.
    - A reduction of $6.7 million for renewal of minor water structures based on the assessment made for comparable wastewater assets. It is recommended that forecast expenditure align with the level adopted in the current regulatory period.

Hunter Water's proposed capital expenditure (discretionary)

In addition to the key non-discretionary expenditure that Hunter Water has proposed for the upcoming regulatory period (see assessment above), it has also proposed two discretionary programs:

- **Stormwater Naturalisation Program** – an allowance to undertake a variety of stormwater naturalisation activities throughout the upcoming regulatory period
- **Recycled Water for Public Irrigation** – an allowance to undertake recycled water initiatives that are designed to provide water for irrigation of public spaces.

The justification for both of these programs is based on the results of a willingness-to-pay study commissioned by Hunter Water in 2018, which IPART is assessing separately.

Aither's assessment of the efficiency of both these programs is dependent on IPART's assessment of the appropriateness of the willingness-to-pay study that the programs are based on. If IPART deems that the study has demonstrated a willingness to pay from Hunter Water's customer base, then the proposed allowances has been assessed as efficient. However, Aither considers it important to:

- capture the programs as output measures for Hunter Water to ensure sufficient reporting on what is being achieved from the investment (e.g. kms of naturalisation and ML of recycled water), and
- consider an ex-post adjustment mechanism for the program whereby only those investments that meet an investment hurdle (which is aligned with results of the willingness-to-pay study) are subsequently added to the RAB.

In the absence of such a mechanism it is not possible to state that the investment is efficient as the forecast allowance does not reflect specific projects with pre-determined outputs or outcomes to measure against.

By including the program as an output measure and applying an ex-post adjustment it will ensure that the expenditure that is subsequently incorporated into the RAB is consistent with the expected outputs from the willingness-to-pay study and therefore considered efficient.

Overall efficiency of Hunter Water's capital program

Following the detailed review of capital projects and programs, Aither considered the efficiency of Hunter Water's broader capital program. This assessment considered:

- project and program planning and scoping, and
- project delivery efficiencies.

From this assessment, Aither considered that Hunter Water adopts practices that are considered reasonable to achieve optimal outcomes for cost, commensurate with risk in relation to project delivery. However, Aither considers that Hunter Water's process of project scoping and decision-making results in a level of investment that is not efficient due to a material dependency on subjective risk assessments. Beyond the related recommendations made for specific projects and programs above, there are several other minor programs where similar issues are likely to arise. Given this, Aither has recommended an adjustment to the forecast expenditure for the mandatory standards program, comprising:

- $0.2 million per annum for the water program
- $0.6 million per annum for the wastewater program

The estimation of these reductions is based on the wastewater pump station compliance improvement, tanker receival facility upgrades, generator connection point improvement, and the firefighting improvement programs. No further efficiency adjustment has been proposed for Hunter Water's capital program.

Recommended capital expenditure

The following table presents the recommendations for the total capital expenditure for Hunter Water.

Table 1 Recommended capital expenditure for upcoming regulatory period ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water forecast of water capital expenditure	39,202	55,346	61,401	57,832	59,609	**273,389**
Adjustments						
Project 3 - Water network Capacity Upgrades	(1,360)	(1,360)	(1,360)	(1,360)	(1,360)	**(6,800)**
Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program	(900)	(900)	(900)	(900)	(900)	**(4,500)**
Adjustment to water treatment minor works	(340)	(340)	(340)	(340)	(340)	**(1,700)**
Adjustment to water network (critical mains)	-	-	(1,900)	(1,900)	-	**(3,800)**
Adjustment to minor water mechanical and electrical network assets	(260)	(260)	(260)	(260)	(260)	**(1,300)**
Adjustment to minor water structures	(1,340)	(1,340)	(1,340)	(1,340)	(1,340)	**(6,700)**
Adjustment to Mandatory Standards Program	(200)	(200)	(200)	(200)	(200)	**(1,000)**
Sub-total recommended adjustments	(4,400)	(4,400)	(6,300)	(6,300)	(4,400)	**(25,800)**
Total recommended water capital expenditure	34,802	50,946	55,101	51,532	55,209	**247,589**
Hunter Water forecast of wastewater capital expenditure	118,869	83,928	85,847	74,309	61,742	**424,695**
Adjustments						
Project 4 - Minor Asset Renewals Programs - Wastewater	(2,030)	(2,287)	(2,338)	(2,594)	(2,543)	**(11,791)**
Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program	(900)	(900)	(900)	(900)	(900)	**(4,500)**
Project 8 - Other Wastewater Treatment Plant Upgrade Program	-	-	-	(16,238)	(7,688)	**(23,926)**

Project 5 - Farley Wastewater Treatment Plant Upgrade Stage 3B	5,000	-	-	-	-	**5,000**
Adjustment to Mandatory Standards Program	(600)	(600)	(600)	(600)	(600)	**(3,000)**
Sub-total recommended adjustments	1,470	(3,787)	(3,838)	(20,332)	(11,730)	**(38,217)**
Total recommended wastewater capital expenditure	120,339	80,141	82,010	53,977	50,011	**386,478**
Hunter Water forecast of stormwater capital expenditure	3,652	2,768	4,664	5,894	6,150	**23,127**
No Adjustments						
Total recommended stormwater capital expenditure	3,652	2,768	4,664	5,894	6,150	**23,127**
Hunter Water forecast of corporate capital expenditure	38,679	43,175	23,199	25,630	19,514	**150,196**
Adjustments						
Recycled water program	(960)	(960)	(960)	(960)	(960)	**(4,800)**
Total recommended corporate capital expenditure	37,719	42,215	22,239	24,670	18,554	**145,396**

Regulatory depreciation and asset lives

Hunter Water has proposed a more disaggregated method to estimate regulatory depreciation for the upcoming regulatory period. This investigation of a disaggregated RAB is consistent with previous IPART decisions regarding regulatory depreciation. Through this process, Hunter Water has allocated each of the four product categories into five classes of assets (civil, mechanical/electrical, equipment, intangible, non-depreciating) to create 20 individual RABs (i.e. a more disaggregated RAB).

This process required Hunter Water to allocate the existing RAB within each product across each of the asset classes and then assign asset lives (both new and existing) for each of the asset classes.

Aither considers Hunter Water's proposed new and remaining asset lives to be appropriate, while the proposed methodologies for disaggregating the RAB values and asset lives appear reasonable. While we note that there are concerns regarding the integrity of the FAR, Hunter Water has demonstrated that the errors do not result in material impacts. Given this, we consider that the proposed approach will result in a better alignment of depreciation and asset lives than the current aggregated approach.

As outlined above, through our review we had some concerns regarding the accuracy of the FAR. Aither considers there are two key aspects to the current and ongoing accuracy of the FAR:

- Initial accuracy for establishing the disaggregated values, and
- Ongoing accuracy for determining the 'remaining asset lives' for future regulatory periods.

Based on the information provided by Hunter Water, Aither considers that the concerns that we have regarding the integrity of the FAR are not sufficient enough to oppose the proposed disaggregated approach. The transition to a more disaggregated RAB that is proposed by Hunter Water, while not perfect, will result in a more economically efficient recovery of asset values than the current aggregated approach.

Aither believes the FAR should include regular updates to reduce and extend asset lives based on current knowledge of the asset's condition, performance and latest expected replacement date. While we note that the analysis provided by Hunter Water demonstrates that the existing concerns do not currently result in material impacts within the FAR, going forward we consider that improvements in the maintenance of the FAR are required to ensure the ongoing integrity of the model in order for it to be used in determining regulatory asset lives.

To ensure confidence in the integrity of the FAR and how it is maintained, Aither is of the view that a process is agreed between Hunter Water and IPART that establishes how the FAR will be maintained over time (e.g. through the use of Hunter Water's internal auditor) to ensure that IPART has confidence in the integrity of the FAR in subsequent reviews and therefore avoids the need to re-consider the FAR when using it to determine appropriate asset lives.

Operating expenditure

Summary findings

For the most part, Hunter Water was able to justify its forecast operating expenditure for the upcoming regulatory period and relied on robust processes to determine forecast expenditure. Information was generally well prepared and provided to Aither in a timely manner for the review. However, there were some instances where justification of increases in expenditure was insufficient that impacted on our assessment of the efficiency of Hunter Water's forecast expenditure.

Our review of Hunter Water's proposed operating expenditure has found that the majority of its forecast operating expenditure is considered efficient. However, we have identified some areas of forecast operating expenditure requiring adjustment in order to be considered efficient.

Review of past operating expenditure

In summary, Hunter Water overspent the allowance set by IPART's 2016 Determination by approximately $26.2 million (equivalent to 4.6 per cent). While actual operating expenditure in 2016-17 is lower than the allowed operating expenditure for that year, the later years of overspend are of a greater magnitude to result in an overall overspend. Some of the key reasons for the overspend include:

- mitigation activities in order to address risks that were identified across the business:
  - including unbudgeted long-cycle preventative maintenance (LCPM) activities; a deliberate shift from reactive to preventative maintenance in their asset management approach.

- corporate costs as a result of higher labour expenditure to support the revised business strategy following the business restructure during 2017-18
- energy expenditure for wastewater due to:
  - higher unit costs of energy following the tendering of a new electricity contract which started in January 2018.
  - changes to wastewater treatment processes resulting in more energy-intensive treatment.
- expenditure in relational to external service providers
- unforeseen and uncontrollable costs.

It was noted that the primary driver behind the considerable increase within the period was within the corporate expenditure product rather than water or wastewater. In reviewing the past operating expenditure, Aither had some concern that the increase in 2017-18 that created a new 'base' level of expenditure was not completely efficient. The assessment of the increases in expenditure over the current regulatory period was a key focus in determining whether the forecast operating expenditure was deemed to be efficient.

Review of future operating expenditure

Based on our review of Hunter Water's proposed operating expenditure, Aither concludes that the majority of operating expenditure is considered efficient and was able to be justified with comprehensive and robust documentation from Hunter Water. Our review identified some adjustments that we consider necessary to reflect an efficient level of forecast operating expenditure:

- reductions in labour to reflect a lower base level of labour expenditure
- reductions in operations costs relating to the sharing of risk between Hunter Water and its customers for transition costs for both the operations and laboratory contracts
- introduction of an ongoing efficiency factor of 0.4 per cent per annum on controllable operating expenditure to reflect future efficiency gains.

The following tables provide our recommended operating expenditure for the water, wastewater, stormwater and corporate products for the upcoming regulatory period. In terms of the operating expenditure related to the proposed discretionary programs, Hunter Water has indicated that it has not sought to recover the associated operating expenditure through this process. Instead it will absorb these cost increases within the business.

Table 2 Recommended water operating expenditure ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water proposed water operating expenditure	48,422	47,196	46,642	45,946	46,295	**234,501**
Adjustments						
Changes to operations	(43)	(105)	(23)	-	-	**(171)**
Changes to energy (Hunter Water amendment)	567	273	223	214	216	**1,494**
Issues paper (Hunter Water amendment)	152	156	158	159	161	**786**
Sub-total recommended adjustments	676	324	358	373	376	**2,108**
Sub-total recommended water operating expenditure	49,098	47,520	47,000	46,320	46,671	**236,609**
Controllable expenditure	48,604	47,026	46,506	45,826	46,177	**234,139**
Efficiency adjustment (0.4% cumulative per annum)	(194)	(374)	(554)	(726)	(913)	**(2,760)**
Total recommended water operating expenditure	**48,904**	**47,146**	**46,446**	**45,594**	**45,759**	**233,849**
Percentage change	1.0%	(0.1%)	(0.4%)	(0.8%)	(1.2%)	**(0.3%)**

Table 3 Recommended wastewater operating expenditure ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water proposed wastewater operating expenditure	53,681	55,013	55,839	55,133	54,785	**274,452**
Adjustments						
Changes to operations	(82)	(225)	(52)	-	-	**(359)**
Changes to energy (Hunter Water amendment)	1,073	587	497	496	494	**3,146**
Issues paper (Hunter Water amendment)	209	215	225	234	243	**1,125**
Sub-total recommended adjustments	1,200	577	670	730	737	**3,913**
Sub-total recommended wastewater operating expenditure	54,881	55,590	56,509	55,863	55,522	**278,365**
Controllable expenditure	54,218	54,927	55,846	55,200	54,859	**275,050**
Efficiency adjustment (0.4% cumulative per annum)	(216)	(437)	(665)	(874)	(1,084)	**(3,276)**
Total recommended wastewater operating expenditure	**54,665**	**55,153**	**55,844**	**54,988**	**54,438**	**275,089**
Percentage change	1.8%	0.3%	0.0%	(0.3%)	(0.6%)	**0.2%**

Table 4 Recommended stormwater operating expenditure ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water proposed stormwater operating expenditure	1,159	1,197	1,190	1,172	1,180	**5,898**
No adjustments						
Sub-total recommended stormwater operating expenditure	1,159	1,197	1,190	1,172	1,180	**5,898**
Controllable expenditure	1,159	1,197	1,190	1,172	1,180	**5,898**
Efficiency adjustment (0.4% cumulative per annum)	(5)	(10)	(14)	(19)	(23)	**(70)**
Total recommended stormwater operating expenditure	**1,154**	**1,188**	**1,175**	**1,153**	**1,157**	**5,828**
Percentage change	(0.4%)	(0.8%)	(1.2%)	(1.6%)	(2.0%)	**(1.2%)**

Table 5 Recommended corporate operating expenditure ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water proposed corporate operating expenditure	54,019	52,825	53,793	53,598	53,420	**267,654**
Adjustments						
Aither adjustments to corporate labour expenditure	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	**(5,000)**
Sub-total recommended adjustments	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	**(5,000)**
Sub-total recommended corporate operating expenditure	53,019	51,825	52,793	52,598	52,420	**262,654**
Controllable expenditure	52,902	51,707	52,675	52,480	52,302	**262,066**
Efficiency adjustment (0.4% cumulative per annum)	(211)	(411)	(627)	(831)	(1,034)	**(3,114)**
Total recommended corporate operating expenditure	**52,809**	**51,413**	**52,166**	**51,766**	**51,386**	**259,540**
Percentage change	(2.2%)	(2.7%)	(3.0%)	(3.4%)	(3.8%)	**(3.0%)**

Forecast demand

Summary findings

Aither considers Hunter Water's proposed forecast sales volumes as appropriate for the upcoming regulatory period. The methodology used to forecast demand has been updated since the initial Pricing Submission. The latest approach uses a new climate correction methodology based on assessing the impact of climatic condition on demand through regression analysis.

As agreed with IPART, our review of Hunter Water's demand forecasting is less detailed than the expenditure review. For example, we understand that Jacobs has completed an in-depth review of the demand model and has provided Hunter Water with detailed recommendations. Our review assesses the extent to which Hunter Water has addressed these recommendations but has not undertaken an equivalent detailed review of the model.

Review of demand forecasting methodology

Aither has assessed two methodologies for estimating demand over the next price period:

- Integrated Supply-Demand Planning (iSDP) model with basic climate condition averaging (used to generate demand forecasts in Hunter Water's Technical Paper 7)
- Demand Tracking Model (DTM) that uses a climate-correcting regression approach alongside iSDP model.

As of October,[1] Hunter Water is proposing to base its demand forecasts on the DTM approach. Aither agrees with the finding of the Jacobs review that the DTM approach improves the robustness of the modelling results when compared to the older iSDP approach. However, there may still be potential issues with the DTM approach that could benefit from further refinement. For example, a visual inspection of scatter plots provided by Hunter Water comparing actual demand with modelling demand suggests the climate correcting starting point for high consumption periods may be too low. There are also a number of outstanding recommendations made by Jacobs that Hunter Water plans to address in the future. These include undertaking a Hunter Region specific end-use study to ascertain the propagation of water-efficient appliances (rather than relying on state-wide statistics).

While noting that no forecast is perfect, Aither considers the proposed DTM methodology as representing a reasonable, objective and robust basis for estimating a climate-corrected demand starting year and an improved methodological approach compared with those used in previous pricing periods.

Review of demand forecasts

The following table presents Hunter Water's forecast water sales volumes for residential and non-residential customers over the upcoming regulatory period. These forecasts are based on the new DTM climate-correction approach and differ from those presented in Technical Paper 7. Residential demand forecasts gradually increase over the five-year period, however, are below consumption levels seen in 2017/18 and 2018/19. This is because the forecasts are based on climate-corrected demand. Non-residential demand is forecast to increase over the period also, while net sales to

[1] Review of Prices for Hunter Water – Response to IPART Issues Paper. Hunter Water, 21 October 2019

Central Coast is forecast to be zero (i.e. any sales to Central Coast will be reciprocated on an equivalent basis).

Table 6 Hunter Water's forecasted water sales volumes (ML)

Financial year	2020-21	2021-22	2022-23	2023-24	2024-25
Residential	38,855	39,021	39,176	39,344	39,525
Non-residential (incl. Bulk water sales)	21,520	21,790	21,956	22,201	22,460
Net Central Coast sales	-	-	-	-	-
Total	**60,375**	**60,811**	**61,132**	**61,545**	**61,985**

Source: All data sourced from Hunter Water's Submissions to IPART.

Aither is satisfied that the proposed water sales forecasts are a reasonable basis for the next pricing period. These are based on a climate-corrected starting year that uses a robust methodological approach and offers a material improvement over the old methodology. Further work is needed to refine the inputs that underpin the new methodology. This is acknowledged by Hunter Water who have planned a work stream to address any remaining recommendations that came out of Jacobs' detailed demand model review.

1. Introduction

1.1. Overview

Aither, and its subcontractor Rex Dusting, were engaged by the New South Wales Independent Pricing and Regulatory Tribunal (IPART) to undertake a review of past and proposed future water and wastewater related capital and operating expenditure and forecast demand for Hunter Water. This report documents the outcomes of the review and will support IPART in making its determination on the maximum prices that Hunter Water can charge from 1 July 2020.

1.2. Background

1.2.1. Role of IPART

IPART is conferred by several pieces of state legislation to regulate the prices for government monopoly services such as energy, public transport and water services in New South Wales (NSW). The *Independent Pricing and Regulatory Tribunal Act 1992* was amended in 1996 to establish the six primary responsibilities for IPART. Under the *Independent Pricing and Regulatory Tribunal Act 1992*, IPART is required to regulate, review and set the (maximum) prices that public water utilities may charge for water. IPART is responsible for maintaining competitive neutrality for water utilities and ensuring that costs which are recovered through water charges are efficient.

In order to meet its responsibilities, IPART has various review or assessment processes associated with price determinations. One such process is independent expenditure reviews, which help determine whether utilities have incurred or are proposing efficient costs. Expenditure reviews, which assess capital and operating expenditure of regulated water businesses, are an input to allow IPART to determine maximum prices.

2020 price review

IPART is conducting a review of the maximum prices that Hunter Water can charge for services provided to its customers from 1 July 2020. The maximum prices determined by IPART for the new determination period will cover a period of up to five years.[2] The length of the determination will be determined by IPART during the course of the review. The current price determination period for Hunter Water commenced on 1 July 2016 and set prices until 30 June 2020 (the 2016 Determination).

1.2.2. About Hunter Water

Business overview

Hunter Water is a State-Owned Corporation (SOC) and provides drinking water and wastewater services to approximately 250,000 residential, business and industrial customers across the Lower Hunter region. Some recycled water and stormwater services are provided to a subset of customers.

[2] The length of the regulatory period will be determined by IPART. We note that initially Hunter Water proposed a five-year regulatory period, but subsequently revised this request in its response to IPART's Issues Paper. Aither has been requested by IPART to review the five years of information that was initially submitted by Hunter Water

Primary functions include water supply, wastewater and stormwater services to customers. Additionally, Hunter Water provides miscellaneous, trade wastewater, recycled water and raw water services. Hunter Water's services, projects and activities cover 6,671 square kilometres in the areas of Cessnock, Lake Macquarie, Maitland, Newcastle, Port Stephens, Dungog and small parts of Singleton.

Hunter Water's water supply infrastructure consists of:

- two dams and sand beds
- six water treatment plants
- 77 water reservoirs
- 99 water pumping stations and
- 220,000 water meters.

Hunter Water also provide an extensive wastewater (sewage) transport service, which includes roughly 5,000 km of sewer mains and treats approximately 5,000 ML of wastewater annually, operating 19 wastewater treatment plants. Recycled water is supplied to non-drinking purposes including:

- Municipal use – including golf courses, a local trotting track, and the Kurri TAFE
- Industrial use – including Eraring Power Station and the Oceanic Coal Washery
- Agricultural use – including local farmers, woodlots and the effluent reuse schemes at Clarence Town and Karuah Wastewater Treatment Works

The remainder is discharged to the environment following tertiary treatment in accordance with licence conditions issued by the NSW Environmental Protection Authority (EPA).

Hunter Water's miscellaneous services are generally one-off service charges such as connections and disconnections, rectifying damaged services, plumbing inspections, site inspections and building plan approvals. Charges for miscellaneous services are set on a cost recovery basis – based on direct labour costs, the direct costs of materials and contractors, and indirect costs based on overheads. Revenue from these charges makes up around 1 per cent of Hunter Water's overall revenue.

1.2.3. Previous expenditure review of and pricing determination

In January 2016, Jacobs completed an independent review of Hunter Water's operating and capital expenditure on behalf of IPART. Jacobs also reviewed Hunter Water's proposed asset management systems and practices. The review was an input into IPART's 2016 price determination for Hunter Water for the regulatory period from 1 July 2016. Jacobs review investigated past and proposed capital expenditure, associated with regulatory periods immediately prior to 2016, and for up to 4 years from 1 July 2016.

Jacobs conclusions, findings or recommendations included:

- Hunter Water did not always demonstrate prudency, specifically where a project was not supported by a specific IPART driver
- Appropriate options were generally considered, but in some cases the least-cost option was not selected

- Retrospectively, some option costs were too high, when compared against Hunter Water's revised data and Jacobs benchmark cost estimates
- A lack of detailed business cases for some capital works programs created uncertainty regarding whether the best option was always selected
- Jacobs did not recommend the removal of projects from the proposed capital program, but did recommend some adjustments to the timing and costs
- Overall, Jacobs found that Hunter Water had overestimated their operating costs for the last pricing period
- Recommendations by Jacobs included decreasing Hunter Water's labour costs by $4.09 million; decreasing costs for the head office associated with owning rather than leasing the building ($1.96 million); and annual productivity-based savings associated with continuing efficiencies ($1.85 million)
- In addition, Jacobs recommended that Hunter Water develop annual guidance for the (internal) operating budgeting process that specifies the basis on which forecasts are to be established
- It was recommended that for all future ICT business cases, the consideration of additional operating expenditure and possible efficiencies should be a mandatory part of the business case sign-off.

1.2.4. Summary of IPART's previous pricing determination

In relation to Hunter Water's proposal and Jacobs review of expenditure, IPART's determination allowed for:[3]

- An operating expenditure allowance which was 1.8 per cent ($9.4 million) lower than Hunter Water's proposed operating expenditure over the same period considering the efficiencies and reductions in labour and office lease costs identified by Jacobs.
- Capital expenditure that was 6.0 per cent ($23.2 million) lower than proposed by Hunter Water over the same period, which largely reflected Jacobs' recommendations. IPART allowed the capital projects proposed by Hunter Water. IPART's reductions were aimed at ensuring Hunter Water 's program was prudent and delivered efficiently.

1.3. Review objectives and scope

1.3.1. Review objectives

The objectives set for this review by IPART were to undertake:

- a strategic review of the utility's long-term investment plans and asset management systems and practices for its water and sewerage business
- a detailed review of the utility's past and proposed operating and capital expenditures

[3] IPART, Hunter Water's water and sewerage services Review of prices from 1 July 2014 to 30 June 2018 – Final Report, June 2014, p.4.

- a review of performance against past output measures and to propose new output measures for the next determination period if appropriate
- a review of the reasonableness of the utility's long-term growth projections
- a review of the reasonableness of the utility's demand and customer connection forecasts over the 2020 determination period, and
- targeted, written advice on expenditure issues raised in submissions to IPART's Draft Reports for Hunter Water (an optional task, subject to IPART confirmation following the Draft Report).

1.3.2. Scope of review

Consistent with the review objectives, the scope of work for the review covers five main areas: strategic considerations, detailed review of operational expenditure, detailed review of capital expenditure, review of performance against past output measures and proposal of new measures if appropriate and review of demand forecasts.

Strategic considerations

The strategic component of the review includes consideration of Hunter Water's investment planning, and its asset management systems and practices. This includes reviewing medium and long-term investments plans and strategies, and associated or supporting systems, including for asset management.

Operational expenditure

The operational expenditure component includes reviewing the efficiency of past operating expenditure (for the 2016 determination period) and proposed expenditure for the 2020 determination period. This includes assessing any variance from that allowed under the 2016 determination, and how expenditure relates to regulated services, and if it has delivered against required service standards.

Assessment of proposed expenditure includes consideration of the level required to efficiently undertake the regulated business, consideration of the potential for cost reductions and efficiency gains, and the appropriateness of cost allocation methods or approaches.

Capital expenditure

The capital expenditure is informed in part by the strategic review, but also by a review of a sample of Hunter Water's past and proposed capital projects. The capital program as a whole is reviewed, and a detailed investigation is made into planning and outcomes for the sample of capital projects. The capital projects are assessed specifically in relation to efficiency. Cost allocation for capital projects, and asset lives, are also considered.

Both past and proposed capital expenditure is considered, including whether past expenditure has contributed to meeting standards and outcomes, and consideration of variance between actual expenditure and that allowed under the current determination. Future expenditure is considered in relation to what is viewed as efficient for Hunter Water to deliver its regulated business, and the potential for efficiency savings is also considered in this context.

Output measures

Hunter Water's performance against its output measures for the current determination period was also considered. Recommendations were also made for output measures for the next period.

Demand forecasts

This demand review includes an assessment of the demand forecasting approach adopted by Hunter Water, as well as a high-level summary of Jacobs' peer review. Due to Jacobs' recently completed peer review, and as agreed with IPART, the review of Hunter Water's demand forecasting is less detailed than the expenditure review.

Reasonable demand forecasts are an important input for ensuring Hunter Water does not over- or under-recover its required revenue. Given the inherent difficulty in forecasting an uncertain future it is unlikely that Hunter Water can perfectly forecast the level of customer demand over the next five-years. The objective is therefore to produce a forecast that minimises the level of over- or under-recovery. The demand review focuses on; 1.) areas of significance (e.g. material to price changes); 2.) the justification for input assumptions; and 3.) the approach to managing inherent uncertainties.

1.4. Report outline

The report is broadly structured to align with the objectives and scope of work, in addition to further detailed requirements set by IPART. Specifically:

- This **Section 1** provides background on IPART and its role, that of Hunter Water, and the objectives and scope of this review.
- **Section 2** outlines the methodology and associated considerations for the review.
- **Section 3** documents the results of the strategic assessment component of the review, including planning and strategic management systems, processes and documentation. The section also considers performance against output measures.
- **Section 4** documents the analysis, findings and recommendations associated with past and proposed capital expenditure, including in relation to a sample of capital projects (detailed project information is contained at Appendix A).
- **Section 5** documents the results of the operating expenditure review, including past and proposed expenditure.
- **Section 6** documents our assessment of both the operating and capital expenditure for Information and Communications Technology.
- **Section 7** documents our assessment of Hunter Water's ring-fencing processes for recycled water schemes.
- **Section 8** provides our assessment of Hunter Water's demand forecasting methodology.
- **Appendix A** contains detailed summaries of the reviews undertaken of capital expenditure projects and programs.

2. Review methodology

2.1. Overview

The overall approach to delivering the review involved four phases, as follows:

- **Initiation** – gathering initial documentation, and selecting capital projects for review
- **Information discovery** – reviewing available information, developing and submitting further information requests, confirming the evaluation criteria and approach, and undertaking meetings or interviews with Hunter Water staff
- **Analysis and review** – completing analysis in support of the major components of the review, follow up information requests, and consolidation of findings across review elements
- **Reporting** – documenting the results of the analysis and review (this report).

The methodology was designed to assess:

- the extent to which strategic and capital planning, and asset management systems are conducive to ensuring efficient expenditure
- the efficiency of operational and capital expenditure
- the appropriateness of demand forecasts, and
- progress against agreed output measures.

The review was undertaken from July to November 2019, with visits to Newcastle to meet with Hunter Water staff in August and October 2019.

2.2. Assessment framework

The framework for assessment of expenditure under this review is based on the efficiency test as required by IPART. Application of this test in relation to each of the review elements is explained further below, but the terms are defined here.

Efficiency test

IPART's efficiency test considers both how the investment decision is made, and how the investment is executed, having regard to, amongst other matters, the following:

- Customer needs, subject to the utility's regulatory requirements
- Customer preferences for service levels, including customers' willingness to pay
- Trade-offs between operating and capital expenditure, where relevant
- The utility's capacity to deliver planned expenditure
- The utility's expenditure planning and decision-making processes.

2.3. Information sources

The major information sources that have informed the review include:

- the Annual Information Return / Special Information Return, prepared by Hunter Water and provided by IPART
- the Hunter Water pricing submission to IPART, including technical papers attached to the submission
- various documentation supplied by Hunter Water, and
- the results of discussions with Hunter Water staff.

2.3.1. Hunter Water interviews

Through the review it should be noted that Hunter Water was well prepared for the interviews and willing to provide as much assistance as possible throughout the review. This was able to assist Aither in understanding the detail of Hunter Water's submission and the assumptions that underpinned the forecasts.

2.4. Review of strategic management

The review of strategic management was primarily undertaken on a qualitative basis, and focused on Hunter Water or NSW Government policy, regulatory and planning matters that may be driving decisions, investments, and processes within Hunter Water. Aither considered:

- planning matters, including in relation to long-term supply and demand and other long-term strategic considerations that may influence large capital investments
- Hunter Water's capital investment strategy, including over short and longer-term horizons, and alignment, risks and efficiency of the strategy
- Hunter Water's approach to asset management including whole of lifecycle planning, risk, asset condition assessment and reporting, asset life, and similar matters, and
- systems or processes associated that may have a bearing on the efficiency of decisions, including risk management, procurement, project management, and others.

2.5. Assessment of operating expenditure

2.5.1. Overview

To provide sufficient depth of analysis in support of any findings in relation to the efficiency of the proposed operating expenditure, Aither sought to first understand, and then critique, the methodology and underlying assumptions adopted by Hunter Water to establish their forecasts. As a result, Aither focused on:

- understanding the factors driving Hunter Water's future costs, and
- ascertaining the assumptions and methodologies Hunter Water adopted to translate those cost drivers into an operational expenditure forecast.

Having regard to the above, our assessment of the efficiency of Hunter Water's operating expenditure involved the following tasks, amongst other things:

- Reviewing Hunter Water's regulatory submission to identify key forecasting issues and assumptions.
- Providing Hunter Water with a detailed questionnaire related to their operating expenditure forecasts. Amongst other things, this initial questionnaire addressed:
  - the methodology Hunter Water used to develop its operational expenditure forecasts – so that Aither could better understand Hunter Water's overarching forecasting methodology
  - cost allocation methodology – so that Aither could better understand how costs are allocated between services
  - escalators and growth drivers – so that Aither could understand how Hunter Water has escalated its forecasts over the period covered by the regulatory submission to account for potential changes in the real cost of labour, materials and electricity costs, as well as changes in the underlying drivers of those costs
  - capitalisation policy – to ensure that Hunter Water has not included in its operational expenditure forecasts, the labour costs that it expects to capitalise over the regulatory period (i.e. to ensure there is no double counting)
  - cost reductions and efficiencies – to better understand how Hunter Water's operating expenditure forecasts include, either directly or indirectly, allowances for on-going productivity improvements.
- Conducting interviews with Hunter Water to discuss their operational expenditure forecasts.

2.5.2. Assessment of operating expenditure

Hunter Water developed 'bottom-up' forecasts for operating expenditure each year rather than using a 'top-down' approach of establishing a base year and identifying step changes to the base year. Given this, rather than considering the overall level of operating expenditure, we have broken down the operating expenditure into the following key cost categories:

- Labour expenditure
- Maintenance expenditure
- Operations expenditure
- Corporate expenditure (exc. ICT)
- Electricity expenditure
- Other on-going operational expenditure costs
- On-going productivity and efficiency improvements.

For each of these cost categories, the forecast expenditure was assessed against the historical levels of expenditure for that particular cost category. This is a more granular approach to the 'base year' approach as it requires a more holistic consideration of the base level of expenditure over the current regulatory period for each of the cost categories.

To assess the efficiency of the forecast operating expenditure, the review considered:

- Comparisons with actual expenditure for each of the cost categories

- Variations in units and/or prices within the bottom-up models
- Cost estimation processes (to determine how accurate previous budgets were with actual results and how they influenced forecasts), and
- Procurement processes (which help ensure efficient levels of costs are incurred).

2.6. Assessment of capital expenditure

2.6.1. Overview

An assessment was made to determine the efficient capital expenditure (as compared to actual and proposed capital expenditure) as is further detailed in Section 4 of this report. The assessment of efficiency of Hunter Water's capital expenditure was based on understanding, and then critiquing, the methodology, underlying assumptions and models that were used to establish capital expenditure forecasts. This was given effect through the following tasks:

- desktop review of information provided by Hunter Water including AIR/SIR, policies and procedures, strategies, and documentation relating to individual projects or programs
- desktop review of information found in the public domain
- meeting with key Hunter Water staff to discuss key issues in relation to a number of individual capital projects selected for detailed review and the broader capital program
- further desktop review of documentation provided by Hunter Water following these interviews
- assessment of the efficiency of the sample capital projects, including drawing on the professional judgement of our team's experienced water infrastructure engineer Rex Dusting in relation to the efficiency of proposed capital expenditure
- assessment of the efficiency of the overall portfolio of actual and proposed capital expenditure, considering whether the findings of the review of sample projects and programs indicate any systemic inefficiencies.

With respect to making an assessment of past expenditure the approach was to gain a view as to whether there is any evidence of systemic inefficiencies. This was carried out by reviewing how decisions were made on individual projects, what actual spending was compared to budget, and whether project outcomes were actually realised. The approach was that should any expenditure be found to have been clearly inefficient, a recommendation would be made to not allow part or all of that expenditure.

For future expenditure the approach was similar though it was more focused on individual projects than at a portfolio level. However, Aither also considered if it is appropriate to apply a global reduction in Hunter Water's forecast capital expenditure as a result of systematic inefficiencies or deliverability concerns.

2.6.2. Assessment of capital projects

An assessment was carried out of selected capital projects and programs against IPART's efficiency test. This was carried out by a combination of a desktop review of documents obtained as part of the strategic review, desktop review of documentation specific to each project, and meetings with Hunter Water staff.

As outlined above, the efficiency test considers both how the investment decision is made, and how the investment is executed. To apply this test, our assessment has considered, for example, whether:

- a complete set of options has been considered or alternative options were identified that were not considered
- the scope of work is appropriate to meet the need, and the standard of work is appropriate
- unit costs are based on market rates or otherwise shown to be efficient; costs are benchmarked; or, efficiency savings are recommended, and
- synergies with other projects were considered.

2.7. Review of output measures

The review of outputs was undertaken by reviewing information in the Hunter Water pricing submission. Further to this, an information request to Hunter Water asked:

- that evidence be provided to substantiate performance against specified service standards during the 2016 determination period, and
- for an explanation of variances in actual performance over time.

Information provided by Hunter Water on service standards was subsequently assessed, including in the context of the overall capital and operational expenditure review.

3. Strategic review

3.1. Overview

The extent to which Hunter Water makes efficient capital investment and operating decisions is partly driven by its policy and operating context, including obligations placed upon it. It is also driven by its approach to strategic management of its assets and the business more broadly, including its strategic objectives, corporate management, and delivery systems.

This section considers the policy and operating context of Hunter Water, and a range of corporate and management systems that are used to guide capital and operating spending and management decisions. While not a sufficient condition, the existence and use of effective strategic, corporate and management systems is a necessary condition to achieving efficient capital and operating expenditure.

3.2. Policy and operating context

The Lower Hunter region is the seventh largest urban area in Australia and is home to over half a million people. Hunter Water has provided a reliable supply of water to the Lower Hunter region for over 120 years. Hunter Water's major sources of water are Chichester Dam and Grahamstown Dam, both man-made and historically reliable water storage systems.

IPART issues and regulates the provision of Hunter Water's Operating License. Hunter Water's current Operating Licence came into effect on 1 July 2017 and expires on 30 June 2022. Hunter Water's previous license was in force from 1 July 2012 to 30 June 2017. New Operating Licences are only issued after a comprehensive public review of a water utilities previous licence by IPART. Hunter Water's operations are also audited on an annual basis. Hunter Water's performance against their service standards and other conditions of their Operating Licence are assessed independently via such an audit. IPART is also responsible for the annual operational audit and periodic reviews of the Operating Licence.

In addition to IPART regulations, Hunter Water is also required to comply with the following institutional or regulatory arrangements:

- Department of Industry (Water) – which administers ministerial approval for construction works under the *Water Management Act 2000*; oversees the performance of local water utilities; and publishes annual benchmarking of performance for NSW water utilities
- Dams Safety Committee – which ensures the safety of dams and maintains surveillance of prescribed dams
- NSW Health – which is responsible for regulating the quality and safety of drinking water
- NSW Environment Protection Authority – which is responsible for licensing and monitoring of discharges from sewerage systems under the *Protection of the Environment Operations Act 1997*
- Natural Resource Access Regulator – a newly formed regulator that is responsible for compliance and enforcement of natural resources management legislation.

3.2.1. Lower Hunter Water Plan

The *Lower Hunter Water Plan* (the Plan) sets out how the Lower Hunter region will continue to ensure its urban water security. It includes actions to supply, save and substitute water, as well as additional measures to respond to the prospect of drought in the future. The first version of the Plan was developed in 2014 by the New South Wales Government's Department of Finance and Services, in collaboration with Hunter Water and with input from stakeholders.

The Plan includes a number of actions on both the supply and demand sides of the urban water supply balance. The New South Wales Government's Department of Industry conducts an annual review of the Plan to evaluate its implementation against these actions.

Actions on the supply side include:[4]

- Manage existing surface and groundwater sources to optimise supply from Chichester Dam, Grahamstown Dam, Tomago Sandbeds and Tomaree Sandbeds
- Transfer water between Hunter Water and the Central Coast supply systems via an existing pipeline (and transfer agreement)
- Increase the transfer capacity from the Central Coast to Hunter Water
- Improve modelling tools to optimise water transfer arrangements between the two regions
- Undertake 'readiness activities' for drought-response desalination if needed in a drought (such as construction of the Belmont temporary desalination plant).

Actions on the demand side include:

- Reduce demand through leak detection and pressure management, and water efficiency programs for households and businesses
- Undertake measures during drought as water storage levels fall, such as applying water restrictions
- Implement water recycling, such as the Kooragang industrial and Gillieston Heights/Chisholm schemes, to reduce the demand on the drinking water supply system
- Install rainwater tanks under the NSW Government's Building Sustainability Index (BASIX) rules to reduce demand on the drinking water supply system.

The Plan is currently being updated. IPART and Aither were provided with an overview of the status of the update process in a teleconference with representatives from the New South Wales Department of Planning, Industry and Environment in October 2019.

The updated Plan is scheduled for completion in 2021, which is later than anticipated but reflects the time and effort allocated to key elements of the update, including:

- peer review of both demand and supply-side models
- comprehensive options analysis, including both drought response (short-term) and longer-term supply augmentation options.

Given the level of supply security identified at the time, the 2014 Plan had a focus on drought-response options. The update to the Plan will supplement this with more substantive consideration of

[4] Hunter Water, Lower Hunter Water Plan webpage, https://www.hunterwater.com.au/Water-and-Sewer/Water-in-the-Lower-Hunter/Lower-Hunter-Water-Plan.aspx.

the next major supply-side augmentations to maintain longer-term water supply security. This will include consideration of the triggers for the implementation of both short-term and long-term responses.

As a key stakeholder in the Plan, Hunter Water is contributing to various aspects of the process to update the Plan by 2021. This includes works to identify and assess potential sites for future long-term augmentations (such as dams and desalination), as well as development of a decision-making framework to inform option assessment. The process includes extensive community, customer and stakeholder consultation.

Current drought conditions have necessitated the implementation of some of the drought response measures identified in the 2014 Plan. In the short-term, there is the possibility that worsening drought conditions could see further measures implemented, including the drought response desalination plant. Hunter Water is progressing the planning approvals for the plant so that it could be built quickly and supplement the region's water supply, should the worst-case eventuate.

For Hunter Water, the implications of continuing drought for the forecast regulatory period include:

- the risk that declining water storage levels prompt short-term responses that have unplanned implications for revenue (such as water restrictions) or costs (such as temporary supply augmentations)
- continuing to contribute to the development of the Plan, primarily in the form of ongoing strategic and concept planning, as well as stakeholder engagement and consultation
- responding to the outcomes of the new Plan when completed in 2021, potentially including sufficient planning and design work to inform subsequent pricing submissions.

3.3. Hunter Water's strategic planning and asset management

As part of the scope for the review, we have reviewed Hunter Water's strategic planning and asset management frameworks. To undertake this assessment, we have considered:

- long-term strategy
- investment planning and governance
- asset management systems
- enterprise risk management framework
- investment prioritisation
- cost estimation, and
- procurement.

The following provides a summary of our assessment against each of these elements.

3.3.1. 2017+3 Strategy

Hunter Water's 2017+3 Strategy (the Strategy) outlines its approach to developing a Long-Term Plan (LTP), intended to come into effect with the outcome of the price determination process in 2020. The Strategy (key elements of which are summarised in Figure 1):

- articulates Hunter Water's vision, purpose and values
- identifies strategic drivers – the key challenges and opportunities that will drive Hunter Water's strategic and planning response
- establishes the aspirational goals of the LTP, and identifies the strategic priorities and shorter-term strategic initiatives that will support its development.

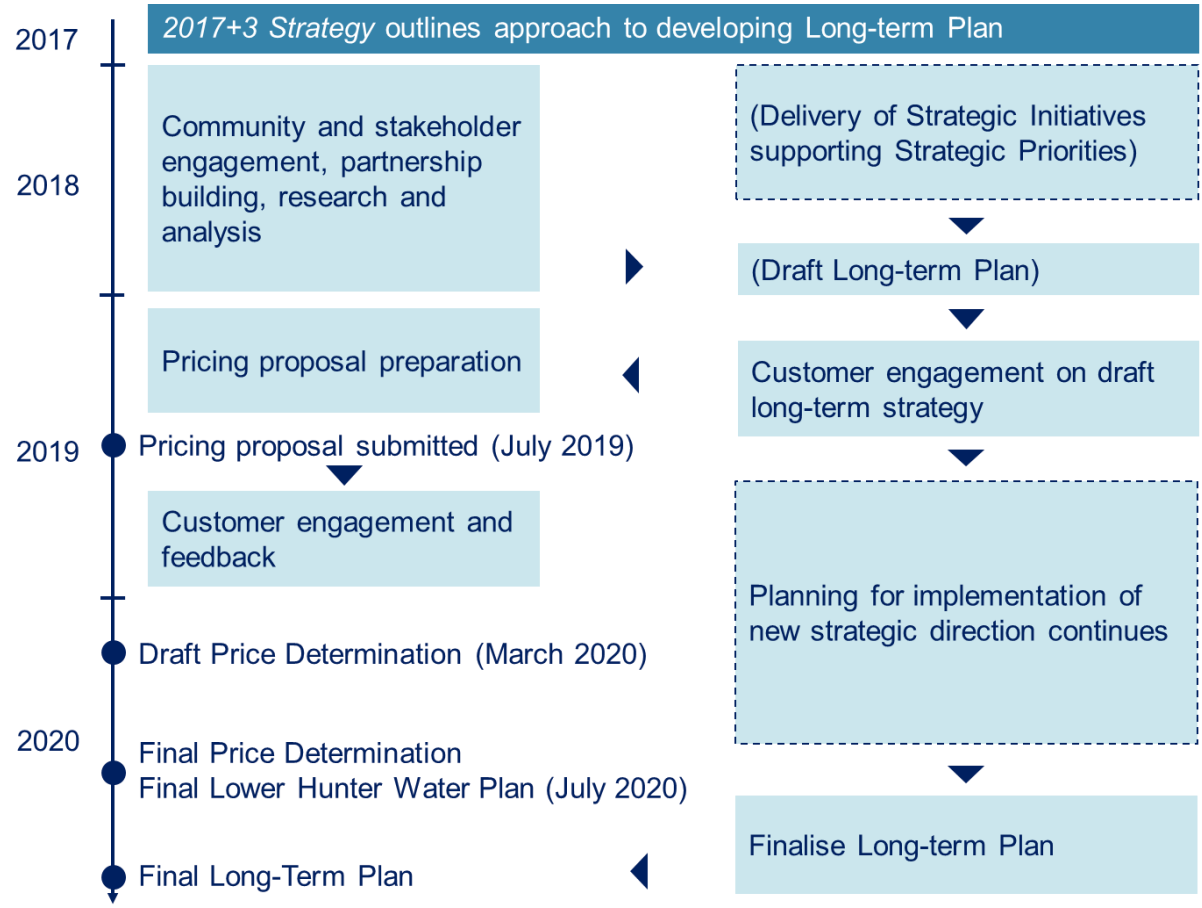
2017+3 Strategy establishes Hunter Water's…	
Vision	To be a valued partner in delivering the aspirations for our region
Purpose	To enable the sustainable growth of the region, and the life our communities desire, with high quality, affordable services
Values	Wellbeing | Collaboration | Innovation | Courage | Excellence | Honesty
Strategic drivers	Population growth | Changing planning environment | Carbon and electricity market | Customer, consumer and community expectations | Technological change | Climate change | Price and cost increases
Strategic priorities	• To be a **thought leader** in developing a sustainable and resilient water and wastewater future • To enable **good development** • To provide **great services** to our customers, consumers and communities • To realise the benefits that being a **digital utility** can provide • To lead the water industry in efficiency and **productivity** • To be a **great employer**
Aspirational goals	• Being carbon neutral by 2030 • Maintaining our prices in line with inflation • Adding 10 years to the timing of future source augmentation • Gaining full support from our customers and community for our decisions

Source: Aither, based on Hunter Water's 2017+3 Strategy

Figure 1 Summary of key elements of Hunter Water's *2017+3 Strategy*

The indicative three-year timeframe of the Strategy set an ambitious program to: deliver a wide range of strategic initiatives to inform the longer-term direction; test the emerging plan with customers and stakeholders; prepare the pricing proposal; then review and refine the LTP based on the outcomes of the final price determination. Hunter Water's pricing proposal indicates that the Strategy represents a considered shift towards investing more time and effort in long-term business planning. It also acknowledged that the program for preparing the LTP would necessarily be dynamic and iterative to accommodate the findings of investigations and community feedback.

A broad representation of the three-year program that was proposed is summarised in Figure 2. However, although the Strategy remains the basis for the business' overarching strategic direction – and a three-year internal plan has been initiated to implement it – Hunter Water advised that it has not yet prepared the LTP as articulated in the Strategy. The Pricing Submission (and associated Technical Papers) remain the most recent and public confirmation of Hunter Water's direction and intended investment, with the expenditure informed in part by some of the shorter-term initiatives outlined in the Strategy.



Source: Aither, based on information from Hunter Water

Figure 2 Indicative process and timeframe for preparation of Long-Term Plan

In addition to a focus on developing a deeper understanding of customer and community expectations, another key feature of the Strategy is the large number of shorter-term strategic initiatives aligned with each of the Strategy's strategic priorities. The initiatives are indicated as foundational to the longer-term direction, many of which are delivering changes to the business as well as comprising investigations to inform the LTP. There are also a number of initiatives that were explicitly identified to help inform the pricing proposal. This includes, for example:

- a Biosolids and Renewable Energy Strategy to define the strategy for reducing carbon emissions and generating renewable energy
- a Sustainable Wastewater Strategy to define the long-term strategy for wastewater system performance and recycled water management
- preparation (in partnership with DPI) of the Lower Hunter Water Plan, to define the long-term strategy for water security and drought response
- a Service Level Strategy to define whether changes to current levels of service are justified based on cost and customer and community engagement.

Given the breadth and extent of the Strategy, Hunter Water indicated that it intends to develop a long-term plan when:

- the outcomes of the price determination process are known

- further key strategic investigations are completed by the water resilience team (including the Lower Hunter Water Plan) and sustainable water team (including the biosolids and renewable energy strategies)
- a permanent Managing Director is appointed.

Hunter Water also noted improvements to investment management processes that are currently being implemented (including the development of strategic cases, discussed in Section 3.3.2 below), which will help inform a consolidated portfolio view of the capital program as part of the LTP.

The delivery of a clear strategy reflects good practice and provides a sound basis for Hunter Water's strategic direction, planning and proposed investment. The outcomes of this process have led to the identification of five priority areas that are identified in Hunter Water's pricing proposal:

1. Using the Enterprise Risk Management Framework to target investment
2. Managing water as a precious resource
3. Understanding customers' values, preferences and priorities
4. Striving for productivity and efficiency gains
5. Catch-up investment in IT to improve business productivity and interact with customers.

These priorities have further concentrated a focus in three core service areas:

- water resilience – particularly leakage reduction and efforts to reduce demand
- energy efficiency projects – including expenditure on renewable energy generation, energy efficiency and alternative procurement models
- biosolids management – investigating long-term opportunities to centralise biosolids treatment, reduce (or recover) energy, and mitigate the risk associated with tightening environmental compliance and current disposal options.

Aither assessment

Hunter Water's 2017+3 Strategy set an ambitious program of initiatives to inform its long-term plan and pricing proposal. In this respect it reflects the implementation of a clear, proactive and rigorous framework for strategic planning, which underpins and supports the business' resulting focus areas.

The strategic drivers identified by Hunter Water are consistent with those observed across the industry, and the strategic priorities reflect a sound response with a comprehensive, if not ambitious, program of initiatives.

Despite its three to four-year duration, the ambition of and program for the Strategy may have put pressure on Hunter Water to synthesise and consolidate the findings of its many investigations within a relatively short timeframe. This includes the stated intent to iteratively develop and refine, often in parallel, its pricing proposal and long-term plan – as well as interfacing with other inputs, such as the revision of the Lower Hunter Water Plan.

However, it is evident that, despite the Strategy's indication that a long-term plan would be prepared at this point, this was overly ambitious. Nonetheless, the reasons indicated by Hunter Water for the delay to the LTP are reasonable and valid – including the legitimate consideration that a new Managing Director should expect to contribute to shaping the longer-term direction of the business.

Given the extent of the actions proposed in the Strategy itself, the failure to deliver on the ambition to have a long-term plan in place does not undermine the clarity of Hunter Water's strategic direction or the basis for its proposed expenditure. It would have been inefficient to pursue the original timeline for the long-term plan if the necessary inputs were not complete. However, some of those inputs – especially the Biosolids Strategy, for example – remain consequential for proposed investment in the forecast regulatory period, given that there are examples of substantive works to address performance deficiencies that should align with longer-term management plans.

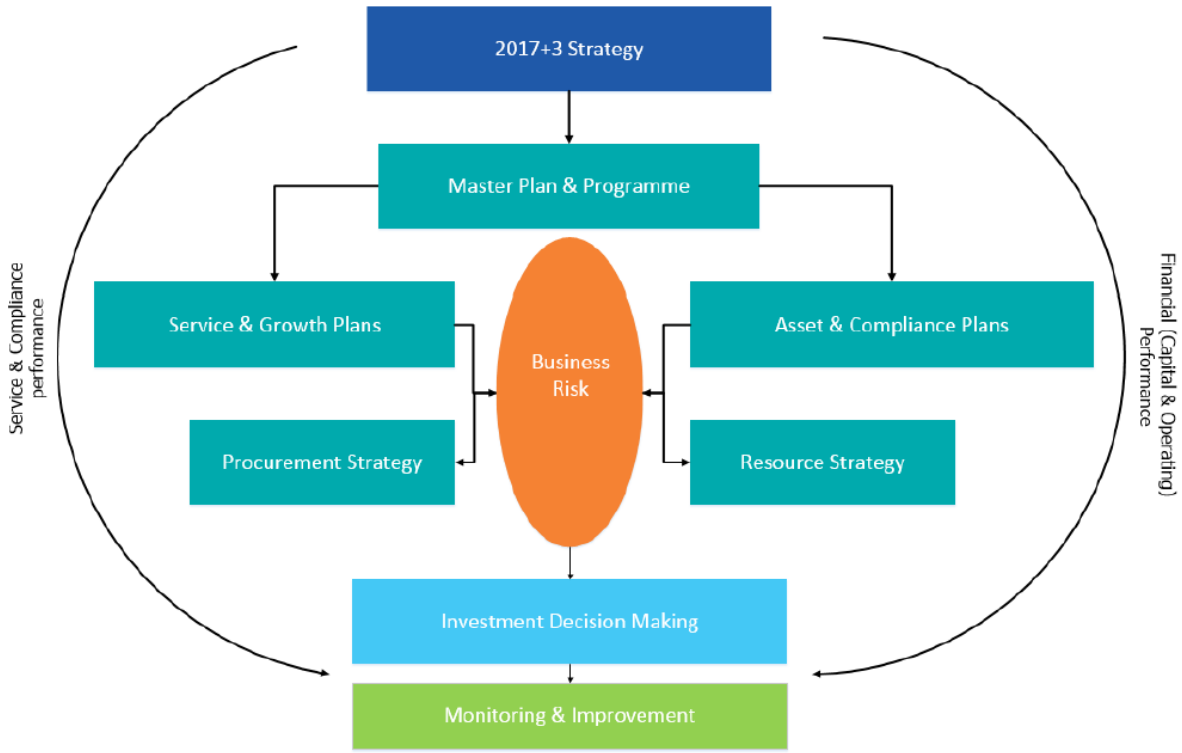
The process of preparing and implementing the Strategy demonstrates Hunter Water's mature and evolving approach to strategic and long-term planning. It provides a framework for establishing and implementing a sound long-term plan, as well as refining subsequent strategic planning cycles with the benefit of experience from the Strategy's implementation.

3.3.2. Investment planning and governance

The Strategy provides the overarching direction for Hunter Water's investment planning process, which the business represents as illustrated in Figure 3. This representation provides an indication of the comprehensive and detailed framework that Hunter Water has in place to identify, inform and determine its investment priorities. At the centre of this framework is the business' Enterprise Risk Management (ERM) system. The introduction of the ERM reflects a material change in Hunter Water's operation since its last price determination, and is discussed further below.

In addition to the various interfaces with key systems and processes – such as, for example, asset management, growth planning and procurement – Figure 3 is also broadly indicative of the way in which Hunter Water progresses from strategy to investment decision-making. This is described as including:

- Setting objectives and drivers
- Decision-making to achieve objectives
- Prioritisation
- Delivery and control of investment
- Performance assessment (benefits realisation) to ensure that proposed investments deliver the planned benefits.



Source: Hunter Water

Figure 3 Hunter Water's investment planning process

To better align its investment programs – recognising the inter-relationships and integrated benefits across projects – Hunter Water is transitioning to the application of Strategic Cases, within which programme business cases, then individual project business cases are nested (see Figure 4, which also illustrates the alignment between business case progression and the gateway approval process).

Source: Hunter Water

Figure 4 Business case transition and alignment with Gateway Approval Process

The Strategic Cases – of which nine are currently identified – should demonstrate the case for change by articulating the problem or opportunity, the current risks relative to the Board's risk appetite, the benefits desired of investment, and the strategic response proposed. Once this high-level need and response is established through the Strategic Case, investment program business cases would typically follow as a basis for seeking to allocate expenditure to a range of projects (to be delivered in tranches over time) that aim to achieve common objectives.

An example of the relationship between a Strategic Case, programs and individual projects is provided in Figure 5.

Source: Aither, based on information provided by Hunter Water

Figure 5 Example of the linkage between Strategic Cases, programs and projects

The Gateway Approval Process governs the progression and prioritisation of business cases. This process provides formal points (gates) at which key information is reviewed and decisions are made, which ensures that projects or programmes are continually reassessed throughout their lifecycle and proposed investment remains efficient. As the basis for decision-making, business cases are a critical part of the process. Hunter Water has adopted aspects of the *Better Business Case* investment model to improve the efficiency and robustness of business case preparation.

An overview of the Gateway Approval Process is provided in Figure 6. Projects with approved business cases join the capital portfolio, which is managed in accordance with a detailed capital portfolio management framework. The framework (and associated guidelines) outline the various processes, documents and guidance that supports investment and portfolio management. Central to this are the governance arrangements that are in place to ensure that investments are strategically aligned, appropriate and delivering the best value for customers.

Gateway		Purpose	Outcome
1	Preliminary Gateway	Confirms the case for change, driver, investment need, strategic alignment, preliminary economic assessment & warrants further investigation	Capital investment allocated on portfolio
2	Development Gateway	Confirms economic assessment, option identification, clarification of risk (full business case for approval to proceed)	Proceed to development / design
3	Delivery Gateway	Reconfirms business case is valid, risks can be managed, outcomes can be achieved, funding is available	Gain approval for delivery funding to proceed to call for tenders
4	Contract Award Gateway	Reconfirms business case is valid, risks can be managed, outcomes can be achieved, funding is available	Proceed through to award of tenders
5	Completion Gateway	Assess whether business case functional outputs have been achieved, risks have been managed	Proceed to project close-out

Source: Aither, based on information from Hunter Water

Figure 6 Overview of Gateway Approval Process

Investment decisions progress through a number of steps, including key committees (summarised in Figure 7), which collectively provide direction to and governance of the capital portfolio and its projects. In particular, the:

- Management Investment Committee provides oversight of, and makes decisions on, all major financial commitments and undertakings, with a purpose, objectives, duties and responsibilities that are set out in the Investment Committee Charter
- Board Investment Committee has a number of objectives that it must achieve to fulfil its purpose to assist the Board of Directors in meeting their responsibilities
- Procurement Committee independently reviews all major procurement activity to ensure outcomes are aligned with the organisation's strategic and operational objectives
- Investment and Innovation Management Committee has been established to provide strategic oversight and make decisions on major infrastructure delivery issues
- Asset Provision Steering Committee critically assesses price path provisions (PPPs), ensures financial compliance, and explores options to defer or modify business case scope to release capital that could mitigate potential cost increases elsewhere in the program or portfolio.

Source: Hunter Water

Figure 7 Overview of investment governance

Aither assessment

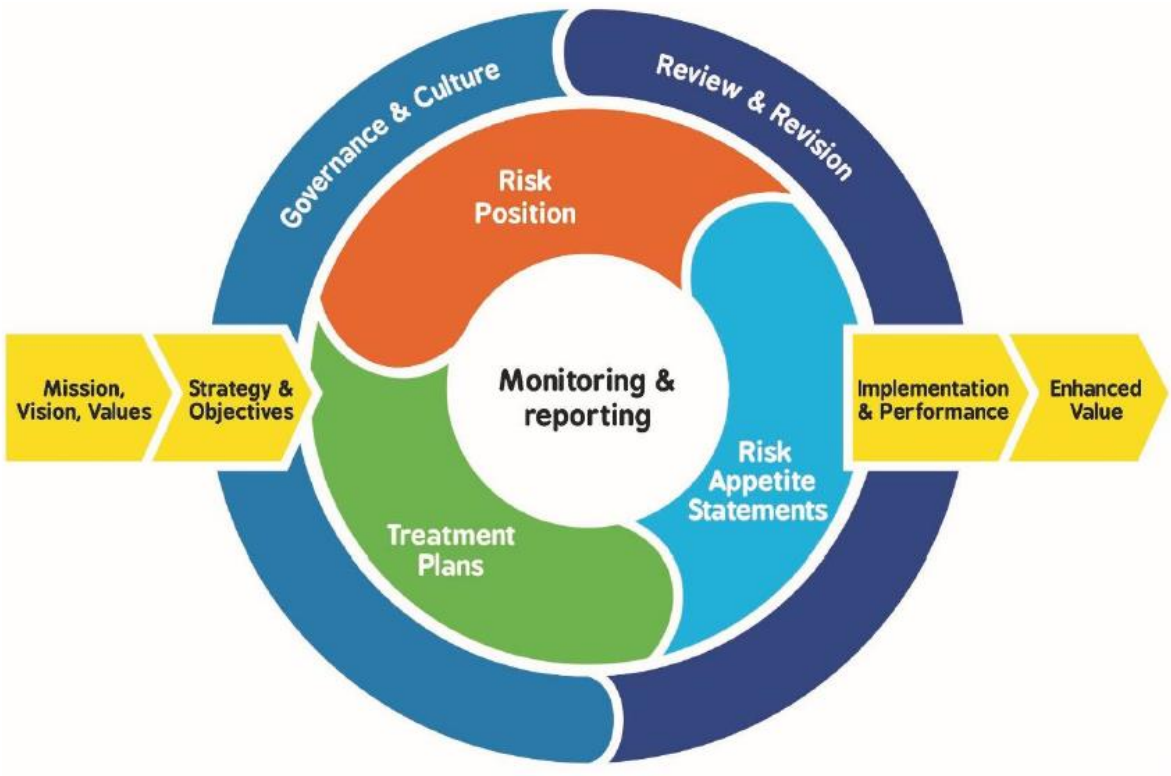
Hunter Water's framework for investment planning and governance is comprehensive and mature. Key aspects – such as the Gateway Approval Process and the approach to business cases – are modelled on best practice or appropriate standards, while the existence and purpose of multiple committees supports robust interrogation of business cases throughout their lifecycle.

It is noted that Hunter Water is still transitioning to the implementation of Strategic Cases as a basis for aligning programs (and projects) that support common objectives. Whilst sound, it will be important to monitor the extent to which this leads more effectively to identifying optimal project selection. In particular, it may be necessary to ensure that the process does not preclude revisiting the proposed strategic interventions or responses, if priorities change or new information suggests an alternative approach. Similarly, it is important to ensure that viable project options are not prematurely eliminated as a result of comprising part of a program that is not selected. In general, however, the stages and requirements of the framework should provide a basis for iterative decision-making that addresses this risk.

3.3.3. Enterprise Risk Management Framework

Hunter Water undertook a comprehensive review of its Enterprise Risk Management (ERM) Framework during the current regulatory period, which has driven a re-assessment of investment priorities and underpinned substantial investment proposals in some areas. A conceptual overview of the ERM Framework is illustrated in Figure 8, which broadly reflects the following considerations when informing decisions:

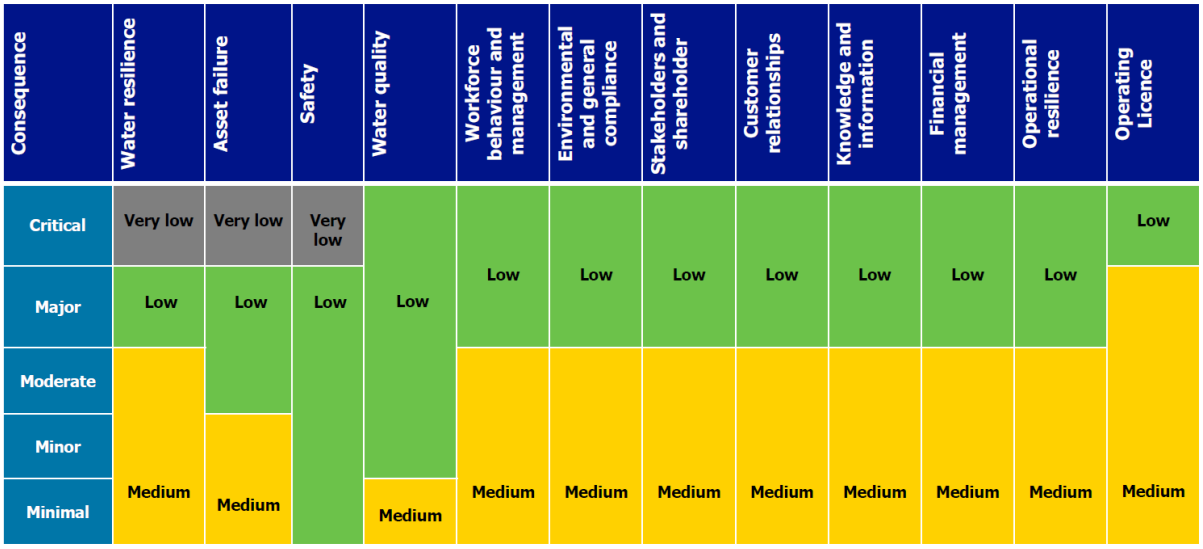
- What is the current risk position?
- What is the target set by risk appetite statements?
- Is there a gap, and if so, what is required to close it?
- What is needed to monitor agreed actions and trends?



Source: Hunter Water

Figure 8 Overview of Hunter Water's Enterprise Risk Management (ERM) Framework

The framework aligns with ISO 31000:2018 – Risk management and utilises the standard expression of risk as the outcome of likelihood and consequence. At the core of the ERM is a series of risk appetite statements that articulate the Board of Directors' expectations for a selection of all identified risk areas. These statements, summarised in Figure 9, describe 'the amount and type of risk the organisation is prepared to pursue, retain or take'. They are linked to the strategic objectives of the business and reflective of stakeholder expectations.



Source: Hunter Water

Figure 9 Summary of risk appetite statements

The risk appetite statements are a key factor in driving investment decisions and are integrated into all aspects and levels of decision-making, including strategic planning processes, Board deliberations and business cases.

At a high level, the ERM Framework comprises the following elements and processes:

- a Corporate Risk Profile, which provides an overview of the number, type and potential effects of each risk on the organisation (currently comprising 21 risk 'events')
- Risk Treatment Plans document the many risk drivers contributing to each risk 'event', aggregating the outcomes into an overarching rating that reflects the overall position of the risk
- the Risk Treatment Plans also document the planned response to risk drivers that are outside of appetite, identifying actions, costs, timeframes and anticipated risk-reduction
- actions to address gaps between identified risk and the relevant risk appetite include interim actions, non-capital solutions and longer-term actions, with proposed risk treatment actions developed into programs of work
- Risk Business Partners embedded within the business oversee compilation of risk information, which is reviewed by the relevant Executive Risk Owner and Executive Management Team
- progress is monitored through quarterly risk status reporting to the Audit and Risk Committee and updates to the Board.

Risk appetite levels were revisited in 2017 in response to an observed increase in the incidence of some critical risks. Hunter Water has subsequently aimed to balance the investment required to close the gap between current risk levels and risk appetite, with the potential impact on customer prices.

Aither assessment

Hunter Water's ERM reflects a mature approach to risk management that is aligned with good industry practice. The enhancements made to the framework – and in particular revisions to risk appetite – have had some impact on proposed expenditure. This is indicative of the trade-off the business must manage between accepting some risk, and prioritising investment in risk treatments that will better align controlled risk with the business' risk appetite.

Overall the ERM is prominent within the business and appears to have a positive role in major decision-making for Hunter Water. To the extent that proposed investment is being driven by risk, the need for that investment may be influenced by:

- whether the risk framework is robust, clear and transparently and consistently applied across the business
- whether Hunter Water's risk appetite aligns with the expectations of customers.

In relation to the former, Hunter Water's ERM Framework is comprehensive and appears well embedded within the business. The ERM Standard provides guidelines for risk assessment, including thorough descriptors of consequence, likelihood and examples across different risk areas. To the extent that the principles of the Standard are being consistently applied – in combination with the oversight of the Executive and Audit and Risk Committee – the assessment and articulation of risk and its treatment appears robust and appropriate.

The revision of risk appetite levels, however, has implications for a number of areas of Hunter Water's proposed capital expenditure. Adopting a more risk averse approach can have a significant impact on the level of capital expenditure proposed to address a particular area of risk.

This issue is identified and discussed in Aither's detailed review of several major programs within the capital expenditure portfolio (see Section 4.5).

Observations in relation to the application of the ERM to the capital program

The focus on the ERM aligns Hunter Water with industry practice and is appropriate for use in the development of capital expenditure planning, prioritisation and delivery. The application of the ERM and consideration of risk is widely evident and observable.

However, it is also evident that the application of greater sophistication to Hunter Water's ERM framework is still evolving in practice. Some of the issues observed are summarised below:

- In many projects reviewed by Aither, there was limited transparency about the extent and nature of the risk assessment undertaken (including how risk was evaluated and scored).
- There appears a heavy reliance upon subjective risk methodologies. Whilst this is appropriate and necessary in many instances, for large expenditure the use of objective risk assessment (using scenario modelling and analytical tools incorporating numerical probability) provides greater rigour and is preferable. However, there are also examples of where such approaches are adopted and should become more prevalent with greater familiarity and expertise.
- The absence of objective risk methodologies introduces the potential for bias (unconscious or otherwise), particularly where subject to influence from recent experience. For example, Hunter Water's recent experience of environmental non-compliance in some areas could lead to the tendency for excessively risk-averse assessments in subjective scoring, which introduces the potential for inefficient expenditure.
- Many of the specific challenges Hunter Water is addressing are complex and multi-faceted. The business case and other documentation observed by Aither rarely identified or discussed these relationships and how more than one risk was being mitigated. Understanding the interfaces between multiple risks is necessary to help inform corporate priorities, as well as to contribute to decision-making about optimal project scopes and costs. While it is likely that this is considered in the course of most project development and cost estimation, the documentation Aither observed rarely identified multiple or related risks in a structured way. The establishment of strategic cases may also provide an opportunity to better consider and document the interrelationships between multiple risk factors.

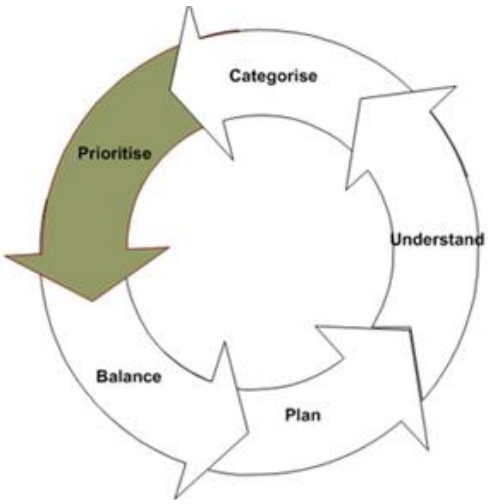
- Risk analysis applied in the development of cost estimates and program expenditure is typically simplistic and largely adopts subjective assessments when developing allowances. Most larger utilities in Australia – similar to major infrastructure development in other sectors – now adopt more formal and sophisticated scenario modelling techniques to better understand risk and uncertainty to incorporate this appropriately in cost estimates and decision-making. Hunter Water should move in this direction for its major programs.

In summary, the ERM provides a consistent framework that assists with the evaluation of all Hunter Water's projects. Its application is cited in almost all business cases and provides confidence that there is a high degree of awareness about the framework and its application within the business.

Specific incidences of some of the general issues observed above have been identified and taken into account, where relevant, in Aither's review of the various programs and projects proposed for the forecast regulatory period.

3.3.4. Investment prioritisation

In fulfilling its objectives, the Board Investment Committee must provide a strategic overview of the longer-term capital portfolio, including prioritisation and balancing of projects and programs. This must also be facilitated on an ongoing basis, which is achieved within the capital portfolio management framework through the articulation of the portfolio definition cycle. Within this cycle, Hunter Water has a detailed process for the prioritisation of programs and projects.



Source: Hunter Water

Figure 10 Prioritisation as a stage in the portfolio definition cycle

Hunter Water uses prioritisation criteria to objectively assess, score and rank each project. The criteria are described as 'lenses', each of which every project must be progressively assessed against. The prioritisation criteria, or lenses, assess whether projects:

- are **forced** (mandatory and present no real investment choice) or **constrained** (business impacts would arise if investment is moved or deferred)
- contribute to **compliance**
- align with strategic objectives to deliver **value**
- present **complexity** risk.

The output of the assessment process is a prioritised portfolio, based on an objective comparison of all projects. This is then a basis for stakeholder engagement, scenario modelling and balancing the

portfolio to provide the optimal mix of projects to achieve the organisation's objectives within constraints (resources, time and risk) over the planning horizon.

Aither assessment

While the capital portfolio management guidance provides a detailed basis for prioritising investment, the outcomes in practice will depend on the extent to which this process is – and particularly subjective judgements therein are – applied consistently.

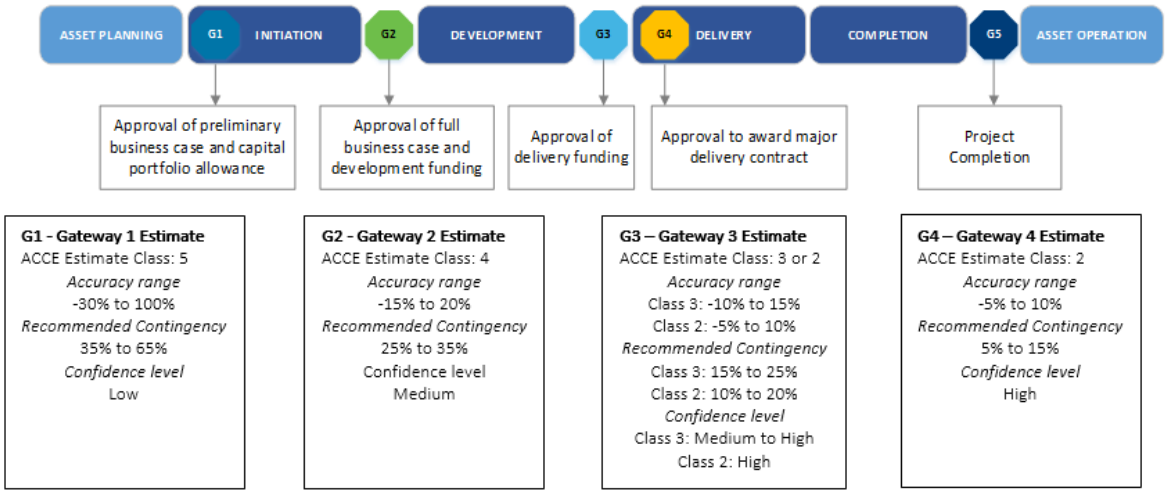
3.3.5. Cost estimation

Hunter Water conducted a review of its cost estimation performance during the current period, in response to incidences of large variation between tender responses and approved funding for a number of projects. The need to improve estimating practices was a driver of the establishment of the Program Portfolio Manager (PPM) Partnership Agreement, with whom Hunter Water undertook to seek expert advice to develop and implement an improvement plan for cost estimating.

As part of its review of cost estimating processes, Hunter Water:

- established that its objectives for estimating accuracy through the project life cycle (which are detailed in the Capital Project Estimating Guidelines and were approved by the Board Capital Works Committee in 2014) remain appropriate
- benchmarked cost estimating objectives and guidelines with comparable organisations and found them to be consistent with good industry practice, but that they would benefit from: formally linking to an accepted international standard; and having clearer guidance on estimate expectations for Gate 3 delivery funding submissions
- proposed the implementation of a cost estimating framework based on the international AACE (Association for the Advancement of Cost Engineering) standard
- updated its Capital Project Estimating Guidelines and related cost estimating tool (currently in the process of finalisation and approval).

Hunter Water expect the implementation of this framework (summarised in Figure 11) – which also aligns with the existing Gateway approval process – to provide greater transparency on the design inputs and level of contingency required to achieve the desired level of estimating accuracy.



Source: Hunter Water

Figure 11 Summary of Hunter Water's cost estimating framework

Data provided by Hunter Water for 23 projects at July 2019[5] showed that:

- 12 (52 per cent) did not meet the objective for target variance (< +/-25%) between Gateway 2 and final cost estimates
- 9 (39 percent) did not meet the objective for target variance (< +/-10%) between Gateway 4 and final cost estimates
- the objectives were met for the total cost of the portfolio of projects, with a variance of 10 per cent between Gateway 2 and final cost estimates, and 3 per cent between Gateway 4 and final cost estimates,

Aither assessment

Hunter Water acknowledged deficiencies in its cost estimating processes during the current period. The response appears proportionate and reasonable, with changes to processes that align Hunter Water with industry practice and relevant international standards.

Aspects of Hunter Water's practice improvements are still in the process of finalisation and embedding across the business, so it is not yet possible to assess the extent to which they will address the shortcomings addressed. However, revisions to Hunter Water's guidelines and cost estimating tool should be expected to deliver improvements.

Aither observed the extent to which cost estimates for a number of projects have varied significantly, particularly between early Gateway approvals and the outcomes of tender processes. This provides evidence for the action taken by Hunter Water in the period to improve cost estimating practices. The effectiveness of the changes implemented will be demonstrated by future cost estimating outcomes.

[5] Variance Report July 2019, Hunter Water

3.3.6. Procurement

Hunter Water has a comprehensive procurement framework comprising key documentation that includes:

- Procurement policy
- Procurement Committee Charter
- Tendering procedure
- Tender assessment and contract award procedure
- Purchasing procedure
- Contract management framework.

The framework establishes the controls that all officers must comply with in meeting their procurement duties. This aligns with delegated authorities to ensure accountability in decision-making, while managing specific procurement risks. This includes centralisation of procurement activities above a threshold of $150,000, for which a dedicated team manages procurement to ensure compliance with internal controls and adherence to the direction provided by the Procurement Committee. The Committee is also part of the governance and independent oversight of major procurement activity.

Hunter Water has a range of established panels and other contracting arrangements to support efficient and competitive procurement of key capital and operational activities. Evaluation of tenders requires the price of a good or service to be given a weighting of at least 50 per cent, to ensure value for money.

Hunter Water also adopts a tiered approach to tendering, whereby any expenditure greater than $200,000 is required to be procured through an open tender process or an established panel. The procurement team provides assistance as required to support procurement and contract development below the threshold, which includes obligations for at least:

- one quote for contracts up to $15,000
- two quotes for contracts between $15,001 and $50,000
- three quotes for contracts between $50,001 to $200,000.

Aither assessment

Hunter Water's procurement processes are consistent with industry practice and appear robust and appropriate. The extent to which those policies and procedures are consistently followed will then be a key determinant in whether procurement is contributing to efficient outcomes. Hunter Water's documentation provides evidence that appropriate processes are being observed.

3.4. Our assessment of Hunter Water's strategic planning and asset management

Hunter Water's governance, strategic and investment planning, risk and asset management arrangements are aligned with industry practice and appear appropriate and reasonable. Although these arrangements are underpinned by sound foundations, Hunter Water has also identified and responded to a number of improvement opportunities during the period, including the development of a four-year strategy, implementation of a more substantive Enterprise Risk Framework, and refinements to cost estimating processes.

Hunter Water aspired to develop a long-term plan in parallel, which has not eventuated. Although the 2017+3 Strategy provides a strategic direction and a substantive list of initiatives, these will be given greater clarity by the completion of a long-term plan. Hunter Water maintains this will be more appropriate once the outcomes of key inputs – including their price determination and key strategies such as the Biosolids Strategy and Lower Hunter Water Plan – are known, as well as a permanent Managing Director appointed.

As noted in Section 3.3, the reasons cited by Hunter Water for the delay of the long-term plan appear reasonable, particularly to provide the opportunity for a new permanent Managing Director to guide future strategic direction. However, the preparation of a long-term plan in parallel with many significant strategic initiatives was also ambitious and challenging. Given this, it is appropriate that the long-term plan should not be tied to an arbitrary and overly ambitious deadline where important inputs are not yet complete.

The implementation of the ERM is indicative of Hunter Water's maturing approach to risk management. The framework appears appropriate and robust. However, when observing the application of the ERM to specific projects, Aither identified some instances where the risk assessment was not completely transparent, relied upon subjective assessment and adopted a conservative risk position that contributed to driving investment. There is an opportunity for Hunter Water to continue to adopt greater sophistication in its consideration of risk – including more objective methodologies – to drive more efficient outcomes in future.

Hunter Water has recently reviewed and improved its cost estimation processes. The need for these improvements has been observed in the course of Aither's review. Hunter Water is still finalising the improvements to its processes, so the success of these changes in addressing some deficiencies in cost estimation will be observable over time.

3.5. Output measures

As part of the scope of this review, Aither was required to assess the output measures proposed by Hunter Water for the upcoming regulatory period (and its actual performance against output measures established as part of the previous review). One of the difficulties in assessing Hunter Water's proposed output measures is that they are not linked to any overarching outcomes – i.e. what is the output measure attempting to indicate achievement of?

The following provides an overview of why outcomes are important to understanding the appropriateness of output measures and then our assessment of Hunter Water's proposed output measures.

3.5.1. Outcomes and outputs in strategic planning

Outcomes are important in strategic planning, as they are a clear articulation of what success looks like for individuals, communities, the environment or other beneficiaries as a result of your organisation or program's activities. They help provide focus for directing effort and investment. Outcomes also provide the basis for measuring and demonstrating progress resulting from the work you do and help identify if you need to make any adjustments to the program to ensure success. Measuring success is also important to help make a case for further funding. Overall, outcomes:

- seek to clearly articulate what success looks like
- are deliberately high-level, largely avoiding prescribing specific actions or processes

- are framed, with appropriate detail, for the intended audience (e.g. Minister, senior executive, general public)
- are often inherently interrelated.

Outcomes approaches are increasingly recognised by national and state governments, as well as government departments and agencies, as a best-practice approach to planning. At a national level, Scotland implemented its first outcomes framework (the National Performance Framework) in 2007, and has reviewed and updated it twice since, most recently in 2016. It contains 16 National Outcomes, which describe what the government wants to achieve, and 55 National Indicators, which are used to measure progress against the outcomes (Scottish Government, 2019). In Australia, Victoria is leading at a state-level through its outcomes reform. This is being progressively adopted by various departments and agencies, including the Essential Services Commission, which introduced an outcomes-based water pricing framework, known as PREMO.

The difference between outcomes and outputs is a common point of confusion. While outcomes represent the desired change or impact, outputs represent the tangible things that result from your activities. They capture the widgets you produce, but they don't capture change or impact. Outputs are essential, but they can't demonstrate performance against outcomes.

These terms can be structured in an outcome logic. Outcome logic is a common approach to strategic planning. It expresses how change is expected to occur within a system. It captures the rationale behind a program or initiative, probing and outlining the anticipated cause-and-effect relationships between defined inputs, activities, outputs and outcomes. Outcome logic also provides a consistent basis upon which to monitor success and drive continuous improvement in the way management actions and programs are identified, delivered and refined over time. A template for an outcome logic is provided in the figure below.

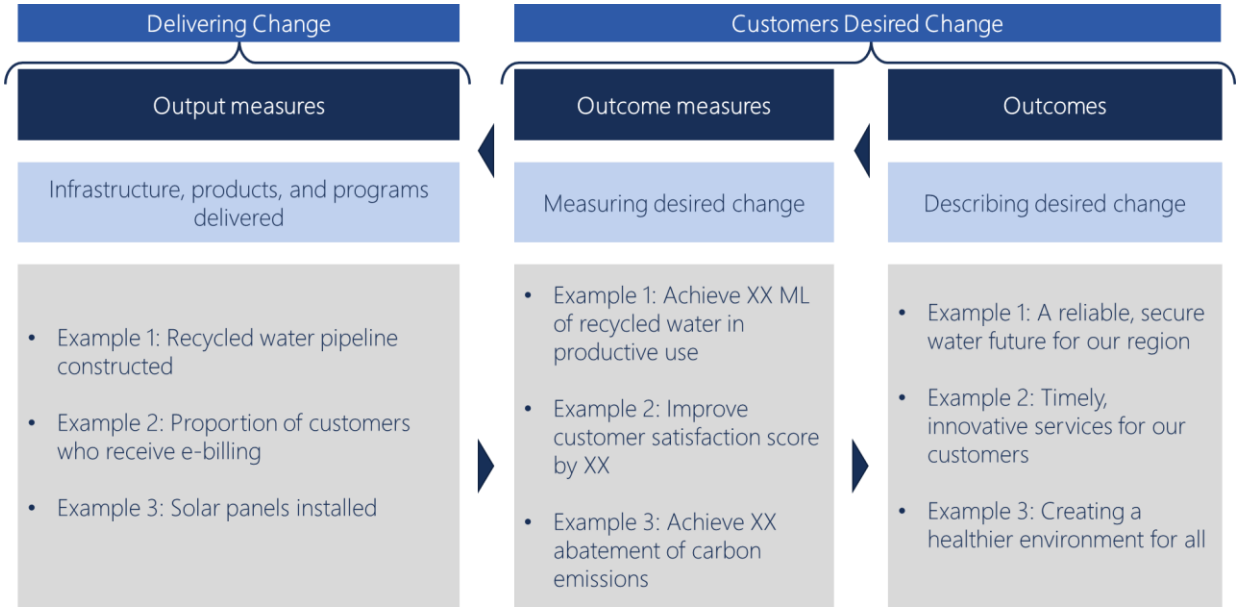
Source: Aither

Figure 12 Example outcome logic template

3.5.2. Outcomes and outputs in the context of utilities

Output measures are intended to track a utility's performance against pre-defined outcomes. Outcomes represent desired long-term changes in the services provided by utilities and should be informed by consultation with the respective utility's customers.

Figure 13 provides a conceptual map of the relationship between outcomes and outputs, and includes examples commonly used by utilities. The process begins with defining a problem or opportunity statement, this is translated into an overarching long-term change (vision), the overarching vision is then categorised into specific outcomes, which are then delivered on. As mentioned above, output measures are tangible and measurable indicators of performance against outcomes.



Source: Aither

Figure 13 Outcomes, Outcome measures, and Output measures

It is difficult to assess the appropriateness of output measures in the absence of defined outcomes. Given this, we have assessed the proposed output measures based on Hunter Water's actual performance in relation to these measures. Aither has not sought to consider the appropriateness of whether the inclusion of an output measure would lead to particular outcomes.

3.5.3. Hunter Water performance against target output measures

Hunter Water has provided information on its performance against the output measures that were established for the current regulatory period. For all except two output measures, Hunter Water has met, or exceeded, the targets that were set. The two output measures that are expected to be behind from the current regulatory period are:

- Switchboard's replaced – a target of 40 sites, but an expected result of 36 sites
- Replace 20mm customer meters – a target of 67,000 meters, but an expected result of 62,021 meters.

While these two output measures are behind the targets, they are not materially under-delivering and expected to be equal to or less than 10 per cent below the target.

Two output measures significantly exceeded their initial target – trunk mains undergoing condition assessment and critical trunk main replacement. The reasons for these significant increases were operational incidents that required additional steel trunk main assessments and the bringing forward of the replacement of a section of the Chichester Trunk Gravity Main (CTGM) within the period. Both of these explanations appear reasonable.

3.5.4. Hunter Water proposed outputs

Hunter Water has proposed output measures for the upcoming regulatory period, as outlined in Table 7. Hunter Water's rationale for these outputs include that the proposed output measures and their metrics are an extension of the previous pricing periods output measures, with natural variations in target outputs occurring where there are specific capital works programs in response to an ageing water supply network. Specifically, Hunter Water states:[6]

> *Hunter Water's output measures are consistent with the proposed capital investment program detailed in this paper (Technical Paper 4), reflecting condition assessments. asset replacements, and renewals planned for the next regulatory period to effectively meet customer, environmental and safety requirements.*

Aither's assessment of the proposed output targets is provided subsequently in section 3.5.5.

[6] Hunter Water Pricing Submission: Technical Paper 4, p. 52.

Table 7 Hunter Water's proposed output measures

Output (or activity) measure	Units	2016-20 Actual		2020-25 Forecast		Variance	Hunter Water's commentary
		Total	Annual	Total	Annual		
Water services							
Renewal/ reliability of distribution mains	km	22	5.5	36	7.2	31%	The minor increase is aligned with increase in program funding
Trunk mains undergoing condition assessment	km	54.1	13.5	130	26.0	92%	The increase associated with the condition assessment of the CTGM falling into the period (80km)
Critical trunk main replacement	km	15.4	3.9	28	5.6	45%	The increase is predominately associated with major critical mains program proposed to address community safety risks
Wastewater services							
Renew non-critical mains	km	44.1	11.0	65	13	18%	The minor increase is associated with proposed program budget increase. The program increase has been proposed to manage a broader sub-set of non-critical sewers through lifecycle costing, predominately high frequency overflows and more accurate deterioration modelling.
Critical sewer mains undergoing condition assessment	km	83	20.8	95	19	-8%	Forecast investment and outputs are consistent with 2016-20 price path

Output (or activity) measure	Units	2016-20 Actual		2020-25 Forecast		Variance	Hunter Water's commentary
		Total	Annual	Total	Annual		
Renewal/ refurbishment of critical sewerage mains (cast iron program)	km	3.1	0.8	5.8	1.2	50%	The forecast is 5.8 km, which represents a 50% annual increase. This increase is predominately in the cast iron lining program, which addresses risks of unlined pipes.
Mechanical and electrical assets							
Telemetry upgrades (water and wastewater)	Sites	356	89.0	27	5.4	-94%	Hunter Water's current program of replacing small obsolete PLCs at hundreds of network sites will be completed in PP16. During PP20, the PLC renewal program will be focused on more complex sites such as treatment plants and large pumping stations where there is an increased risk due to obsolete PLCs, which will result in a reduced quantity and cost.
Switchboards replaced	Sites	36	9.0	31	6.2	-31%	A number of switchboards were replaced in PP16 as part of major projects, program switchboard renewals, and price path provision switchboard renewals. The estimate in PP20 relates to replacing switchboards as part of the mechanical electrical renewals program only and does not forecast a large number of switchboards to be replaced in separate projects/programs. Risks will be monitored during the period and if an increased risk is identified, then consideration will be given to expanding the switchboard renewal program.
Replacement or refurbishment of pumps	Pumps	571	142.8	550	110.0	-23%	The forecast refers to combined replacements/refurbishments in both water and wastewater networks. the historical performance involved a higher level of refurbishments (which are at a lower cost per item), which is forecast to change to a higher level of replacements, which will reduce the total number of pumps impacted. The estimate relates to a forecast failure rate of pumps requiring renewal. If the actual failure rate exceeds this then a greater number of renewals would be required

Output (or activity) measure	Units	2016-20 Actual		2020-25 Forecast		Variance	Hunter Water's commentary
		Total	Annual	Total	Annual		
Stormwater drainage							
Stormwater drainage channel rehabilitations	km	1.37	0.3	3.4	0.7	99%	The increase is associated with major renewal projects and culvert refurbishments proposed for the price path period. Historical renewal activities have focused on more smaller length localised refurbishments and renewals.
Corporate							
Replace customer meters 20mm	meters	62,021	15,505	63,378	12,676	-18%	During PP16 an accelerated program of 20mm (residential) meter replacements was still being completed to address an identified risk of early failure in the backflow device contained within the meter. This risk was limited to one type of meter, but it was the prominent brand and model used on residential properties. The program required on average 30,000 meter replacements each year, and was completed by the end of 16/17. This increased amount of exchanges in the first year of the price path have raised the average per year. The PP20 forecasted numbers are consistent with replacement volumes prior to the accelerated program being required.

Source: Hunter Water submission to IPART issues paper, p.5

3.5.5. Aither's assessment of proposed outputs

Aither has sought to understand how Hunter Water has decided on the above output measures and their respective targeted quantities over the forecast price period (Table 8).

As outlined earlier, Aither has not necessarily assessed the appropriateness of the output measures other than to consider whether any perverse outcomes may eventuate. We consider that this type of assessment would form the basis of a broader assessment of the appropriateness of the output measures in line with a consideration of the specific outcomes that Hunter Water are seeking to deliver to their customers.

Table 8 Aither's assessment of Hunter Water's proposed output measures

Output (or activity) measure	Units	2020-25 Forecast	Variance to 2016-20 Actual	Aither's assessment
Water services				
Renewal/ reliability of distribution mains	km	36	31%	Hunter Water has increased their proposed renewal target to align with increased funding. We consider this to be a reasonable adjustment to the target.
Trunk mains undergoing condition assessment	km	130	92%	Hunter Water has nearly doubled its expected output when compared to the previous price period. The majority of this increase in output is associated with the condition assessment of the Chichester Trunk Gravity Main falling into the forecast price period. We consider the target set for linear assets to be reasonable.
Critical trunk main replacement	km	28	45%	Hunter Water has increased its expected output when compared to the previous price period. The proposed replacements are related to the large proposed program of condition assessment and required to address community and safety risks. We note that while there is a recommended adjustment to part of the program of work that will deliver on this output, we do not expect this to impact on Hunter Water's ability to meet the revised target. The part of the program that has been recommended for reduction appears to be primarily focussed on strengthening and other works and not replacements. Therefore, we consider the target set for linear assets to be reasonable.
Wastewater services				
Renew non-critical mains	km	65	18%	Hunter Water has increased their proposed renewal target to align with increased funding. Specifically, the increase is connected to Hunter Water's increased risk appetite include more accurate deterioration modelling of non-critical sewers. We consider the increase in the target to be reasonable.
Critical sewer mains undergoing condition assessment	km	95	-8%	Hunter Water has proposed a minor decrease to their renewal target. We consider change in the target to be reasonable.

Output (or activity) measure	Units	2020-25 Forecast	Variance to 2016-20 Actual	Aither's assessment
Renewal/ refurbishment of critical sewerage mains (cast iron program)	km	5.8	50%	Hunter Water has increased its expected output when compared to the previous price period. This increase is associated with their cast iron lining program to address the risk of unlined pipes. We consider the increase in this target to be reasonable.
Mechanical and electrical assets				
Telemetry upgrades (water and wastewater)	Sites	27	-94%	Hunter Water has substantially decreased its expected output when compared to the previous price period. The reasoning being telemetry upgrades moving from a large number of small network sites, to a small number of treatment plants and large pumping stations. We consider this to be an appropriate adjustment to the target.
Switchboards replaced	Sites	31	-31%	Hunter Water has decreased its expected output when compared to the previous price period. A large number of switchboards were replaced in the previous price period with the decrease more closely reflecting 'business as usual'. Hunter Water have noted that this estimate may increase. We consider that the revised target is reasonable.
Replacement or refurbishment of pumps	Pumps	550	-23%	Hunter Water has decreased its expected output when compared to the previous price period. The reasoning provided includes an increase in the forecast failure rate of pumps. This means that a greater number of pumps will require replacement. Conversely, there is a decrease in the number of pumps requiring refurbishment. We consider this change in target to be reasonable.
Stormwater Drainage				
Stormwater drainage channel rehabilitations	km	3.4	99%	Hunter Water has nearly doubled its expected output when compared to the previous price period. The majority of this increase in output is associated with a program of major culvert refurbishments and renewal projects falling into the forecast price period. We consider this to be an appropriate adjustment.

Output (or activity) measure	Units	2020-25 Forecast	Variance to 2016-20 Actual	Aither's assessment
Corporate				
Replace customer meters 20mm	meters	63,378	-18%	Hunter Water has decreased its expected output when compared to the previous price period. The reasoning provided was that a large replacements program was required in the previous price period. The decrease more closely reflects 'business as usual' prior to this replacements program. We consider this to be a reasonable adjustment given the performance within the current regulatory period.

3.5.6. Aither's recommended outputs

As outlined above, the appropriateness of output measures is dependent on the outcomes that they are designed to achieve. Given the lack of defined outcomes, it is difficult to determine the appropriateness of the output measures. We consider that a broader assessment of the output measures framework is adopted to establish clear outcomes for Hunter Water, that would then allow a more comprehensive and robust assessment of the proposed output measures. We note that this is consistent with Hunter Water's response to IPART's Issues Paper which states that it considers it appropriate to review the role that output measures have within the regulatory framework.[7]

As an interim measure, Aither considers that Hunter Water's proposed output measures for the upcoming regulatory period be adopted. Aither has identified an additional output measure to be captured within the upcoming regulatory period. Aither notes that the output is not linked to any particular outcome, but is intended to provide a 'safeguard' to customers regarding what Hunter Water will deliver to customers throughout the regulatory period.

Table 9 Additional output measures for next regulatory period

Output measure	Units	Target	Reason
Naturalisation of stormwater assets*	Km	1 (over regulatory period) *	To ensure that the outputs delivered align with customer expectations from the willingness-to-pay study.
Recycled water for open spaces	ML	20 p.a. by 2024-25	To ensure that the outputs delivered align with customer expectations from the willingness-to-pay study.

* - This is a minimum requirement as a result of the study

Note: This only applies if IPART deems that Hunter Water has demonstrated a willingness to pay from its customers based on the willingness-to-pay study.

[7] Hunter Water, *Response to IPART Issues Paper: Hunter Water Review*, October 2019, p.28.

4. Capital expenditure

4.1. Overview

This section summarises the review of the capital expenditure undertaken, discusses Hunter Water's performance against output measures, and makes an overall assessment of efficient capital expenditure given review findings. It also discusses asset life assumptions and Hunter Water's proposed changes to regulatory depreciation. The outcome of our review of past and proposed capital expenditure and any adjustments recommended are presented herein with detail of the review of sample projects contained within Appendix A.

4.2. Summary of past and proposed capital expenditure

IPART approved capital expenditure of $383 million in its 2016 Price Determination, which compares with Hunter Water's actual and estimated capital expenditure during the current regulatory period of $491 million. The significant variation between approved and actual expenditure arises primarily from new expenditure initiatives in the final two years of the period (see Figure 14). This has in large part been due to works aligned with two main drivers (asset and service reliability, and existing mandatory standards), which are also the basis for the major share of proposed expenditure in the forecast regulatory period (see Figure 15 and Figure 16).

Hunter Water's actual and forecast capital expenditure for the current regulatory period – compared with IPART's 2016 Determination – is summarised in Table 10.

Table 10 Hunter Water's actual and estimated capital expenditure for the current regulatory period ($000s, nominal)

Products	2017	2018	2019	2020	Total
Water	32,697	49,932	61,361	46,032	**190,022**
Sewerage	43,872	33,535	36,031	111,204	**224,642**
Corporate	9,713	20,223	15,747	20,310	**65,993**
Stormwater	475	452	6,101	3,828	**10,856**
Total	**86,758**	**104,141**	**119,240**	**181,374**	**491,513**
IPART 2016 determination (nominal)	106,587	91,971	96,759	87,626	**382,943**
Variance to determination	(18.6%)	13.2%	23.2%	107.0%	**28.4%**

Source: All data sourced from Hunter Water's AIR (Capex by RAB). It should be noted that the data is based on the regulated business only and excludes any corporate related capital expenditure that has been allocated to unregulated recycled water.

Figure 14 summarises actual and forecast expenditure over the current and forecast regulatory period, which illustrates the trajectory of increasing expenditure relative to the current regulatory period, particularly for wastewater services. Hunter Water has indicated that its current Price Submission is underpinned by a transition away from a period in which concerns about debt levels were driving reduced expenditure and a reliance on available asset capacity and condition to minimise investment. The ramification of this is a transition to increased expenditure in the forecast period, which is suggested to be in order to restore deteriorating asset condition, address performance deficiencies and cater for growth.

Increased concern from the EPA about the compliance of a range of assets with environmental requirements has exemplified the risks arising from insufficient past expenditure to maintain asset condition and performance. At the same time, Hunter Water has also substantially revisited its approach to understanding – and maintaining assets within – its risk appetite, following a significant water supply asset failure. This has led to the identification and prioritisation of increased investment to try to better align existing risks with Hunter Water's risk appetite.

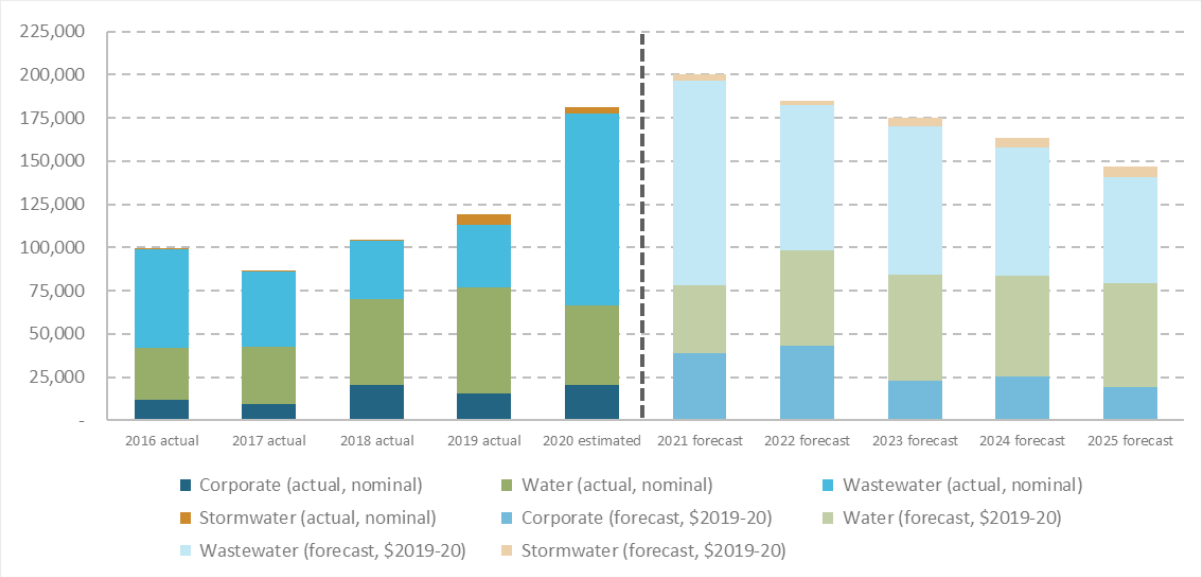
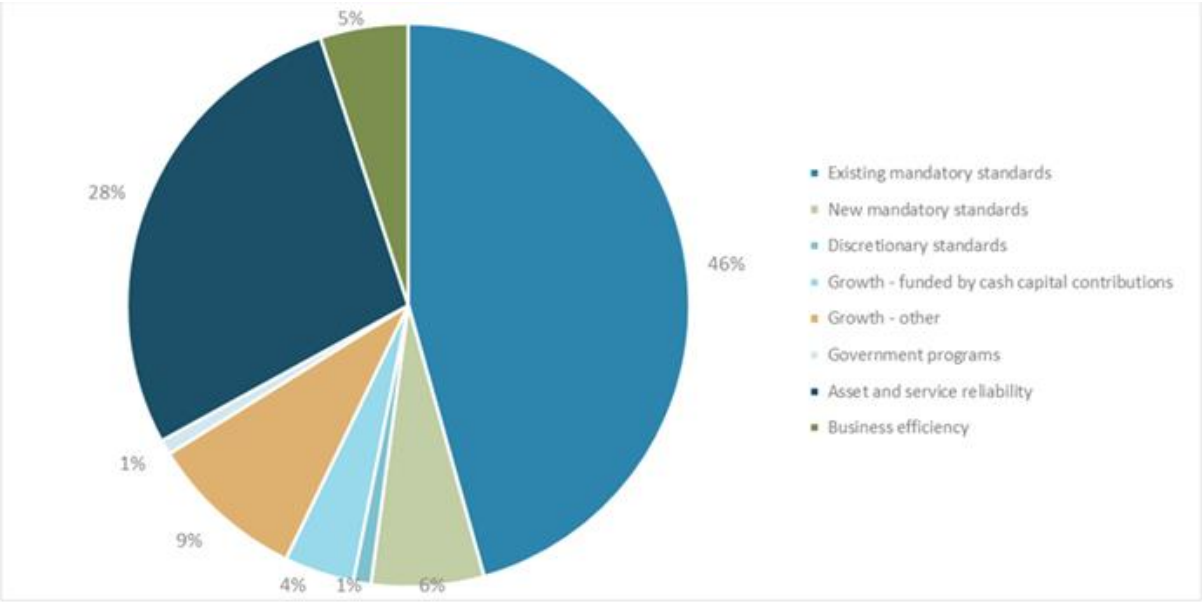


Figure 14 Capital expenditure by service

Figure 15 illustrates that almost half of capital expenditure in the current period has been in response to existing mandatory standards, with asset and service reliability nearly one quarter.



Source: Average of the four years of current regulatory period, with all data sourced from Hunter Water's AIR (Capex SIR 4).

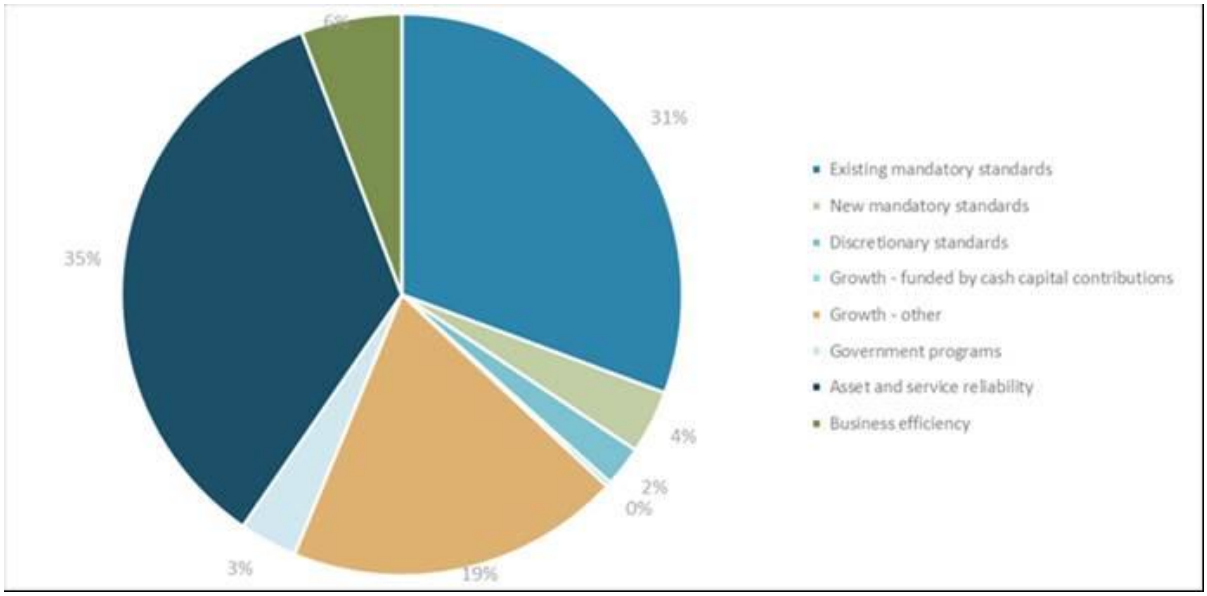
Figure 15 Capital expenditure by cost drivers for current regulatory period

Hunter Water's proposed capital expenditure for the next regulatory period is summarised according to each service requirement in Table 11 below. Figure 16 illustrates that the main drivers for this expenditure remain asset service and reliability, existing mandatory standards, as well as growth.

Table 11 Hunter Water's forecast capital expenditure for the upcoming regulatory period ($000s, $2019-20)

Products	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Water	39,202	55,346	61,401	57,832	59,609	273,389
Sewerage	118,869	83,928	85,847	74,309	61,742	424,695
Corporate	38,679	43,175	23,199	25,630	19,514	150,196
Stormwater	3,652	2,768	4,664	5,894	6,150	23,127
Total	**200,402**	**185,217**	**175,111**	**163,664**	**147,014**	**871,408**

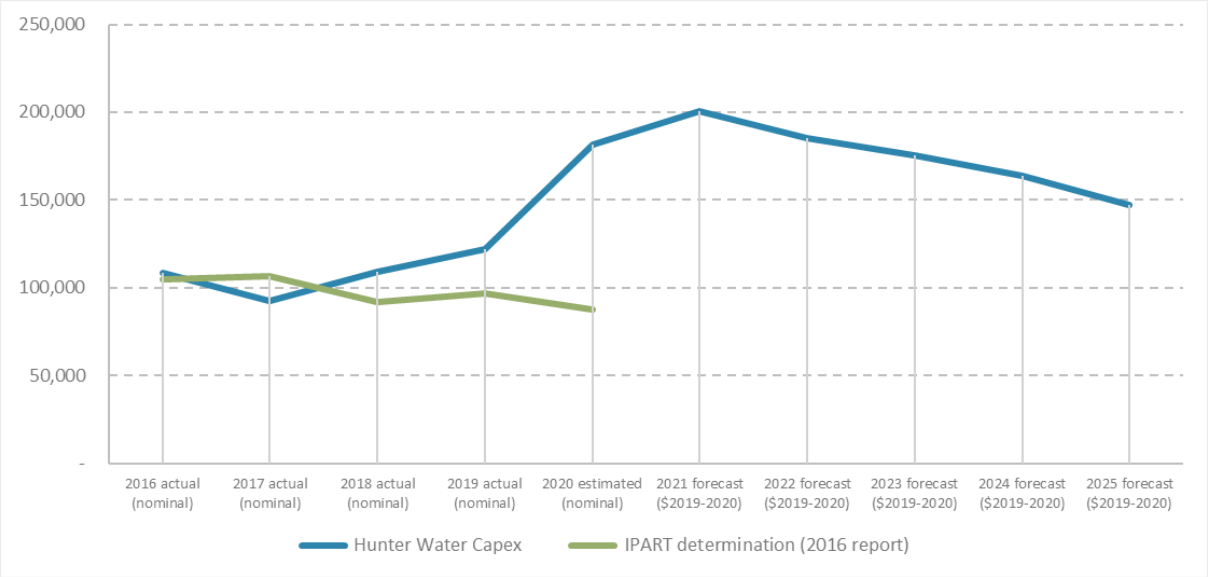
Source: All data sourced from Hunter Water's AIR (Capex by RAB).



Source: Average of the four years of forecast regulatory period, with all data sourced from Hunter Water's AIR (Capex SIR 4).

Figure 16 Capital expenditure by cost drivers for forecast regulatory period

A ten-year capital expenditure portfolio for Hunter Water, including the current financial year, is presented in Figure 17. It reflects an increase over the near-term, before reducing, but only to levels which are still significantly higher than the current period. Hunter Water informed Aither that the increase in expenditure is generally driven by Hunter Water's aspiration to better align asset service reliability with the business' risk appetite.



Source: Hunter Water AIR

Figure 17 Actual and forecast capital expenditure compared to previous IPART Determination

4.3. Capital projects overview

A detailed review of a representative sample of current and proposed capital projects was undertaken, consistent with this element of the review, as described at Section 2.6.2.

The capital projects selected for detailed review were primarily selected based on their cost and risk, but also included consideration of:

- whether the project or program contributed to significant variations from forecast expenditure at the time of the 2016 Determination
- individual projects amongst those major projects listed by Hunter Water (in Section 5.7 of Technical Paper 4 of their Pricing Submission) as having an impact on capital expenditure in the forecast regulatory period
- projects that are representative of major program initiatives
- projects that are representative of, and bring insight and assist with recommendations on, the efficiency of sub-programs.

The detailed review and findings for each project reviewed are included in Appendix A and the rationale for selecting the projects identified is summarised in Table 12.

Table 12 Rationale for selection of specific projects for review

Project name	PP2016 Variation	PP2020 Major Expenditure	Program Initiative	Relevance to Sub-Program Evaluation
Project 1 – Chichester Trunk Gravity Main (CTGM) Replacement	✓	✓		Capital Mains Safety Program
Project 2 – Dungog Water Treatment Plant Upgrades	✓			Representative of water treatment program
Project 3 - Water network Capacity Upgrades	✓	✓	✓	Relevant to other programs that feature growth drivers/compliance
Project 4 - Minor Asset Renewals Programs - Wastewater		✓	✓	Relevant to reticulation renewals, minor M&E and treatment renewals
Project 5 - Farley Wastewater Treatment Plant Upgrade Stage 3B	✓	✓		
Project 6 - Wyee Backlog Sewer Program	✓			
Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program		✓	✓	Network Chemical Upgrade program
Project 8 - Other Wastewater Treatment Plant Upgrade Program	✓	✓		
Project 9 - Stormwater Major Rehabilitation / Renewal Program		✓	✓	
Project 10 - Water loss improvement project		✓	✓	

Source: Aither

Table 13 lists the capital projects that were assessed and their expenditure for each period. The combined proposed capital expenditure is $516 million, representing 38 per cent of the $1,363 million over the two regulatory periods.

Table 13 Capital projects assessed ($000s, $2019-20)

Project name	Past Period capital expenditure FY17-FY20 ('000s, nominal)	Proposed capital expenditure FY21-FY25 ('000s, $2019-20)
Project 1 – Chichester Trunk Gravity Main (CTGM) Replacement	40,639	-
Project 2 – Dungog Water Treatment Plant Upgrades	11,540	-
Project 3 - Water network Capacity Upgrades	5,397	40,491
Project 4 - Minor Asset Renewals Programs - Wastewater	-	110,637
Project 5 - Farley Wastewater Treatment Plant Upgrade Stage 3B	13,100	57,026
Project 6 - Wyee Backlog Sewer Program	20,142	13,792
Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program	513	24,088
Project 8 - Other Wastewater Treatment Plant Upgrade Program	23,665	108,571
Project 9 - Stormwater Major Rehabilitation / Renewal Program	-	13,612
Project 10 - Water loss improvement project	-	32,800
TOTAL OF REVIEWED CAPITAL PROJECTS	**114,996**	**401,017**

Source: Hunter Water AIR (SIR Capex 3).

4.4. Past expenditure

As detailed in Section 4.2, Hunter Water's actual expenditure in the current regulatory period was $310 million between 2016-17 and 2018-19. With forecast expenditure of $181 million in 2019-20, the total expenditure over the regulatory period is estimated at $492 million, which is 28 per cent higher than IPART's 2016 Determination. Expenditure over the period was characterised by reduced levels (below that described in the determination) in the first two years, before a substantial increase towards the end of the period (as illustrated in Figure 14).

Hunter Water's actual expenditure for 2015-16 was $100 million, this was 15 per cent (or $14 million) less than that allowed for in IPART's 2016 Determination. The major variations in expenditure from that forecast occurred in the wastewater program which underspent by 17 per cent (or $9.9 million) principally in delays in wastewater treatment plant upgrade expenditure.

Past expenditure 2015-16 to 2018-19

In general, Hunter Water's asset performance met required service standards during the current period. Hunter Water has observed, though, that the period also required them to respond with greater urgency to a general deterioration in the condition of ageing assets across their systems, which in some instances was the cause of environmental and other performance concerns. More broadly, relatively lower levels of expenditure in previous regulatory periods (and running down condition and capacity of assets) are understood to have contributed to the need to invest more substantively in asset serviceability.

Several areas of major expenditure change were the subject of more detailed project efficiency reviews, including:

- Chichester Trunk Gravity Main (CTGM) upgrade
- Dungog WTP upgrade
- Farley WWTP upgrade
- Minor wastewater asset renewals
- Wyee backlog sewer program
- Water network capacity program.

Conclusions on the overall efficiency of capital expenditure in the current regulatory period have been drawn from these reviews, as well as from the review of similar or continuing programs (such as the stormwater upgrade program) proposed for the forecast period.

Hunter Water's actual expenditure for 2015-16 of $100 million was 15 per cent less than that allowed for in IPART's 2016 Determination and resulted in a minor additional expenditure in the following year. Aither considers that the planned projects were delivered and overall the expenditure was considered efficient.

Of the projects above, only expenditure on the water network capacity program was less than planned. This was due to actual Greenfield development proceeding at a lower rate than forecast, along with the availability of spare network capacity (arising from further investigations identifying changes in customer behaviour over time that differ from pre-2016 peak demand design standards). The reduced expenditure reflects the need to respond to the actual timing of planned development and was considered appropriate and efficient.

The significant increases in capital expenditure across the other projects were generally associated with several key drivers:

- increased occurrence or significant incidences of asset failure, which triggered a greater focus by Hunter Water on inspection and condition assessment of ageing infrastructure
- the greater focus on asset condition driving improved asset inspection processes, which then identified equipment in critical condition and a need to bring forward expenditure to mitigate a risk of imminent failure
- the scope of projects increasing to accommodate new or expanded requirements, whether identified by further investigations or prompted by regulator concern about asset condition and performance
- forecast costs increasing significantly from initial estimates once the project is tendered.

Although Hunter Water has also brought greater sophistication to its Enterprise Risk Management framework during the current period, the changes to the business' risk appetite – or application of the ERM – have generally not directly impacted the decisions made in the current period (whereas they are more influential for some program expenditure proposed in the forecast period). The projects brought forward in the current period – and the associated increase in capital expenditure – are more directly attributable to: compliance failures (initiating directives from the EPA); asset failure impacting customer services standards or threatening public safety; or the outcomes of an increased focus on, and improved processes in, asset condition assessment.

To some extent, the increased expenditure in the current period reflects the need to redress the legacy of historical levels of investment in maintaining ageing infrastructure, combined with a greater understanding of asset condition and risks. However, the review also highlights some recurrent examples of Hunter Water under-estimating the scope and cost of projects and expenditure at the early stages of concept development (at Gateway 1).

Nonetheless, following detailed review of the decision-making and procurement processes, the changes in capital expenditure that have arisen on these major projects are generally considered efficient and as having responded appropriately to clear drivers.

Beyond the review of these projects, the assessment of the broader program of capital expenditure in the current period identified that asset performance generally met required service standards. Any changes in expenditure from that forecast were less prevalent and material than that observed across the major projects reviewed. Where expenditure increases have occurred, the drivers are consistent with those observed as part of the detailed project-based review (the identification of ageing assets at risk of failure, unforeseen scope changes arising from additional investigation or regulatory directives, and cost estimates increasing following the outcomes of the tender process).

Conversely, reductions in expenditure have arisen where actual conditions (such as growth or water demand) have varied from that forecast, or action has been delayed pending the need for strategic review or further investigation. This is an appropriate and expected response to adaptively managing emerging circumstances and consistent with the approach across the industry. Hunter Water's decision-making processes and resulting expenditure appear appropriate and efficient.

Forecast 2019-20 capital expenditure

Hunter Water's planned expenditure in the final year of the current period is substantially higher than preceding years, partly in response to some of the drivers identified (such as asset condition deterioration or performance issues). Hunter Water initially indicated that expenditure during 2019-20 was (or would be) closely aligned with that forecast.

However, a subsequent review and advice provided by Hunter Water to Aither in October 2019 indicated a revised forecast expenditure for 2019-20 on major projects of $78 million, representing a $9.9 million reduction on previous estimates. Hunter Water's internal review identified both increases and decreases in expenditure across nine projects, with the single largest change associated with a scope change in the Dora Creek WWTP upgrade (reduction of $7 million).

The assessment of Hunter Water's ability to achieve the revised forecast expenditure against major projects in 2019-20 is considered in the broader context of program deliverability (see also Section 4.10). In general, Hunter Water has robust and appropriate arrangements in place that should ensure there is no impediment to delivering its substantial capital program.

The recent adjustments to forecast expenditure on several major programs are not atypical or unreasonable. Similarly, it is not unreasonable to expect some change from initial forecasts in

expenditure for the broader program over the course of the year. At the same period in 2018-19, Hunter Water's adjustment in forecast expenditure was a 2 per cent reduction.

The challenges for Hunter Water to meet planned expenditure during 2019-20 are exemplified by the progress of the Farley WWTP upgrade. While there is $14 million forecast to be invested in the remainder of 2019-20, the works have only recently been tendered and will not be awarded before January. By the time the works commence, the level of expenditure proposed will be difficult to achieve in the remaining months of the financial year.

This example, as well as the experience from the preceding year, suggest that a further, minor reduction in proposed expenditure for 2019-20 is warranted.

Aither's assessment

Asset-related performance has generally met required service standards during the current period, however additional expenditure beyond that approved under the 2016 Determination has been required to respond to specific incidences where performance has not been adequate, which appears warranted and appropriate. Changes made to the business' risk framework (and appetite) have not materially impacted decisions made in the current regulatory period.

Our assessment identified that the capital program in 2015-16 was delivered with minor delays and resulted in a reduction in expenditure from that allowed in 2015-16. Hunter Water's actual expenditure in 2015-16 can be considered efficient.

In addition to the revised 2019-20 estimate provided by Hunter Water (which reduced expenditure by $9.9 million), Aither is recommending a further adjustment to the proposed capital expenditure of $5 million. This is based on the expectation that – as occurred last year and exemplified by challenges delivering expenditure on the Farley WWTP upgrade in the period – a reduction in expenditure of at least 2 per cent can be expected. This level of adjustment is not atypical given the scale of the program, with the expenditure to be deferred to the first year of the upcoming regulatory period (2020-21).

4.5. Capital project review

This section provides an overview of the key findings from the detailed analysis of the selected capital projects for the expenditure review.

The following is a short summary of each of the capital projects that were assessed as part of this expenditure review. The detailed findings for each capital project can be found at Appendix A. The subsequent section then considers the broader capital program, based in part on the findings of the detailed project reviews.

4.5.1. Chichester Trunk Gravity Main replacement

Project description

The Chichester Trunk Gravity Main (CTGM) is an 85km pipeline that supplies water for approximately 38 per cent of Hunter Water's average demand. Asset condition surveys, as well as recent failures, have highlighted the need to address the significant risk to supply continuity and health and safety associated with failure of the ageing pipeline.

Hunter Water has commenced replacement of an 8km section between Duckenfield and Tarro, replacing the existing 900mm above-ground pipe constructed in 1923 with a 1200mm diameter below-ground pipeline. The larger diameter increases capacity that will enable deferral of an upgrade at the Grahamstown Water Treatment Plant. Capital cost estimates have increased to $43.5 million ($2018-19) from the allocation made in the 2016 Determination of $29.7 million ($2016-17).

Assessment

Capital expenditure on this project was assessed as efficient. There is a clear and well-demonstrated need to address a major business risk, with a suitable and comprehensive range of project options identified and assessed through a robust process. The decision to increase the capacity of the pipeline reflects an efficient approach to considering system-wide implications, with the preferred option selected based on satisfactorily mitigating risk at the lowest lifecycle cost.

4.5.2. Dungog Water Treatment Plant upgrade

Project description

The Dungog Water Treatment Plant (WTP) supplies water to meet 40 per cent of Hunter Water's average demand. Water is sourced from a catchment with significant water quality issues, which create challenges for the efficacy of water treatment. In 2014 Hunter Water identified the risk that treatment could fail to comply with the requirements of the Australian Drinking Water Guidelines.

A project proposed to address this risk subsequently led to the identification of two further risks (including a failure of chemical containment that led to prosecution and fines issued by the EPA), which increased the scope of work at the site. Investigations undertaken since making an allowance of $1.6 million ($2015-16) in the 2016 Determination have led to a revised cost allocation of $13.8 million ($2018-19).

Assessment

Capital expenditure on this project was assessed as efficient. Notwithstanding the expansion in scope over time to address deficiencies at the site, the works proposed address a clear project need to mitigate significant risk (including consequences identified by both the NSW Department of Health and the EPA). The process to identify, assess and select a preferred option appears robust, including the integration of multiple, interrelated elements.

4.5.3. Water network capacity upgrades

Project description

Hunter Water constructs new transfer mains, pump stations and associated facilities to ensure growing demand from new customers across the system can be met. Two ongoing programs address, respectively, capacity upgrades in the existing network, and extension of the network to Greenfield areas.

Expenditure for network expansion into new subdivisions is $14.6 million for the forecast regulatory period, compared with $3.9 million in the current period. There is also a significant increase in expenditure forecast for existing network capacity upgrades, with $25.9 million proposed in the forecast period compared with $1.5 million in the current regulatory period. Growth in connections are expected to continue at a similar or slightly reduced rate in this period.

Assessment

Expenditure in the current period was much lower than forecast, arising from two main factors:

- a higher proportion of growth in existing, rather than Greenfield, areas, and
- changing customer behaviour that no longer aligns with pre-2016 design standards for peak flows, which allowed Hunter Water to make use of spare capacity to cater for growth.

Given that Hunter Water has also advised there is no additional provision in the forecast regulatory period for expenditure not made in the current period, and that customer expectations for flow and pressure are being met expenditure in the current period was assessed as efficient.

The program of expenditure to service Greenfield development for the forecast regulatory period was assessed as efficient. Although information was provided belatedly by Hunter Water, the process to establish – and the outcomes of – forecast growth appear reasonable, with cost estimates based on a unit cost per property that is consistent with past practice and comparable with other locations.

By contrast, the unit rate adopted as the basis for forecast expenditure for general increases in *existing* network capacity upgrades is markedly higher than that used for Greenfield development. Hunter Water acknowledges that the cost per dwelling to service infill development (in established areas with an existing network) should generally be lower. However, this is partially offset by the need to upgrade parts of the existing network to deliver flows to greenfield development areas.

Other relevant issues to the efficiency of the existing network program are the understanding that a significant part of the network has spare capacity because of changing customer behaviour and the number of customers experiencing poor water pressures in spite of minimal expenditure on capacity increases in the past period is currently reducing.

In the absence of specific evidence that would support a higher cost for existing capacity upgrades, it is recommended that the allocation should be reduced to align the basis for cost estimates with that adopted for Greenfield development. This equates to a 40 per cent reduction to the $16.9 million sub-program for general increases in system capacity, resulting in a $6.8 million reduction.

4.5.4. Minor wastewater asset renewals program

Project description

This program involves provision for the condition assessment and renewal of minor assets within the wastewater system, including: civil components of the wastewater network (planned renewal of non-critical sewer mains, reactive mains renewals, and planned and reactive renewals of structures and fittings); and mechanical and electrical treatment and network assets.

This is a program that supports ongoing delivery of wastewater services to meet service standards. Hunter Water has proposed major increases in all minor asset renewal programs in the forecast regulatory period to address asset condition and align associated risk with the business' risk appetite.

Assessment

Aither's assessment of the efficiency of this program is largely based on reviewing trends in performance, incorporating the following system elements:

- Given that the proposed increase in expenditure on the **wastewater network** is proportionate with the increase in failures observed in the previous period, the proposed expenditure is considered efficient.

- Insufficient rigorous evidence was provided to substantiate the claim that increased expenditure is required on **wastewater structures** to address public safety risks and manage inflow and infiltration. A reduction of $6 million to align expenditure with the previous period's actual expenditure is recommended.
- Although Hunter Water is not well-placed to apply more sophisticated modelling approaches (consistent with industry best practice) to renewal of **mechanical and electrical network and treatment assets**, there is some concern that the outcomes of the appropriate but subjective risk assessment process that is adopted are too risk averse. While a detailed review confirmed that the provisions for most items are reasonable, there is also a proportion for which a more reasonable risk position could be taken. As a result, a reduction of 10 per cent – representing, respectively, $3.229 million for the treatment and $2.563 million for network mechanical and electrical programs – is recommended.

4.5.5. Farley Wastewater Treatment Plant upgrade

Project description

The Farley WWTP discharges effluent to Fishery Creek, which the EPA has indicated is unable to receive nutrient loads above Hunter Water's existing licence conditions. An upgrade to the plant is required to address significant growth in the catchment, as well as specific asset reliability and performance concerns.

An allowance of $13 million was made in the current regulatory period to increase treatment capacity to ensure mandatory standards continue to be met. Further investigation subsequently identified additional challenges, including a lack of compliance with biosolids management requirements, as well as potential groundwater contamination arising from the condition of some assets on the site. The proposed capital expenditure has increased to $70 million, including $57 million in the forecast period.

Assessment

Capital expenditure on this project was assessed as efficient. Supported in the 2016 Determination, this project has expanded in scope to address some significant issues and associated risks at the site. Sustained concern from the EPA is indicative of the project need, while a suitable and broad range of options has been identified and robustly assessed.

The assessment of capital expenditure for 2019-20 determined that it was unlikely that Hunter Water would be able to fully invest the $14 million works planned for the Farley WWTP upgrade in the current period, given that the tender process was only due to be completed in January 2020. The assessment considered that $5 million should be deferred to the forecast period.

4.5.6. Wyee backlog sewer program

Project description

This project responds to a 2014 Government directive to provide wastewater services to 450 existing and forecast properties in Wyee. The project involves the construction of a reticulation (sewer) network (a combination of gravity and pressure sewers), as well as infrastructure to transfer wastewater to the Dora Creek WWTP.

An allowance for expenditure of $9 million in the current period was made in the 2016 Determination, of a total cost of $22.3 million ($2015-16). A revised 2018 business case responded to community

interest in Hunter Water's plans, as well as forecast growth, to propose phased implementation of increased scheme capacity to cater for regional development.

The scheme will now have capacity to service 2,100 properties over time, at an additional cost of around $8 million and total estimated project cost of $34.1 million ($2019-20). Consultation with the community and Government has also clarified an expected completion date of 2020.

Assessment

The capital expenditure on this project was assessed as efficient. The backlog program responds to a clear, long-standing directive from Government, including the more recent confirmation of the expectation that it will be delivered by 2020. Hunter Water conducted a thorough investigation and assessment of options, including revisiting the scheme design to cater efficiently for growth drivers. The preferred option meets the project need at lowest cost, with appropriate phasing that minimises future disruption.

4.5.7. Treatment plant chemical containment and safety upgrades program

Project description

This program involves a range of works across a number of Hunter Water's operational sites, to address environmental contamination risks and ensure that the facilities meet current health and safety requirements. It continues work commenced in the current period to address EPA directives at Dungog WTP (see related project above) as well as at 23 sites across the water and wastewater distribution network.

Specific incidents, EPA-mandated improvements, as well as a broader assessment of the condition of chemical containment and dosing systems across the business' facilities, have all contributed to an increased awareness and understanding of Hunter Water's chemical-related risks. This has led to the identification of prioritised works as the basis for this program, which aim to mitigate and better align existing risks with Hunter Water's risk appetite.

The proposed expenditure of $24 million ($2019-20) is premised on upgrading all at-risk systems to achieve a level of risk consistent with the business' risk appetite.

Assessment

The elevated concern from the EPA in relation to the environmental risks – which have manifested as directives for improvement works – are indicative of the clear need for the project. Similarly, health and safety risks represent a material concern for Hunter Water and require action to address.

However, the primary consideration in evaluating the efficiency of this program is the identification of, and justification for, the appropriate level of investment. This is premised on aligning the risk perceived across relevant assets with Hunter Water's risk appetite, which leads to the selection of a (risk averse) preferred option that has a higher cost than other options that adequately address the current directives from the EPA.

Specifically, Hunter Water has taken the view that condition assessment and the need for secondary containment installation is undertaken across all facilities, on the basis that the EPA has specified this need for selected facilities where directives are currently in place. However, there is no requirement or basis for this level of containment at facilities that are not the subject of EPA action, reflecting an overly risk averse position that arises because of the recent attention from the EPA. If not for the past poor performance by Hunter Water and related EPA directives, it is unlikely that this position would be

taken, and a more risk tolerant approach would be acceptable (which is also consistent with wider industry practice).

On this basis Aither recommends a reduction of $4.5 million in proposed expenditure for each of the water and wastewater program of related works (total reduction of $9 million).

4.5.8. Major wastewater treatment works upgrade program

Project description

Hunter Water proposes major upgrades at a number of wastewater treatment plants (WWTP), comprising asset improvements or capacity enhancements primarily to address growth and environmental compliance issues.

Major upgrades (exceeding $10 million each) are proposed at seven WWTP sites, in addition to the Farley WWTP upgrade (reviewed separately and summarised in Section 4.5.5). A total expenditure of $107.9 million is proposed for the forecast period.

Assessment

The majority of the proposed expenditure (for five of seven projects) was considered efficient, on the basis that it responds to clear drivers and is underpinned by thorough and appropriate planning, design and procurement processes. Three key issues arise in relation to the efficiency of the program:

- Some projects propose works to address biosolids management issues, which could be influenced by the outcomes of Hunter Water's Biosolids Strategy (currently at Gateway 1 approval for a preferred strategy to develop a central biosolids facility). It appears that this can be managed by deferring relevant works until later in the period and reallocating relevant funds from specific projects towards a new project for a centralised biosolids facility, if approved to proceed.
- Similarly, there is some uncertainty about the future discharge licence conditions that the EPA will impose at some sites. No works should proceed until the objectives of the conditions are clear. In the meantime, Hunter Water is progressing relevant planning on the presumption that conditions will be similar to current arrangements.
- The case for proceeding with two of the seven projects within the forecast period – which is premised on unconfirmed growth driving potential future risk of non-compliance with licence compliance conditions – is not sufficiently robust. While the eventual need for the projects is sound, it is considered that the timing is overly conservative, and the associated expenditure could be deferred without impacting Hunter Water's licence compliance. It is recommended that proposed expenditure of $24 million for these two projects be deferred beyond the forecast period.

4.5.9. Stormwater upgrade program

Project description

The majority of the 96km of stormwater assets that Hunter Water manages were constructed between 1920 and 1940. Hunter Water has been progressively assessing the condition of the system, which – combined with an asset failure requiring remedial work in 2017 – has indicated the need for rehabilitation and renewal of parts of the system.

Appropriate asset management techniques have been adopted to establish a risk rating for each section of the stormwater network (based on likelihood and consequence of failure). Although the precise nature of the works is the subject of further investigation, this process has established the need for major rehabilitation at four locations at a total cost of $13.6 million ($2017-18).

Assessment

The capital expenditure on this project was assessed as efficient. Hunter Water has improved its understanding of, and condition assessment processes for, its stormwater assets. This has confirmed the need for remedial works that have been prioritised based on their risk rating. Enhanced monitoring and minor remedial works are also proposed, with the aim of minimising major rehabilitation works in the future.

4.5.10. Water loss improvement program

Project description

The objective of this program of works is to reduce water loss across the network and therefore contribute to water security for Hunter Water. This would also provide additional time for future supply augmentation decisions. The program is based on a forecast of $32 million over the upcoming regulatory period to undertake initiatives to reduce water loss to minimise non-revenue water and thereby increase the timing of any future supply augmentation.

As part of its Operating Licence, Hunter Water was required to submit to IPART a proposed methodology for determining its economic level of water conservation (i.e. Economic Level of Water Conservation Methodology). This methodology is required to outline the principles relating to water conservation for the following elements:

- Water leakage (within and downstream of its water treatment plants)
- Water recycling, and
- Water efficiency (including demand management).

Following the approval of this methodology, Hunter Water was required to develop and submit (as part of its pricing submission) a water conservation work program based on this methodology. This program of work is the proposed work program to comply with this conservation methodology.

Assessment

The forecast capital expenditure for this program was considered efficient. The program of works reflected investments that are not unique for a water utility in regard to water loss management and are considered more of a ‘catch-up; in water conservation measures. The proposed investment met the ELWC Methodology test to ensure investments were considered economically efficient.

Through discussions with Hunter Water, it was stated that all identified leaks were rectified by Hunter Water as this was business-as-usual activities. These rectification costs are not captured as part of the levelised cost estimate for the methodology. The calculation of the levelised cost was based on only the upfront cost for identifying water savings with each initiative, where further rectification costs are required to realise the water savings these costs have not been included. As an example, Hunter Water has identified the upfront costs for active leak detection, however the costs of rectifying the leaks have not been considered.

Aither considers it appropriate that these rectification costs be captured as part of the estimate of the levelised costs within the ELWC Methodology. This is a more holistic approach to ensuring that the

capturing of water losses is economically efficient and beneficial to customers. The rectification costs would vary depending on the size of the leak, however similar assumptions could be made to ensure a levelised cost estimate.

The costs of rectification are generally relatively low and therefore we do not expect the change in the levelised costs for the initiatives proposed by Hunter Water to result in the initiatives no longer being viable under the methodology.

4.5.11. Summary of capital project reviews

After conducting the review of past, forecast and proposed capital expenditure for individual projects, Aither makes the following recommendations for adjustments for the upcoming regulatory period (see Table 14 below). The findings from these reviews has also informed a broader assessment of the capital program (see section 4.6).

Table 14 List of adjustments from detailed project review

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Adjustments						
Project 3 - Water network Capacity Upgrades	(1,360)	(1,360)	(1,360)	(1,360)	(1,360)	**(6,800)**
Project 4 - Minor Asset Renewals Programs - Wastewater	(2,030)	(2,287)	(2,338)	(2,594)	(2,543)	**(11,791)**
Project 5 - Farley Wastewater Treatment Plant Upgrade Stage 3B	5,000	-	-	-	-	**5,000**
Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program (Water)	(900)	(900)	(900)	(900)	(900)	**(4,500)**
Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program (Wastewater)	(900)	(900)	(900)	(900)	(900)	**(4,500)**
Project 8 - Other Wastewater Treatment Plant Upgrade Program	-	-	-	(16,238)	(7,688)	**(23,926)**

4.6. Assessment of the capital expenditure program

This section summarises Aither's assessment of the overall capital program, informed by the detailed review of the projects described above (and detailed in Appendix A). The assessment is structured around the various components of Hunter Water's capital program.

The assessment of the program is based on:

- more detailed review of limited and selected projects (recognising the constraints on undertaking a detailed review of the entire program within a reasonable timeframe)
- extrapolating the findings from the strategic review of the approach to the capital program, as well as the detailed review of individual projects, as relevant to the broader program.

4.6.1. Water program: water sources

Proposed expenditure for the forecast period is $14.2 million. Other than some specific rehabilitation projects, no conventional upgrade program of significance was identifiable. Hunter Water has not identified the need for major supply-side investments in the near term, planning for which will be informed in the next period once the Lower Hunter Water Plan is completed.

Proposed water source expenditure is considered efficient.

4.6.2. Water program: water treatment major works

Proposed expenditure on water treatment works in the forecast period is $69.1 million. A significant proportion of this ($18.2 million) is associated with the $95.8 million upgrade to the Grahamstown WTP. (This is in addition to a separate allowance of $26 million for construction of other related works in the Grahamstown system). The timing of proposed expenditure on the Grahamstown WTP – the majority of which is at the end of the period – is also influenced by the increased system capacity generated by the upgrade and upsizing of a section of the Chichester Trunk Gravity Main.

Although the proposed expenditure on WTP upgrade works was not reviewed in detail, the data presented by Hunter Water relating to existing plant capacity and growth in demand – combined with evidence of water quality challenges in the catchment – provide a reasonable basis for the investment need. Deteriorating water quality in the reservoir supplying the Grahamstown WTP supports the case for upgrading the plant by 2027, irrespective of the inherent uncertainty that is attributed to the other driver of growth (and customer behaviour) influencing increasing demand.

Proposed expenditure on water treatment upgrades is considered efficient.

4.6.3. Water program: water treatment minor works (including chemical containment upgrades)

The detailed review of the treatment plant chemical containment program (see Section 0) recommended a reduction in proposed expenditure, on the basis that Hunter Water's preferred option was unreasonably risk averse.

More broadly, Hunter Water proposes $17.425 million for minor mechanical and electrical upgrades of its water treatment assets in the forecast period. The analytical approach that underpins this forecast aligns closely with the approach adopted for minor wastewater asset renewals (see related detailed review in Section 4.5.4). The review of that program found that Hunter Water's preferred approach was, in some instances, unreasonably risk averse and therefore proposed expenditure should be reduced by 10 per cent. Based on that conclusion and the strong parallels with the water treatment program, it is recommended that expenditure for this program be reduced by a similar proportion.

Although this essential program is underpinned by a clear need to maintain asset condition in support of service standards, Aither's view is that the *extent* of the expenditure proposed is unreasonable. This is on the basis that it is underpinned by a subjective assessment of risk that, in some instances, is unreasonably risk averse. As a result, some of the expenditure is considered inefficient and it is recommended that (in addition to the reduction specified in Section 0 for the wastewater component of the treatment plant chemical containment upgrade program), the water treatment minor mechanical and electrical upgrade program be **reduced by $1.742 million** from $17.425 million to $15.683 million.

4.6.4. Water program: water network

Hunter Water proposes total capital expenditure of $190 million on its water networks in the forecast period across several programs:

- critical mains
- network capacity
- minor network asset renewals, and
- water loss reduction program.

Each of these is discussed below.

Water program: water network – critical mains

Hunter Water has documented a strategic approach to the management of critical mains and has invested in a systematic program of condition assessment in the current program. This has helped inform a series of major (greater than $2 million) expenditure proposals in the forecast period:

- completion of the Balickera Tunnel works ($6.85 million), the commencement of which was supported in the 2016 Determination
- $5.8 million for remedial works on three sections of the CTGM, which is consistent with the priorities in the detailed asset management plan for that asset, and
- $15.8 million for a critical mains safety program.

The critical safety mains program is a new initiative that arose following the failure of the CTGM. It involves risk-based, prioritised replacement or rehabilitation of pipelines and related works to address public safety and customer risks.

This program is based on a unique approach to validating the possible impacts of a failure event. The analytical basis is considered valid and a good example of the application of an objective risk assessment process (modelling of likelihood and consequences at a desktop level) to support prioritisation. However, Hunter Water has also described this process as being at an early stage of development, with the desktop results yet to be validated on the ground. In its submission, Hunter Water has allowed for a scope reduction of 25 per cent as part of the site analysis stage.

Notwithstanding the appropriateness of the method being adopted, Aither's assessment is that a delay and reduction in the program is appropriate given:

- the uniqueness of the analytical approach and its early stage of development
- the scope uncertainty

- challenges estimating costs on similar projects (such as the CTGM upgrade), and
- the substantive project development load across other areas of the capital program.

While the majority of proposed expenditure on critical water mains is considered appropriate and efficient, the extent of the allocation for the critical mains safety program was assessed as inefficient. It is recommended that this program **be reduced from $15.8 million to $12 million**, with expenditure – other than funds needed to complete investigations – occurring in the final three years of the forecast period.

Water program: water network – network capacity

Proposed expenditure for water network capacity upgrades was reviewed in detail and a recommendation made accordingly (see Section 4.5.3).

Water program: water network – minor network asset renewals

This component incorporates both mechanical and electrical, and civil assets, with the latter comprised of network assets (pipes and fitting) and structures. There is strong alignment between this program and the equivalent for wastewater (the subject of the detailed review summarised in Section 4.5.4).

The approach to forecasting renewal of minor **mechanical and electrical** water network assets is comparable with that adopted for the wastewater network. Based on the findings for the parallel wastewater program a similar reduction in expenditure is proposed, which is premised on the assessment that a small proportion of the works proposed are unreasonably risk averse.

Similarly, the expenditure proposed for **civil water structure** assets is assessed as inefficient on the basis of the assessment made for comparable wastewater assets. In the absence of specific evidence of the need for increased expenditure, it is recommended that expenditure align with the level adopted in the current period.

The component of this program for **civil network assets** includes proposed expenditure for the forecast period of $28.2 million for planned renewal of pipes and fittings, and $7.5 million for reactive maintenance. Hunter Water's related performance (water network failures) has been stable over the current regulatory period and is consistent with the benchmark demonstrated by comparable utilities in Hunter Water's cohort. The proposed expenditure is similar to the level of past expenditure and this allocation therefore considered efficient.

Some elements of this program are assessed as inefficient. It is recommended that:

- expenditure for renewal of minor mechanical and electrical network assets **be reduced by $1.28 million** (10 per cent) from $12.8 million to $11.5 million
- expenditure for renewal of minor water structures **be reduced by 50 per cent** from $13.4 million to $6.7 million.

Water program: water network – water loss reduction program

Proposed expenditure for the water loss reduction program was reviewed in detail and was deemed to be efficient (see Section 4.5.10).

4.6.5. Wastewater program: wastewater network

Hunter Water proposes total capital expenditure of $169.7 million on its wastewater networks in the forecast period across two main programs:

- network capacity and compliance improvement upgrades, and
- network minor renewals.

Each of these is discussed below.

Wastewater program: wastewater network – network capacity and compliance improvement upgrades

This program includes several sub-components, as follows:

- Expenditure of $26.3 million is proposed for developer-delivered wastewater infrastructure to extend the system to service new growth. This program has not been reviewed in detail but is underpinned by growth in customer connections (and associated changes in demand) and is comparable to the parallel program for water network capacity upgrades. The review of that program (see Section 4.5.3) established that Hunter Water's approach to forecasting growth is reasonable and appropriate, as is the basis for cost estimates. Notwithstanding the uncertainty associated with growth planning, this otherwise reflects a relatively consistent and ongoing part of Hunter Water's business for which associated processes should be well-established. It is therefore considered that the proposed expenditure is efficient.
- A further $13.8 million (following expenditure in the current period) to complete the Wyee Backlog Sewer Program. This project was reviewed in detail (see Section 4.5.6) and the expenditure assessed as efficient.
- An allocation of $12.6 million for capacity increases across the system to manage wet weather sewer overflows. During a discussion in September 2019 between the EPA, IPART and Aither, the EPA confirmed the importance of this activity as well as their satisfaction with the environmental modelling that supports the proposed investment. The techniques adopted by Hunter Water for sewer planning and assessment, including calibrated modelling and inflow and infiltration reduction programs, are consistent with industry practice. This program is therefore considered efficient.
- Proposed expenditure of $11.1 million to improve the reliability of wastewater pump stations has been briefly reviewed, with the approach adopted by Hunter Water assessed as consistent with industry practice. Hunter Water has undertaken a detailed assessment of the storage capacity within the wastewater system that – in the event of a power failure – provides effective containment until operational teams can respond. The regulatory standards that Hunter Water must meet are clear, and the measures proposed by Hunter Water in response are consistent with appropriate and of industry standard. The program is also prioritised to address those pumping facilities at higher risk. The proposed expenditure is therefore assessed as efficient.

The expenditure proposed for wastewater network capacity and compliance improvement upgrades in the forecast period is considered efficient.

Wastewater program: wastewater network – network minor renewals program

Hunter Water proposes $28 million for a program of minor civil (pipeline and structures) wastewater asset renewals, as well as $25.6 million for and renewal of minor mechanical and electrical assets in

the wastewater network. This expenditure was considered as part of the detailed review of the minor wastewater asset renewal program (see Section 4.5.4).

4.6.6. Wastewater program: wastewater treatment

Hunter Water proposes total expenditure of $255 million for wastewater treatment across two broad portfolios of major upgrades and minor renewals respectively. All recommendations for related expenditure have been made in the detailed review of several projects:

- Farley WWTP upgrade (see Section 4.5.5)
- Major wastewater treatment works upgrade program (see Section 4.5.8)
- Minor wastewater asset renewal program (see Section 4.5.4)
- Treatment plant chemical containment upgrade program (see Section 4.5.7).

4.6.7. Stormwater program

The major works proposed as part of this program have been assessed as part of the review of the stormwater major rehabilitation and renewal program (see Section •), which established that the approach adopted was appropriate and the expenditure proposed efficient.

4.7. Discretionary programs

4.7.1. Introduction

In addition to the specific capital projects reviewed in the previous section, Aither has also reviewed the proposed expenditure allocated to discretionary programs for the upcoming regulatory period. IPART may allow for discretionary expenditure to meet service levels that exceed mandated standards. In such cases, IPART requires clear evidence that customers are willing to pay the higher prices required to meet the higher or different standard.

Hunter Water has identified two discretionary programs that it is seeking to fund from overall revenue:

- Stormwater Naturalisation Program (forecast regulatory period), and
- Recycled water for public open space (forecast regulatory period).

The two programs for the forecast regulatory period are driven by the results of a willingness-to-pay study commissioned by Hunter Water in 2018.

Consideration of the willingness-to-pay study

Aither has been advised that IPART will independently and separately assess whether the willingness to pay study meets its best practice principles and therefore meets the needs of its customers.

Based on our instructions from IPART, Aither has mainly considered the willingness-to-pay study based on its implications for estimated costs for the programs. Aither has provided some commentary on the economic justification for each of the projects for IPART to consider in its assessment. The following provides an overview of our assessment of these discretionary projects and their proposed expenditure.

4.7.2. Stormwater Naturalisation Program

The Stormwater Naturalisation Program is based on undertaking discretionary work on Hunter Water's stormwater drainage assets to provide increased amenity for its customer base. Hunter Water's initial Pricing Submission proposed a separate project related to Lower Cottage Creek Stormwater Amenity to be undertaken in the current regulatory period, however it has now altered its position to include this project within the broader Stormwater Naturalisation Program in the upcoming regulatory period (see further discussion below).

The driver for the discretionary project is to improve the amenity of its stormwater assets based on the results of the willingness-to-pay study undertaken by Hunter Water in 2018 that is referenced above. The key finding in relation to this program from the willingness-to-pay study was:

> 'Willingness to pay [for stormwater naturalisation] is on average $33.87 a year, however the distribution of willingness to pay is fairly evenly spread across service levels, with most respondents willing to pay up to $25 or more for 3 kilometres or more of channel rehabilitation'[8]

The willingness-to-pay study sought to understand customers' willingness to pay for stormwater amenity through providing them with options regarding bill impacts and expected outputs (i.e. length of stormwater assets to be naturalised). The following are the questions that were posed within the study:[9]

- Do bankwork and/or landscaping on up to 3km (10-30 rugby fields) of open stormwater drains during 2020-25. This is around 5 per cent of all Hunter Water's concrete lined open stormwater drains. Your water bill will increase by between $5 to $20 each year during 2020-25 if you choose this option.[10]
- Do bankwork and/or landscaping on 3 to 6km (30-60 rugby fields) of open stormwater drains during 2020-25 (around 5-15 per cent of Hunter Water's open stormwater drains). Your water bill will increase by between $20 to $50 each year during 2020-25
- Do bankwork and/or landscaping on 6 to 10km (60-100 rugby fields) of open stormwater drains during 2020-25 (around 15-25 per cent of Hunter Water's open stormwater drains). Your water bill will increase by between $50 to $70 each year during 2020-25

As a result of the study, Hunter Water has proposed an 'allowance' of $11.3 million for the 5-year pricing period. The allowance is spread uniformly, $2.255 million per annum for each year until 2024-25. Hunter Water has also proposed an increase in operating costs of $50,000 per annum for litter and weed management and replanting. The initial allowance was based on a bill increase of $12 per annum across all Hunter Water customers, however as a result of a variety of contributing factors the total bill impact will be substantially less (approximately $2 per annum). For this allowance, Hunter Water is committing to a minimum of 1km of stormwater amenity improvements to be achieved (noting that it could be between 1km and 3km). While the results of the study showed a higher willingness to pay, Hunter Water has adopted a lower bill impact with a view to focusing on higher priority sites within the period.

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8 Marsden Jacob, *Hunter Water customer willingness to pay survey*, p.17

9 Marsden Jacob, *Hunter Water customer willingness to pay survey*.

10 We have taken the reference of 10-30 rugby fields to indicate that 1km would be a minimum for this option (this was confirmed through discussions with Hunter Water).

Aither notes that the Preliminary Business Case for the program states that Hunter Water would undertake a range of works over the regulatory period and that a minimum of 1km of stormwater amenity improvement works must be achieved (it states that between 1km to 3km could be achieved).

Hunter Water commissioned a consultant, Alluvium, to investigate opportunities for naturalisation of their stormwater drainage assets. This included consultation with the relevant council officers to understand other planning proposals and to provide integrated solutions. Alluvium identified a shortlist of 21 sites - 4 sites in Cessnock, 2 sites in Lake Macquarie and 15 sites in Newcastle. Alluvium's report contains specific concept designs for each shortlisted site; however, no costing estimates appear to have been developed within Alluvium's report.

Hunter Water has obtained cost estimates from Sydney Water based on a costing exercise that was undertaken for the Department of Planning using previous works that had been undertaken by Sydney Water. The cost estimates provided were for different types of naturalisation activities. It was noted that the rates provided were quite high-level and the actual costs would be highly dependent on particular constraints and designs. Hunter Water has used this high-level costing information to inform the potential cost involved in undertaking works for the 21 sites that were shortlisted by Alluvium. However, it should be noted that the *quantum of funding is based on applying the findings of the willingness to pay study to the entire customer base, at a lower level of bill impact (half)*.[11]

In terms of the decisions on which projects should be undertaken and when, Hunter Water informed Aither that this would be based on further discussions with Councils (as a representation of the community) and economic assessments based on market and non-market values of potential benefits from the projects.

Hunter Water is proposing to recover the costs from its entire customer base rather than just the stormwater customers. This is based on the results of the willingness-to-pay study. Given this, it has classified the expenditure as 'corporate' in nature and to be recovered in line with other corporate capital expenditure.

Hunter Water states that the procurement plan will be finalised following the approval of the business case. The design and construction work would be procured externally through experienced consultant/contractors through its standard tender processes.

Lower Cottage Creek Stormwater Amenity Work

As outlined in its response to IPART's Issues Paper, Hunter Water is currently undertaking design work for amenity improvements to Lower Cottage Creek. The works are based on converting a concrete stormwater channel wall to a stepped, vegetated embankment in Lower Cottage Creek. The section of creek is between the light rail line and Honeysuckle Drive, Newcastle West. This project was initially expected to occur over 2018-19 and 2019-20 with a completion date in early 2020, however the construction works for the project have been delayed until 2020-21. As a result of this, Hunter Water is proposing to now capture this project as part of the broader Stormwater Naturalisation Program.

The preferred option for this project involves constructing stepped sandstone block walls with salt marsh planting on both banks of the creek (approximately 80 metres). Stepped vegetated embankments represents a modern approach to design of stormwater channels. For existing channels, such redesign would occur at the end of the asset's useful life. In the case of Lower Cottage Creek, it represents a bring-forward of expenditure to coincide with broader community

[11] Hunter Water, Preliminary Programme Business Case: Stormwater Amenity Improvement, p.4.

works. The channel is about 90 years old with a remaining design life of about 65 years, so it is appropriate that Hunter Water considered some external funding.

The estimated cost of the project is $2.3 million (including design costs). However, Hunter Water successfully applied for funding of $450,000 (excl GST) from the Newcastle Port Community Contribution Grant to contribute towards construction costs. This brings the project costs down to approximately $1.8 million. The estimated cost was based on an estimate from an independent consultant.

Operating cost impacts

Hunter Water estimates that the Stormwater Naturalisation Program will result in a $50,000 operating cost impact for the business going forward. Hunter Water stated that these cost impacts were not captured within the information provided to IPART and it will therefore absorb these additional costs within the business.

Assessment of Stormwater Naturalisation Program

Our assessment of these discretionary programs is focused on the forecast expenditure rather than whether Hunter Water have demonstrated a need for the projects, including through the willingness-to-pay study (this will be undertaken by IPART) or any other regulatory considerations. For this program, our assessment is therefore on whether the allowance that Hunter Water has put forward for the regulatory period is efficient.

For programs such as this, Aither considers the most appropriate measure of their success should be on the outcomes that are expected to be delivered to customers from the investment. The focus of the analysis that underpins this program however, is based on outputs (i.e. km of naturalisation). Given this, our assessment of the success of the program is aligned with the outputs to be delivered for customers rather than the outcomes.

Other capital programs put forward by Hunter Water are informed by cost estimates for identified projects to be undertaken during the regulatory period (or based on previous costs of similar projects). However, the approach proposed for this program is to have an allowance over the regulatory period that is linked to the results of the customer willingness-to-pay study.

The estimate provided for Lower Cottage Creek is significantly higher than the estimates provided by Sydney Water. This is a relatively unique site in that it has a number of constraints that would not impact on other sites and therefore Aither does not expect that this would form a reasonable estimate for other stormwater amenity sites. However, it should be noted that spending such a proportion of the overall allowance on only 80 metres of stormwater assets may raise questions on the ability of Hunter Water to meet the output requirements from the program within the allowance.

While the Alluvium report had identified a number of short-listed sites, it is not clear whether there are any processes in place to ensure undertaking work on those sites meets the output and bill expectations of customers. Aither considers that explicit criteria are developed to guide both Hunter Water and its stakeholders on how the allowance should be distributed within the program.

Hunter Water has provided its model for estimating the bill impacts from the program. This model considered the potential bill impacts from both a building blocks and net present value perspectives. The weighted average cost of capital (WACC) that has been used within the analysis was based on previous estimates of 4.1 per cent. We note that the WACC estimate is likely to be lower for the upcoming regulatory period and therefore the calculated impact on customer bills is likely to be conservative (i.e. higher than the actual bill impact that will eventuate) in the short-term. It should be noted however, that there is a risk that future increases in the WACC may result in the current level of

expenditure allowance having a greater impact on customer bills (through a higher return on investment) than has been indicated through the willingness-to-pay study. This may necessitate the use of various WACC estimates to understand the likely customer bill impacts given that the investments will be recovered over multiple regulatory periods. This would provide greater certainty that the investments in the current period will not have a greater bill impact on customers (than indicated in the willingness-to-pay study) in future regulatory periods.

The outputs of the analysis do not align exactly with the notional bill impact from the program business cases, however Aither notes that the calculated impact is less than the notional impact previously documented (and therefore within the bounds of the results of the willingness-to-pay study).

Hunter Water has captured the allowance for the program as corporate expenditure as a way of allocating the costs across the customer base rather than simply stormwater customers. The appropriateness of this will depend on IPART's assessment of Hunter Water's willingness-to-pay study and whether it has demonstrated that the entire customer base is willing to fund this type of program. It should be noted however that the asset lives associated with corporate assets is much lower than stormwater assets. For the level of expenditure that is currently proposed this is unlikely to cause any material issues, however if this level of expenditure were to continue into the future, Aither considers that a different approach to capturing these projects within the RAB is adopted to ensure that an appropriate asset life is assigned to the investment.

If IPART deems that Hunter Water has demonstrated a need for the investment through its willingness-to-pay study we propose that the expenditure allowance be approved as efficient, however we consider it important to:

- capture the program as an output measure for Hunter Water to ensure sufficient reporting on what is being achieved from the investment (e.g. kms of naturalisation), and
- consider an ex-post adjustment mechanism for the program whereby only those investments that meet an investment hurdle (which is aligned with results of the willingness-to-pay study) are subsequently added to the RAB.[12]

This adjustment ensures that the risk of not delivering on the designed outputs will rest with Hunter Water rather than the remaining customer base. In the absence of such a mechanism it is not possible to state that the investment is efficient as the forecast allowance does not reflect specific projects with pre-determined outputs or outcomes to measure against.

By including the program as an output measure and applying an ex-post adjustment it will ensure that the expenditure that is subsequently incorporated into the RAB is consistent with the expected outputs from the willingness-to-pay study and therefore considered efficient.

4.7.3. Recycled water for public open space

Hunter Water has proposed an expenditure 'allowance' of $11.48 million ($2.3 million per annum) over the five-year period (2020-21 to 2024-25) for the provision of discretionary recycled water for public open space irrigation.

[12] Aither notes that while IPART will require a review of historical capital expenditure as part of the next regulatory period, some capital projects may not be picked up through this process. We have therefore recommended a specific consideration of this project given the nature of how the expenditure is derived.

The initial proposal was based on delivering 150 to 200ML per annum of additional recycled water with a benefit cost ratio of 0.76. This includes a willingness-to-pay estimate of an extra $2.07 on each household bill and a long-run marginal cost of potable water of $2.34.[13, 14]

The willingness-to-pay study sought to understand customers' willingness to pay for increasing wastewater recycling for irrigation with options regarding bill impacts and expected outputs. The following are the questions that were posed within the study:[15]

- Continue to recycle equivalent to 240 Olympic pools of wastewater each year for irrigation during 2020-25. Continue to make investments in wastewater recycling when it saves drinking water and the investments lower water bills, or if the investment is needed to meet minimum environmental standards. Your annual Hunter Water bill will not change if you choose this option.
- Increase Hunter Water's wastewater recycling so that between 8-20 Olympic-sized swimming pools additional recycled water is used each year for public open space irrigation on average when the scheme is operating during 2020-25. This will mean total recycled water for open space irrigation is equivalent to about 248-260 Olympic pools each year. This will help keep about 3 kilometres of Newcastle waterways healthier. Your annual Hunter Water bill will increase by about $0.50-$1 during 2020-25.
- Increase Hunter Water's wastewater recycling so that equivalent to 60-80 Olympic-sized swimming pools is used each year for public open space irrigation on average when the scheme is operating during 2020-25. This will mean total recycled water for open space irrigation is equivalent to 660-680 Olympic-sized pools each year. This will help keep about 5 kilometres of Newcastle waterways healthier. Your annual Hunter Water bill will increase by about $1-$3 during 2020-25.
- Increase Hunter Water's wastewater recycling so that equivalent to 120-160 Olympic-sized swimming pools is used each year for public open space irrigation on average when the scheme is operating during 2020-25. This will mean total recycled water for open space irrigation is equivalent to about 720-760 Olympic-sized pools each year. This will help keep about 10 kilometres of Newcastle and Lake Macquarie waterways healthier. Your annual Hunter Water bill will increase by about $3-$5 during 2020-25.

Hunter Water has undertaken several studies on recycled water opportunities in the lower Hunter since 2007, such as the Recycled Water Strategy Study (2007), H250 Plan (2008), Hunter River Catchment Effluent Management Master Plan (2010-12) and Recycled Water Opportunities Study (2012) specifically undertaken for the LHWP. A long list of potential recycling sub-options was compiled by Hunter Water based on these studies. Irrigation of existing parks / open spaces, and dual reticulation schemes for new residential development account for more than half of the opportunities.

Despite a long list of potential recycling options, Hunter Water has not yet put forward its selection/investment criteria and/or a list of proposed projects. Aither is therefore unable to test the economic efficiency of the specific projects that will be undertaken, or whether the outputs are achievable for the bill increases proposed.

Through the review process, Hunter Water indicated that it was not seeking to recover the costs associated with avoided and deferred costs through IPART's recycled water pricing framework. Hunter Water advised that this represented approximately $5 million of the program. Given this, the

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13 The derivation of this estimate of long-run marginal cost has not been tested. It is noted that IPART has indicated it will be issuing guidance on how to estimate long-run marginal cost.

14 Aither notes that this willingness-to-pay estimate is different to that outlined in the Marsden Jacob study. Aither has used the Hunter Water documentation as this is the most recent and what the decision-making is based on.

15 Marsden Jacob, *Hunter Water customer willingness to pay survey*.

focus of our analysis was based on the remaining $6 million and the alignment with the results of the willingness-to-pay study. This resulted in a reduction in the bill impact to customers and the expected outputs from Hunter Water. As a result, Hunter Water's revised bill impact assessment is less than $1 and it has therefore revised its output target to at least 20ML per annum by 2024-25.

Hunter Water has advised Aither that they will be seeking contributions from the owners/managers of the open space provided with recycled water, which could include user charges. However, as specific projects have not yet been selected, this information is not yet available.

Operating cost impacts

Hunter Water estimates that the Recycled Water for Public Space Irrigation Program will result in a $150,000 operating cost impact for the business going forward. As with the Stormwater Naturalisation Program, Hunter Water stated that these cost impacts were not captured within the information provided to IPART and it will therefore absorb these additional costs within the business.

Assessment of recycled water for open space program

Aither's assessment of this program of expenditure aligns with its assessment of the Stormwater Naturalisation Program outlined above. After adjusting for the removal of the potential deferred costs ($4.8 million), our approach to the assessment is the same as the Stormwater Naturalisation Program.

As with the Stormwater Naturalisation Program, Hunter Water has provided its model for estimating the bill impacts from the program. This model considered the potential bill impacts from both a building blocks and net present value perspectives. Aither considers that it may be worthwhile a consistent approach is developed for these models to ensure that the bill impacts remain appropriate in the future when the program involves long-lived capital investments.

Consistent with the findings for the Stormwater Naturalisation Program, if IPART deems that Hunter Water has demonstrated a need for the investment through its willingness-to-pay study we propose that the expenditure allowance be approved as efficient, however we consider it important to:

- capture the program as an output measure for Hunter Water to ensure sufficient reporting on what is being achieved from the investment (e.g. additional volume of recycled water for open space), and
- consider an ex-post adjustment mechanism for the program whereby only those investments that meet an investment hurdle (which is aligned with results of the willingness-to-pay study) are subsequently added to the RAB.[16]

This adjustment ensures that the risk of not delivering on the designed outputs will rest with Hunter Water rather than the remaining customer base. In the absence of such a mechanism it is not possible to state that the investment is efficient as the forecast allowance does not reflect specific projects with pre-determined outputs or outcomes to measure against.

By including the program as an output measure and applying an ex-post adjustment it will ensure that the expenditure that is subsequently incorporated into the RAB is consistent with the expected outputs from the willingness-to-pay study and therefore considered efficient.

[16] Aither notes that while IPART will require a review of historical capital expenditure as part of the next regulatory period, some capital projects may not be picked up through this process. We have therefore recommended a specific consideration of this project given the nature of how the expenditure is derived.

4.7.4. Other jurisdictions

Aither notes that as part of its submission to the 2016 Price Review, Melbourne Water put forward proposed expenditure ($29.9 million) to improve liveability. The focus of the expenditure was based on, among other things, delivering green space for shade and cooling near waterways and returning concrete drains to a more natural state.[17]

In reviewing this proposed expenditure, the Essential Services Commission (and its consultant Deloitte) had concerns with the lack of detail from Melbourne Water regarding how it would deliver the green space program within the regulatory period. Melbourne Water was seeking approval for an expenditure allowance but had not yet defined the projects within this allowance. Given this, the Essential Services Commission considered it was unable to make a proper assessment about the extent of the expected benefits to customers or the efficiency and prudency of the expenditure. As a result, the Essential Services Commission did not approve the expenditure associated with the green space program.

4.7.5. Assessment of discretionary programs

Based on the above assessment, the following table outlines Aither's assessment of Hunter Water's proposed discretionary programs. Aither has not made any assessment in relation to operating expenditure associated with these programs as Hunter Water has indicated that it is not seeking to recover these costs from customers and will be absorbing those costs over the period. Aither notes that the discretionary projects are subject to IPART's assessment of the willingness-to-pay study and therefore we have not made specific recommendations, but rather provided our assessment of the proposed expenditure.

Table 15 Assessment of capital expenditure for discretionary programs ($000s, $2019-20)

	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water forecast discretionary capital expenditure	**2,083**	**4,551**	**4,551**	**4,551**	**4,551**	**4,551**	**24,838**
Adjustments							
Lower Cottage Creek	(2,083)						(2,083)
Recycled water program		(960)	(960)	(960)	(960)	(960)	(4,800)
Sub-total adjustments	**(2,083)**	**(960)**	**(960)**	**(960)**	**(960)**	**(960)**	**(6,883)**
Total assessed discretionary capital expenditure	**-**	**3,591**	**3,591**	**3,591**	**3,591**	**3,591**	**17,955**

[17] Essential Services Commission, Melbourne Water Price Review 2016 – Final Decision, p.37.

4.8. Overall assessment of capital program efficiency

Project and program planning and scoping

The key factors that typically influence the efficiency of an organisation's capital expenditure relate to the maturity and robustness of systems and processes for asset management, governance and risk. These systems enable:

- access to timely and relevant information on current and future service requirements, based on demand and connections forecasting, asset condition assessments, changing customer, community and regulatory requirements, and current performance
- relevant analytical assessment of this information to develop appropriate responses, including long-term capital and operating expenditure implications
- appropriate decision-making frameworks that consider financial, whole-of-life assessments, non-financial aspects and corporate risk within a robust governance framework
- project planning processes that specify outcomes that are timely, effective and optimise risk and financial impacts
- project delivery arrangements that deliver on time and at appropriate costs.

As part of this review Aither has considered various factors relating to the efficiency of Hunter Water's capital delivery, including asset management, strategic planning, governance and risk (see Section 3), as well as part of the review of individual projects and programs. In general, Hunter Water's systems and processes have been assessed as consistent with or leading industry practice. Where specific issues have been identified in relation to projects or programs, appropriate recommendations have been made.

The only broader efficiency issue that has been identified relates to the process of project scoping and decision-making where there is a material dependency on subjective risk assessment. Beyond the related recommendations made for specific projects and programs, there are several other minor programs where similar issues are likely to arise. Based on, and consistent with, the findings from the detailed review, a reduction in the proposed expenditure for the forecast period for the **mandatory standards program** is also recommended, comprising:

- $0.2 million per annum for the water program
- $0.6 million per annum for the wastewater program

These reductions are driven by consideration of: wastewater pump station compliance improvement; tanker receival facility upgrades; generator connection point improvement; and the firefighting improvement program.

Project delivery efficiencies

An organisation's project delivery efficiency is best supported by employing a selection of delivery methods that are appropriate for the nature of the works. Hunter Water is generally considered to have good practices that align with standard industry approaches.

Hunter Water has undertaken internal reviews to ensure that outcomes for ongoing programs align with the benchmark of comparable utilities in the water industry. As an example, Hunter Water provided data for sewer main renewals that demonstrate they achieve a lower unit cost than many utilities within their cohort (see Table 16).

Table 16 Sewer main renewal profile comparison

Utility	Delivery period	Total length (km)	Identified for renewal (km)	% replaced per year	Capex ($ million)	Unit cost ($ per m)
Icon Water	2013–18	3,288	89.2	0.54	30.7	344
Sydney Water	2012–16	25,355	137.0	0.11	68.2	498
City West Water	2018–23	4,239	28.0	0.13	9.8	350
South East Water	2018–23	9,250	34.0	0.07	12.5	368
Hunter Water	**2020-25**	**5,160**	**65.8**	**0.25**	**12**	**182**

Source: Hunter Water

Benchmarking the cost of major projects is generally problematic and an assessment of efficiency typically involves a review of an organisation's practices. Hunter Water consistently adopts practices that are considered reasonable to achieve optimal outcomes for cost, commensurate with risk. Examples of this include:

- using consultants for concept development and pre-tender cost estimates that are independent of contractors appointed for project delivery
- the use of design and construct contracts for major treatment works
- packaging similar works across multiple facilities into larger programs, enabling economies of scale on material purchases and project management, but leveraging lower-margin, smaller subcontractors for installation
- separate design and construct packages to optimise risk allowances in construction tenders.

In summary, Hunter Water's practices are broadly assessed as consistent with or leading the industry standard. Accordingly, the capital program (beyond the specific recommendations made) is considered efficient. The only exception arises where subjective risk assessment is likely to inform a level of investment that is not efficient. It is therefore recommended that proposed expenditure in the forecast period for the water and wastewater mandatory standards programs be **reduced by $0.2 million and $0.6 million per annum respectively**.

The scoping of these particular programs is understood to rely on a subjective assessment of risk. When Aither has made a more detailed review of project activities that have similarly been based on subjective risk-based scoring (e.g. the mechanical and electrical network and treatment renewals components of Capital Project 4) it has considered that to be inefficient and a reduction of 10 per cent.

The recommended overall efficiency adjustment does not apply to other parts of the program as they have either had specific efficiency adjustments or are based on more objective risk assessments techniques.

4.9. Regulatory depreciation and asset lives

IPART allows Hunter Water to earn revenue calculated using a 'building block' approach which includes allowances for return *on* assets, a return *of* assets (regulatory depreciation), efficient operating costs and a tax allowance. In the current pricing period, regulatory depreciation averaged

approximately $36 million per annum ($2015-16) which was about 12 per cent of the total revenue allowance.

In the past, Hunter Water's regulatory depreciation allowance was based on an overall asset life of 100 years for new assets and 70 years for existing assets. During the previous expenditure review, Jacobs was required to assess Hunter Water's remaining useful asset lives. This resulted in IPART approving a gradual transition of asset lives to 67 years for new assets, and for 62 years for existing assets. IPART's 2016 Final Report indicated that Hunter Water would undertake further work on asset lives prior to the next price review.

As well as reviewing the asset lives, Hunter Water also reviewed the categories for its RAB. As a result of the review Hunter Water proposed to further disaggregate the RAB from 4 product categories into 20 separate RAB components with individual asset lives associated with each RAB component. Hunter Water has provided a report on the methodology for the disaggregation – our assessment of the methodology is based on this report and further information and discussions with Hunter Water staff.

The impact of the proposed change, if approved, would be to increase regulatory depreciation by about $25 million per annum ($2019-20).

It should be noted that by changing the asset lives associated with the RABs for existing assets, the basis on which the opening RABs were first determined should be acknowledged. The opening RAB values for Hunter Water were back-solved and set to reflect prices prevailing at that time (this is known as the 'line-in-the-sand' approach). Therefore, had asset lives (for regulatory purposes) been what Hunter Water is now proposing, a lower opening RAB is likely to have eventuated. The result of higher asset lives (and therefore lower regulatory depreciation) was a higher RAB value during the setting of initial RABs. We note that asset lives are updated over time, however this is a significantly different set of asset lives from the setting of the initial RAB.

Aither's review has not considered this issue, but rather focused on the proposed methodology going forward. However, it is an issue that IPART will need to consider in the broader context of the review.

To consider these issues regarding the change in methodology, we have considered:

- the disaggregation of the RAB values
- Hunter Water's proposed asset lives for each asset class, and
- Hunter Water's fixed asset register.

4.9.1. Disaggregation of the RAB

Hunter Water allocated each of the four product RABs into five classes (civil; mechanical/electrical; equipment; intangible; non-depreciating) to make 20 individual RABs. The allocation to the different RABs was based on apportioning the RAB to each class based on the value of assets in each class, as recorded in the Fixed assets Register. The gross replacement cost (GRC) was used for determining the asset values for the corporate classes, with the depreciated replacement cost (DRC) used for each other class. Hunter Water stated that the reasoning behind the different approaches was that:

- The majority of assets in water, wastewater and stormwater have longer lives, more in line with the asset lives adopted in previous determinations. Therefore, it was expected that the current asset values in the RAB will more closely reflect the DRC rather than the GRC.

- The majority of assets within the corporate RAB have shorter asset lives. As the corporate RAB had been depreciated on the same basis as the other RABs for previous determinations, Hunter Water was of the view that applying the DRC method would overstate the value of non-depreciating assets and equipment, and understate the value of intangibles. Given this, Hunter Water apportioned the corporate RAB into asset classes based on the GRC.

Table 17 presents the results of this analysis from Hunter Water.

Table 17 Hunter Water's proposed RAB opening balances ($m, $2019-20)

RAB Asset Class	Water	Wastewater	Stormwater	Corporate
Civil	1,095.0	741.3	49.0	14.1
Electrical/ Mechanical	100.7	133.8	0.0	3.0
Equipment	9.1	7.6	0.1	57.3
Intangibles	0.0	0.0	0.0	71.4
Non-Depreciating	36.3	552.9	0.9	4.7
Total Opening RAB	**1,241.1**	**1,435.7**	**50.0**	**150.5**

Source: Hunter Water, Disaggregation of the RAB, p.3.

Table 18 outlines the difference in values that are allocated to each corporate asset class when using the GRC approach rather than the DRC. There is not a material difference in the values of civil and electrical/mechanical, and while there are significant differences in the equipment and intangibles values (and to a lesser extent, non-depreciating assets), this difference largely cancels-out because Hunter Water has adopted the same asset life of 5 years for both *existing* equipment and intangibles.

Table 18 Hunter Water's proposed corporate RAB opening balances ($m, $2019-20)

RAB Asset Class	Corporate (GRC)	Corporate (DRC)	Difference
Civil	14.1	17.4	(3.3)
Electrical/ Mechanical	3.0	5.4	(2.4)
Equipment	57.3	83.3	(26.0)
Intangibles	71.4	31.6	39.8
Non-Depreciating	4.7	12.8	(8.1)
Total Opening RAB	**150.5**	**150.5**	**-**

Source: Hunter Water, Disaggregation of the RAB, p.11.

4.9.2. Determining asset lives

The calculated asset life for each RAB category was based on a weighted average of the asset lives recorded in the Fixed Assets Register. The weighting factor was the annual depreciation of each entry divided by the annual depreciation total for all entries assigned to the particular RAB category. The asset lives calculated by Hunter Water are outlined in Table 19 and Table 20 below.

Table 19 New asset lives by RAB categories proposed by Hunter Water

Asset class	Water assets	Wastewater assets	Stormwater assets	Corporate assets
Civil	90	90	117	42
Electrical/Mechanical	25	25	25	25
Equipment	11	11	11	11
Intangibles	5	5	5	5
Non-Depreciating				

Source: Hunter Water, Annual Information Return.

Table 20 Remaining asset lives of existing assets by RAB categories proposed by Hunter Water

Asset class	Water assets	Wastewater assets	Stormwater assets	Corporate assets
Civil	48	62	47	22
Electrical/Mechanical	16	16	16	16
Equipment	5	5	5	5
Intangibles	5	5	5	5
Non-Depreciating				

Source: Hunter Water, Annual Information Return.

The asset lives assigned to entries in the Fixed Assets Register for statutory accounting purposes are informed by engineering estimates of useful lives. Through the review, Hunter Water provided a comparison of its proposed asset lives against the NSW Reference Rates Manual and Sydney Water.

Useful Lives of Assets		NSW Reference Rates Manual	Hunter Water Valuation Reports	Sydney Water/Halcrow Recommendations
Water				
Dams	Structure	100	100-150	n/a
	Mechanical & Electrical	25	25-30	n/a
Bores		30	30	n/a
Treatment Works	Structure	70	70	100
	Mechanical & Electrical	30	25-30	30-40
Pumping Stations	Structure	50	60	100
	Mechanical & Electrical	25	30	30-40
Mains	New	80	100-150	30-200
Reservoirs	Structure	100	100	150
	Roof	40	100	
Sewerage				
Treatment Works	Structure	50	50-100	100
	Mechanical & Electrical	20	25	25
Pumping Stations	Structure	70	120	100
	Mechanical & Electrical	25	25	25
Access Chambers	Structure	70	85-120	
Mains	AC pipes	45	80	
	VC pipes	70	140-150	50-150
	UPVC pipes	70	80-100	100-150
	concrete pipes	45	85	75-100
	DI pipes	40	100-120	
Others	Odour Control	20	20-120	
Stormwater Assets				
Channels		30	100-150	150
Culverts		60	100	

Source: Hunter Water

Figure 18 Comparison of asset lives

At the FAR individual entry level, there does not appear to be a major difference between Sydney Water and Hunter Water in terms of asset lives. However, the asset life for a RAB category is the combination of the asset lives in the FAR corresponding to projects aggregated to form this RAB category. Given the different lives and project values, the RAB life needs to be a weighted average of the component projects.

Jacobs reviewed Hunter Water's asset lives as part of the 2016 Determination. We note that this was a temporary measure intended to provide Hunter Water with time to undertake their own assessment. In reviewing this approach, Aither observes:

- Jacobs used project value as its weighting whereas weighting by depreciation (as proposed by Hunter Water) appears more correct
- Jacobs review was based on valuations from the fixed assets register which Hunter Water has subsequently identified as overstated (and has since corrected), and
- Jacobs, for new assets, used a capex forecast for 5 years to derive its weightings – this could easily be different to the longer-term weightings given the lumpy nature of investments.

Given the concerns regarding the Jacobs assessment we consider it reasonable that Hunter Water's assessment would result in a different outcome.

As there is a significant increase in the regulatory depreciation allowance as a result of the change in methodology, Aither has sought to focus on the key areas that are driving this impact. One of the key areas is the length of asset lives for intangible assets.

Intangible assets in this context largely refer to (but not solely) software-related assets. This is a growing asset class within Hunter Water and has a relatively low asset life of 5 years. In reviewing the recommended asset lives for software assets from the Australian Tax Office, it appears that most software assets are assigned a life between 4 and 7 years.[18] Given this, the proposed 5 years for new assets is not unreasonable.

Further to the consideration of how differences between businesses can be a function of the amount of assets in each RAB category. Indeed, a weakness of the Jacob's review, mentioned above, was that they used a 5-year investment profile on which to base weightings. Hunter Water in their response to IPART listed the following comparison of 5-year investment profiles:

Table 21 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, Submission to IPART Issues Paper.

This comparison suffers the same weakness attributed to the Jacob's review. Aither believes the longest history of investment profile should be used, and that is the Fixed Assets Register – recognising that history is not necessarily representative of the future.

Aither acknowledges there are some concerns regarding the ongoing accuracy of the FAR(outlined in section 4.9.3 below), however it considers that Hunter Water's methodology for calculating asset lives for each RAB category is appropriate.

In relation to the estimated lives for new assets, Aither notes that these are reasonably consistent with the NSW Reference Manual and Sydney Water (as outlined above in Figure 18). For the intangibles asset category, it is noted that adoption of 5 years is consistent with the ATO's treatment of software and is therefore considered appropriate. Given this, Aither recommends that the proposed new asset lives are accepted as appropriate.

Transition RAB

To manage the customer impact from the change in methodology, Hunter Water is also proposing to quarantine the RAB opening balances for corporate equipment and intangibles assets into a 'transition' RAB component. Hunter Water proposes that this sum of $128.7 million is proposed to be depreciated over 50 years in order to lessen customer impacts. Hunter Water says this broadly equates to its estimate of the historic under-recovery of regulatory depreciation, largely in the corporate product area.

[18] Australian Taxation Office, Taxation Ruling 2019/5: Effective life of depreciating assets https://www.ato.gov.au/law/view/document?DocID=TXR/TR20195/NAT/ATO/00001

Aither has not sought to assess the validity of this approach within IPART's framework, nor the appropriateness of the selection of corporate equipment and intangible assets as the basis for the transition RAB.

4.9.3. Fixed Assets Register

Hunter Water operates and maintains a Fixed Assets Register that has the details of the utility's assets that it is required to maintain (there are over 66,000 entries within the register). Its proposed approach to disaggregating the RAB and applying new asset lives relies on the accuracy of the data held within its fixed assets register.

The values and lives of most assets within the Fixed Assets Register are reviewed on a 5-yearly cycle by Public Works Advisory. Aither has viewed the latest sewer and water network reports (representing the majority of assets by value in the fixed assets register and revalued by Public Works Advisory) and is satisfied they provide an independent and structured analysis of current asset replacement costs for:

- Sewer network (2013-14)
- Stormwater network (2014-15)
- Buildings (2015-16)
- Land (2015-16)
- Wastewater treatment works (2015-16)
- Water resources (2016-17)
- Water networks (2017-18)

As for asset lives, the Public Works Advisory reports adopt lives generally consistent with the range of values Hunter Water uses in its fixed assets register. Public Works Advisory had no condition data for water network assets, while for sewerage assets, Hunter Water's current asset condition assessment is focussed on a small number of high-priority critical assets, consequently no condition-based reassessments of asset lives were undertaken.

The only adjustments made to asset lives were for assets having less than three years of remaining useful life at the time of revaluation; these lives were upwardly revised to three years.

There is quite a number of assets in the fixed assets register which are not yet retired and have a life-to-date which is greater than the estimated life. They were excluded by Hunter Water in its analysis of weighted average lives, in the belief that their inclusion was distortionary. During the review process, Hunter Water was requested to undertake analysis on the materiality of this issue of not extending asset lives.

Hunter Water advised that there were 1,118 civil and electrical assets (662 civil and 456 electrical) that had no remaining asset life within the FAR. The gross replacement cost of these assets was $275 million (or four per cent of Hunter Water's total RAB). To undertake the analysis, Hunter Water extended the asset lives of those fully written down (civil and electrical) assets by five years. This resulted in a minor change to the analysis through a reduction in the asset lives and therefore a minor increase in the depreciation.

Hunter Water did not adjust the FAR to consider intangibles and equipment assets as they advised that these assets were effectively retired from the FAR when fully written down however they were not

removed from the FAR due to the volume and practicality of doing this. Through our own analysis of the FAR, we noted that while the number of assets that had no remaining asset lives was significant, the gross replacement cost value of these assets was likely to be less than that identified by Hunter Water for the civil and electrical assets.

4.9.4. Aither's assessment

Aither notes that the objective for depreciation within a regulatory setting is to align the recovery of the asset (regulatory depreciation) with the use of the regulatory assets. The current aggregated approach to the RAB and regulatory depreciation does not provide a close alignment between the recovery and the use of the assets. Given this, Hunter Water has proposed an alternative approach to maintaining the RAB and deriving its regulatory depreciation.

Aither considers that Hunter Water's proposed methodologies for disaggregating the RAB values and asset lives (both new and existing lives) appear reasonable. While we note that there are concerns regarding the integrity of the FAR, Hunter Water has demonstrated that the errors do not result in material impacts. Given this, we consider that the proposed approach will result in a better alignment of depreciation and asset lives than the current aggregated approach.

As outlined above, through our review we had some concerns regarding the accuracy of the FAR. Aither considers there are two key aspects to the current and ongoing accuracy of the FAR:

- Initial accuracy for establishing the disaggregated values, and
- Ongoing accuracy for determining the 'remaining asset lives' for future regulatory periods.

Based on the information provided by Hunter Water, Aither considers that the concerns that we have regarding the integrity of the FAR are not sufficient enough to oppose the proposed disaggregated approach. The transition to a more disaggregated RAB that is proposed by Hunter Water, while not perfect, will result in a more economically efficient recovery of asset values than the current aggregated approach.

Aither believes the FAR should include regular updates to reduce and extend asset lives based on current knowledge of the asset's condition, performance and latest expected replacement date. While we note that the analysis provided by Hunter Water demonstrates that the existing concerns do not currently result in material impacts within the FAR, going forward we consider that improvements in the maintenance of the FAR are required to ensure the ongoing integrity of the model in order for it to be used in determining regulatory asset lives.

To ensure confidence in the integrity of the FAR and how it is maintained, Aither is of the view that a process is agreed between Hunter Water and IPART that establishes how the FAR will be maintained over time (e.g. through the use of Hunter Water's internal auditor) to ensure that IPART has confidence in the integrity of the FAR in subsequent reviews and therefore avoids the need to re-consider the FAR when using it to determine appropriate asset lives.

4.10. Deliverability of capital expenditure

Hunter Water is embarking on a challenging capital works program, which involves both a material increase on past levels of expenditure across the period as a whole, as well as a substantial peak of $200 million in 2020-21. The increase is being driven by a variety of different programs, from major works to programs involving many complex individual sites.

In planning for the resulting activity, Hunter Water has taken a robust approach to bundling smaller projects into significant contracts, managed under the appointment of a Project Portfolio Manager (PPM) contractor. Under this arrangement, no single contract – nor the program as a whole – is beyond the technical or organisational capability of Hunter Water to manage.

Some observations relating to recent past performance by Hunter Water include the following:

- In December 2018, Hunter Water's revised forecast for 2018-19 was within 2 per cent of the previous forecast for the year, indicating that delivery was largely proceeding as planned (but slightly behind).
- Forecasts for major projects for 2019-20 were reduced in October 2019 by $9.9 million (or 11 per cent). This reduction included a $7 million reduction on one project alone resulting from a change in strategic direction (Dora Creek Stage 2B sludge management). Other variations on individual projects ranged to similar amounts resulting from changes in schedule, with the net effect across all projects of the $9.9 million reduction to expenditure.
- The most significant major projects planned for the current regulatory period had significant scope variations in between Gateway 1 and Gateways 3 and 4. Ensuring scopes are appropriate results in efficient outcomes. However, this not only impacts forecast costs but has potentially had an impact on the ability for projects that are in the early stages of planning to meet forecast delivery targets.

Observations of this nature are not atypical and can be expected within a five-year program of this nature.

Hunter Water has managed a steady increase in expenditure over the past four years, which is consistent with the sustained increased planned for this and subsequent years. They have established a robust approach to delivery, including the appointment of a PPM contractor along with capable design and construction panels from which to select contractors. Accordingly, no significant impediments to the delivery of the program as set out are expected.

Following our adjustments set out in the analysis above (including the deferral of $5 million in 2019-20), Aither considers that Hunter Water will be able to deliver the recommended program of capital works over the upcoming regulatory period.

4.11. Recommended capital expenditure

The recommended reduction in capital expenditure for the 2016 determination period (including 2015-16) is discussed in detail in Section 4.4. The majority of the expenditure was considered efficient with a recommended reduction due to deferral of $5 million from 2019-20 to 2020-21. The outcome is summarised in Table 22 below.

Table 22 Recommended actual capital expenditure for current regulatory period ($000s, nominal)

	2016 actual	2017 actual	2018 actual	2019 actual	2020 estimated	Total
Hunter Water actual water capital expenditure	29,882	32,697	49,932	61,361	46,032	190,022
No Adjustments						
Total recommended water capital expenditure	29,882	32,697	49,932	61,361	46,032	190,022
Hunter Water actual wastewater capital expenditure	56,927	43,872	33,535	36,031	111,204	224,642
Adjustments						
Project 5 - Farley Wastewater Treatment Plant Upgrade Stage 3B	-	-	-	-	(5,000)	(5,000)
Sub-total recommended adjustments	-	-	-	-	(5,000)	(5,000)
Total recommended wastewater capital expenditure	56,927	43,872	33,535	36,031	106,204	219,642
Hunter Water actual stormwater capital expenditure	715	475	452	6,101	3,828	10,856
Adjustments						
Lower Cottage Creek Stormwater Naturalisation project	-	-	-	-	(2,083)	(2,083)
Sub-total recommended adjustments	-	-	-	-	(2,083)	(2,083)
Total recommended stormwater capital expenditure	715	475	452	6,101	1,745	8,773

Hunter Water actual corporate capital expenditure	12,151	9,713	20,223	15,747	20,310	65,993
No Adjustments						
Total recommended corporate capital expenditure	12,151	9,713	20,223	15,747	20,310	65,993

Source: All data sourced from Hunter Water's AIR and consideration by Aither of recommended project adjustments.

Following the review of Hunter Water's forecast capital expenditure for the next regulatory period, some adjustments are recommended as summarised in the table below (this includes the adjustments to proposed discretionary expenditure).

Table 23 Recommended forecast capital expenditure for upcoming regulatory period ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water forecast of water capital expenditure	39,202	55,346	61,401	57,832	59,609	**273,389**
Adjustments						
Project 3 - Water network Capacity Upgrades	(1,360)	(1,360)	(1,360)	(1,360)	(1,360)	**(6,800)**
Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program	(900)	(900)	(900)	(900)	(900)	**(4,500)**
Adjustment to water treatment minor works	(340)	(340)	(340)	(340)	(340)	**(1,700)**
Adjustment to water network (critical mains)	-	-	(1,900)	(1,900)	-	**(3,800)**
Adjustment to minor water mechanical and electrical network assets	(260)	(260)	(260)	(260)	(260)	**(1,300)**
Adjustment to minor water structures	(1,340)	(1,340)	(1,340)	(1,340)	(1,340)	**(6,700)**
Adjustment to Mandatory Standards Program	(200)	(200)	(200)	(200)	(200)	**(1,000)**
Sub-total recommended adjustments	(4,400)	(4,400)	(6,300)	(6,300)	(4,400)	**(25,800)**
Total recommended water capital expenditure	34,802	50,946	55,101	51,532	55,209	**247,589**

Hunter Water forecast of wastewater capital expenditure	118,869	83,928	85,847	74,309	61,742	**424,695**
Adjustments						
Project 4 - Minor Asset Renewals Programs - Wastewater	(2,030)	(2,287)	(2,338)	(2,594)	(2,543)	**(11,791)**
Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program	(900)	(900)	(900)	(900)	(900)	**(4,500)**
Project 8 - Other Wastewater Treatment Plant Upgrade Program	-	-	-	(16,238)	(7,688)	**(23,926)**
Project 5 - Farley Wastewater Treatment Plant Upgrade Stage 3B	5,000	-	-	-	-	**5,000**
Adjustment to Mandatory Standards Program	(600)	(600)	(600)	(600)	(600)	**(3,000)**
Sub-total recommended adjustments	1,470	(3,787)	(3,838)	(20,332)	(11,730)	**(38,217)**
Total recommended wastewater capital expenditure	120,339	80,141	82,010	53,977	50,011	**386,478**
Hunter Water forecast of stormwater capital expenditure	3,652	2,768	4,664	5,894	6,150	**23,127**
No Adjustments						
Total recommended stormwater capital expenditure	3,652	2,768	4,664	5,894	6,150	**23,127**
Hunter Water forecast of corporate capital expenditure	38,679	43,175	23,199	25,630	19,514	**150,196**
Adjustments						
Recycled water program	(960)	(960)	(960)	(960)	(960)	(4,800)
Total recommended corporate capital expenditure	37,719	42,215	22,239	24,670	18,554	**145,396**

Source: All data sourced from Hunter Water's Submission to IPART and consideration by Aither of recommended project adjustments.

Note: ICT capital expenditure is included in the above forecasts. The assessment of ICT expenditure is contained in section 6.

Based on the above adjustments, Table 24 provides the recommended capital expenditure by asset class. We have used the asset class information from the AIR and accounted for our adjustments

based on our understanding of the works to be undertaken within the adjusted projects and programs. In relation to the recycled water discretionary program, given this is based on an allowance, we have adjusted the civil asset class within the corporate capital expenditure.

Table 24 Recommended forecast capital expenditure by asset class ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Water						
Civil	24,158	33,762	35,440	32,573	35,988	61,922
Electrical/Mechanical	7,088	11,852	12,896	11,098	12,956	55,890
Equipment	3,439	5,332	6,765	7,861	6,264	29,660
Intangibles	-	-	-	-	-	-
Non-depreciating	117	-	-	-	-	117
Total recommended capital expenditure	**34,802**	**50,946**	**55,101**	**51,532**	**55,209**	**247,589**
Wastewater						
Civil	67,560	43,685	44,227	27,916	25,520	208,909
Electrical/Mechanical	46,611	26,849	27,275	18,330	18,386	137,451
Equipment	4,176	3,178	7,727	5,627	4,845	25,554
Intangibles	-	-	-	-	-	-
Non-depreciating	1,992	6,428	2,780	2,104	1,260	14,565
Total recommended wastewater capital expenditure	**120,339**	**80,141**	**82,010**	**53,977**	**50,011**	**386,478**
Stormwater						
Civil	3,447	2,614	4,356	5,484	5,689	21,590
Electrical/Mechanical	-	-	-	-	-	-
Equipment	205	154	308	410	461	1,538
Intangibles	-	-	-	-	-	-
Non-depreciating	-	-	-	-	-	-
Total recommended stormwater capital expenditure	**3,652**	**2,768**	**4,664**	**5,894**	**6,150**	**23,127**

Corporate						
Civil	5,737	7,716	4,574	4,574	2,883	25,484
Electrical/Mechanical	3,974	10,534	694	694	694	16,589
Equipment	7,469	7,016	6,501	7,746	4,541	33,273
Intangibles	20,421	16,827	10,344	11,533	10,313	69,438
Non-depreciating	118	123	126	123	123	613
Total recommended corporate capital expenditure	**37,719**	**42,215**	**22,239**	**24,670**	**18,554**	**145,396**

Source: All data sourced from Hunter Water's AIR (Capex by RAB) and consideration by Aither of recommended project adjustments.

Note: ICT capital expenditure is included in the above forecasts. The assessment of ICT expenditure is contained in section 6.

5. Operating expenditure

5.1. Overview

This section discusses Hunter Water's past and forecast operating expenditure, and more specifically, our opinion as to whether proposed expenditure should be considered to be efficient, given Hunter Water's objectives, obligations and operating environment.

5.2. Overview of Hunter Water's forecasting approach

Hunter Water utilises a combination of a bottom-up and top-down approach to forecasting its annual operating expenditure.[19] In its submission, Hunter Water states that, among other things, its bottom-up approach:[20]

- builds operating budgets by product, process (network or treatment), location and expense type (cost category)
- begins with each individual business unit and budget owner identifying drivers of expenditure in their area of responsibility including tactical, operational and strategic requirements
- involves consideration of unforeseen items in the current price period and the identification of further efficiencies or setting stretch targets for the next price period
- ensures operating expenditure outcomes align with the delivery of the capital program.

Hunter Water states its internal governance process applies a top-down review of the bottom-up forecasts via "an iterative review of budgets for prudency and efficiency throughout the budgeting process".[21] This top-down review included assessment and challenge of the forecast by several internal committees to test:

- drivers and assumptions underpinning expenditure
- significant variances in forecasts to the 2017-18 year
- investment against an assessment of benefits and organisational capacity
- impact of operating expenditure forecasts on customer affordability
- alignment with the forecast capital program and risk appetite statements
- expenditure prioritisation
- efficiencies.

Figure 19 provides an overview of the process that is adopted by Hunter Water, outlining where these top-down tests are applied within the process.

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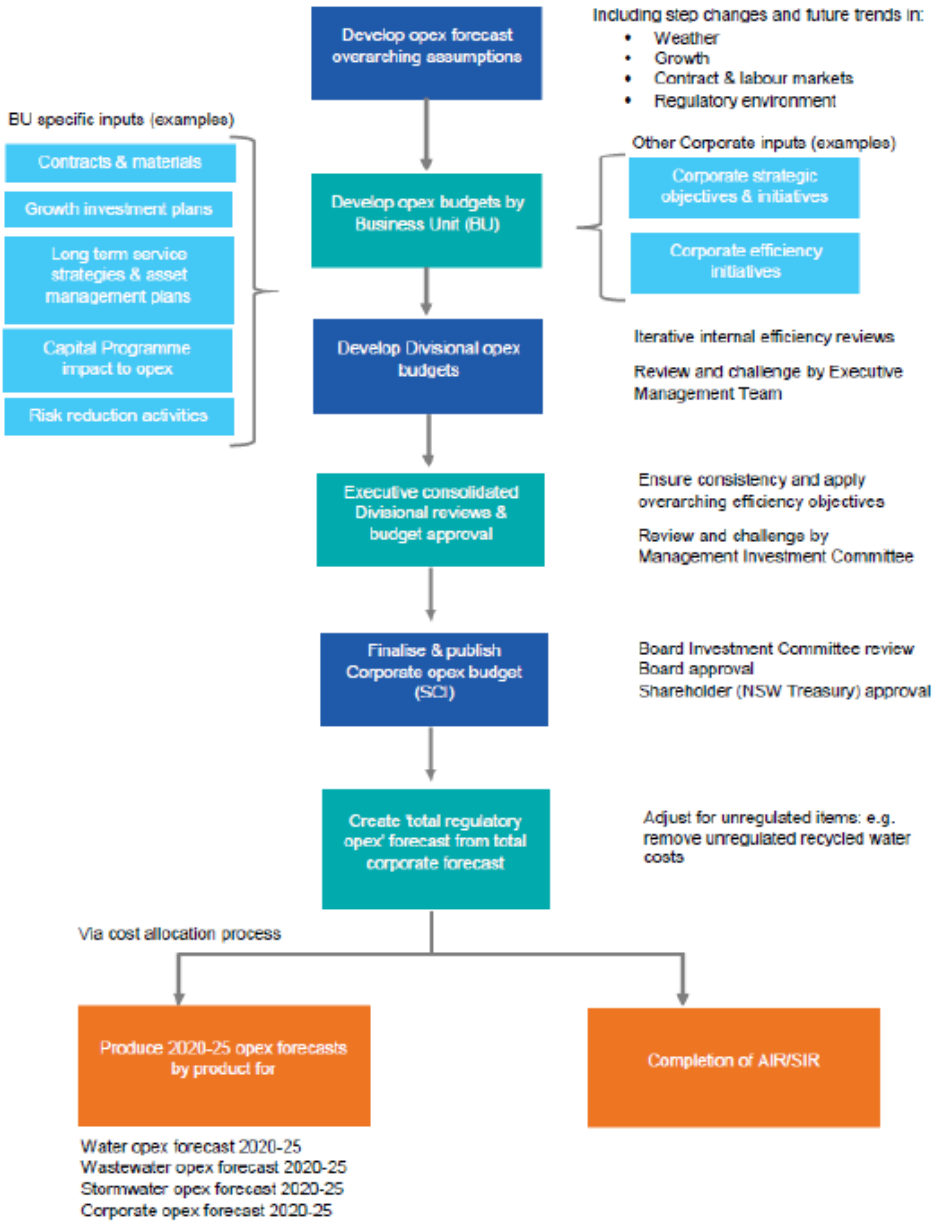
19 A top-down approach is a high-level approach that uses overarching trends and forecasts to apply to expenditure totals to derive forecasts, whereas a bottom-up approach is a more granular approach that develops forecasts based on expected changes to each individual expenditure item.

20 Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 50

21 Ibid, p. 51



Source: Figure 8.1 Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 52

Figure 19 Hunter Water operating expenditure budgeting process

Hunter Water's method of cost allocation consists of an activity-based costing approach to capture direct operating expenditure by product and allocate shared costs based on the proportion of costs assigned to each product.

In developing its forecast operating expenditure, Hunter Water notes that key assumptions include:[22]

- total water sales are forecast to remain relatively stable for 2020-21 to 2024-25 and are in-line with long-term growth assumptions

[22] Ibid, p. 53

- connections and billable property growth are forecast to continue at historical growth rates
- there are real price decreases forecast in future years and these market rates have been applied to future energy consumption expectations
- energy efficiency program outcomes were included in the operating expenditure forecast
- while weather conditions can significantly impact Hunter Water's operating costs, average weather conditions are assumed (in line with a 'P50' budgeting approach)
- full-time equivalent employees will remain stable over the coming price period, at 480-490 FTEs each year across 2020-25. This is an increase from the assumption of approximately 460-465 FTEs each year in the current price period (2016-20). As stated previously, the increase is driven by the organisational restructure that occurred in 2017, which resulted in an increase to 485 FTE employees.
- any wage increases above 2.5 per cent per year provided through the enterprise agreement negotiations will be offset by productivity improvements, as required by the NSW Public Sector Wages Policy.

5.3. Hunter Water as a low-cost operator

In its pricing submission, Hunter Water specifies that, based on the National Performance Report (NPR) data, it has historically been a low-cost operator compared to the other major water utilities and in the 2019 NPR it had the third-lowest operating expenditure per property of 15 major Australian water utilities.[23] However, Aither considers this high-level analysis can distort actual differences between the utilities without consideration of key underlying characteristics.

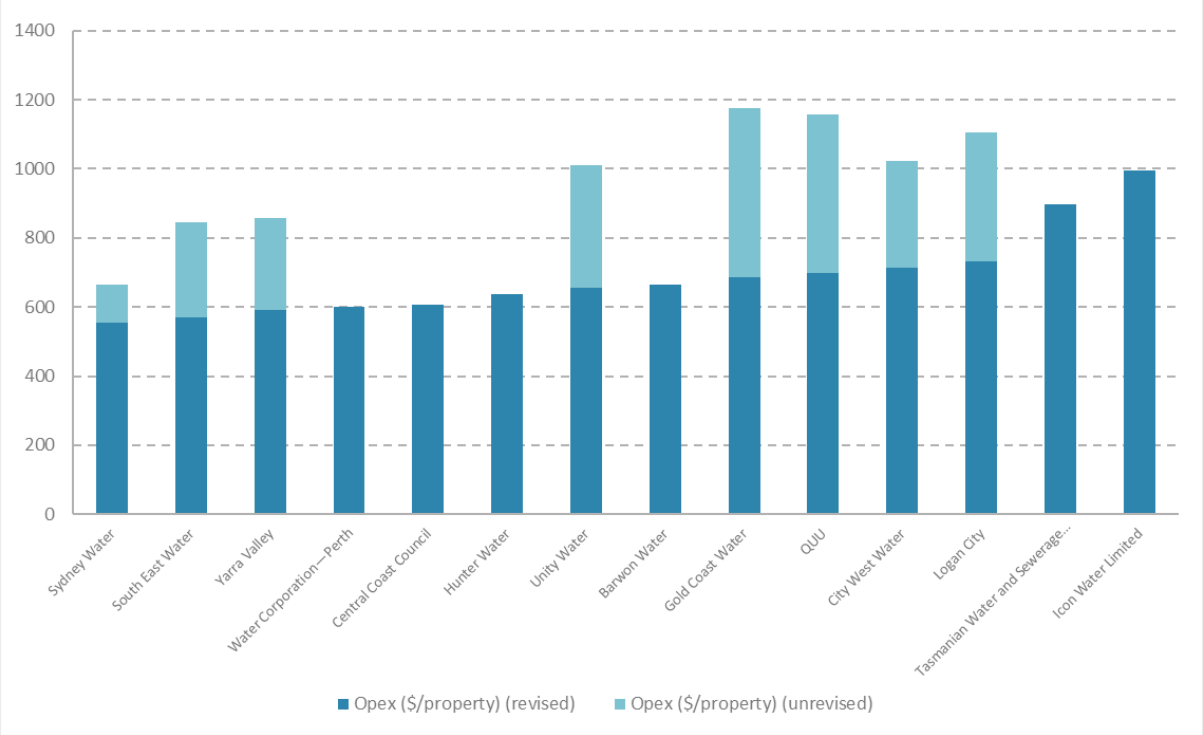
Across the utilities covered by the NPR, Aither notes that some are vertically integrated whereas others are required to purchase bulk water supply from bulk water suppliers (vertically disaggregated). Those utilities operating in a vertically disaggregated structure will have some of the bulk water supplier's capital costs captured within their operating expenditure. That is, the entirety of the bulk supplier's charges to the disaggregated business will be captured as an operating expense, despite the charge reflecting a combination of the supplier's capital and operating costs.

To account for the differences between the types of structures outlined above, we have sought to adjust the bulk water costs for those vertically disaggregated utilities to account for the capital component of the revenue requirement for their respective bulk water supplier (see Figure 20). This adjustment can be seen through the lighter coloured bar for those disaggregated utilities below.

Once this adjustment is made, the comparison should be made on the darker blue columns as this more accurately represents the operating costs for providing services to those customers. Aither notes that following these adjustments Hunter Water is still at the lower-end of the scale of service providers, but more towards the middle.

It should be noted that these numbers have not been normalised for any factors such as geography, distance, topography or age of assets and therefore could not be used for any meaningful benchmarking comparisons.

[23] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 4



Source: NPR data; Aither adjustments

Figure 20 Revised comparison of operating expenditure per property

5.4. Past operating expenditure

This section:

- highlights how Hunter Water's expenditure over the current regulatory period compares to its allowance
- summarises the key factors that have led to Hunter Water's actual expenditure differing from its allowance
- provides Aither's opinion as to the efficiency of Hunter Water's historical expenditure, given the information available.

Over the current regulatory period Hunter Water's actual operating expenditure exceeded IPART's 2016 determination allowance by approximately $26.2 million (4.6 per cent) as shown in Table 25.[24]

[24] The figures shown in Table 25 are based on Hunter Water's updated AIR template and not on its pricing submission document.

Table 25 Comparison of allowed and actual operating expenditure ('000s, $2019-20)

	2016-17	2017-18	2018-19	2019-20	TOTAL 2017-20
IPART operating expenditure allowance	140,345	142,635	144,377	144,851	**572,209**
Hunter Water actual operating expenditure	136,004	152,087	154,497	155,952	**598,540**
Difference	(4,341)	9,452	10,120	11,101	**26,331**
Difference %	(3.1%)	6.6%	7.0%	7.7%	**4.6%**

Source: All data sourced from Hunter Water's AIR (Opex by item, SIR Opex 1) and escalated using SIR CPI tab. Hunter Water's actual operating expenditure is based on the Total Regulated Business information within the AIR (this includes recycled water expenditure from "Section 16A" related schemes).

While actual spend in 2016-17 is lower than the allowed operating expenditure for that year, the later years of overspend are of a significantly greater magnitude. In explaining the variation to IPART's approved operating expenditure, Hunter Water noted it was broadly driven by increase in:[25]

- mitigation activities in order to address risks that were identified across the business:
  - including unbudgeted long-cycle preventative maintenance (LCPM) activities; a deliberate shift from reactive to preventative maintenance in their asset management approach.
- corporate costs as a result of higher labour expenditure to support the revised business strategy following the business restructure during 2017-18
- energy expenditure for wastewater due to:
  - higher unit costs of energy following the tendering of a new electricity contract which started in January 2018.
  - changes to wastewater treatment processes resulting in more energy-intensive treatment.
- expenditure in relational to external service providers
- unforeseen and uncontrollable costs.

Figure 21 plots Hunter Water's actual operating expenditure against IPART's 2016 determination. What's apparent is the significant increase in 2017-18 followed by small annual increase for the remainder of the period.

[25] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 19

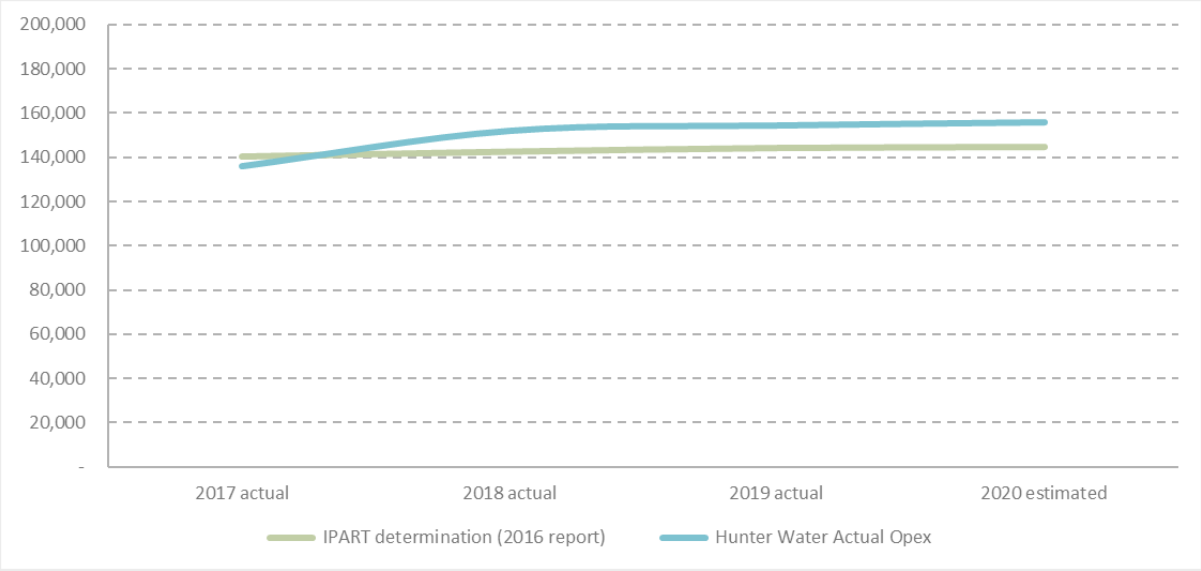


Figure 21 Hunter Water's actual operating expenditure compared to IPART 2016 Determination ('000s, $2019-20)

In identifying the service categories responsible for the overspend during the current period, Hunter Water states:[26]

> *We expect operating expenditure on water and stormwater to be below IPART's allowance during each year of the price period. We forecast higher costs to deliver wastewater services in each year of the price period. Corporate expenditure shows the highest variance to IPART's 2016 allowance – above the allowance in three of the four years.*

The average annual spilt of Hunter Water's operating expenditure across its business functions during the current period is shown by Figure 22. Labour expenditure was the most significant contributor to Hunter Water's operating expenses, with maintenance, operations and corporate expenditure contributing to the bulk of the remaining expenditure.

[26] Hunter Water Pricing Submission Technical Paper 5, p. 17.

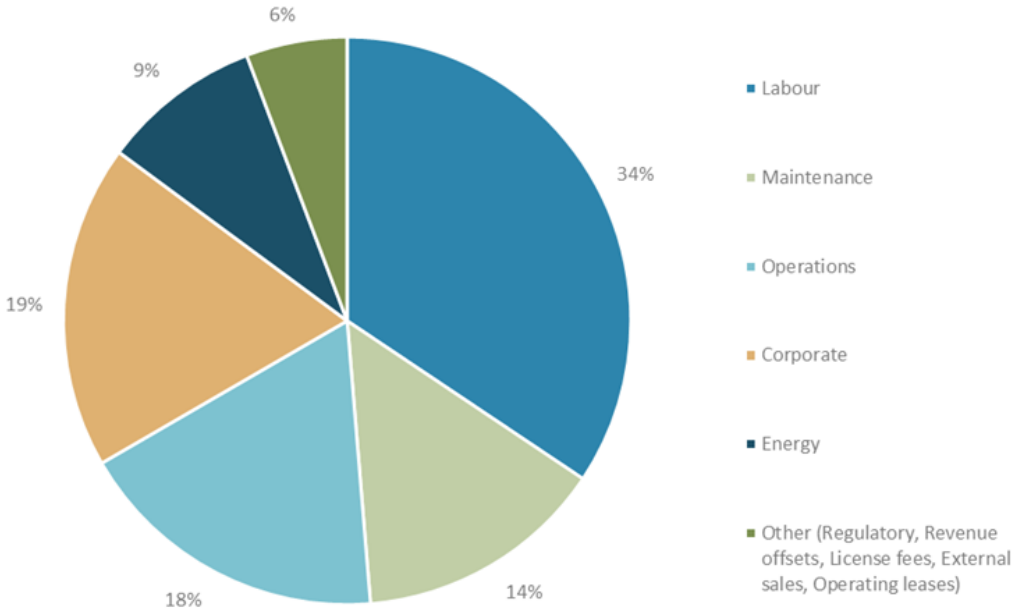


Figure 22 Hunter Water's average operational expenditure (2016-20)

5.5. Aither's approach to assessing forecast operational expenditure

To provide sufficient depth of analysis in support of any findings in relation to efficiency of operating expenditure, Aither sought to first understand, and then critique, the methodology and underlying assumptions adopted by Hunter Water to establish their forecasts. As a result, Aither focused on:

- understanding the factors driving Hunter Water's future costs
- ascertaining the assumptions and methodologies Hunter Water adopted to translate those cost drivers into an operational expenditure forecast.

Having regard to the above, our assessment of the efficiency of Hunter Water's operating expenditure involved, amongst other things:

- reviewing Hunter Water's regulatory submission to identify key forecasting issues and assumptions
- providing Hunter Water with a detailed questionnaire related to their operating expenditure forecasts
- undertaking detailed interviews with Hunter Water staff to clarify issues in relation to underlying assumptions for the operating expenditure.

5.6. Assessment of forecast operating expenditure

This section:

- provides a summary of Hunter Water's forecast operating expenditure
- outlines the information that Aither has relied upon when making our assessment of the efficiency of Hunter Water's operational expenditure forecasts
- provides our opinion as to whether or not Hunter Water's operational expenditure forecasts are likely to be efficient, and our reasons for coming to that conclusion, and
- summarises the adjustments that Aither believe need to be made to Hunter Water's proposed operating expenditure forecasts to align them with levels that Aither believe are efficient.

Prior to commencing the review of the forecasts, Aither considered the general make-up and trends in Hunter Water's forecast operating expenditure. Figure 23 below shows the movement of operating costs per customer over the current and upcoming regulatory periods. From this, it is evident that there was a spike in operating costs per customer during 2017-18 and the continuation of a comparatively higher forecast level of expenditure through the upcoming regulatory period. Our assessment in the following subsections gives consideration to these proposed higher costs with regard to an efficient level of operating expenditure for Hunter Water.

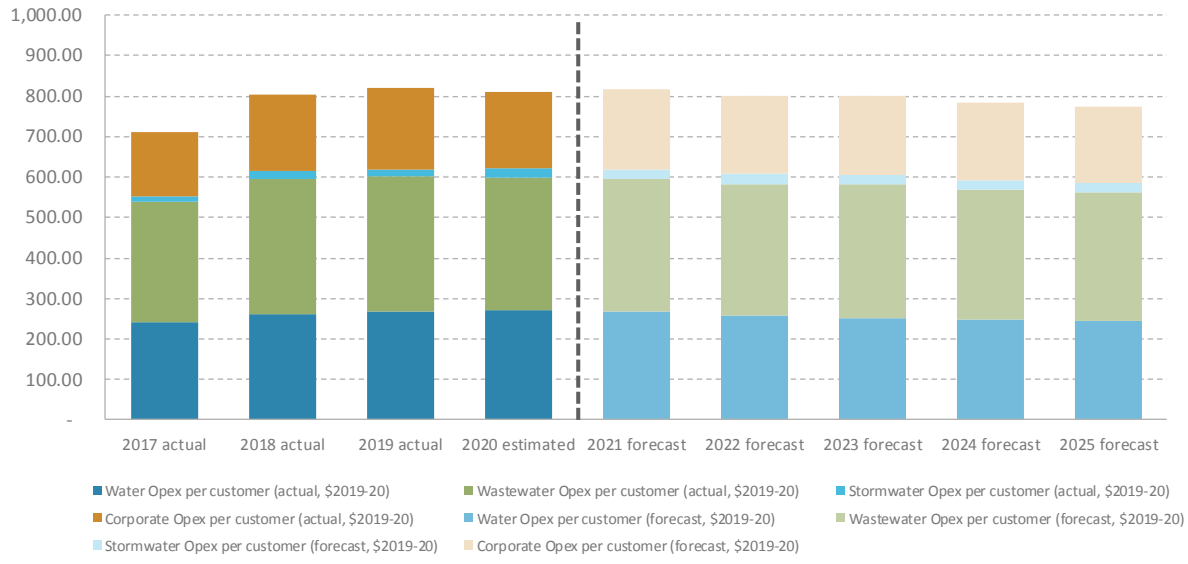


Figure 23 Hunter Water's operating cost type per customer ($2019-20)

The makeup of Hunter Water's forecast operating expenditure over the upcoming regulatory period is shown by Figure 24. There has been minimal change in the split between Hunter Water's cost categories compared to the current regulatory period, with increases or decreases in any one category limited to 1 per cent. Labour remains the largest contributor to costs, with maintenance, operations and corporate costs contributing to the bulk of the remaining operating expenditure.

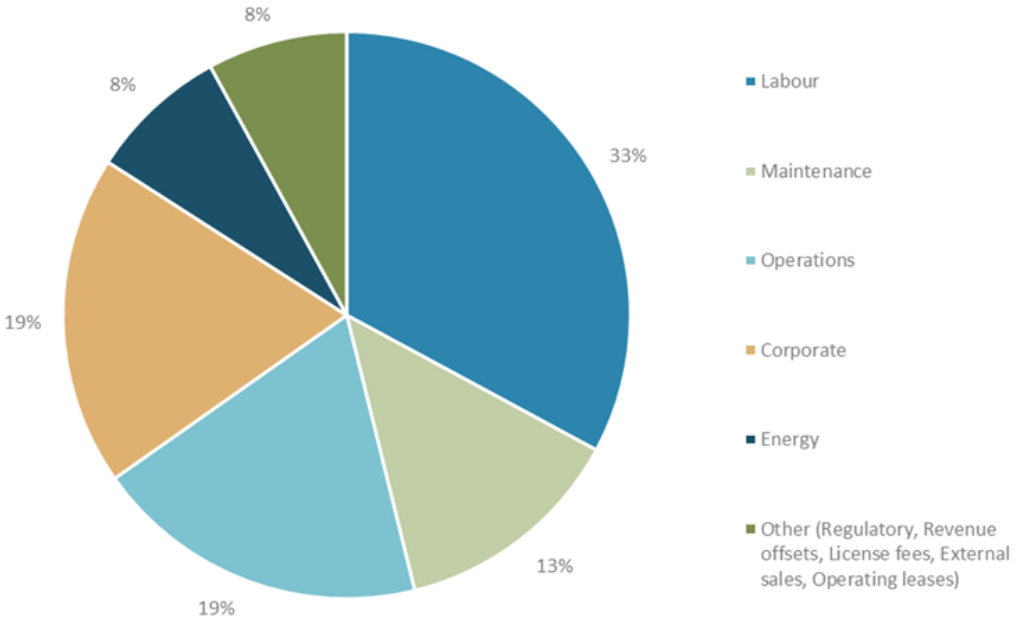


Figure 24 Hunter Water's average operational expenditure (2021-25)

To assess the efficiency of Hunter Water's forecast operating expenditure, Aither has separated its review into the following sub-sections:

- Labour expenditure
- Maintenance expenditure
- Operations expenditure
- Corporate expenditure (exc. ICT)
- Electricity expenditure
- Other on-going operational expenditure costs
- On-going productivity and efficiency improvements

5.6.1. Labour expenditure

Labour costs comprise a considerable proportion (approximately 33 per cent) of Hunter Water's forecast operating expenditure for the upcoming regulatory period.[27] This can have a material impact on the overall revenue requirement and customer prices and therefore it is important to ensure that the expenditure allowance is efficient. Aither notes that Hunter Water has classified both internal and external labour (i.e. contractors) within this cost category. Aither suggests that going forward, Hunter Water separate out external labour in to the contractor cost item within the IPART information return template.

[27] Net of capitalised labour which are costs associated with development and delivery of capital projects.

In developing its labour expenditure forecasts, Hunter Water noted that:[28]

- labour expenditure throughout the upcoming regulatory period is similar to the 2019-20 base year requirements[29]
- internal labour costs increase slightly across the upcoming regulatory period, as a result of a transfer of expenditure from external contractor labour (which reduces over the same period)
- the labour budget is built up on an individual employee basis including assumptions in relation to work dedicated to capital projects, and
- all internal labour includes on-costs for the total cost of employment including superannuation, leave, payroll tax and other expenses.

In considering the forecast labour expenditure, there are some key issues that we have considered:

- how the annual forecast labour expenditure compares to IPART's 2016 determination allowance and how forecast compare to Hunter Water actual labour expenditure from the current period
- the escalation rate for forecast labour expenditure
- the organisation restructure that occurred in the current period and its influence on changes in FTEs, and
- the vacancy rates that are applied to forecast labour costs.

Hunter Water's historical and forecast labour expenditure

A comparison of Hunter Water's actual labour expenditure with IPARTs 2016 Determination allowance for the current period as well as Hunter Water's proposed labour expenditure for the next period is shown in Table 26. Hunter Water states that the $9.5 million of additional labour expenditure above IPART's determination reflects higher expenditure on contract labour, due to:[30]

- additional labour resources to support risk-driven operational activities and longer-term planning work
- a high vacancy rate in internal labour positions - external contract labour was used to fill these vacant internal positions, and
- additional resources required for project development within the expanded capital program, including both physical infrastructure and ICT projects.

[28] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 41

[29] We note that the 2019-20 base year labour requirements specified by Hunter Water is $52m compared to IPART's 2016 determination allowance for 2019-20 of $48.6m (in real $2019-20) as shown on page 19 of Hunter Water's Technical Paper 5.

[30] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 20

Table 26 Hunter Water actual and forecast labour expenditure $m ($2019-20)

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Determination allowance	50.8	48.7	48.9	48.6					
Actual/ forecast	48.6	51.6	54.3	52.0	52.1	51.1	51.2	51.1	52.1
Difference	-2.2	2.9	5.4	3.4					

Source: Hunter Water Pricing Proposal, 1 July 2019, Technical Paper 5, p. 19 (this information was unavailable from the AIR therefore we have used the information from the Technical Paper for this comparison).

Note: The labour expenditure is net of capitalised labour. Aither has presented the information from the Technical Paper rather than the AIR as it did not have access to explicit Determination decisions on labour expenditure.

Through the review, Aither raised concerns regarding the historical increases in labour expenditure and how this historical increase has now been accepted as the new 'base' level of labour expenditure. In response to these queries, Hunter Water provided explanations for the increases in labour expenditure across 2017-18 and 2018-19:

- In 2016-17 a recruitment freeze for 6-months while the organisational restructure was underway – this led to an increase in vacant roles compared to what would normally be the case
- Once the organisational restructure had been finalised and announced, there was still a process of recruitment that took time to undertake – focusing on prioritising key positions
- Through 2018-19, as positions from the restructure were filled, the total FTEs were closer to the budgeted amount and therefore a lower vacancy rate

Figure 25 demonstrates the breakdown in the change in labour costs across water, wastewater, stormwater and corporate. It can be seen from this that the majority of the increase in labour expenditure within the current regulatory period was driven by corporate labour expenditure.

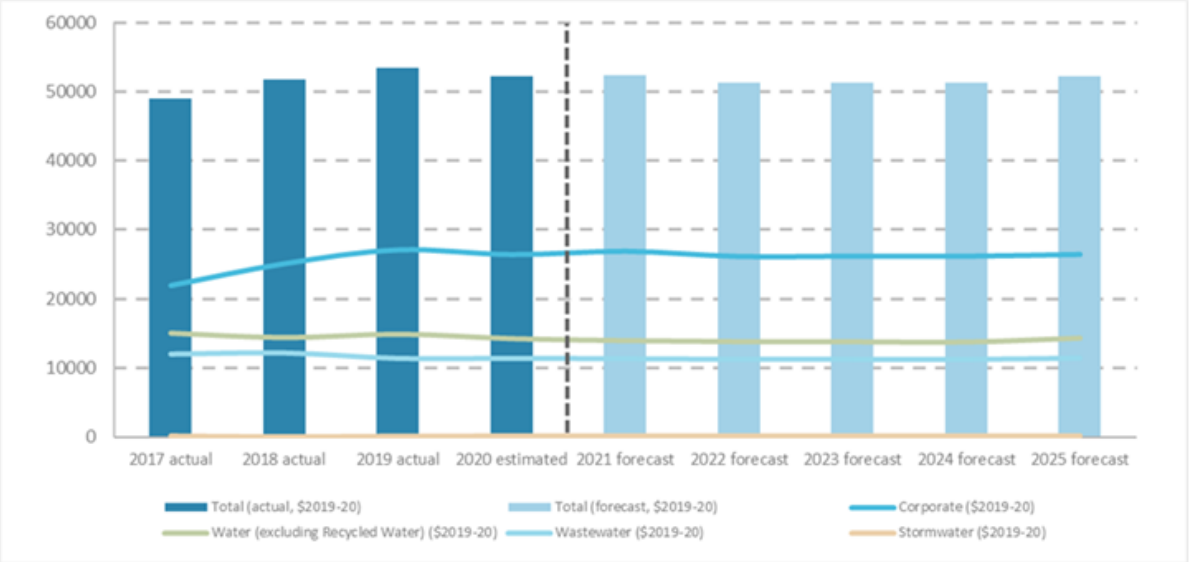


Figure 25 Comparison of actual and forecast labour expenditure by products net of capitalised labour ('000s, $2019-20)

Changes in FTEs over the regulatory period

Hunter Water states it underwent an organisational restructure in October 2017 resulting in an increase from its average annual budgeted FTE of approximately 465 FTE to 485.5 FTE. [31] Hunter Water specifies the key principles of the restructure were:[32]

- shifting resources to customer-facing services to increase the focus on meeting customer needs
- consolidating developer functions to improve engagement and enable good development
- grouping short-term planning functions to deliver support necessary to customer-facing teams
- grouping planning functions to consider longer-term infrastructure options and service levels, and
- reorganising non-customer facing functions to better support customer-facing teams.

In response to a request for information, Hunter Water provided Aither with a breakdown of the 2017-18 FTE restructure by division, outlining the shifts from the original budget to the restructured budget. As shown in Table 27, the restructure resulted in just over 10 additional FTE's in total and an increase in the labour budget of $1.7 million. Hunter Water indicated that it incorporated a higher vacancy amount in 2017-18 to account for the delays in recruiting new positions (and existing positions through the freeze on recruitment) and thereby off-set the budgeted cost increase in that year.

[31] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 33

[32] Ibid, p. 8

Table 27 Hunter Water 2017-18 restructure by division ($nominal)

Division	Budget FTE	Budget $	Restructure FTE	Restructure $	Movement
Customer Strategy and Retail	73.1	8,288,171	75.6	8,671,095	382,923
Information and Comms Tech	39.7	5,346,993	38.2	5,127,722	-219,271
Corporate and Legal	47.3	6,298,004	48.3	6,428,491	130,487
Finance	24.2	3,304,820	25.2	3,465,253	160,434
OMD	12.7	3,800,044	12.7	3,808,101	8,058
Service Delivery	210.9	25,888,763	213.9	26,653,238	764,475
Innovation and Investment	67.2	9,738,491	71.6	10,270,716	532,225
Total	**475.1**	**$62,665,285**	**485.5**	**$64,424,615**	**$1,759,330**

Source: Hunter Water supplied

Table 28 outlines Hunter Water's budgeted internal and external labour FTE's during the current period and forecast regulatory period.

Table 28 Hunter Water's budgeted historical and forecast FTE numbers

	2016-17 (actual)	2017-18 (actual)	2018-19 (actual)	2019-20 (estimate)	2020-21 (forecast)	2021-22 (forecast)	2022-23 (forecast)	2023-24 (forecast)	2024-25 (forecast)
Internal budget	465.3	485.5	475.2	484.6	482.5	490.9	488.4	485.4	484.7
Unbudgeted positions	1.4	1.3	8.3	NA	NA	NA	NA	NA	NA
Vacant positions	(45.7)	(57.5)	(50.3)	(36.7)	(36.5)	(36.7)	(36.5)	(36.3)	(36.2)
Vacancy rate (actual and forecast)	9.54%	11.57%	8.84%	7.57%	7.56%	7.47%	7.47%	7.48%	7.46%
Total costed internal FTE after vacancy	**419.6**	**429.4**	**433.1**	**447.9**	**446.0**	**454.2**	**451.9**	**449.0**	**448.5**
External contract labour	29.5	43.2	58.0	38.9	41.9	27.1	28.1	29.2	28.5
Total labour FTE	**449.1**	**472.5**	**491.2**	**486.8**	**487.9**	**481.3**	**480.0**	**478.2**	**477.0**

Source: Aither – based on documentation supplied by Hunter Water

Shift to insourcing

There has been a decision by Hunter Water to insource activities associated with its contact centre that were previously outsourced. Hunter Water has indicated that the shift of 9.6 FTE from external to internal will occur in 2021-22, with a forecast saving of $0.2m per year. [33] This has led to an increase in internal labour expenditure and a reduction in contractor expenditure for the period.

Vacancy rate

A vacancy rate is used to account for positions that are unfilled throughout the year and the number of staff that may be on leave during the year. Hunter Water has factored in an estimated vacancy rate of approximately 7.5 per cent for each year of the upcoming regulatory period.

It was difficult to assess the actual vacancy rate for Hunter Water based on initial information provided. Following an initial assessment based on internal FTEs, further information was provided that separated the contractor (external) FTEs into backfill and operational staff that provided a more comprehensive understanding of the actual vacancy rate for the business (see Table 29).

Table 29 Estimated actual vacancy rates

	2016-17	2017-18	2018-19
Vacancy rate target (budget)	5.0%	8.0%	8.0%
Actual vacancy rate (pre-labour hire)	9.5%	11.57%	8.84%
Vacancy rate (including back-fill contractors)	5.67%	6.98%	3.94%

Source: Hunter Water information

Aither notes that there can be a perverse impact of over-estimating the vacancy rate through higher contractor expenditure, this would depend on the vacant roles and how critical they are for ongoing operations. In considering the forecasts, Aither notes that there is a decline in contractor expenditure for the upcoming regulatory period while maintaining a target of 7.5 per cent vacancy rate for internal FTEs.

Labour escalation rate and enterprise agreements

Hunter Water's forecast labour escalation rate is based on its 2018 enterprise agreements which contain provision for increases to salaries and wages underpinned by the agreements at 2.5 per cent per year.[34]

These agreements are due to expire at the end of the 2020-21 financial year however Hunter Water has maintained the 2.5 per cent (nominal) annual labour escalation rate for the remainder of the forecast period. Hunter Water also notes that an outcome of the recent enterprise agreements includes improved rostering of employees resulting in a saving of around $80k per year of overtime.[35]

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[33] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 49

[34] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 21

[35] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 21

Capitalisation of labour

Hunter Water has proposed a material increase to its capital program for the next regulatory period in comparison to what it has undertaken during the current period. There is a proposed average capital spend of $174 million per annum for the upcoming regulatory period compared to an average capital spend of $123 million per annum in the current regulatory period. As shown in Table 30 the increased capital spend has resulted in an increase to the value of capitalised labour for the forecast period. Hunter Water specifies[36]:

> *Capitalisation of internal labour occurs where Hunter Water employees work on activities associated with developing and delivering capital projects. The costs associated with work on capital projects is transferred to capital work-in-progress and then capitalised as an asset when the project is complete.*

Table 30 Capitalisation of labour over the current and forecast periods ('000s, $2019-20)

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Resources to capital	11,371	13,046	14,219	14,524	14,930	14,883	14,916	14,966	14,217

Source: Hunter Water AIR

Aither's assessment

Aither has separated our assessment of the forecast labour expenditure into the following key topics:

- base level of labour expenditure
- vacancy rate
- labour escalation rate, and
- capitalisation of labour.

The following outlines our findings in relation to each of these topics.

Base level of labour expenditure

As outlined above, Hunter Water had a material increase in labour costs across 2017-18 and 2018-19. The reasons provided by Hunter Water as to the efficiency and reasonableness of the increases related to:

- similar alignment with FTE levels from 2011 and 2012
- an internal realignment resulted in reductions in FTEs that were deemed unsustainable and therefore an organisational restructure was implemented
- a temporary recruitment freeze was implemented during 2017-18.

In relation to the alignment with historical FTE levels, Aither considers that there was no information to justify the efficiency or reasonableness of the FTE levels in 2011 and 2012. Further to this, with changes in organisational structures over time and differences in insourcing and outsourcing

[36] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 13

arrangements, a simple analysis of the total number of FTEs between periods does not provide a robust indication as to the efficiency of the FTE levels.

The organisational restructure did result in an increase in labour expenditure (although this was off-set by efficiencies and vacancy assumptions in the first year), however this did not account for the majority of the increase.

While there was a 6-month freeze in new hires during the restructure, this would temporarily supress the cost of internal labour and potentially increase the cost of external (contractor) labour (if back-filling was required). Once the freeze was lifted, it would be expected that the level of expenditure would return to:

- the pre-existing levels (for internal labour)
- *plus* the additional labour costs associated with the organisational restructure ($1.7 million)
- *less* the external (contractor) labour required to cover the vacancies that arose during the freeze period.

If labour expenditure (internal and external) was reduced during the freeze period, it would not have accounted for the increases that occurred.

Given this analysis, Aither has concerns regarding the justification of the previous increases in labour expenditure that now form the basis for the forecast of labour expenditure in the upcoming regulatory period. Aither therefore proposes a downward adjustment to Hunter Water's forecast labour expenditure of $1 million per annum to reflect a lower level of base expenditure. This adjustment is a subjective assessment of the lack of robust justification provided for the increased labour expenditure rather than a build-up of definitive changes that occurred over that time.

Corporate labour expenditure was the key driver behind this previous increase in labour expenditure for the business. Given this, Aither proposes that the adjustment be made to the corporate product, which will then be allocated across the other products within the framework.

Table 31 Impact of adjustment to the base level of labour expenditure ('000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Forecast net corporate labour expenditure	26,883	26,124	26,183	26,164	26,425	131,780
Aither adjusted net corporate labour expenditure	25,883	25,124	25,183	25,164	25,425	126,780
Difference	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**5,000**

Source: Aither analysis based on Hunter Water's AIR (Opex by item) and Aither adjustment.

Vacancy rate

Aither considers that a 7.5 per cent vacancy rate target, combined with a reduction in contractor expenditure is appropriate for the upcoming regulatory period.

Labour escalation rate

The assumed continuation of the existing escalation rate for the forecast period appears reasonable given the requirements of the NSW Public Services Wages Policy which Hunter Water must abide by. The information provided by Hunter Water to determine how this labour escalation rate has been

incorporated into the forecast is consistent with the 2.5 per cent (nominal) specified in its pricing submission.

Capitalisation of labour

Aither considers that Hunter Water's approach to capitalisation of labour is appropriate and the forecast levels of capitalisation appear reasonable.

Aither adjustments to labour expenditure

Aither considers that the majority of Hunter Water's labour expenditure is efficient, with two adjustments to the forecast expenditure recommended. The following table outlines Aither's recommended adjustments and their impact on Hunter Water's forecast expenditure.

Table 32 Hunter Water proposed, and Aither recommended changes to forecast labour expenditure ($000's, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25
Hunter Water forecast (net of capitalised labour)	52,283	51,294	51,334	51,264	52,265
Adjustments					
Reduction in corporate labour expenditure	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
Recommended	51,283	50,294	50,334	50,264	51,265
Difference	**(1,000)**	**(1,000)**	**(1,000)**	**(1,000)**	**(1,000)**
Percentage change	(1.9%)	(1.9%)	(1.9%)	(2.0%)	(1.9%)

Source: Forecast information from the AIR; adjustment from Aither
Note: Excludes capitalised labour

5.6.2. Maintenance expenditure

Hunter Water's proposed maintenance expenditure represents approximately 13 per cent of Hunter Water's forecast operating expenditure for the upcoming regulatory period. In developing its maintenance expenditure forecasts, Hunter Water noted that:[37]

- the maintenance cost category includes expenditure on preventative and reactive maintenance for electrical and mechanical assets, civil assets and corporate assets
- external service providers to support the performance of its maintenance activities and to supplement internal resources for some activities, are engaged using competitive procurement processes and include engagements for:
  - plant hire

[37] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 13

- civil and electrical/mechanical maintenance
- road and path restorations
- traffic control, and
- spoil management.

- a large proportion of expenditure relates to ongoing maintenance work on water mains and sewer mains

Hunter Water specified a bottom-up approach is utilised for maintenance expenditure forecast, consistent with its broader expenditure forecasting methodology.

Hunter Water's actual and forecast maintenance expenditure

During the current regulatory period, there has been a slight increase in maintenance expenditure from Hunter Water. It states that this increase was driven by a focus on timely rectification of water main breaks and leaks, resulting in higher expenditure than planned. Hunter Water's submission specifies:[38]

> *The benefits of reducing leaks and losses needs to be understood in the broader context of changes to population growth, per capita consumption, industry demand and deferral of the next major supply augmentation. Without these water conservation initiatives, a decision on a future supply-side solution would potentially be needed within five years.*

Hunter Water also faced greater spoil management costs than anticipated in the current period as a result of changes to waste regulations. This has led Hunter Water to engage a dedicated spoil management officer in an attempt to minimise spoil waste disposal which Hunter Water claims will deliver efficiencies going forward.[39]

Hunter Water's forecast maintenance expenditure for the upcoming determination period has reduced on average per year compared to its actual maintenance expenditure during the current regulatory period. However, the annual forecast maintenance expenditure for the next period is higher on average than IPART's approved maintenance expenditure for the current regulatory period.

[38] Ibid, p. 33

[39] Ibid, p. 49

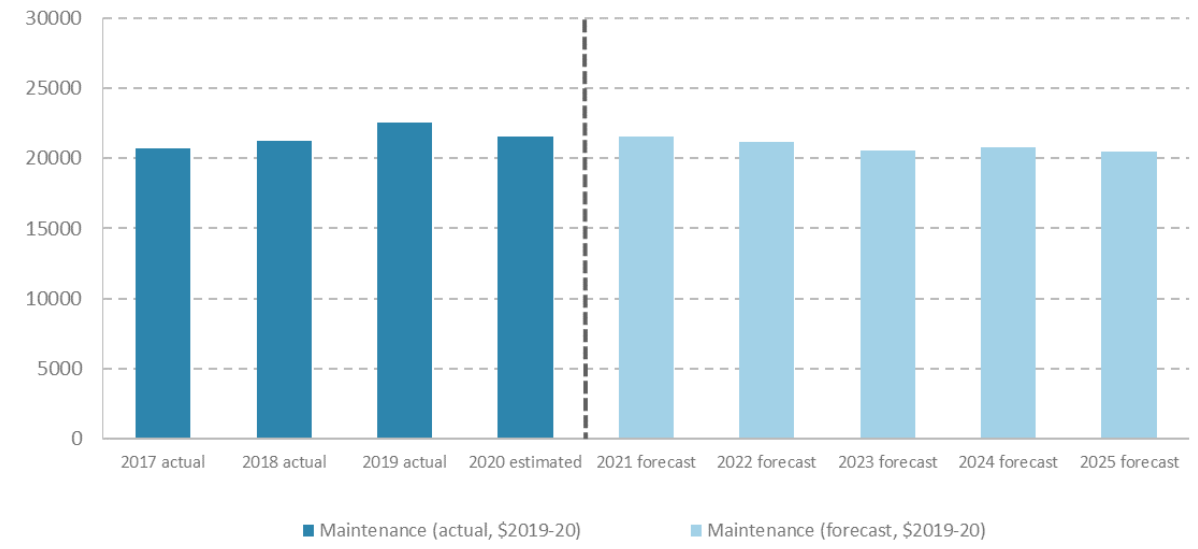


Figure 26 Comparison of actual and forecast maintenance expenditure ('000s, $2019-20)

We note that Hunter Water has undertaken a number of efficiency measures to limit the increase to forecast maintenance expenditure in the next period, including:

- a dedicated Spoil Officer will continue to maximise reuse and minimise spoil going to waste, reducing overall expenditure in the next price determination period by $1.8 million.[40]
- continued investment in a workforce management project that will facilitate a step change in productivity by improving the effectiveness of maintenance works planning, scheduling, dispatch, mobility, delivery, and reporting systems.[41]

In developing the forecast of maintenance activities for the upcoming regulatory period, Hunter Water has relied on the last three years of actual information to estimate forecast maintenance activity. It was noted that Hunter Water has not factored in growth in the network over the upcoming regulatory period and that it would absorb any impact from this growth. Hunter Water noted that for mechanical and electrical assets, there was a higher level of planned maintenance than reactive, however this was reversed when applied to civil assets.

There has been a step change incorporated in the forecasts based on the CTGM replacement. Hunter Water stated that the CTGM had been a driver for a number of reactive maintenance activities and therefore following the replacement, there would be a reduction in reactive maintenance activities.

Aither's assessment

In reviewing the method underpinning Hunter Water's forecast maintenance expenditure, we consider the forecast expenditure to be efficient. The models used to develop the annual forecast maintenance expenditure are robust and based on consistent forecasts.

Aither notes that the maintenance expenditure has increased in the current regulatory period while it is forecasted to decline over the upcoming regulatory period in real terms. This is consistent with the discussions with Hunter Water in relation to future expectations of the maintenance requirements.

[40] Ibid, p. 49

[41] Ibid, p. 29

Table 33 Hunter Water proposed, and Aither recommended changes to forecast maintenance expenditure ($000's, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25
Hunter Water forecast	21,544	21,123	20,538	20,791	20,442
Recommended	21,544	21,123	20,538	20,791	20,442
Difference	**-**	**-**	**-**	**-**	**-**
Percentage change	-	-	-	-	-

5.6.3. Operations expenditure

Hunter Water's proposed operations expenditure represents approximately 19 per cent of Hunter Water's forecast operating expenditure for the upcoming regulatory period. The operations costs include the expenditure required to operate infrastructure, including:[42]

- Water and wastewater treatment plants
- Water and wastewater pumping stations
- Energy costs
- Chemical costs, and
- Laboratory costs to monitor water and wastewater quality.

Hunter Water's treatment operations and laboratory functions are contracted out to external service providers via a competitive tender.

As outlined in Figure 27, the operations expenditure increased materially through the current regulatory period. The most significant increase was in 2017-18 where there was a predominantly one-off increase in operations expenditure. A significant component of this increase ($2.9 million) 2018 was driven by long-cycle preventative maintenance (LCPM) activities that were required at:

- Dewatering of Edgeworth sludge lagoon ($1.2m)
- Clean out of Cessnock digester ($0.7m)
- Maturation pond clean out at Cessnock ($0.6m)
- Dewatering and cleaning of multiple smaller sludge lagoons ($0.2m)

Hunter Water has forecast a relatively flat level of operations expenditure over the upcoming regulatory period, with some increases in 2021-22 and 2022-23 which is partly driven by the potential transition costs associated with the end of the treatment contract with Veolia.

[42] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 13

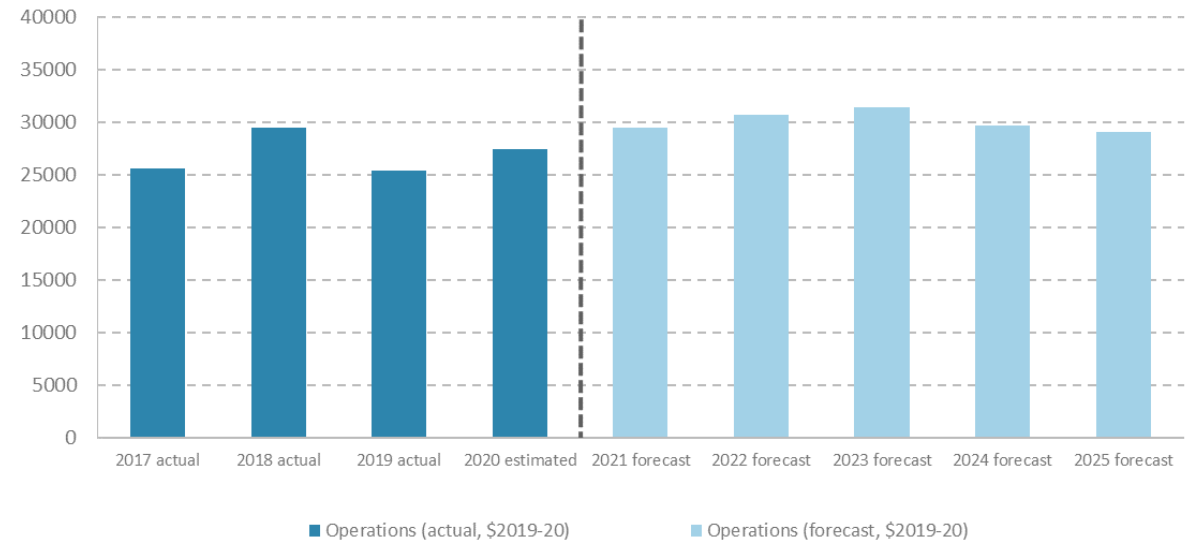


Figure 27 Comparison of actual and forecast operations expenditure ('000s, $2019-20)

Hunter Water's actual operations expenditure over the current regulatory period was higher than IPART's 2016 Determination allowance, as well as Hunter Water's proposed operations expenditure for the upcoming regulatory period. In addressing the increase during the current period, Hunter Water noted that higher costs were a result of:[43]

- Improved management of compliance risks relating to operational performance of treatment plants
- Implementation of a maintenance optimisation program focused on increased long-cycle preventative maintenance (LCPM) activities [44]
- Periods of unacceptable trace contaminant levels, such as cadmium or ammonia
- Capital investments in treatment plants to meet compliance requirements resulted in higher operating costs. Examples include:
    - More energy-intensive treatment as a result of new technology
    - Upgrades to improve effluent quality discharged to meet Environment Protection Licence conditions.

Hunter Water notes that it expects treatment plant operating costs to remain steady relative to current levels throughout the next regulatory due to the:

- renewed focus on LCPM, and
- the program of major capital works at several treatment plants.

[43] Ibid, p.22

[44] Hunter Water states that LCPM aims to improve asset reliability, optimise the asset life of treatment plant infrastructure and reduce lifecycle asset costs. This is a change from their previous reactive approach to asset maintenance. Hunter Water states that they expect this higher up-front expenditure to defer future capital investment and ensure that they meet compliance requirements.

Treatment operations contract – Veolia

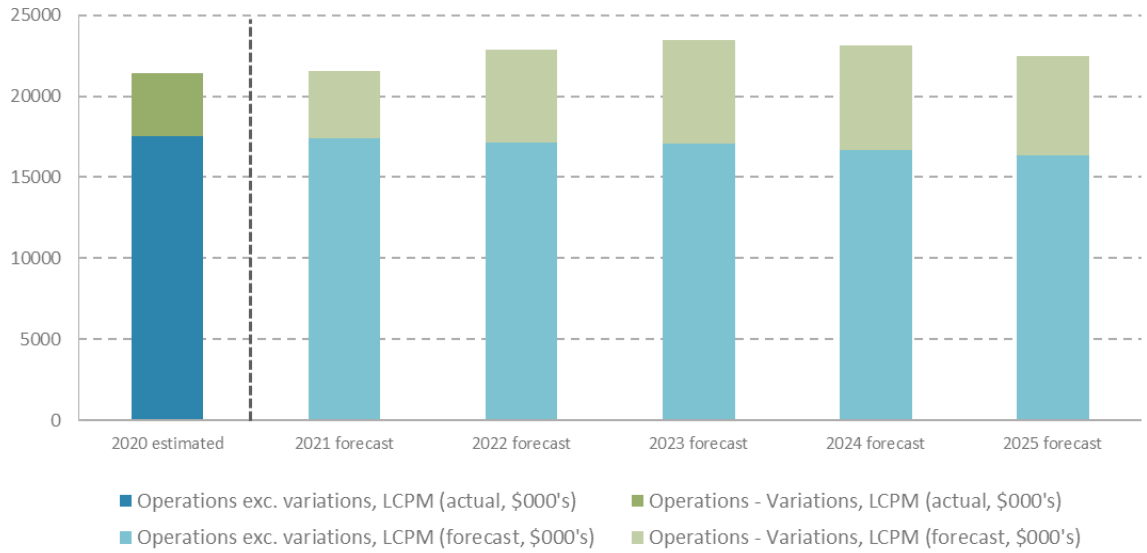
The key aspect of Hunter Water's operations expenditure is the treatment contract it has with Veolia Water Australia that commenced in 2014 for a period of 8 years. Through this contract, Veolia operates Hunter Water's 25 water and wastewater treatment plants.

Hunter Water maintains a detailed forecasting model that estimates the forecast operating cost per site over the upcoming regulatory period. It is noted that the forecasts within the model are based on average dry-weather flows – this is likely to understate the actual costs to be incurred through the contract as the rates paid under the contract are based on actual flow (including wet weather).

A key thing to note in the forecasts is the impact that variations and LCPM have on the contract cost. Variations represent a significant component of the increased 'base' level of costs for the upcoming regulatory period. These variations are primarily driven by new assets that need to be operated by Veolia that were not previously captured within the contract. Assumptions have been made within the treatment models that lead to an increase in operating costs based on this new capital expenditure. The estimated cost of these variations is based on historical evidence of the operating and maintenance costs of similar assets within Hunter Water.

Increasing LCPM leads to higher costs in the short-term by taking a planned approach and avoiding the cost impacts of unforeseen expensive reactive responses. The LCPM program was developed jointly by Hunter Water and Veolia in 2017. Some of the early works included the cleanout of the Cessnock digester; the cleanout of emergency sludge lagoons at Edgeworth, Toronto and Raymond Terrace; and the Cessnock maturation pond.

Figure 28 highlights this impact by separating out these two components from the remainder of the contract costs for operations. It can be seen that the bottom (blue) bar is getting smaller over the upcoming regulatory period, while the top (green) bar is getting larger.



Source: Hunter Water, Aither analysis
Note These figures are based on the operations costs associated with the Operations Contract, not the operations expenditure as a whole.

Figure 28 Impact of variations and long-cycle preventative maintenance on operations expenditure ('000s, $2019-20)

The contract with Veolia has a Service Standard Adjustment mechanism whereby the rates within the contract are adjusted if Veolia are unable to meet minimum service standards. This mechanism has been enacted in the past, however it has not been material.

Transition costs

The existing contract with Veolia comes to an end during the period, this requires the establishment of a new contract (either with Veolia or with a new service provider). Hunter Water has stated that this will result in transition costs associated with the procurement process for assessing bids from service providers and any additional costs associated with transitioning to a new service provider.[45] Hunter Water's proposed transition costs are shown in Table 34.[46]

Table 34 Hunter Water specified transition costs of treatment contract ('000s, $2019-20)

Item	2020-21	2021-22	2022-23
Project Manager	[redacted]	[redacted]	
Consultant tender prep & tender involvement	[redacted]	[redacted]	
Legal Drafting & Advice	[redacted]	[redacted]	
Probity Auditor	[redacted]	[redacted]	
Payment to Tenderers	[redacted]	[redacted]	
Tender Team	[redacted]	[redacted]	
New contractor transition in	[redacted]	[redacted]	
Veolia Transition Out Fees			[redacted]
Spares Purchase from Veolia			[redacted]
Transitioned employee entitlements			[redacted]
Total	[redacted]	[redacted]	[redacted]

Source: Hunter Water provided this information in response to a request by Aither

Laboratory services

Another key component of the operations expenditure is the costs associated with laboratory services. Hunter Water provided a detailed breakdown of the forecast expenditure for laboratory services for the upcoming regulatory period. There are some increases in additional works that are expected to be required, however the key increases over the upcoming regulatory period relate to:

- Transition costs for the new laboratory services contract
- Expected increase in the costs of laboratory services.

These two issues are discussed further below.

Transition costs

As with the operations contract, the laboratory contract is due to expire within the upcoming regulatory period. Given this, Hunter Water has proposed transition costs (similar to the operations contract) for

[45] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 45

[46] Hunter Water provided a detailed breakdown of the transition costs to Aither in response to our requests.

the procurement process required to establish a new laboratory contract. A breakdown of these transition costs is provided in Table 35 below.

Table 35 Hunter Water specified laboratory services contract procurement costs ($'000, $2019-20)

	2021-22
Market Testing	[redacted]
Contract Preparation and Legal Review	[redacted]
Concurrent Sampling	[redacted]
Total	[redacted]

Source: Hunter Water

Cost escalation

Given the expiration of the existing laboratory contract, Hunter Water was required to forecast any changes in the existing contract rates for the next contract period. Table 36 outlines Hunter Water's proposed increases in the cost of scheduled and unscheduled monitoring (note that this is focused on the incremental increase and does not capture the existing cost of these activities). Hunter Water stated that the reason for these lower contract rates was that the initial contract was entered into with Hunter Water Australia (which was subsequently purchased by ALS) with favourable rates. These unit rates remained in place following the transition of the contract to ALS.

Table 36 Hunter Water proposed increase in cost of monitoring activities ($'000, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Expected increase in cost of scheduled monitoring	-	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Expected increase in cost of unscheduled monitoring	-	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	**-**	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Source: Hunter Water

Hunter Water's pricing submission states that 'market-testing suggests that estimated rates will increase from the current contract rates'.[47] Hunter Water provided information that compared its current contract rates for scheduled monitoring activities with pricing information from two different laboratories (both of which are expected to tender for the new contract). This analysis demonstrated that the current contract rates are lower than the market rates and therefore it would be reasonable to expect an increase in the rates under a new contract in the future.

In relation to unscheduled monitoring, Hunter Water noted that it currently has a 20 per cent mark-up on these activities. Through discussions with prospective tenderers, Hunter Water was informed that this mark-up is more likely to be around 36 per cent for the new contract.

[47] Hunter Water Pricing Submission: Technical Paper 5, p. 44.

Response to IPART Issues Paper

As part of its response to IPART's Issues Paper, Hunter Water advised that its demand forecasts would be updated based on the major demand review within the Lower Hunter Water Plan. These updated demand estimates result in a higher level of demand for both water and wastewater services.

Hunter Water indicated that its forecast operating expenditure was based on its previous demand forecast and therefore needed to be revised to account for the higher forecast levels of demand. To update the forecast levels of expenditure, Hunter Water has used its estimate of the short-run marginal cost (SRMC) for both water and wastewater to develop an approximate proxy for the additional cost.

Table 37 Estimated additional costs from change in demand ($'000, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Water operating costs						
Additional water demand (kL)	1,345,000	1,380,000	1,395,000	1,410,000	1,422,000	6,952,000
SRMC (c/kL)	11.3	11.3	11.3	11.3	11.3	11.3
Additional operating costs	**152**	**156**	**158**	**159**	**161**	**786**
Wastewater operating costs						
Additional discharge volume (kL)	1,054,000	1,087,000	1,134,000	1,181,000	1,227,000	5,683,000
SRMC (c/kL)	19.8	19.8	19.8	19.8	19.8	19.8
Additional operating costs	**209**	**215**	**225**	**234**	**243**	**1,125**

Aither's assessment

In undertaking our assessment of the forecast operations expenditure, we have aligned our recommendations with the issues discussed above.

Treatment contract

The information provided by Hunter Water was comprehensive and well detailed regarding the activities to be undertaken by Veolia through the contract. There is downward pressure in real terms on the rates that are in the contract and that is reflected in the forecast operating expenditure for the upcoming regulatory period. Overall, we consider that the treatment contract and the forecast costs associated with the contract to be efficient.

Transitional costs

Aither had concerns regarding some of the transitional costs associated with additional resourcing requirements. Aither was initially of the view that these costs should be covered by internal procurement staff and therefore additional costs were not required. Hunter Water provided further information outlining how similar contract tendering processes had been resourced previously which demonstrates that these costs would be additional to the internal procurement team. Given this, Aither has decided to accept these additional resourcing costs associated with the project.

Hunter Water is proposing to recover all potential transition costs from customers regardless of the decision on the future service provider, however it will not necessarily incur all of these transition

costs if the incumbent is reappointed. Given this, Aither does not think it appropriate that customers bear all of the risk associated with those costs when there is a chance that Hunter Water may not incur them at all. In order to share the risk, Aither therefore proposes to share these potential costs between Hunter Water and its customers. In the absence of any expected outcome of the procurement processes, Aither has assumed that these forecast costs should be shared 50:50 with the customer base. Table 38 below outlines the cost items that are impacted by this recommendation.

Table 38 Transition costs that are dependent on selected tenderer ('000s, $2019-20)

Item	2020-21	2021-22	2022-23
Operations contract			
New contractor transition in	[redacted]	[redacted]	
Veolia Transition Out Fees			[redacted]
Laboratory services contract			
Concurrent Sampling		[redacted]	
Total	[redacted]	[redacted]	[redacted]
Risk sharing adjustment	[redacted]	[redacted]	[redacted]
Total recommended	[redacted]	[redacted]	[redacted]

Cost for laboratory services

Aither accepts Hunter Water's position regarding the increase in the expected rates for scheduled monitoring under a new contract in the upcoming regulatory period. It is apparent from the information provided by Hunter Water that there will be upward pressure on the existing contract rates and the assumed [redacted] appears reasonable.

In relation to unscheduled monitoring, Aither had concerns regarding how the increase in unit rates was applied by Hunter Water. Further clarification was provided by Hunter Water and Aither now accepts the [redacted] increase as being reasonable.

Response to IPART Issues Paper

The proposed increases in operations costs from the revised demand forecasts are based on a reasonable methodology and appear appropriate. Given the materiality of the revisions, Aither has not sought to assess the accuracy of the SRMC estimates and has deemed that the variations are efficient.

Total recommended operating expenditure

Based on the above analysis, Aither has made some adjustments to Hunter Water's forecast operating expenditure. These adjustments, and the total recommended level of expenditure, are captured within Table 39 below.

Table 39 Hunter Water proposed, and Aither recommended changes to forecast operations expenditure ($000's, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25
Initial Hunter Water forecast	29,465	30,682	31,439	29,749	29,062
Response to Issues Paper revision (Hunter Water amendment)	361	371	382	393	404
Total Hunter Water forecast	29,826	31,053	31,821	30,142	29,466
Adjustments					
Cost sharing	(125)	(330)	(75)		
Recommended	**29,576**	**30,393**	**31,671**	**30,142**	**29,466**
Percentage change	(0.8%)	(2.1%)	(0.5%)	-	-

5.6.4. Corporate expenditure

Hunter Water's proposed corporate operating expenditure represents approximately 19 per cent of Hunter Water's forecast operating expenditure for the upcoming regulatory period.[48] Hunter Water's costs within this category include:

- property management
- external service providers for asset planning and development activities
- financial and customer areas
- people and development
- information and telecommunications[49]
- general expenses.

As outlined in Figure 29, Hunter Water's actual corporate expenditure increased during the current regulatory period and, in aggregate, has smoothed out over the forecast period. In explaining some of the historical variations, Hunter Water noted that:

- postage costs increased by $1.4 million
- expenditure increased on compliance training activities for employees by $0.5 million

Another primary driver for increases in corporate expenditure is ICT costs. It can be seen from the figure that the ICT component of corporate costs increased considerably in 2019-20 and is forecast to continue to increase in the upcoming regulatory period. Our analysis of the forecast ICT expenditure is contained in Section 6.

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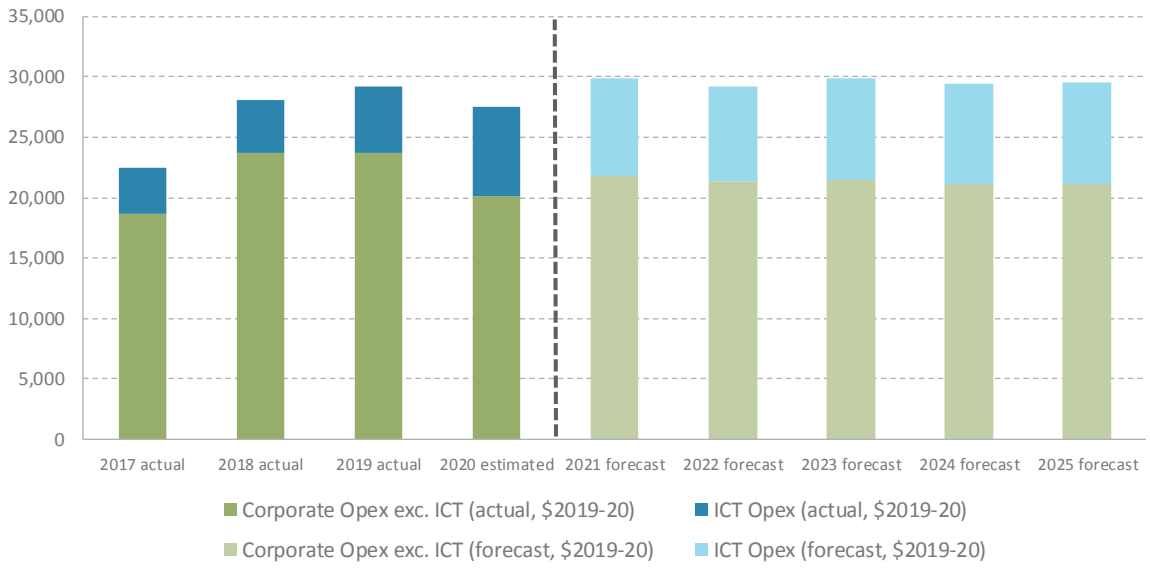
[48] It should be noted that this consideration of 'corporate expenditure' relates to the corporate cost category for operating expenditure within the Annual Information Return rather than the corporate product.

[49] Aither's detailed analysis of Hunter Water proposed ICT is covered in Section 6.



Source: Hunter Water's AIR (Opex by item); ICT information based on information presented by Hunter Water to Aither during interviews

Figure 29 Comparison of actual and forecast corporate expenditure ('000s, $2019-20)

In explaining the proposed changes in non-ICT corporate costs for the next regulatory period, Hunter Water states:[50]

- property management costs increase next price period due to:
  - higher insurance costs caused by higher asset values and historical claims
  - higher repair, cleaning and maintenance costs
- higher forecast expenditure on external service providers from increased investment in the critical asset program
- new initiatives to improve the customer experience via shifting to quarterly billing is forecast to incur an additional $4.2 million
  - this is forecast to be partially offset by the introduction of electronic billing - leading to a $2.9 million reduction in printing and postage costs (see below)
- people and development costs are forecast to reduce following the completion of leadership and management training during the current period.

As identified above, Hunter Water has factored in efficiencies relating to its electronic billing program. Table 40 provides a breakdown of the expected efficiencies from the electronic billing initiative that have been incorporated into the forecasts.

[50] Ibid, p.46 – p.48

Table 40 Hunter Water's proposed efficiencies from electronic billing initiative ('000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Agency fees	(50)	(90)	(130)	(170)	(210)	(650)
Bill preparation	20	10	0	(10)	0	20
Postage	(210)	(320)	(420)	(500)	(510)	(1,960)
Total	**(250)**	**(410)**	**(550)**	**(690)**	**(720)**	**(2,590)**

Source: Hunter Water

Aither's assessment

Accounting for the increase in ICT expenditure (considered separately in Section 6), the forecast corporate expenditure is flat over the upcoming regulatory period and less than the current regulatory period.

Based on our review of the information provided by Hunter Water in relation to forecast corporate expenditure, Aither considers that the forecast expenditure is efficient. It is noted that operating expenditure associated with the ICT program is considered separately in Section 6.

Table 41 Hunter Water proposed, and Aither recommended changes to forecast corporate expenditure (excluding ICT) ($000's, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25
Hunter Water forecast	21,795	21,310	21,520	21,161	21,108
Recommended	21,795	21,310	21,520	21,161	21,108
Difference	**-**	**-**	**-**	**-**	**-**
Percentage change	-	-	-	-	-

5.6.5. Electricity expenditure

Electricity expenditure makes up approximately 8 per cent of Hunter Water's forecast operating expenditure for the upcoming regulatory period. Electricity expenditure is significantly influenced by contracts with electricity retailers, with the two key components being:

- Volumes – how much electricity Hunter Water is forecasting to purchase, and
- Rates – what (unit) price Hunter Water is forecasting to pay for that electricity.

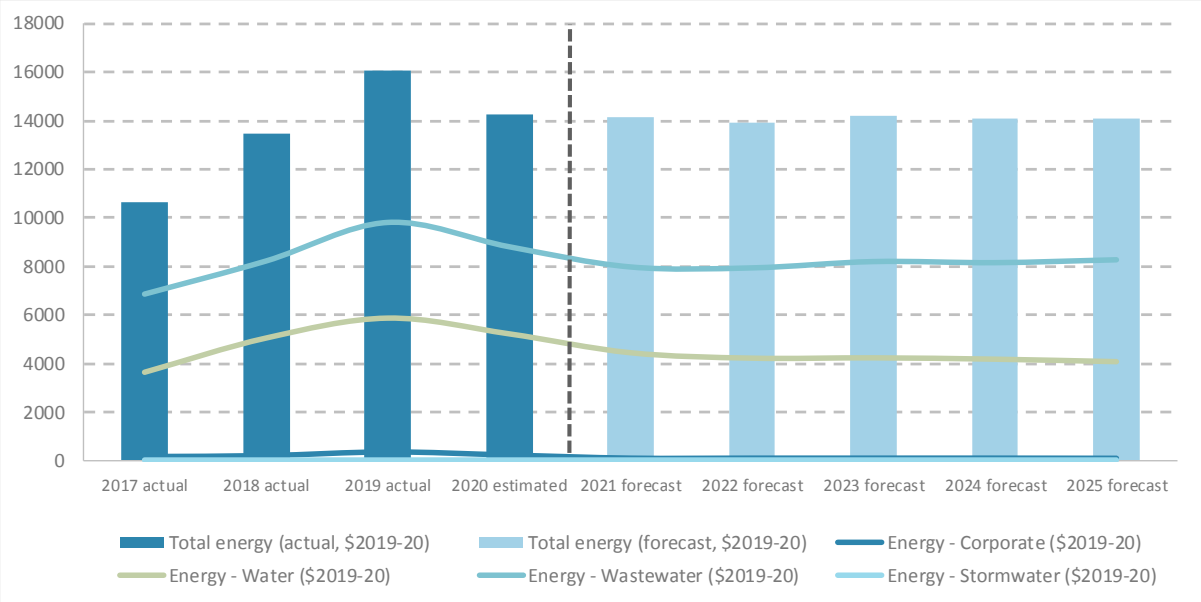
In relation to the first component, Hunter Water applies consumption growth forecasts at each site, with the starting point for future use based on the average of the previous four-years of electricity consumption for each site. The growth in electricity consumption over the period is broadly consistent with the overall growth profile for the business. It was noted that the growth forecasts for wastewater transport sites were higher than the general wastewater growth, Hunter Water explained that this was driven by the location of the growth. That is, growth at the extremities of the network required more electricity consumption to transport the wastewater to the treatment plant.

In forecasting its electricity consumption, Hunter Water classifies its sites in to large-market or small-market accounts based on their nominal annual consumption. Large-market sites are those which

consume greater than 160MWh of electricity per year, and small-market sites are those that consume less than 160MWh per year. Hunter Water has 497 individual small-market sites, these are further classified into different tariff structures.

In relation to the second component, Hunter Water has relied on electricity pricing forecasts from Energy and Management Services (EMS), a consulting firm specialising in electricity price forecasting. Forecasts were provided for both large and small-scale sites and for each tariff component. Based on these pricing forecasts, the estimated c/kWh is reducing over the period in real terms.

Figure 30 provides a comparison of the revised electricity expenditure forecasts from Hunter Water with its actual electricity expenditure over the current regulatory period. It can be seen from this that there was a considerable increase in electricity expenditure across 2017-18 and 2018-19. Hunter Water stated that these increases were driven by high spot prices in the electricity market that were then passed on by retailers through electricity contract prices. The expected reduction in electricity expenditure for 2019-20 and the forecast period indicates that the high electricity prices were temporary in nature and largely contained in the current regulatory period.



Note: The forecast electricity expenditure is based on revised information provided by Hunter Water through the review (discussed further below).

Figure 30 Comparison of actual and forecast electricity expenditure ('000s, $2019-20)

Energy efficiency initiatives

Hunter Water has identified two key energy efficiency initiatives for the upcoming regulatory period:

- **Smart integrated pump scheduling:** This initiative involves applying technology to enable Hunter Water to optimise the operation of pump stations and valves to ensure electricity is being consumed at the most efficient schedules.
- **Renewable energy savings:** This initiative involves investing in renewable energy technology (solar panels) to save on electricity expenditure. It was noted that this is a substantial investment and will reach a 'cap' within the period. Further work will be undertaken to investigate the realisation of benefits to determine whether further investments are efficient.

Table 42 outlines the forecast cost reductions resulting from energy efficiency initiatives over the upcoming regulatory period.

Table 42 Energy efficiency initiatives ('000s, $2019-20)

Initiative	2020-21	2021-22	2022-23	2023-24	2024-25	TOTAL
Smart integrated pump scheduling (SIPS)	(456)	(484)	(485)	(493)	(498)	(2,415)
Renewable energy savings*	(360)	(1,100)	(1,230)	(1,230)	(1,230)	(5,150)
TOTAL	**(816)**	**(1,584)**	**(1,715)**	**(1,723)**	**(1,728)**	**(7,565)**

Source: Hunter Water

Note: * These numbers are based on revised information provided by Hunter Water – see discussion further below.

Procurement strategy for electricity

Hunter Water engages with a specialist electricity consultant to assist with the identifying a preferred electricity retailer. It was noted that while previous contracts were generally of a three-year term, Hunter Water indicated that this would not always be the case with decisions on the most appropriate term of a contract to be made through the procurement process (it was noted that the most recent contract with Origin was for one-year).

Hunter Water engaged Energetics to develop a recommended electricity procurement strategy for 2020 to 2024. The recommended strategy is designed to control electricity procurement costs and manage future volume risks within an appropriate risk appetite for the business. It will also provide Hunter Water with a flexible approach to manage its electricity market risks in the future.

The strategy reviewed various contracting options available to Hunter Water and provided recommendations for a mix of these contracting options over the short, medium and longer-term. In addition to the recommendation of contracting options, the strategy also highlighted a need for Hunter Water to expand its internal capacity (both physical generation and market knowledge) to enable more sophisticated electricity contracting arrangements in the future to further manage risk and reduce energy costs.

As part of its procurement approach, it was noted that Hunter Water has approximately 1MW of curtailable load that it has been able to use as part of negotiations in electricity contracts with retailers. This has assisted in reducing electricity costs within the current regulatory period.

Revised electricity expenditure forecasts

Subsequent to the initial pricing submission, Hunter Water has advised IPART and Aither that there were errors in the electricity expenditure forecasts in relation to:

- Small-market sites, and
- Renewable energy savings.

In relation to the small-market sites, Hunter Water engaged a consultant to provide market price forecasts across various small-market tariff structures over the forecast regulatory period. As part of the modelling process for electricity forecasts, an error was made in the transfer of small market tariff

data into Hunter Water's electricity model. This error was detected after the pricing proposal had been submitted to IPART and resulted in a lower electricity expenditure forecast ($3.64 million) for Hunter Water over the forecast regulatory period.

In relation to renewable energy savings, Hunter Water is proposing to reduce its energy costs and associated greenhouse gas emissions through the installation of on-site solar PV systems at its treatment and pumping assets. The Pricing Submission included a capital allowance of $16 million for the project with forecast operating expenditure savings of $1.23 million per annum.

Hunter Water has since identified a mistake in its calculations in that it had assumed the full benefit of the $1.23 million in savings would start from 1 July 2020. This did not align with the original project scope where it was assumed that the project would be commissioned throughout 2020-21 and 2021-22. Based on the latest estimates of the likely roll-out, Hunter Water estimates that all of the solar infrastructure will be in place by the end of June 2022, with the full value of the savings to commence from 2022-23. Table 43 provides the revised cost saving information related to this initiative.

Table 43 Revised cost savings from renewable energy project ('000s, $2019-20)

Initiative	2020-21	2021-22	2022-23	2023-24	2024-25	TOTAL
Price Submission	1,230	1,230	1,230	1,230	1,230	6,150
Revised	360	1,100	1,230	1,230	1,230	5,150
TOTAL	**(870)**	**(130)**	**-**	**-**	**-**	**(1,000)**

Source: Hunter Water

Aither has included these variations with the original forecasts as part of our assessment of Hunter Water's forecast electricity expenditure.

Aither's assessment

The method used by Hunter Water to develop electricity expenditure forecasts is robust and transparent. The models were developed at a disaggregated and detailed level to enable consideration of consumption and electricity costs for each site within the business. Hunter Water's forecast electricity consumption used within those models aligns with the overall growth in demand forecasts for the business over the regulatory period.

To test the efficiency of the electricity price that has been adopted by Hunter Water, Aither has converted the forecast electricity expenditure and consumption into a unit price for the upcoming period (see Table 44 below). From this it can be seen that the forecast unit price (c/kWh) over the regulatory period is falling.

Table 44 Forecast electricity expenditure per kWh of consumption ($2019-20)

Initiative	2020-21	2021-22	2022-23	2023-24	2024-25
Forecast electricity expenditure ('000s)	14,171	13,129	13,265	13,155	13,166
Forecast electricity consumption (kWh)	87,816,953	88,926,575	90,025,068	91,159,950	92,307,916
Unit price (c/kWh)	**16.14**	**14.76**	**14.73**	**14.43**	**14.26**

Source: Hunter Water; Aither calculations

Aither considers that Hunter Water's position in relation to the energy efficiency initiatives is a reasonable and have been factored in to the electricity forecasting model. However, in future it is expected that further efficiency initiatives should be able to be realised through the maturation of the business and sophistication in electricity capabilities.

Based on our review, we consider that Hunter Water's forecast electricity expenditure is efficient and therefore no adjustments are required.

Table 45 Hunter Water proposed, and Aither recommended changes to forecast electricity expenditure ($000's, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25
Hunter Water forecast	14,171	13,129	13,265	13,155	13,166
Recommended	14,171	13,129	13,265	13,155	13,166
Difference	**-**	**-**	**-**	**-**	**-**
Percentage change	-	-	-	-	-

5.6.6. Other on-going operational expenditure

Hunter Water's operational expenditure forecasts also comprise other, less material operational expenditure items, such as:

- Licence fees
- Revenue offsets
- Regulatory expenditure
- Operating leases

Forecast licence fees are reasonably constant and reasonably consistent with historical licence fees. There was some variation in previous years due to fees being incurred in different years, however the effective annual expenditure has remained relatively constant.

The revenue offsets expenditure primarily relates to debt collection activities (including Hunter Water's Hardship Program). The forecast expenditure is reasonably consistent with the current regulatory period.

Regulatory expenditure increased in 2017-18 and 2018-19 primarily as a result of the Dungog non-standard water customer project and increased costs for the Lower Hunter Water Plan. Further costs were also incurred in relation to the Burwood Beach Marine Environment Assessment Program and the Hunter River estuary master plan.

The operating lease expenditure comprises head office and motor vehicle lease costs. Hunter Water provided a detailed breakdown of the forecast costs for these cost items. Aither also notes that in relation to the head office lease expenditure, Hunter Water has forecast this expenditure to be $2.6 million (including outgoings of $0.26 million) per annum over the upcoming regulatory period. To verify this cost, Hunter Water engaged an independent value to provide a valuation report for the head office building. The rental value of the building was estimated to be $2.35 million per annum plus outgoings. This independent estimate aligns with the forecast cost for the head office operating lease.

Aither's assessment

Based on the above discussion, Aither considers the forecast for these other ongoing operating expenditure categories to be efficient.

5.6.7. On-going productivity and efficiency improvements

We note that as part of Hunter Water's submission it did not incorporate any ongoing efficiency improvements for the regulatory period. During interviews with Hunter Water staff, it was indicated that the forecast vacancy rate was used as a method for imposing efficiencies across the business. In reviewing the vacancy rate (see section 5.6.1), it is not clear that any explicit consideration of efficiencies had been factored in to the forecast vacancy rate.

Rather than an ongoing efficiency factor, Hunter Water identified some specific efficiency initiatives and incorporated these within its forecast expenditure for the upcoming regulatory period (see Figure 31 below). Further to these initiatives, in reference to the organisational restructure, Hunter Water noted that:[51]

> *Hunter Water completed a significant organisational restructure during the current price period to better align organisational structure with our activities. In addition to better outcomes for customers, we expect that the restructure will deliver efficiencies through better collaboration and workforce productivity.*

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, Response to IPART Issues Paper, p. 22.

Note: The forecast savings from renewable energy is based on revised information provided by Hunter Water through the review.

Figure 31 Hunter Water's proposed efficiency initiatives ($millions, $2019-20)

Hunter Water response to IPART Issues Paper

In response to IPART's Issues Paper, Hunter Water made further comments in relation to the potential imposition of an ongoing efficiency factor. Hunter Water acknowledged that although it had identified some efficiency initiatives, applying a continuing efficiency target was typical practice in economic regulation. This is due to the fact that it seeks to mimic the rate at which an 'efficient frontier' firm becomes even more efficient. Hunter Water went on to state:[52]

[51] Hunter Water Pricing Submission: Technical Paper 5, p.25.

[52] Hunter Water, Response to IPART Issues Paper, p. 22.

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 that the value of any additional factor should not exceed 0.25 per cent per annum.

Aither's assessment

As identified by Hunter Water in its response to IPART's Issues Paper, it is common practice in economic regulation to impose continuing efficiency targets on regulated utilities as a way to ensure the regulated utilities continue to search for efficiencies that may not have been apparent at the time of the regulatory decision.

In assessing a possible ongoing efficiency target, Aither has:

- Considered the trend over time in operating expenditure for Hunter Water
- Considered the efficiency frontier and the need for any catch-up efficiencies, and
- Compared operating expenditure per customer with the Victorian water industry.

Aither has then recommended an ongoing efficiency improvement, based on this analysis in conjunction with our detailed assessment of operating expenditures. Aither notes that there is subjectivity in this assessment and that methods adopted across regulators and industries typically vary considerably.

Trends in Hunter Water operating expenditure

To consider the efficiency of Hunter Water's forecast operating expenditure, Aither has investigated the change in operating cost per customer over the current and upcoming regulatory period. Based on Hunter Water's submission, the operating cost per customer is forecast to decline over the upcoming regulatory period at a steady rate since the peak of 2017-18. While this is positive for customers that the operating cost per customer is declining, it is still higher than it was in 2016-17 in real terms.

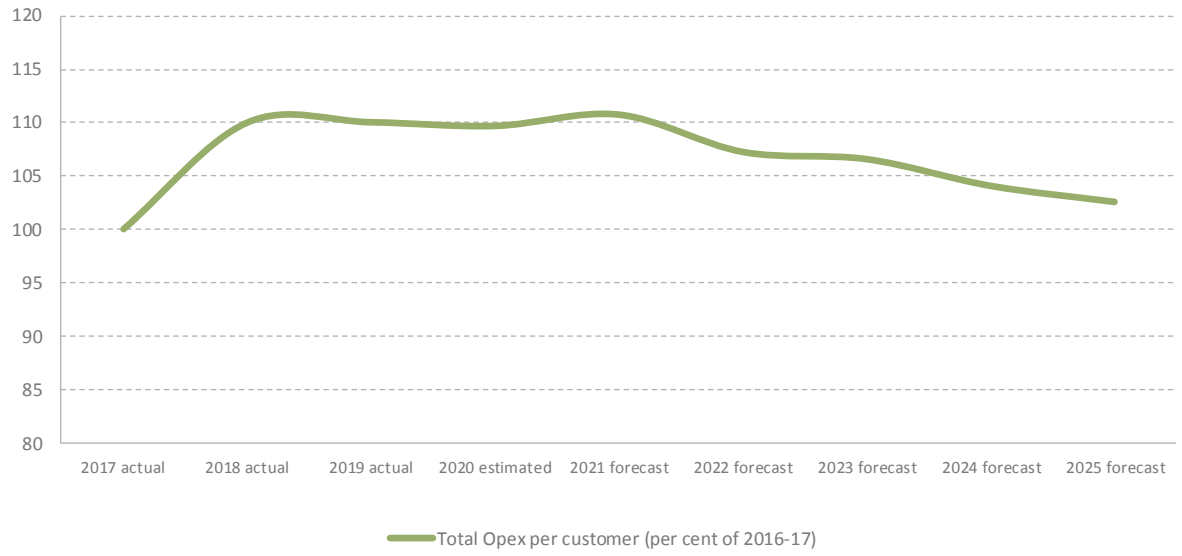
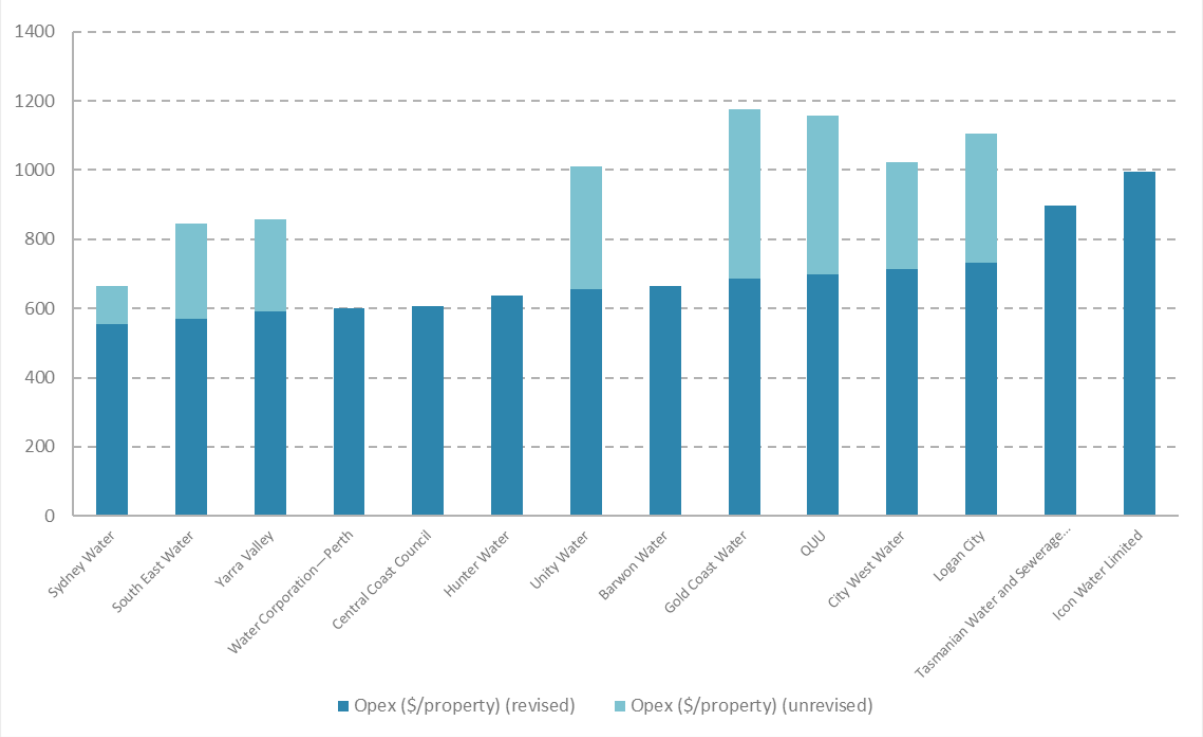


Figure 32 Hunter Water operating cost per property over the regulatory periods

As outlined in section 5.3, based on a high-level consideration of the NPR, Hunter Water falls within the low to medium operating cost per customer for medium to large water utilities in Australia (this is after adjusting for bulk water). It should be noted that this comparison is based on 2017-18 figures which includes the increase in operating expenditure per customer identified above. This demonstrates that following the increase in operating expenditure in 2017-18, Hunter Water still compared well with other similar water utilities.[53]



Source: NPR data; Aither adjustments

Figure 33 Revised comparison of operating expenditure per property

Consideration of efficiency frontier and catch-up efficiencies

One of the ways in which economic regulators determine the level of ongoing efficiencies that are imposed on regulated utilities is to understand the efficiency frontier and where the utility sits in relation to that frontier. The efficiency frontier reflects the most efficient utilities in the sector, whereby the closer the utility is to the frontier, the more efficient the utility is. The further away from the frontier implies that the utility has greater scope for realising efficiencies.

The process for estimating an efficient frontier requires considerable data on cost inputs and outputs across a wide variety of similar service providers. Aither considers that there is insufficient data to determine if Hunter Water is a 'frontier' utility from an efficiency perspective. In addition to the insufficient Hunter Water data, there are limited number of suitable comparators to make definitive judgements on the efficiency of Hunter Water through such benchmarking analysis.

Aither notes that Hunter Water have been through multiple regulatory reviews with IPART and have established reasonably robust internal processes as a result. Through this bottom-up review of historical and forecast operating expenditure there was no obvious evidence of the need for any

[53] It should be noted that the NPR data can at times have issues with integrity with comparing across business, so the analysis should be considered at a high-level and not be seen as definitive.

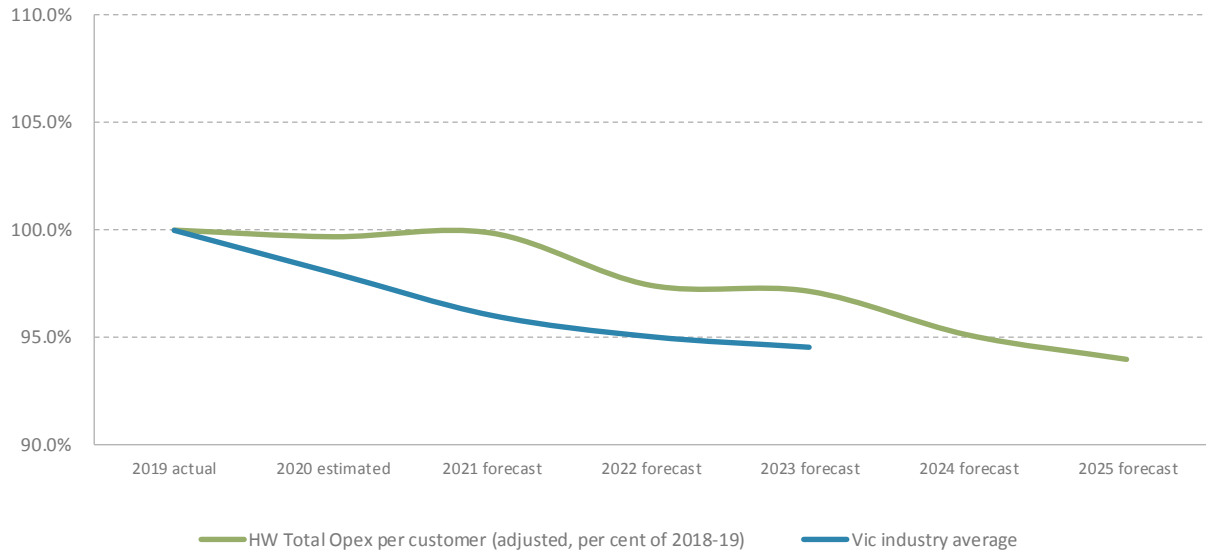
‘catch-up’ efficiencies in addition to the base adjustments that have been proposed in the previous sections.

Comparison with other utilities

The high-level comparison has focused on the forecast ongoing efficiencies within the Victorian water industry from its recent regulatory review. The Victorian water industry has been used as a comparator as it provides a mix of metropolitan and regional utilities and has a higher number of utilities (13) to provide a reasonable average. Aither has undertaken the comparison from the final year of actual operating expenditure for Hunter Water (2018-19 as the base year). We note that different utilities will have different starting points that will affect the assessment of any efficiency analysis – i.e. some utilities may have already realised significant efficiencies while others may be realising significant efficiencies through the upcoming period. This can affect the comparison of expected efficiencies. Aither has therefore used the Victorian industry average as the comparator to minimise these risks of different starting points for different utilities.

While the assessment of the Victorian water industry is based on controllable costs, these costs make up over 90 per cent of its total operating costs. Further to this, of the non-controllable costs, the environmental contribution levy (a separate charge that is passed directly on to customers) makes up over 95 per cent. Therefore, we consider it to remain a reasonable point of comparison.

Figure 34 provides the comparison of Hunter Water with the Victorian water industry. The Hunter Water information is based on Hunter Water’s proposed efficiencies and Aither’s recommended adjustments (excluding any ongoing efficiency). This shows that average Victorian water industry operating costs per customer are forecast to decline by more than the reductions per customer proposed by Hunter Water.



Source: Essential Services Commission; Aither adjustments

Figure 34 Comparison of operating expenditure per property

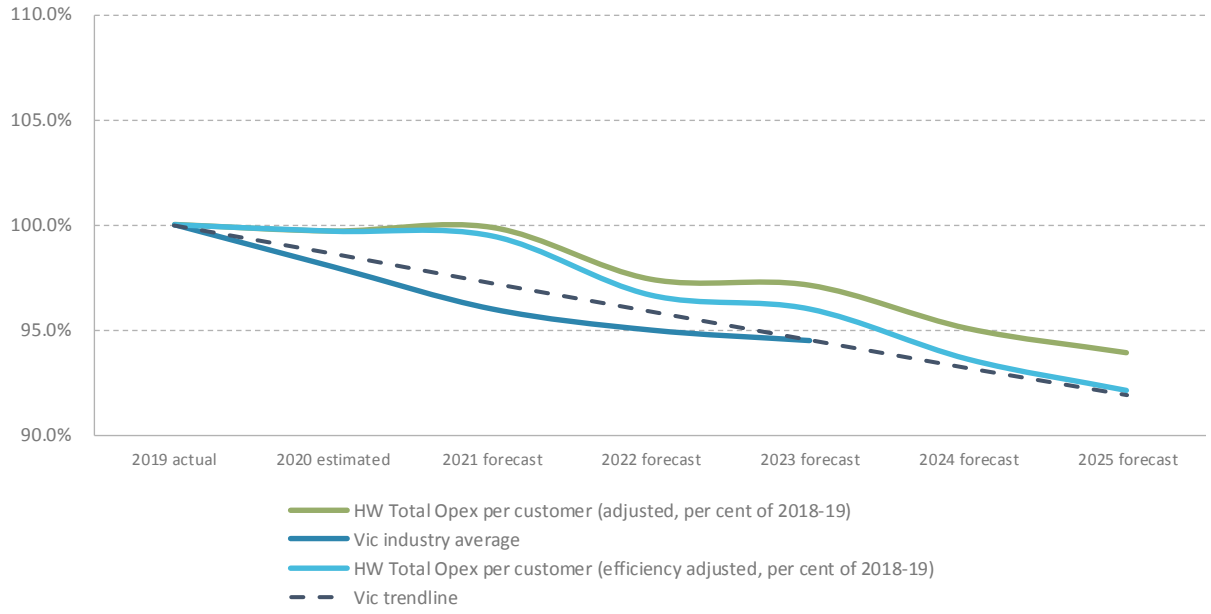
Findings from assessment

Aither considers that an ongoing efficiency factor is warranted to ensure Hunter Water continues to seek efficiencies throughout the upcoming regulatory period.

Noting that the operating cost per customer is forecast to decline over the upcoming regulatory period, Aither recommends the application of an ongoing efficiency factor of 0.4 per cent per annum to Hunter Water's controllable costs. This recommendation is based on Aither's consideration that:

- There is no obvious evidence of the need for any catch-up efficiencies to be applied in addition to the previous adjustments
- Hunter Water is currently a low to medium operating cost water utility
- The ongoing efficiencies seek to bring the forecast operating expenditure per property more in line with the forecast ongoing efficiencies from the Victorian water industry which covers a range of water utilities.

Figure 35 highlights the impact that the ongoing efficiency factor has in more closely aligning the operating cost per property changes over time between Hunter Water and the Victorian water industry. While this is not a perfect alignment as the time periods do not match, we have developed a high-level trend line for the Victorian industry to provide an indicative level of ongoing efficiency for the later years. We did not seek to align the reductions in operating expenditure as this would not be appropriate, but rather use this as a guide, along with the other analysis highlighted above to determine an appropriate ongoing efficiency adjustment.



Source: Essential Services Commission; Aither adjustments

Figure 35 Comparison of operating expenditure per property (including ongoing efficiency)

Aither notes that the application of a 0.4 per cent efficiency adjustment is broadly consistent with the 2019 Productivity Bulletin that was recently published by the Productivity Commission. The Productivity Bulletin highlights that labour productivity for the 'Market sector' is 0.4 per cent, while the estimate of the multi-factor productivity (factoring in labour and capital) for 2017-18 is also broadly consistent at 0.5 per cent.[54]

[54] https://www.pc.gov.au/research/ongoing/productivity-bulletin/2019

Hunter Water was of the view that any ongoing efficiency adjustment should only be applied to controllable operating expenditure. However, Aither notes that the AIR does not separate costs between controllable and non-controllable. Aither accepts that it can be inappropriate to apply an efficiency factor to non-controllable costs and has therefore sought to remove the non-controllable costs from the adjustment. Aither has not applied the ongoing efficiency adjustment to the forecast licence fee expenditure as these are non-controllable costs for Hunter Water.[55] This has a minor impact on the overall efficiency adjustment.

Aither notes that the previous adjustments to the forecast labour expenditure were based on the identifying the appropriate base-level of expenditure rather than forecast efficiencies. We therefore consider it appropriate to apply to the ongoing efficiency across all controllable operating expenditure (i.e. including labour expenditure).

These findings of an ongoing efficiency adjustment are only applied to controllable operating expenditure and do not apply to capital expenditure. The consideration of ongoing efficiencies for capital expenditure are considered in section 4.8. Table 46 below outlines the impact of that efficiency factor on the forecast operating expenditure.

[55] It should be noted that non-controllable costs in the Victorian industry are also quite low for most utilities and only represent licence fees, environmental contributions (imposed by State legislation) and where bulk services are purchased from a separate utility.

Table 46 Recommended ongoing efficiency adjustment for operating expenditure ($000s, $2019/20)

	2020-21	2021-22	2022-23	2023-24	2024-25
Water					
Aither adjusted operating expenditure	49,098	47,520	47,000	46,320	46,671
Sub-total excluding non-controllable	48,604	47,026	46,506	45,826	46,177
Efficiency adjustment (0.4% cumulative per annum)	(194)	(374)	(554)	(726)	(913)
Wastewater					
Aither adjusted operating expenditure	54,881	55,590	56,509	55,863	55,522
Sub-total excluding non-controllable	54,218	54,927	55,846	55,200	54,859
Efficiency adjustment (0.4% cumulative per annum)	(216)	(437)	(665)	(874)	(1,084)
Stormwater					
Aither adjusted operating expenditure	1,159	1,197	1,190	1,172	1,180
Sub-total excluding non-controllable	1,159	1,197	1,190	1,172	1,180
Efficiency adjustment (0.4% cumulative per annum)	(5)	(10)	(14)	(19)	(23)
Corporate					
Aither adjusted operating expenditure	53,019	51,825	52,793	52,598	52,420
Sub-total excluding non-controllable	52,902	51,707	52,675	52,480	52,302
Efficiency adjustment (0.4% cumulative per annum)	(211)	(411)	(627)	(831)	(1,034)

5.7. Recommended operating expenditure

Based on our review of Hunter Water's proposed operating expenditure, Aither concludes that the majority of operating expenditure is considered efficient and was able to be justified with comprehensive and robust documentation from Hunter Water. Our review identified some adjustments that we consider necessary to reflect an efficient level of forecast operating expenditure:

- reductions in labour to reflect a lower base level of labour expenditure
- reductions in operations costs relating to the sharing of risk between Hunter Water and its customers for transition costs for both the operations and laboratory contracts
- introduction of an ongoing efficiency factor of 0.4 per cent per annum to reflect future efficiency gains.

The following tables provide our recommended operating expenditure for the water, wastewater, stormwater and corporate products for the upcoming regulatory period. In terms of the operating expenditure related to the proposed discretionary programs, Hunter Water has indicated that it has not sought to recover the associated operating expenditure through this process. Instead it will absorb these cost increases within the business.

Table 47 Recommended water operating expenditure ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water proposed water operating expenditure	48,422	47,196	46,642	45,946	46,295	**234,501**
Adjustments						
Changes to operations	(43)	(105)	(23)	-	-	**(171)**
Changes to energy (Hunter Water amendment)	567	273	223	214	216	**1,494**
Issues paper (Hunter Water amendment)	152	156	158	159	161	**786**
Sub-total recommended adjustments	676	324	358	373	376	**2,108**
Sub-total recommended water operating expenditure	49,098	47,520	47,000	46,320	46,671	**236,609**
Controllable expenditure	48,604	47,026	46,506	45,826	46,177	**234,139**
Efficiency adjustment (0.4% cumulative per annum)	(194)	(374)	(554)	(726)	(913)	**(2,760)**
Total recommended water operating expenditure	**48,904**	**47,146**	**46,446**	**45,594**	**45,759**	**233,849**
Percentage change	1.0%	(0.1%)	(0.4%)	(0.8%)	(1.2%)	**(0.3%)**

Table 48 Recommended wastewater operating expenditure ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water proposed wastewater operating expenditure	53,681	55,013	55,839	55,133	54,785	**274,452**
Adjustments						
Changes to operations	(82)	(225)	(52)	-	-	**(359)**
Changes to energy (Hunter Water amendment)	1,073	587	497	496	494	**3,146**
Issues paper (Hunter Water amendment)	209	215	225	234	243	**1,125**
Sub-total recommended adjustments	1,200	577	670	730	737	**3,913**
Sub-total recommended wastewater operating expenditure	54,881	55,590	56,509	55,863	55,522	**278,365**
Controllable expenditure	54,218	54,927	55,846	55,200	54,859	**275,050**
Efficiency adjustment (0.4% cumulative per annum)	(216)	(437)	(665)	(874)	(1,084)	**(3,276)**
Total recommended wastewater operating expenditure	**54,665**	**55,153**	**55,844**	**54,988**	**54,438**	**275,089**
Percentage change	1.8%	0.3%	0.0%	(0.3%)	(0.6%)	**0.2%**

Table 49 Recommended stormwater operating expenditure ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water proposed stormwater operating expenditure	1,159	1,197	1,190	1,172	1,180	**5,898**
No adjustments						
Sub-total recommended stormwater operating expenditure	1,159	1,197	1,190	1,172	1,180	**5,898**
Controllable expenditure	1,159	1,197	1,190	1,172	1,180	**5,898**
Efficiency adjustment (0.4% cumulative per annum)	(5)	(10)	(14)	(19)	(23)	**(70)**
Total recommended stormwater operating expenditure	**1,154**	**1,188**	**1,175**	**1,153**	**1,157**	**5,828**
Percentage change	(0.4%)	(0.8%)	(1.2%)	(1.6%)	(2.0%)	**(1.2%)**

Table 50 Recommended corporate operating expenditure ($000s, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Hunter Water proposed corporate operating expenditure	54,019	52,825	53,793	53,598	53,420	**267,654**
Adjustments						
Aither adjustments to corporate labour expenditure	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	**(5,000)**
Sub-total recommended adjustments	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	**(5,000)**
Sub-total recommended corporate operating expenditure	53,019	51,825	52,793	52,598	52,420	**262,654**
Controllable expenditure	52,902	51,707	52,675	52,480	52,302	**262,066**
Efficiency adjustment (0.4% cumulative per annum)	(211)	(411)	(627)	(831)	(1,034)	**(3,114)**
Total recommended corporate operating expenditure	**52,809**	**51,413**	**52,166**	**51,766**	**51,386**	**259,540**
Percentage change	(2.2%)	(2.7%)	(3.0%)	(3.4%)	(3.8%)	**(3.0%)**

Note: ICT operating expenditure is included in the above forecasts. The assessment of ICT expenditure is contained in section 6.

6. Information and Communications Technology

6.1. Overview

Aither's review of information and communications technology (ICT) is based on a total expenditure approach and therefore we have assessed Hunter Water's ICT expenditure holistically, rather than assessing its operating or capital expenditure in isolation. We have adopted this approach due to the shifting nature of ICT expenditure. This shift can result in expenditure that varies significantly from historical trends, whereby increases in operating expenditure could be offset by decreases in capital expenditure (and vice versa). Aither has used the Australian Energy Regulator guidance on ICT expenditure assessments as a reference for assessing Hunter Water's ICT forecasts.[56]

In its submission, Hunter Water stated its 2017+3 Strategic Plan identified a need to undertake 'catch-up' investment in ICT, noting:[57]

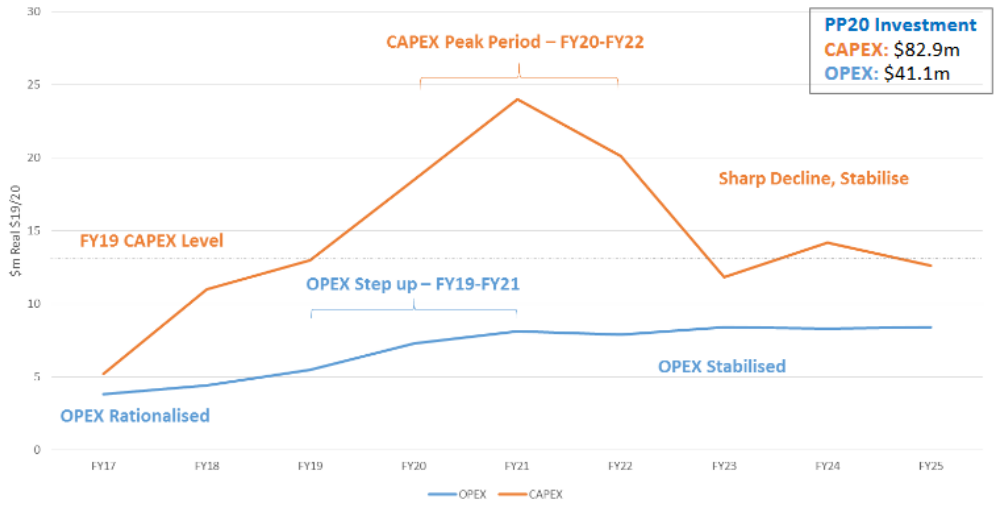
> *Hunter Water recognised that we lagged behind our water peers and many other utilities in the way we use technology to run our business and manage information. Our maintenance and field workforce management system is 20 years old, our billing system is 15 years old and our financial management system is 15 years old. We cannot move forward without first establishing a solid ICT foundation, bringing us in line with other network utilities. We are working to ensure our customers have access to up to date ways of communicating with us, paying bills, registering complaints, requesting services and providing feedback on our performance.*

Hunter Water has increased its level of expenditure on ICT during the current period and is proposing to further increase its ICT related operating and capital expenditure in the next period, as shown by Figure 36[58]

[56] Australian Energy Regulator, *ICT Expenditure Assessment: Consultation Paper*, May 2019.

[57] Hunter Water Pricing Proposal, 1 July 2019, p.4

[58] Hunter Water supplied this figure following a presentation to Aither



Source: Hunter Water

Figure 36 Actual and forecast ICT expenditure

Hunter Water's proposed ICT expenditure is outlined in Table 51. Hunter Water has categorised its ICT expenditure as:

- **Digital** – to improve customer services; and to improve telecommunications reliability at remote worksites (drivers: 25% existing standards; 46% reliability; 29% business efficiency)
- **Technology** – to address cyber security; and to undertake timely renewals based on risk, reliability and investment outlook (drivers: 76% reliability; 24% existing standards)
- **Corporate** – telecom costs, computer services, support and maintenance

Table 51 Hunter Water proposed ICT expenditure for the upcoming regulatory period ($million, $2019/20)

Category	Programs	Operating Expenditure	Capital Expenditure (Recurrent)	Capital Expenditure (Non-Recurrent)	Total Expenditure
Digital	• Field services model • Service and experience • Intelligent networks • Go Digital	$6.1	$0	$27.1	$33.1
Technology	• Information security • Applications • Networks and communications • Storage/Compute • End user computing	$3.0	$48.5	$7.3	$58.8
Corporate	• Telecom expenses • Computer services • Support and maintenance	$32.0	$0	$0	$32.0
Total		**$41.1**	**$48.5**	**$34.4**	**$123.9**

Source: Aither – based on analysis of Hunter Water supplied information

Aither has reviewed Hunter Water's proposed ICT expenditure under the following categories:

- Strategy – review of strategic context, drivers, deliverability and commitments to outcomes
- Recurrent – compare forecast expenditure to historic expenditure; and benchmarking
- Non-recurrent – review of business cases and Gateway process; assumptions, and NPV; ensure options were considered; review identified benefits.

The following sections outline Aither's review, followed by our concluding recommendation.

6.2. ICT strategy

Hunter Water has a draft Technology Strategy 2020 - 2025 which describes the drivers, direction and technology influencing the approach to ICT at Hunter Water. The context of the strategy is that Hunter Water describes itself as emerging from a period of under-investment that saw the focus placed on extending asset lives beyond typical upper limits.

Hunter Water stated that historical under-investment had left it with increased operational costs, increased frequency and duration of outages, dated business practices and offering services well below what is considered by customer and stakeholders as fundamental from a water utility. Hunter Water plans to deliver new technology largely within the existing enterprise architecture. It has identified that with increased expenditure, it will deliver improved customer service, operational performance, environmental outcomes, information security, risk and safety.

Aither's assessment

Aither believes the strategy is sound but lacks specific numerical outcomes for the expenditure planned. Without those outcomes it is not possible to judge the efficiency of the strategy. Aither recommends that a system of progress reporting and an ex-post assessment with an adjustment be implemented by Hunter Water during the next period.

An example of this type reporting and assessment is South East Water's self-service and outage alerts. By undertaking this assessment, South East Water has been able to monitor customer uptake of new service offerings made available by investment in ICT and has so-far achieved:[59]

- 37 per cent of customers using its self-service webpages
- 79 per cent of customers (who had recorded their mobile telephone numbers) alerted to water outages.

6.3. Recurrent ICT program assessment

As demonstrated in Figure 37, Hunter Water's operating costs across the current regulatory period were close to the IPART 2016 Determination. However, while the annual determination allowance was relatively flat on an annual basis, Hunter Water's actual expenditure was significantly higher at the end of the period compared to the beginning. Hunter Water's explanation for this is that their past ICT investment strategy focused on extending asset lives. Several core systems remained largely untouched, using technology from a decade or more ago, including the:

- billing system
- field job management system
- document management solution
- plan management system.

Hunter Water has also specified the underspend during the first two years of the current period was from savings related to project deferrals, contract rationalisation and re-negotiation of short-term vendor concessions.[60] Hunter Water stated that the Integrum system that manages quality and risk was built on technology first developed in 1989. While the program has been effective in deferring capital costs, operating costs have increased as a result.[61]

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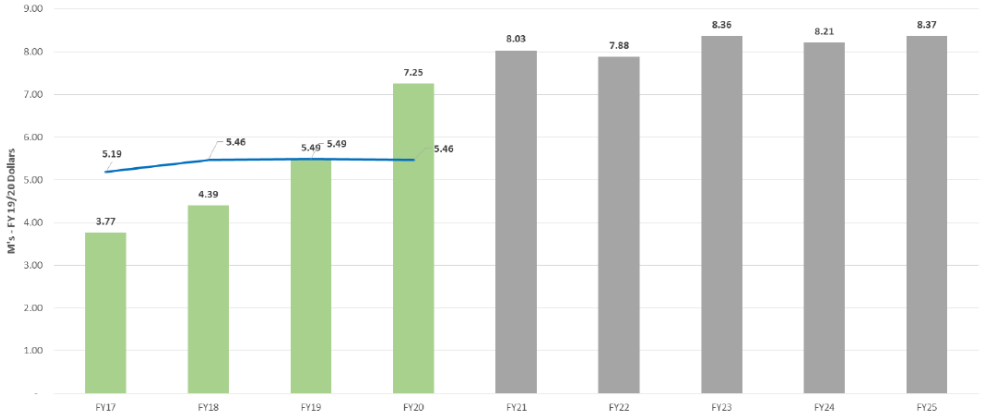
59 South East Water Annual Report 2018-19, pp 29, 49, 16

60 Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 27

61 Hunter Water provided detail of its systems in presentations to Aither and additional supplied documentation

ICT Corporate Costs PP16 – OPEX ($m) – Real $19/20					
	FY17	FY18	FY19	FY20	Total
Determination	5.2	5.5	5.5	5.5	**21.6**
Actual	3.8	4.4	5.5	7.3	**20.9**

ICT Corporate Costs PP20 - OPEX ($m) – Real $19/20						
	FY21	FY22	FY23	FY24	FY25	Total
Submission	8.1	7.9	8.4	8.3	8.4	**41.1**



Source: Hunter Water

Figure 37 Recurrent ICT expenditure over current and upcoming regulatory period

Hunter Water stated that the $2.9 million increase from 2017-18 compared to 2019-20 (as shown by Figure 37) arose across five areas:[62]

- implementation of new technology and projects including improving information and cyber security, moving to ISO27001 Information Security Standard, training of staff for new systems ($0.5 million)
- a premium to maintain serviceability [redacted] ($0.3 million)
- software – increased annual support costs associated with billing system, total contact centre, incident management system and meter reading system and new systems for environment, customers and leakage such as [redacted]
- increased telecommunications costs associated with voice, data, data centre and the contact centre ($0.1 million)
- costs associated with photocopier leases and radio communications ($0.1 million).

Aither has reviewed a sample of invoices, and while not comprehensive, has formed a view that these explanations are reasonable. The expenditure for 2019-20 is a forecast and reflects a substantial expenditure increase on the previous year. Aither selected one significant component [redacted] and sighted paperwork showing that Hunter Water has based its forecast on an independent quote from [redacted] While not a comprehensive test, Aither believes the forecast operating cost increase in 2019-20 is likely to occur. In addition, Hunter Water provided a list of cost savings and cost increases to explain the $0.8m increase from 2019-20 to 2020-21.

62 Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 37

Consistent with its ICT strategy, Hunter Water's forecast ICT operation expenditure for the next period is proposed to increase as shown by Figure 37. In explain these increases, Hunter Water states:[63]

- ICT support and maintenance costs increase as new technologies are implemented
- higher ongoing annual support and maintenance costs compared to the cost of maintaining the legacy equivalent
- other new applications, like the customer self-service portal and our intelligent network program, all have higher annual costs than the current systems
- ICT support and maintenance costs increase

In a presentation to Aither, Hunter Water quantified the proposed annual increases to forecast annual operating costs as a result of its new ICT systems as show by Figure 38.

Figure 38 Hunter Water's proposed increases to ICT operating costs

Hunter Water also provided the forecast ICT operating cost savings arising from investment in these new systems as shown by Figure 39.

Figure 39 Hunter Water proposed ICT expenditure savings

Aither's assessment

Aither notes that the annual cost increases of the new systems outweigh the annual savings specified by Hunter Water for the removal of old systems. However, the drivers of Hunter Water's new ICT strategy necessitates improvements in its existing systems in order to achieve the desired outcomes of the strategy. These improvements attract the higher costs of newer technologies.

Notwithstanding our previous concerns, discussed in Section 4.8, that benchmarking can be problematic and inconclusive in efficiency terms we sighted evidence that Hunter Water is an

[63] Hunter Water Pricing Proposal, 1 July 2019, Technical paper 5, p. 48

organisation that has been operating at a 'lean' level of ICT spend relative to other utilities in Australia.

6.4. Non-recurrent ICT program assessment

In considering the non-recurrent ICT program, Aither has focused on the deliverability of this program, the way costs were estimated and the efficiency of the program. These issues are discussed below.

In relation to deliverability, Aither notes that there is a continued increase in the overall ICT program. During the current regulatory period Hunter Water has delivered approximately 25 projects per year, similar to the number proposed in the upcoming regulatory period. Both periods are dominated with one large project in each, and the proposed project on workforce management is smaller than the current project on the billing system refresh. Further to this, there has been a 'back-ending' of ICT capital expenditure in the current period which results in Hunter Water being well-placed to be able to manage a similar higher level of expenditure at the start of the upcoming regulatory period.

However, the first projects typically deferred when a business is facing deliverability constraints are non-recurrent projects as these are less likely to impact on operational factors. Aither is concerned that the majority of Hunter Water's proposed non-recurrent major ICT projects outlined in Table 52 are not well-advanced in the stages of Hunter Water's 4-step gateway process. Project options early in the gateway process are generally not well defined, costs are at their most uncertain and there is a possibility of a project not passing a future gateway.

Table 52 Status of ICT projects

Project Name	Capital Expenditure	Operating Expenditure	Gateway Status
Field Service Model	[redacted]	[redacted]	Between G2 and G3 (Development)
Service and experience	[redacted]	[redacted]	Between G1 and G2 (Initiation)
Intelligent networks	[redacted]	[redacted]	Between G1 and G2 (Initiation)
Go Digital	[redacted]	[redacted]	Between G1 and G2 (Initiation)
Information security	[redacted]	[redacted]	Between G1 and G2 (Initiation)
Network and communications	[redacted]	[redacted]	Between G1 and G2 (Initiation)
Applications	[redacted]	[redacted]	Between G1 and G2 (Initiation)
End user computing	[redacted]	[redacted]	Between G1 and G2 (Initiation)
Storage and compute	[redacted]	[redacted]	Between G1 and G2 (Initiation)

Source: All data sourced from Hunter Water

Note: The proposed expenditure covers the upcoming regulatory period.

In considering these issues, Aither has sighted cost estimating spreadsheets from Hunter Water. The Intelligent Network program spreadsheet is based on unit costs and density of installations used in Sydney Water's program, which Sydney Water expect to further refine as the program progresses. The document sighted by Aither from Sydney Water mentioned that its density of roll-out was probably conservative, and might be reduced once it had conducted some analysis to develop machine learning algorithms.

Aither's assessment

Aither believes the program categories proposed by Hunter Water are sensible. While there is a continued increase in expenditure in the first two years of the upcoming regulatory period, Hunter Water has increased its internal capacity within the current regulatory period to the point where it should be able to handle such an increase from a delivery perspective.

6.5. Recommendations for ICT program

Based on this review of the ICT program, Aither considers that the forecast expenditure from Hunter Water is efficient. There is an increase in the level of capital expenditure in the period, however a material proportion of this is related to technological investments that would otherwise be seen as standard by other large water utilities.

The increase presents deliverability issues for Hunter Water, however with the increase in the ICT program within the current regulatory period, it provides a reasonable guide to the ability of Hunter Water to be able to deliver the program within the timeframe.

7. Recycled water

7.1. Overview

This section discusses Hunter Water's recycled water schemes and the costs associated with delivering on these schemes. To undertake this, we have focused on the ring-fencing approach that has been adopted by Hunter Water for these schemes.

7.2. Existing recycled water schemes and ring-fencing

Hunter Water provides recycled water to customers from 11 of its wastewater treatment plants. The recycled water provided to customers through these schemes is approximately 10 per cent of the effluent throughput that is treated to a recycled water standard. Table 53 provides a list of the various recycling schemes and how they are classified under IPART's cost recovery framework.

'Least-cost recycled water' schemes do not require financial ring-fencing as they are seen as the least cost option and therefore the costs are attributed to wastewater customers. Given each of these schemes existed prior to the start of the current pricing period, Aither has not sought information from Hunter Water to show that these are in fact least-cost recycled water schemes and/or a requirement of their discharge licence.

In response to Aither's request for further information on its least-cost schemes, Hunter Water confirmed that is was not proposing any changes to its existing least-cost schemes from the current period.

'Higher-cost recycled water' schemes are required to be ring-fenced from other regulated services for Hunter Water. This is required to demonstrate that non-recycled water customers are not unnecessarily funding recycled water schemes.

Aither's review focuses on these 'higher-cost recycled water' schemes, ensuring that forecast expenditure has been appropriately ring-fenced in line with IPART's requirements (outlined in Section 7.2.1) and are not being recovered from other customer segments. As shown in Table 53 higher-cost schemes can be categorised as either mandatory or voluntary and Hunter Water has two schemes within each category:

- Mandatory recycled water schemes are those in which customers have no effective choice in opting-out
    - Gillieston Heights (supplied from Farley WWTP)
- Chisholm (supplied from Morpeth WWTP) Voluntary recycled water schemes are those in which customers have choice of opting-in
    - Kurri Kurri TAFE
    - Vintage Golf Course (supplied from Branxton WWTP)
    -

Table 53 Hunter Water's recycled water schemes

Least-cost recycled water schemes	Higher-cost recycled water schemes	
	Voluntary schemes	Mandatory schemes
Branxton Golf Course	Kurri Kurri TAFE	Gillieston Heights
Clarence Town Irrigation Scheme	Vintage Golf Course (supplied from Branxton WWTP)	Chisholm
Local farmers supplied from Dungog WWTP, Morpeth WWTP and Farley WWTP		
Karuah Irrigation Scheme		
Paxton woodlot		
Cessnock Golf Course		
Easts Golf Course		
Waratah Golf Course		
Kurri Kurri Golf Course		
Waratah Golf Club		
Water Utilities Australia (supplied from Shortland WWTP for use in the Kooragang Industrial Water Scheme)		
Onsite recycling at WWTP for use by Hunter Water		
Indirect agricultural reuse		

Source: Hunter Water Pricing Submission: Technical Paper 9, p. 18.

7.2.1. Ring-fencing arrangements

IPART has requirements on pricing arrangements for recycled water and related services[64]. For *least-cost* recycled water schemes the costs and subsequent prices are treated like traditional services. For recycled water schemes that are *not least-cost* schemes (therefore higher-cost schemes), costs are shared on the following basis:

- those that are to be funded through customer and developer charges for water, wastewater and/or stormwater services and added to the public water utility's regulatory cost base. These include avoided and deferred costs, external benefits, and any requirement under a Government direction
- the remaining costs of the scheme are ring-fenced and recovered in order from:
  - external funding sources, including any direct Government subsidies and third-party contributions

[64] Review of pricing arrangements for recycled water and related services – IPART July 2019

- recycled water customer charges, then
- recycled water developer charges

Hunter Water has stated it ring-fences expenditure associated with higher-cost recycled water schemes from its other regulated services, consistent with IPART's requirements.[65] Hunter Water's submission provided an example flow diagram of how Hunter Water has adopted cost ring-fencing for the Chisholm mandatory scheme within its processes (see Figure 40). In response to Aither's requests for further information Hunter Water also provided flow diagrams relating to the ring-fencing of costs for its other higher-cost schemes:

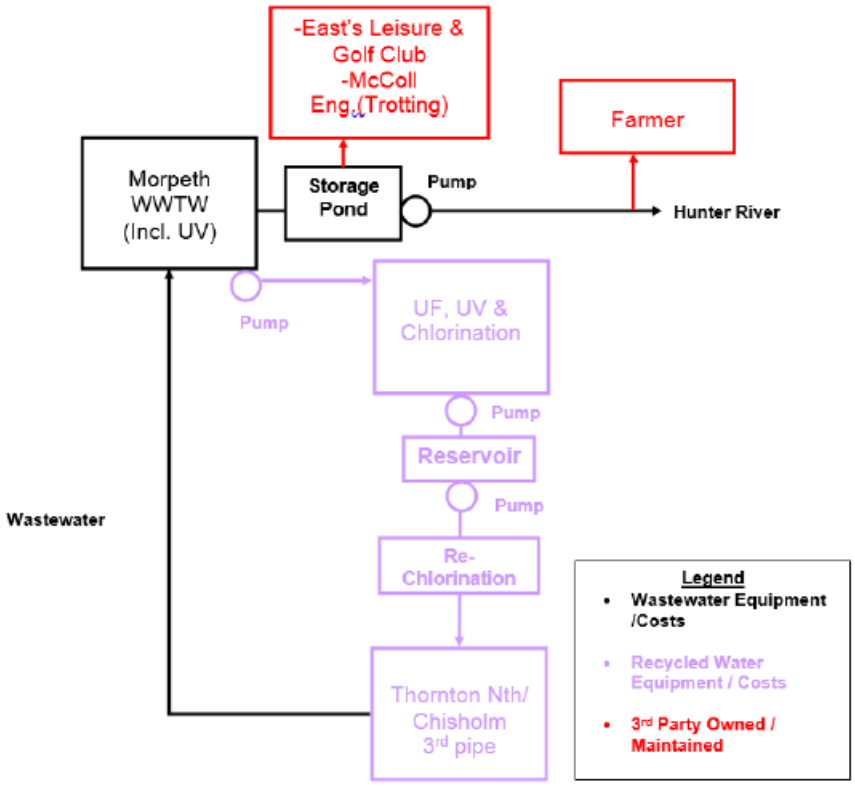
- Kurri Kurri TAFE scheme (Figure 41)
- Vintage Golf Course (Figure 42)
- Gillieston Heights (Figure 43)

Hunter Water's flow diagrams help in ensuring expenditure for higher-cost recycled water schemes at wastewater treatment plants is appropriately classified (ring-fenced) as recycled water and not passed on to wastewater customers. Hunter Water states:[66]

> *These diagrams identify processes and items of equipment that are specifically involved in supplying recycling water. We separately identify the cost of these ring-fenced operations - including, routine maintenance, dosing, electricity, equipment installation, repairs and replacement.*

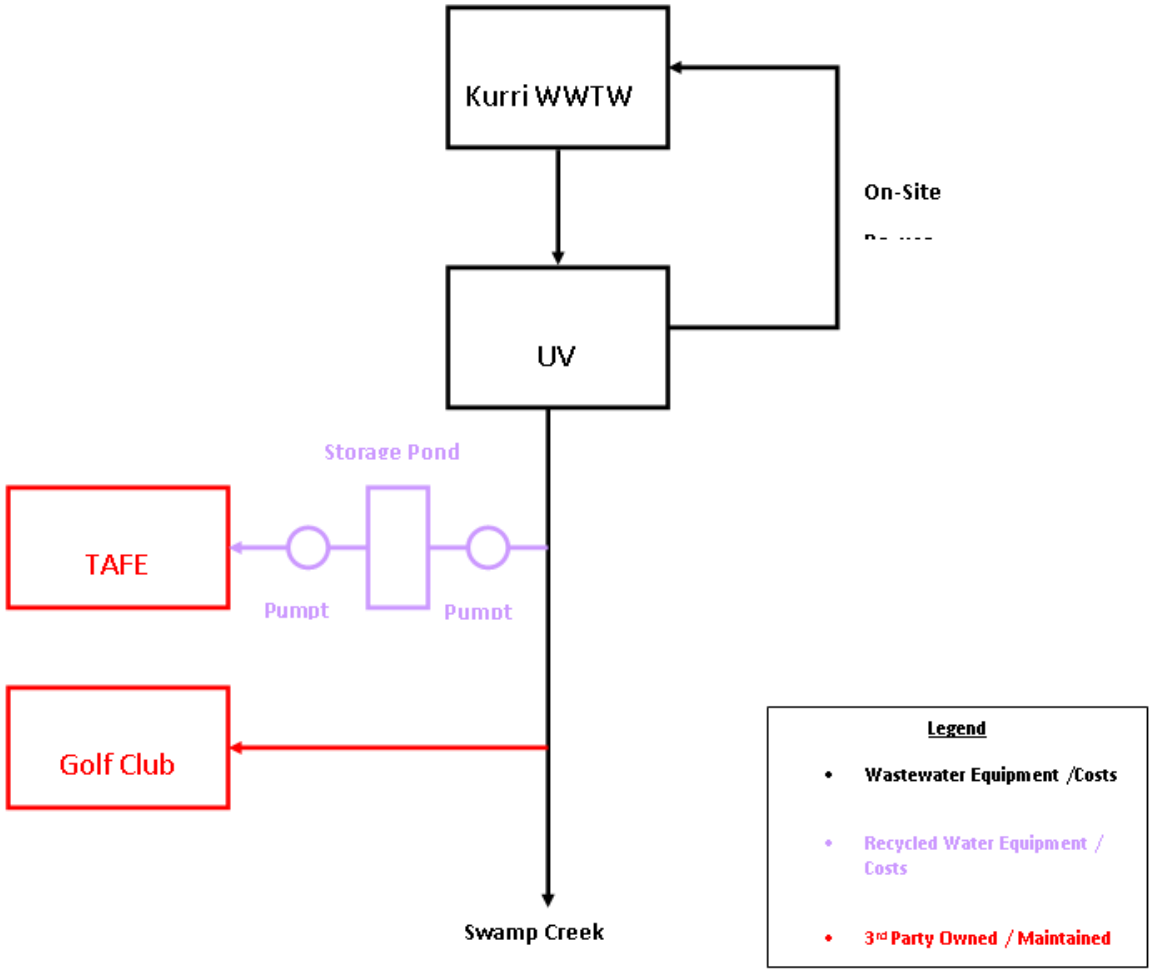
65 Hunter Water Pricing Submission: Technical Paper 9, p.18

66 Ibid, p.18



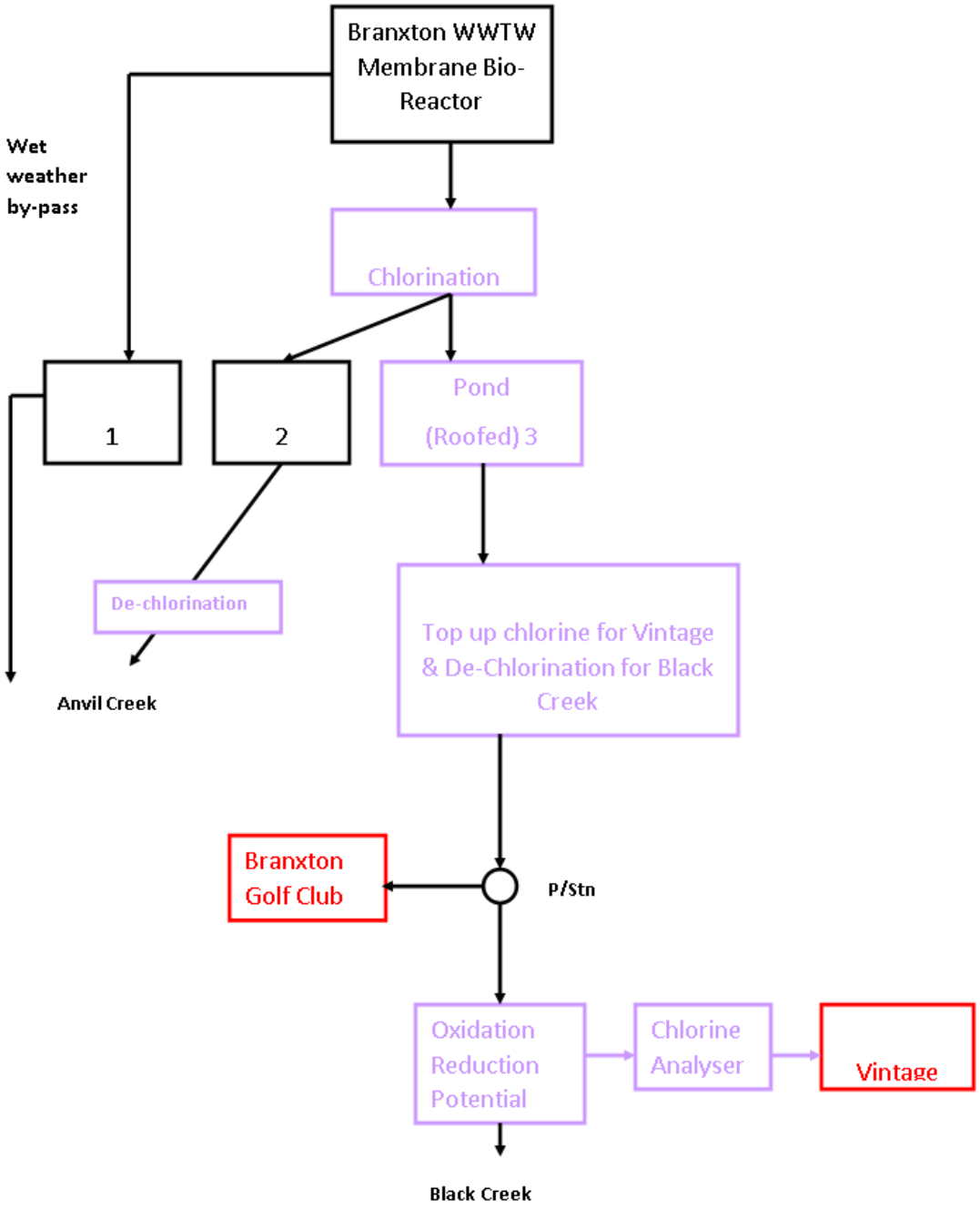
Source: Hunter Water Pricing Submission: Technical Paper 9, p. 19.

Figure 40 Ring-fencing arrangements for Morpeth WWTP



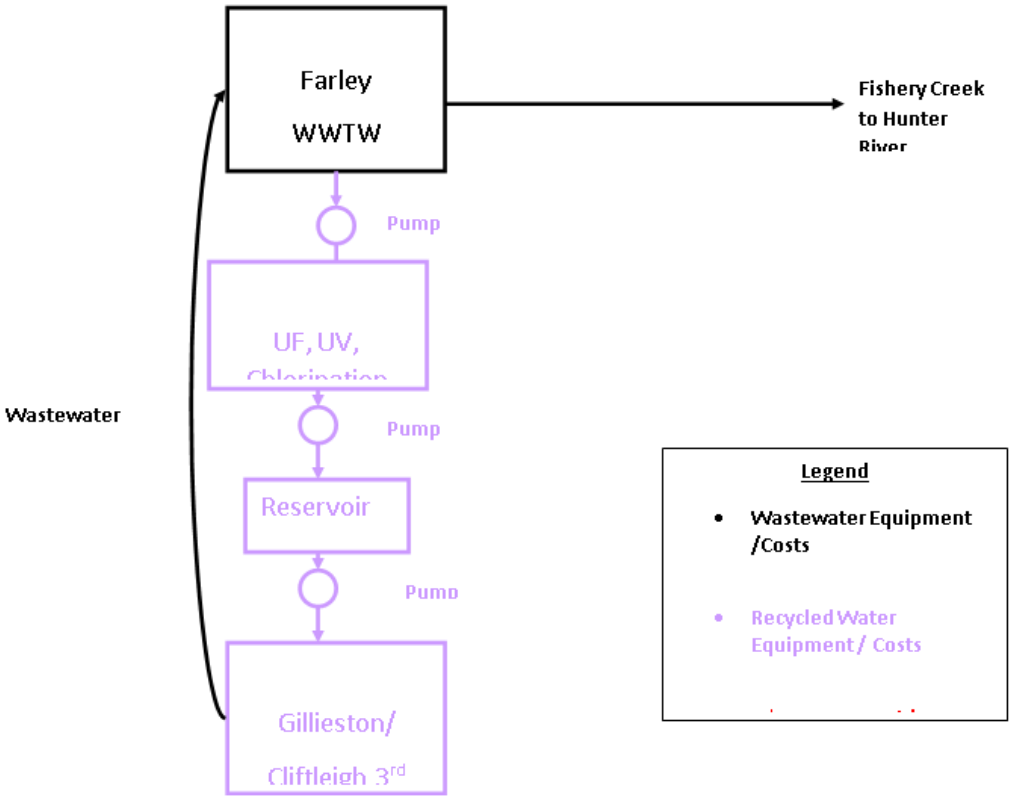
Source: Hunter Water response to Aither

Figure 41 Ring-fencing arrangements for Kurri WWTP



Source: Hunter Water response to Aither

Figure 42 Ring-fencing arrangements for Branxton WWTP



Source: Hunter Water response to Aither

Figure 43 Ring-fencing arrangements for Farley WWTP

7.2.2. Recycled water expenditure

Hunter Water's two mandatory schemes, Chisholm and Gillieston Heights, were commissioned during the current period in 2018-19. Hunter Water states:[67]

> *We have applied IPART's formula to derive a lower bound total scheme cost of $5.5 million for Gillieston Heights and $4.7 million for Thornton North ($2019-20).3 Our calculation includes all capital expenditure from commencement of the schemes. No further capital expenditure is forecast during the next price period.*

In response to a request for information, Hunter Water confirmed that the direct operating costs and an allocation of overhead amounts for these mandatory higher-cost schemes is captured in the appropriate recycled water sections of the AIR.

Aither also requested Hunter Water to explain the reasons for the lower forecast expenditure for its non-mandatory Vintage Golf Course scheme at Branxton WWTP. Hunter Water's response noted that there were direct cost allocations in the current regulatory period for maintenance and laboratory services which are not forecast to occur in the upcoming regulatory period. Furthermore, changes to

[67] Ibid, p.20

indirect cost allocation between the higher-cost recycled water schemes has shifted costs to Gillieston Heights and Chisholm and away from Vintage.

7.2.3. Aither's assessment of Hunter Water's ring-fencing of recycled water costs

Based on Aither's review of documentation provided and discussions with Hunter Water staff, the ring-fencing arrangements for higher-cost recycled water schemes appear appropriate and consistent with IPART's requirements for these schemes. Hunter Water has not proposed any new capital expenditure on higher-cost schemes for the upcoming regulatory period nor has it proposed any new least-cost recycled water schemes.

8. Demand forecasting

8.1. Overview

Reasonable demand forecasts are important for ensuring Hunter Water does not over- or under-recover its required revenue. Its required revenue is based on the expenditure forecasts presented in the preceding sections. Revenue and some expenditure items are a function of customer numbers and climate, and therefore demand forecasts. Revenue is recovered from customers who are charged for a range of water services. There are three possibilities:

1. **Hunter Water underestimates the level of customer demand.** The per-unit price is above the efficient revenue recovery level and therefore Hunter Water over-recovers its revenue.

2. **Hunter Water perfectly estimates the level of customer demand.** The per-unit price reflects the efficient revenue recovery level. Hunter Water recovers no more or less than its required revenue.

3. **Hunter Water overestimates the level of customer demand.** The per-unit price is below the efficient revenue recovery level and therefore Hunter Water under-recovers its revenue.

Given the inherent difficulty in forecasting an uncertain future it is unlikely that Hunter Water can perfectly forecast the level of customer demand over the next five years. The objective is therefore to produce a forecast that is unbiased in that there is an equal probability of revenue over- or under-recovery. Should the magnitude of under- or over-recovery become too large, IPART has a demand adjustment mechanism that it may apply.

In this section, we assess Hunter Water's approach to forecasting demand. As agreed with IPART, our review of Hunter Water's demand forecasting is less detailed than the expenditure review. For example, we understand that Jacobs has completed an in-depth review of the end-use demand model as well as a climate correction model that forms the foundation of the demand forecasts.[68] Our assessment has therefore not duplicated this recently completed work (however we have assessed whether the recommendations made by Jacobs have been implemented). Our focused approach considers the following:

- **Significance:** our review focuses on areas of significance – i.e. those material to price changes. This means that, for example, the approach to forecasting water consumption or billable connections will be analysed in greater detail than bulk water sales.
- **Justification:** our review considers the justification for the assumptions made. This involves assessing the sources, precedent, and appropriateness of input assumptions.
- **Bias:** in the cases where inherent uncertainties exist, we have assessed Hunter Water's approach in the context of potential biases.

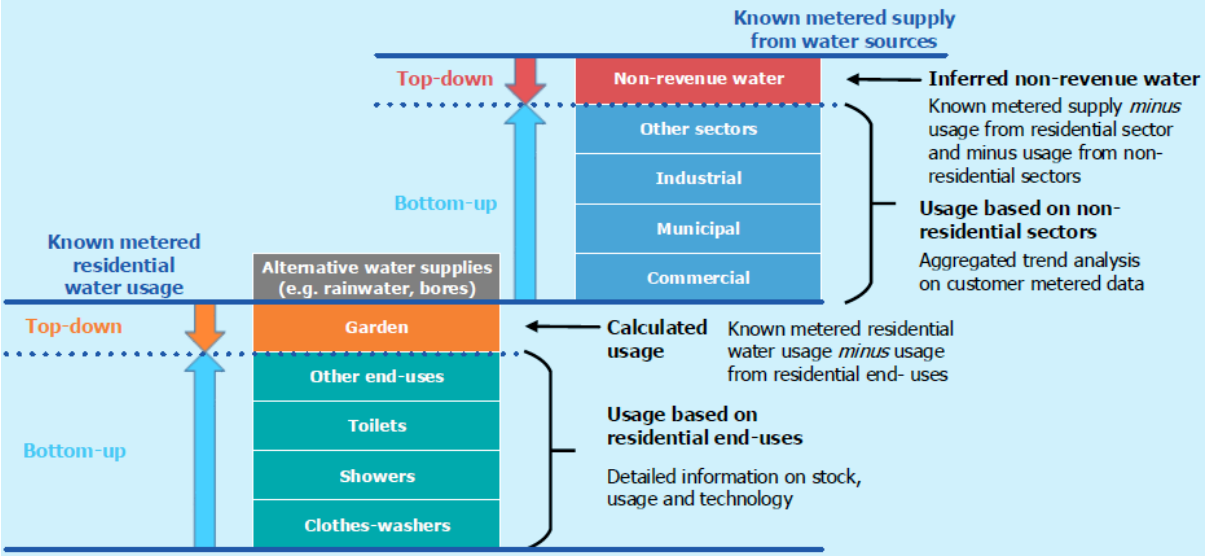
[68] Peer Review of Hunter Water Demand Model, Phase 1: Demand Tracking Model Review; and Phase 2: Peer Review of iSDP. Jacobs. *15 July 2019*

8.2. Overview of forecasting approach

This subsection provides an overview of the demand forecasting approach adopted by Hunter Water, as well as a high-level summary of the Jacob's peer review.

8.2.1. Integrated Supply-Demand Planning (iSDP) Model

The iSDP model is an end-use forecasting model that establishes a bottom-up estimate of residential and non-residential use. The difference between the metered supply and estimated end-use supply equates to garden use for residential and non-revenue water for non-residential (i.e. the remainder is estimated via a bottom-down approach). A conceptual diagram of the model, sourced from Hunter Water's Pricing Proposal, is provided in Figure 44.



Source: Hunter Water Technical Paper 7 – Demand for Services

Figure 44 Conceptual diagram of iSDP model

End-use models

The bottom-up elements of the iSDP model are based on a range of end-use sub-models, which are summarised in Table 54. As a thorough review of the iSDP model is outside the remit of this review we have not validated the arithmetic accuracy of these sub-models. Ten sub-models are used to estimate the residual end-use, while five sub-models estimate the non-residential use.

Table 54 iSDP end-use models

iSDP end-use models, residential and non-residential
Residential models
Basins
Baths
Clothes washers
Dishwashers
Garden
Outdoor miscellaneous
Pools
Showers
Sinks
Toilet
Non-residential models
Industrial
Municipal
Other non-residential
Inter-Regional transfers
Vacant land

Source: All data sourced from Hunter Water

The methodology for establishing the base-year demand (that is 'climate corrected') is as follows:

1. Calculate internal residential demand via end-use modelling
2. Subtract internal residential demand from total annual metered residential water consumption to derive an estimate of total garden water use
3. Average the estimate from step 2 over a seven-year period to account for the impact of variations in climate on garden water use
4. Add averaged (i.e. climate corrected) garden water use to internal residential water demand to generate climate corrected residential water use
5. Add other demand components such as non-residential, non-revenue, and bulk water sales

There are risks with such an approach. Climate conditions can persist below or above trend for several years. This means that the averaging process in step 3 may not correct for climate differences entirely.

IPART has accepted the iSDP demand modelling approach as part of Hunter Water's 2013 Determination[69] and 2016 Determination[70]. As such, we consider its continued use as appropriate while noting the risk above. It is still necessary to review the inputs to the iSDP even if the model framework is accepted. This is particularly so for recycled water when it substitutes for potable water.

8.2.2. Demand Tracking Model (DTM)

The DTM is a model that estimates the relationship between local climatic variables and water production. The model was created by the NSW Government and has been used by several local governments since its introduction in 2006.[71] The DTM uses a regression equation to model the relationship between water production (dependent variable) and climatic conditions (independent variables). The regression coefficients that are generated from the equation represent the 'relationship' between the specific climatic inputs and water production. The mean value of the climate regression is applied to historical climate data set to estimate the average climate corrected demand. Aither considers the DTM a more robust modelling approach when compared with the basic 'climate-correcting' approach outlined in Section 8.2.1.

Inputs

The model uses daily data from 1970 to 2018 to estimate the regression equation. The model uses the following climatic inputs:

- Maximum daily temperature
- Daily rainfall
- Daily evaporation
- Daily soil moisture index: this index is generated by a simple, single store conceptual model that uses rainfall and evaporation inputs. It is used to represent the impact that antecedent soil moisture can have on demand.

For the dependent variable the model uses the recorded volumes of water produced at water treatment plants. This historical data is adjusted for changes in use of potable water by major industrial users (e.g. changed production or recycled water substituting for potable water) as well as changes in non-revenue water and is denominated on a per capita basis.

Hunter Water modified the regression equation to exclude a specific 'rainfall' variable, the impact of rainfall instead being represented via the soil moisture index. Aither conceptually supports this modification as the variables in the regression equation are meant to be independent. Using the same line of reasoning, the 'evaporation' variable can also be excluded as it has minimal impact on model explanatory power.

Results

A summary of the headline regression results is presented in Table 55. The mean hindcast value over the entire 1970 to 2018 period is 326 L/person/day. When applying the model coefficients to the 2016-2018 climate period, this average usage falls to 277 L/person/day. The R^2 value measures the

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69 IPART, Hunter Water Corporation's water, sewerage, stormwater drainage and other services - Review of prices from 1 July 2013 to 30 June 2017 - Final Report, June 2013, p 88.

70 IPART, Review of prices for Hunter Water Corporation from 1 July 2016 to 30 June 2020 - Final Report, June 2016, p 90.

71 For example, Gosford City, Wong Shire, and Bellingen Shire Councils all cite the model online

predictive power of the model.[72] The predictive power is 79 per cent of the variance in demand can be explained by the model.

Table 55 Regression results – mean hindcast value and climate corrected starting point

Measure	Results
Dependent variable	Modified water production (see above)
R^2	0.79
Mean hindcast value (L/person/d) – over historical climate data	326
Mean hindcast value (L/person/d) – over calibration period (01-07-2016 to 25-07-2018)	277

Source: Jacobs

8.2.3. iSDP and DTM peer review

As mentioned in Section 8.1, Jacobs has recently undertaken an in-depth review of the iSDP model and the DTM climate correction model. Several recommendations were made, which are summarised in Table 56. In summary, we support the recommendations and believe they will improve the robustness of the modelling results if implemented.

[72] In general, a higher R^2 value is usually desired. This statistic ranges from 0 to 1.

Recommendations

Table 56 Jacobs review of iSDP and DTM – recommendations

#	Recommendation	Priority	Materiality	Hunter Water response
Review of iSDP				
1	Application of climate correction to starting year water demand	Urgent	Not given	Complete
2	Updated data for uptake of water-efficient appliances	Urgent	Not given	The iSDP has been updated with updated stock sales and residential end use data. An end use study is currently being scoped with its findings incorporated for the next major demand review
3	Average commercial water use update	Urgent	Not given	Complete
4	Average industrial water use update	Urgent	Not given	Complete
5	Post-2025 population forecast explanation	Urgent	Not given	Complete
6	Additional sensitivities	Urgent	Medium	Will be undertaken as part of a broader sensitivity analysis on option portfolios (2020)
Review of DTM				
7	HWC to provide greater guidance on decision process to modify daily water production	High	Medium	No material impact on the current forecast
8	HWC should document current understanding of link between climate data and daily water demand	Medium	Medium	No material impact on the current forecast
9	HWC should remove, where possible, industrial water use from water production data	Medium	Medium	To be included in next major review
10	HWC should strengthen their understanding between climate data and daily water demand	Low	Medium	This study is currently being scoped by Hunter Water. To be included in next major review.
11	HWC should consider sensitivity analysis using regional models to account for regional differences	Low	Low	To be included in next major review.

Source: Jacobs, Hunter Water

The detailed demand forecasts as presented in Technical Paper 7 do not reflect the recommendations above (i.e. the recommendations had not been implemented when the forecasts were prepared). As such, we cannot readily assess the impact of the recommendations with respect to the effect they may have had on Hunter Water's submitted forecast. In Hunter Water's response to IPART's Issues Paper, it is stated that all high priority recommendations have been addressed and reflected in the updated demand forecasts provided. These updated forecasts are presented in several tables in Aither's Demand Review (for example, Table 67). Tables that reflect the updated

demand forecasts are noted appropriately. All other tables are based on other data sources such as the AIR or supplemental datasets which do not reflect the latest demand forecast position. Aither understands that Hunter Water will submit revised demand forecasts to IPART after Aither's review of demand is completed. We recommend that IPART assess the materiality of the recommendations on an item-by-item basis to identify the drivers of any changes to the demand forecast submitted by Hunter Water.

8.3. Assessment of forecasting approach

The demand forecasts in Technical Paper 7 were generated using the iSDP. Hunter Water are proposing a significant change to how they account for climate in their demand forecasting. Both models are assessed below.

8.3.1. Core iSDP model assessment

Aither considers the iSDP model as an appropriate baseline model for forecasting the demand for water if all the recommendations made by Jacobs are implemented. However, Aither considers the DTM climate correction model to represent a more robust approach.

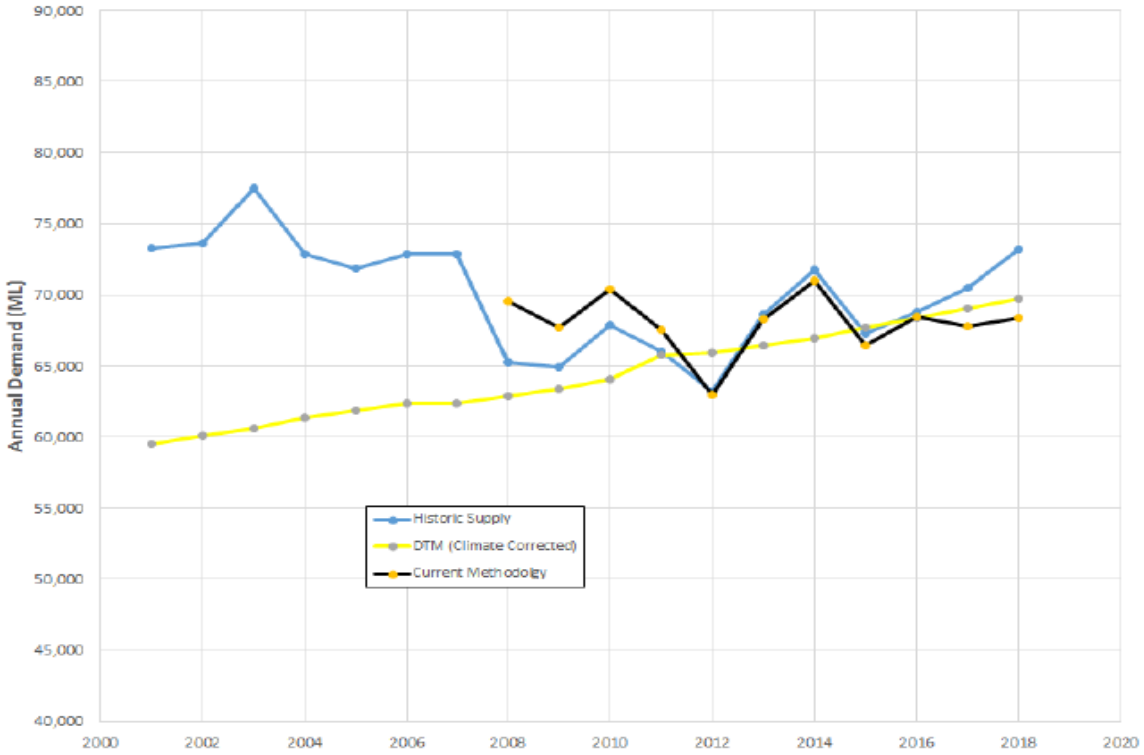
We agree with Jacobs that the use of input data from 2013 and earlier is less than optimal. For example, the version of the iSDP end-use model provided to Aither includes water efficiency usage data from 2013 at the latest.[73] Sourcing updated appliance inputs is the best solution for improving the robustness of this aspect of the model. However, Hunter Water's modelling approach assumes continued growth in the uptake of efficient appliances (by applying an s-curve that plateaus) which may improve the accuracy of the model even with dated inputs. Hunter Water has indicated that appliance inputs have been updated with the most up-to-date water efficiency stock data for NSW.

Aither also has broader concerns in relation to the risks of using both a bottom-up and top-down approach in estimating residential demand. The residual top-down category (garden use) is the difference between modelled internal household use and metered supply. This means that any non-compensating errors in modelling internal household use will impact on estimated garden use.

Current approach compared to DTM approach

The current iSDP climate correction approach is compared to the proposed DTM approach in Figure 45.

[73] Specifically, the clothes washers end-use model has ABS data related to the uptake of front-loading washing machines from 2013. The penetration of dishwashers is based on data from Growth from Knowledge (GfK) 2005 (latest).



Source: Hunter Water Application of Climate Correction Report

Figure 45 Annual demand comparison between old (current) methodology and DTM

The black trend line (current methodology) overestimated actual supply prior to 2012 and underestimated supply from 2016 onwards. In 2018 the difference between the current methodology and the DTM approach is approximately 1.3 GL. Hunter Water consider some possible explanations for this difference to be:

- Water Wise rules not achieving the intended savings
- rainwater tanks not achieving the intended savings
- assumptions for internal residential use (based on NSW data) may not match Hunter Region residents

The final bullet point would be alleviated by the planned Hunter Region end-use survey which is expected to be complete for the next price review.

Implementation of Jacobs' peer review recommendations

Some of the tables and figures in this demand review reflect the latest forecasts produced by Hunter Water and are marked accordingly. These are based on the DTM approach. However, numbers from Technical Paper 7 are also presented and care should be taken when interpreting our analysis across the review.

Hunter Water have indicated that all of the high priority recommendations have been addressed and reflected in the latest demand forecasts.[74] These include integrating updated appliance data, commercial water use, industrial water use, and population growth. We recommend that IPART

[74] Review of Prices for hunter Water – Response to IPART Issues Paper, Hunter Water, 21 October 2019.

consider any adjustments to the population growth closely as our analysis indicated a divergence between Hunter Water's and the NSW Government forecasts (see 8.4.1).

Two of the six recommendations related to the iSDP model are expected to be addressed in 2020 or later. These relate to undertaking additional sensitivities on the iSDP model as well as undertaking an end-use study specifically for the Hunter Region. We agree with Jacobs that additional sensitivities such as around assuming uptake in multi-dwelling residences, price elasticities, and others would add value and improve Hunter Water's understanding of the potential range of demand forecasts. Similarly, a Hunter Water region end-use model will improve the utility's understanding of the propagation of efficient appliances and will lessen the reliance on state-specific sources that are sometimes dated. We recommend that an end-use study is conducted on a periodic basis to reduce the reliance on generic data or modelling assumptions.[75]

8.3.2. DTM assessment

The DTM, Hunter Water's proposed climate correction model, is assessed below. The DTM uses 40+ years of daily climatic and bulk water data to establish a relationship between climatic variables and water consumption. In general, Aither is satisfied with the overall theoretical approach of using historical climate data to establish a 'climate-neutral' demand estimate as a basis for forecasting demand. This has significant benefits relative to using climatic forecasts which may be available, due to the following reasons:

- **Forecast period:** the five-year forecast period is significantly longer than the publicly available Bureau of Meteorology (BoM) climatic forecast data (three-months).
- **Geographic coverage:** the geographic area covered by the BoM forecasts are broader than the historic daily data sourced from the Williamtown Node near the Newcastle airport.
- **Variables:** The BoM forecasts do not include measures such as daily evaporation. This is an important variable which influences the soil moisture index.
- **Significance:** Long term climatic forecasts may offer benefits in terms of capturing projected climate change impacts. The significance of capturing climate change impacts may be muted given the issues identified above, as well as the short price period in the context of climate changes.

Model specification and data cleaning

Aither are broadly satisfied with the model specification and consider both the dependent variable and independent variables to be appropriate for estimating the relationship between climatic variables and water demand.

Aither also consider Model 2 (namely, the model in which Orica and non-revenue water is excluded from the measure of water production) as appropriate. The exclusion of non-climate related factors that significantly influence the dependent variable of the regression equation is a reasonable cleaning procedure like the removal of outliers. That said, it is important to check how the non-revenue water (NRW) and Orica forecasts are reincluded in the forecasts of demand. Hunter Water have stated that both NRW and Orica are added in the annual demand forecast following estimation of climate corrected demand. The Orica forecast is based on advice from Orica as to their water needs, while the short-term NRW forecast is based on targets set internally by Hunter Water's Operations and

[75] The modelling approaches in the iSDP model (such as imposing an S-curve uptake in appliances) are beneficial given the relative lack of data, however, an end-use study will improve the basis for these approaches.

Maintenance team.[76] As Orica and NRW demand does not correlate with climate, adding these forecasts onto the climate corrected demand is reasonable.

Calibration period

The model is calibrated to the latest two years to appropriately capture the latest consumer behaviours. Jacobs tested the sensitivity of water demand to changes in the calibration period, the results of which are presented below.

Table 57 Calibration period sensitivities

Calibration period	R-squared	mean hindcast value (L/person/d)	climate corrected observed water production (L/person/d)
1-07-17 to 25-07-18	0.80	281	279
1-07-16 to 25-07-18	0.79	277	279
1-07-15 to 25-07-18	0.75	274	279

Source: Jacobs

Changes to the calibration period results in non-trivial changes to the mean hindcast value. However, the implied climate corrected observed water production is essentially static across all sensitivities chosen. This demonstrates the model produces stable climate corrected results when varying the calibration period by one and two years.

Aither asked further clarification questions with respect to the robustness of the model to changes in the calibration period. Specifically, we requested the outputs of the DTM under a longer-term calibration period. In order to generate these results, it was necessary to include all bulk water production (that is, including Orica and non-revenue water) which makes direct comparison with the results above inappropriate.

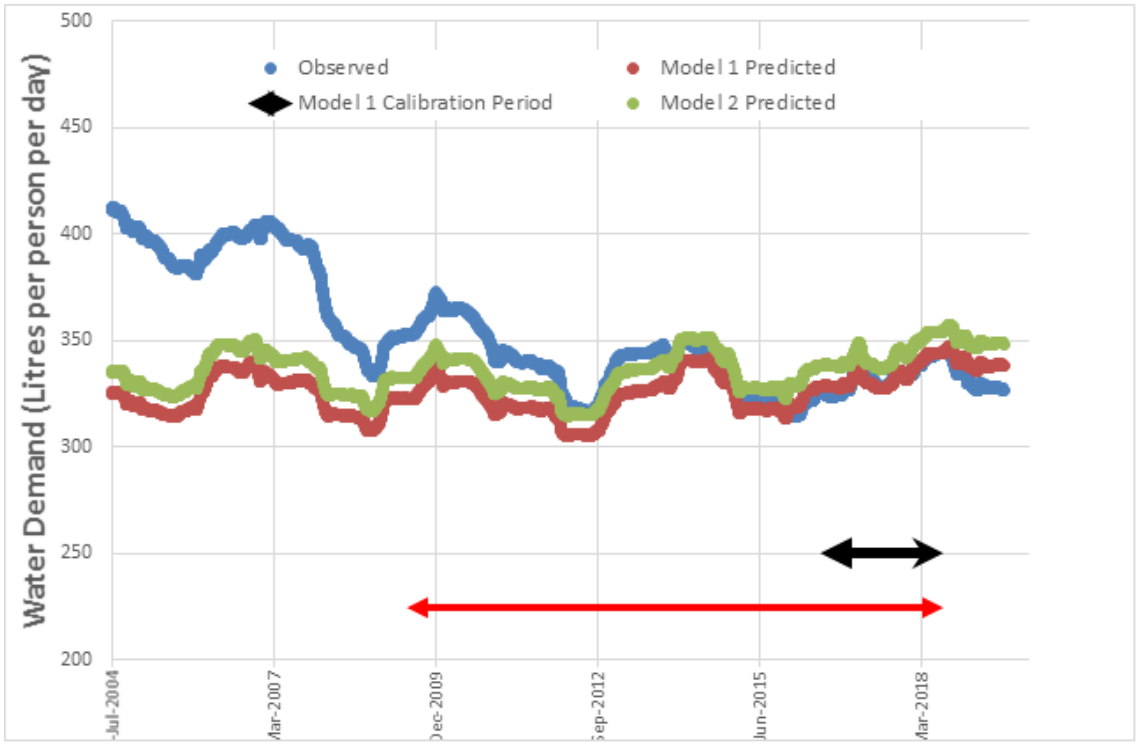
Table 58 Calibration period sensitivities – all bulk water model

Calibration period	R-squared	mean hindcast value (L/person/d)
1-07-16 to 25-07-18 (Model 1)	0.80	327
1-07-09 to 25-07-18 (Model 2)	0.70	337

Source: Hunter Water documentation and RFI response

A graphical display of the mean hindcast value time series under the approximately 2-year and 9-year calibration period models are presented in Figure 46. Model 2, due to the longer calibration period capturing periods of higher water consumption (driven by less efficient appliances, regulatory changes, and price differences), predicts a higher demand over the climatic sequence.

[76] Long term NRW forecasts assumes that leak savings will not occur post-2025 and that NRW will increase alongside growth. Aither agree with Jacobs that this approach is reasonable.



Source: Hunter Water RFI response

Figure 46 Mean hindcast value under Model 1 and Model 2 with all bulk water included

As the ultimate purpose of the DTM is to derive a climate adjusted starting demand, it is appropriate to calibrate the model to the latest two years. This ensures that the model is calibrated to consumer behaviour under recent factors such as the propagation of efficient appliances, regulatory changes such as BASIX, and changes in the housing stock. A two-year calibration period also captures enough climatic variation as required by the NSW Government.[77]

Model bias

Aither requested scatter plots of actual demand versus modelled demand for the following time periods:

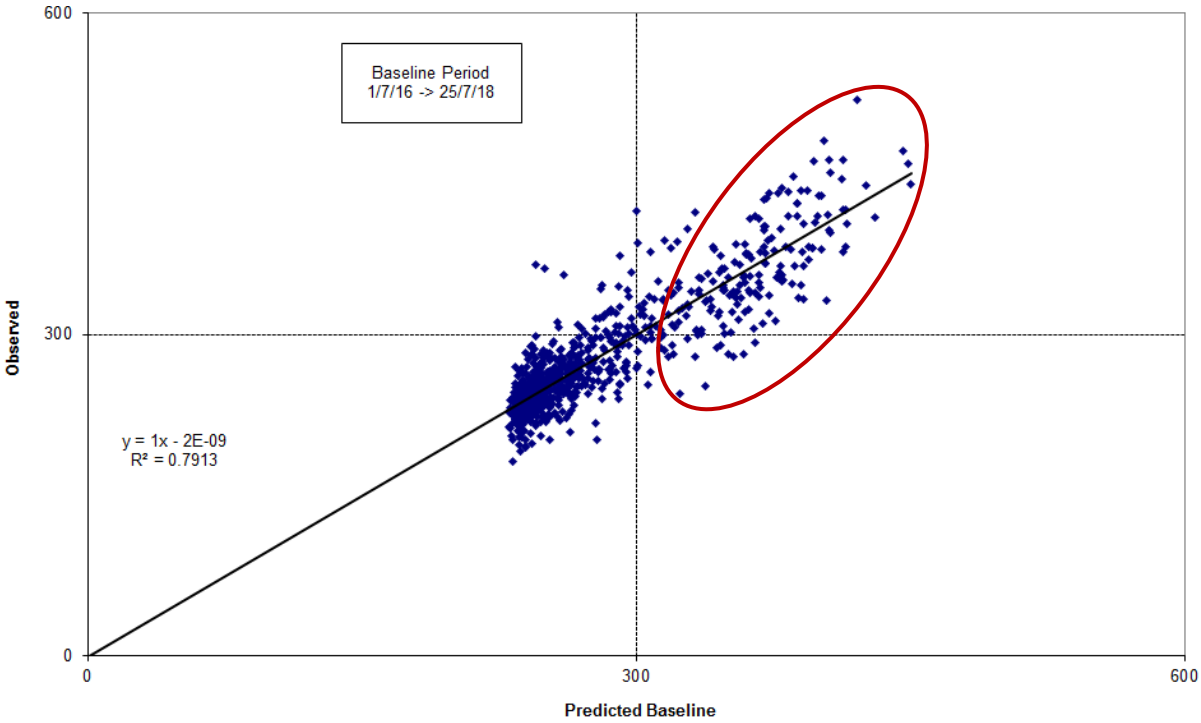
- Calibration period (1-07-2016 to 25-07-2018)
- End of calibration period to latest date available (Hunter Water provided 26-07-2018 to 31-01-2019)

Bias in the model can be identified by visually inspecting these scatterplots. The scatterplot of an unbiased model would contain evenly distributed dot-points that follow the trendline without drift.

Figure 47 presents the scatterplot for the calibration period. Aither has highlighted visually where potential bias may be present. It appears that the climate correction model tends to under-estimate higher consumption days (i.e. days with greater than 375 litres per person per day). A similar pattern is seen in Figure 48 which presents an equivalent scatterplot for the July 2018 to January 2019

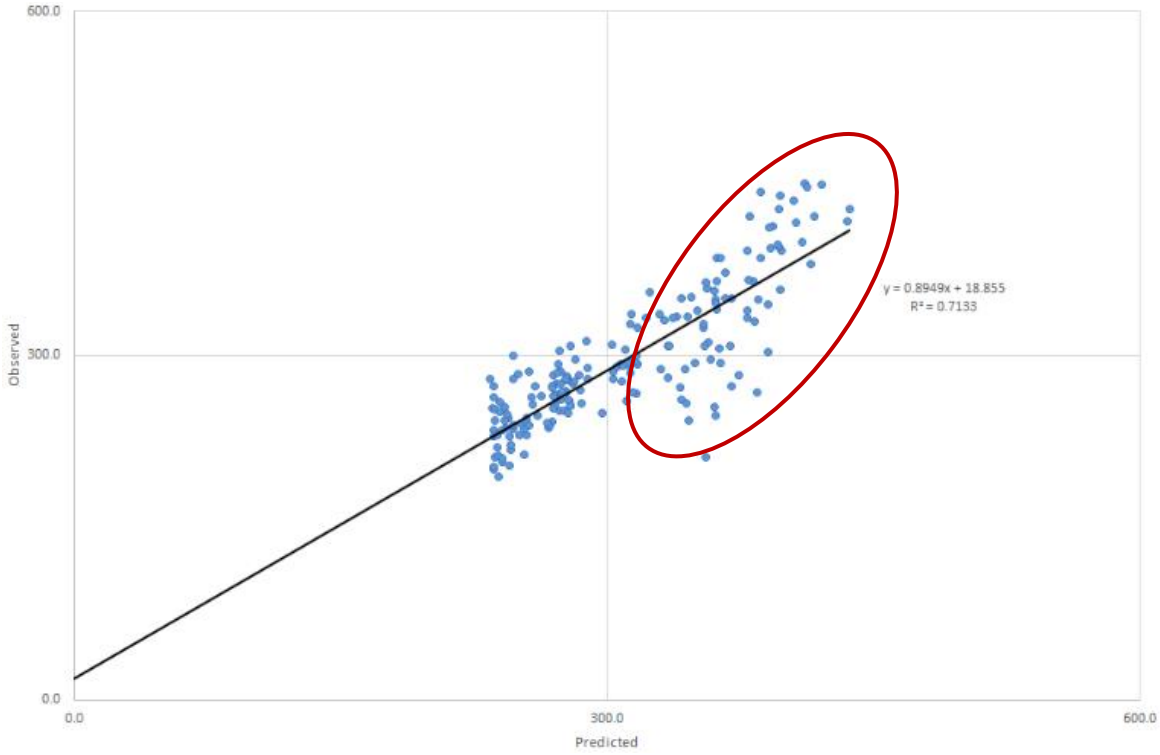
[77] Department of Energy, utilities, and sustainability, New South Wales Government, Water Demand Trend Tracking and Climate Correction 2002

period. Aither suggests that the climate corrected starting point for high consumption periods is likely to be too low.



Source: Hunter Water RFI response, Aither highlight

Figure 47 Observed and predicted demand across calibration period

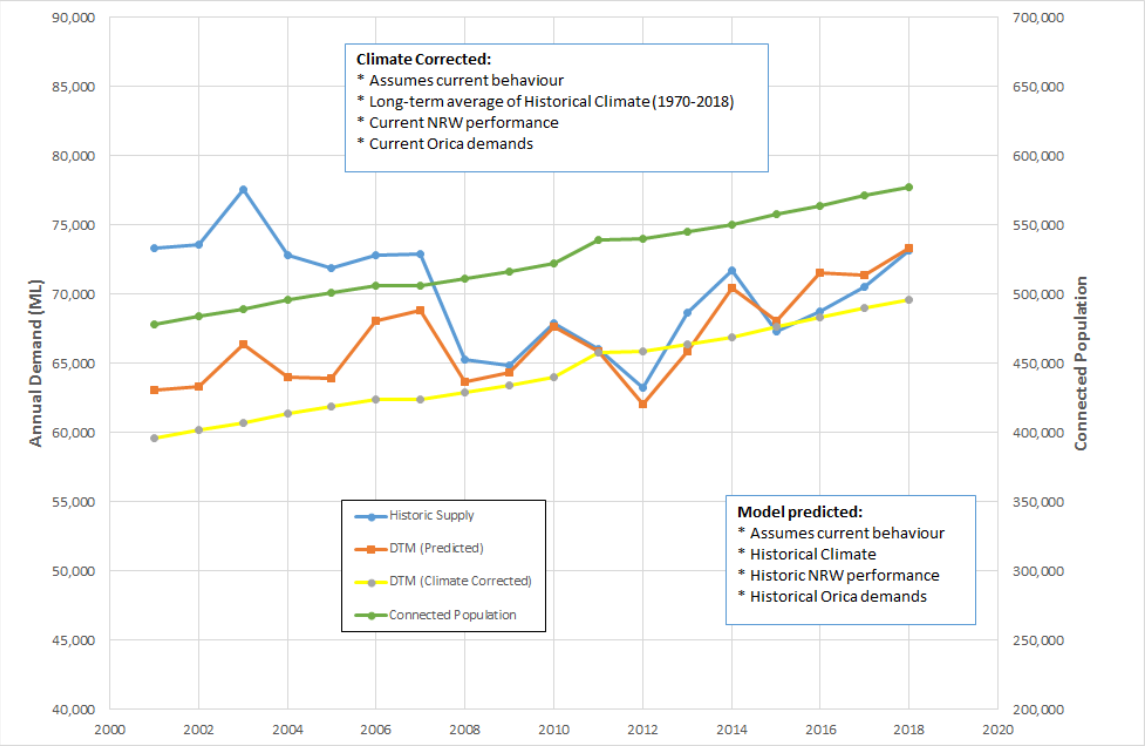


Source: Hunter Water RFI response, Aither highlight

Figure 48 Observed and predicted demand across 26-07-2018 to 31-01-2019 period

Predictive power

It is important to ensure the model used to forecast demand has enough predictive power. This will be influenced by the calibration period chosen (discussed above). Aither issued Hunter Water with clarification questions regarding the predictive power of the model. Figure 49 presents the observed, predicted, and climate corrected demand for 2001 to 2018. As expected, and given the calibration period, the predicted demand tracks observed demand consistently in the most recent years.



Source: Hunter Water RFI response

Figure 49 Observed, predicted, and climate corrected demand, 2001 to 2018

The divergence between predicted demand and observed historic supply from 2001 to 2008 can be explained by the model being calibrated to current consumer behaviour. Current behaviour will be influenced by the same factors mentioned with respect to the calibration period, namely changes in price, regulations, and appliance efficiency.

Aither consider the predictive power of the model to be sufficient given its purpose is to derive a climate adjusted starting demand. It is therefore appropriate to model this based on current consumer behaviour.

Jacobs peer review recommendations

Hunter Water have indicated that out of the five recommendations provided by Jacobs:

- two are not relevant to the current demand forecast
- two are consistent with the recommendations under the iSDP paper
- one is being scoped by Hunter Water

Taking these in turn, the recommendations cited as having no material impact on the forecasts include providing greater guidance on when to modify the dependent variable, and the documentation of the link between the climate data and daily water demand. The first recommendation is of critical importance for future reviews, particularly if further modification or cleaning of the daily water production series is undertaken. However, we understand that in the context of the subsequent price period this is not relevant. The inclusion of documentation in Hunter Water's DTM report is also not of relevance to this demand review.

The recommendations duplicated with the iSDP recommendations have been addressed in the preceding subsection of this report.

Finally, understanding the relationship between climate data and daily water demand is important. We agree with Jacobs that underpinning the soil moisture index calibration with an empirical study would improve the independence of the soil moisture index. However, for the purposes of capturing current consumer behaviour, calibrating this variable to the most recent years will achieve this goal. A study into this relationship will provide Hunter Water with greater justification for the proposed approach.

Overall view of the DTM

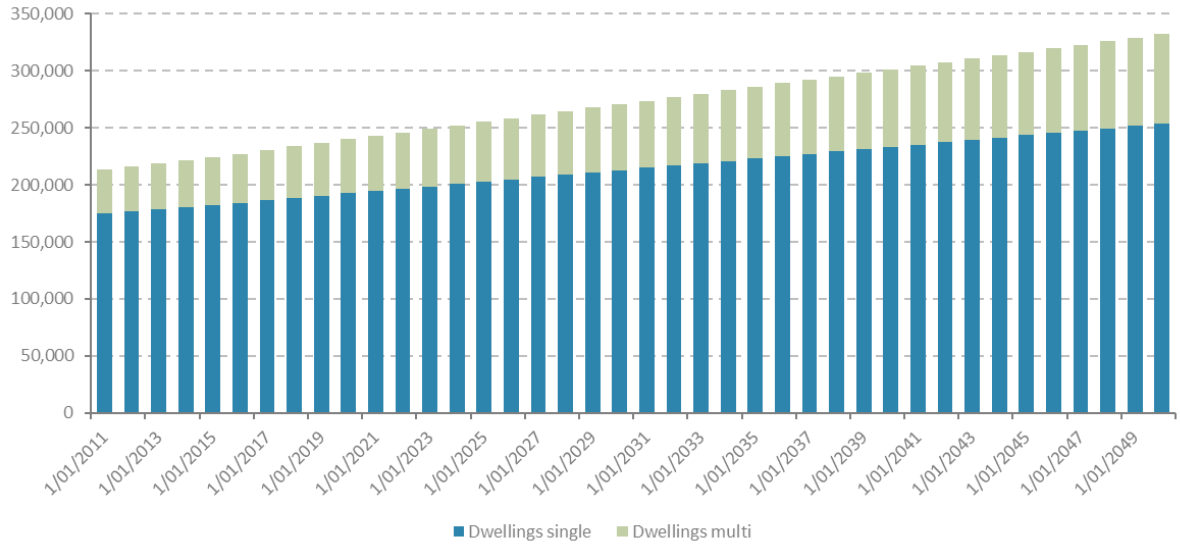
Aither support the findings of the detailed modelling review team (Jacobs) and emphasise the need to address all the recommendations made by this team in relation to the DTM. We note that Hunter Water has addressed a range of these recommendations already and has produced update demand forecasts in October. Further work is planned to address the outstanding recommendations. We support the findings that the proposed climate correction model represents an improvement in robustness compared with the old approach.

8.4. Summary of actual and forecasted demand

In this subsection we have provided a summary of the actual and forecast demand for Hunter Water services. Firstly, we examine population and dwelling growth. This is followed by a summary of forecasts associated with the range of water services (potable water, wastewater, bulk water) provided by Hunter Water. A selection of tables and figures in this section reflect Hunter Water's updated demand forecasts as presented in their response to IPART's Issues Paper. Tables and graphs reflecting Hunter Water's updated forecasts are noted where appropriate. In general, Aither considered the impact of these adjustments to be immaterial.

8.4.1. Population and dwelling growth

Figure 50 presents dwelling forecasts within the iSDP model. In 2018 there were 236,000 dwellings, 80 per cent of which were single dwellings. By 2050, the dwelling count is forecast to increase to 330,000. The proportion of single dwellings is forecasted to fall to 76 per cent.



Source: iSDP end-use model

Figure 50 Dwelling forecasts (single and multi) in iSDP model, 2011 to 2050

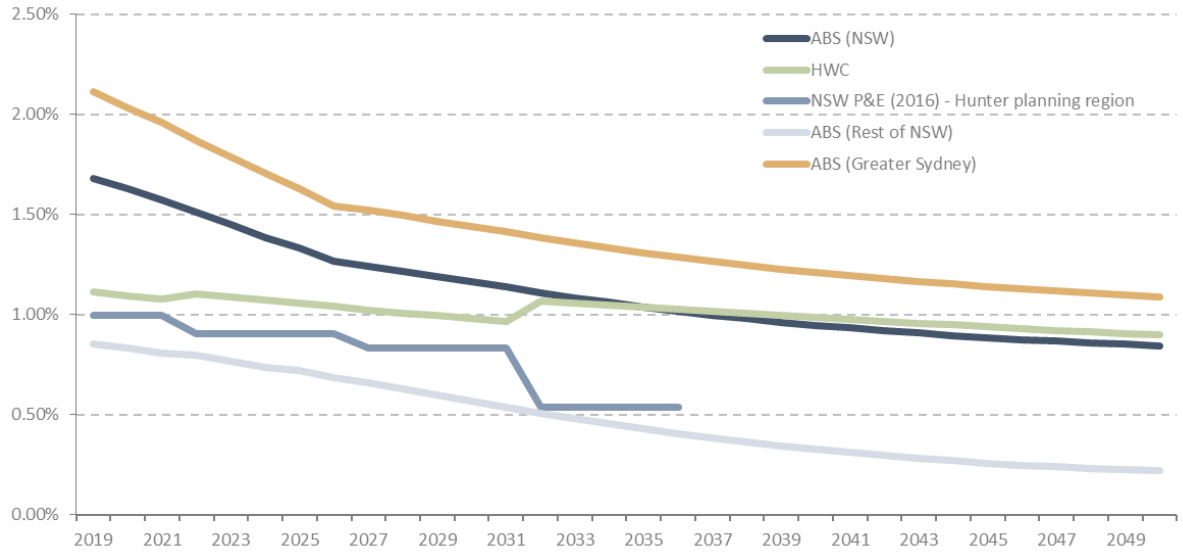
Projection comparators

The product of the dwelling forecasts and the assumed occupancy ratio within the iSDP model equals the forecast population projection. We have undertaken this analysis, and compared the population forecast growth rates with other publicly available population forecasts. These include:

- ABS Population Projections – New South Wales – Series B[78]
- ABS Population Projections – New South Wales excluding Sydney – Series B
- NSW Planning, Industry, and Environment population projections – Hunter Region

Figure 51 presents these forecasted population growth rates alongside those assumed by Hunter Water with the iSDP model. In 2020, the iSDP model assumes a population growth rate of 1.1 per cent. This compares with 1.6 per cent for all of NSW, 0.8 per cent for NSW excluding Sydney, and 0.99 per cent for the NSW Planning and Environment projections for the Hunter region. In the post-2030 period, the iSDP model has forecasted a growth rate that broadly tracks ABS' forecast for the state. The large divergence in 2030 between the growth rate assumed within the iSDP model and the NSW Planning & Environment projections is noted. In 2032, the former has a growth rate of 1.07 per cent while the latter falls to 0.54 per cent.

[78] Series B largely reflects current trends in fertility, life expectancy at birth, and migration



Source: Aither analysis of iSDP data, ABS population projections, NSW Planning, Industry, and Environment population projections

Figure 51 Hunter Water (iSDP), ABS, and NSW Planning, Industry, and Environment population projection growth rates

8.4.2. Billable connections

Hunter Water provided IPART with a supplemental AIR spreadsheet titled billable connections. This spreadsheet provided detailed forecasts of connections which form the basis of the tariff modelling. These forecasts differ from the AIR non-financial forecasts as the AIR is based on more simplistic forecasting approach.[79]

Given that the supplemental billable connections spreadsheet is used in calculating customer tariffs, we have focused our analysis on this spreadsheet.

Water connections

Table 59 presents Hunter Water's actual and projected potable water connections over the current regulatory period. Residential connections increased from approx. 229,100 to 240,300 over the four-year period. Non-residential connections have also increased, growing from approximately 28,500 to 29,200.

Table 59 Hunter Water's actual/projected water connections

Financial year	2016-17	2017-18	2018-19	2019-20
Residential connections	229,089	232,879	236,849	240,257
Non-residential connections	28,512	28,599	28,862	29,198
Total	**257,601**	**261,478**	**265,711**	**269,456**

Source: Hunter Water supplemental AIR (billable connections)

[79] Hunter Water have provided a detailed breakdown of the differences between these methodologies in Technical Paper 7 and in information request responses.

Table 60 presents the variation between actual/projected water connections relative to forecast connections over the current regulatory period. Housing connections were within a percentage point deviation range from the forecast. In contrast, actual/projected multi-premises residential connections exceeded forecast levels. In 2019-20 multi-premise water connections are projected to exceed the forecast level by just under 10%. Actual/projected non-residential connections were less than forecast. However, multi-premises exceeded forecast levels.

Table 60 Variance of Hunter Water's actual/projected water connections relative to IPART 2016 Determination (rebased)

Financial year	2016-17	2017-18	2018-19	2019-20
Houses	-0.8%	-0.7%	-0.6%	-0.6%
Multi-premises	5.1%	6.8%	8.7%	9.8%
Residential connections	**0.2%**	**0.6%**	**1.0%**	**1.3%**
20mm	-4.2%	-5.5%	-6.2%	-6.4%
Multi-premises	0.1%	1.3%	3.0%	2.8%
25mm and above	-5.2%	-6.2%	-6.7%	-6.9%
Non-residential connections	**-4.8%**	**-5.9%**	**-6.3%**	**-6.5%**

Table 61 presents connection data for the next regulatory period. Residential connections are forecast to grow by approximately 0.93% per annum.[80] Non-residential connections are forecast to growth at 0.55% per annum.

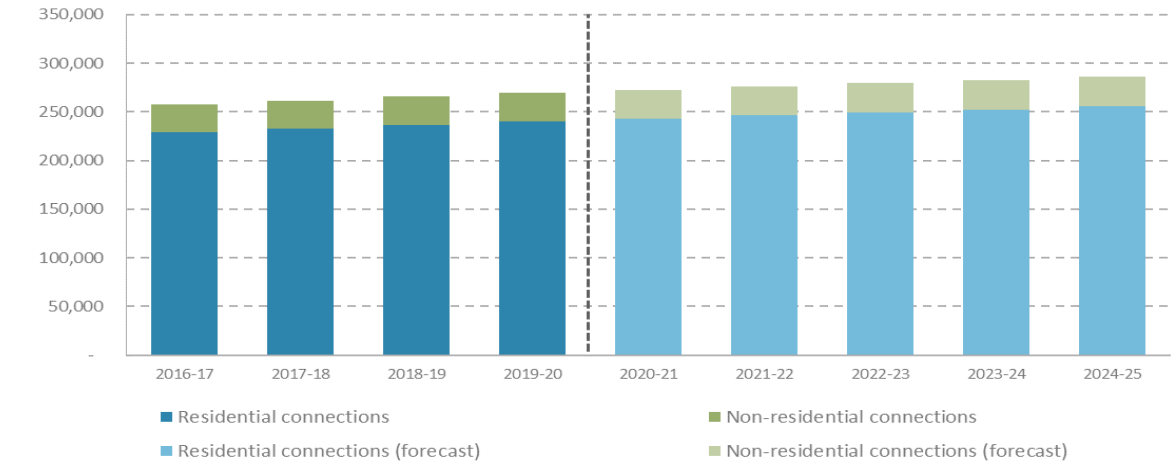
Table 61 Hunter Water's forecast water connections

Financial year	2020-21	2021-22	2022-23	2023-24
Residential connections	243,309	246,360	249,412	252,471
Non-residential connections	29,509	29,782	29,988	30,166
Total	**272,818**	**276,143**	**279,401**	**282,637**

Source: Hunter Water supplemental AIR (billable connections)

Both actual/projected as well as forecast potable water connections are presented graphically in Figure 52. A steady increase in both residential and non-residential connections is seen historically and is forecast to continue.

[80] Based on compound annual growth rate



Source: All data sourced from Hunter Water Submission and supplemental data provision

Figure 52 Hunter Water's actual and forecast water connections

Wastewater connections

Hunter Water's historic and projected wastewater connection during the current regulatory period is presented in Table 62. Residential connections grew by 1.1% (compound annual growth rate) across the period when accounting for projected connections for the 2019-20 financial year. The multi-premises subcomponent of residential connections grew by 3.4%. Non-residential connections grew by 1.7% over the period.

Table 62 Hunter Water's actual/projected wastewater connections

Financial year	2016-17	2017-18	2018-19	2019-20
Residential connections	219,434	222,871	226,542	229,929
Non-residential connections	15,397	15,606	15,919	16,185
Total	234,831	238,477	242,462	246,114

Source: Hunter Water supplemental AIR (billable connections)

Table 63 presents the variation between actual/projected wastewater connections and those forecast in the current regulatory period. A greater number of residential wastewater connections were actualised over the period than forecast. In particular, the number of multi-premises connections was higher than forecast (projections for 2019-20 are 5.2 per cent greater than forecast). In contrast, non-residential connections have been lower than forecast for this regulatory period. Non-residential connections have exhibited a -4.3 per cent to -5.2 per cent variation against forecast values across the period.

Table 63 Variance of Hunter Water's actual/projected wastewater connections relative to IPART 2016 Determination (rebased)

Financial year	2016-17	2017-18	2018-19	2019-20
Houses	-0.3%	0.5%	0.8%	0.9%
Multi-premises	2.0%	3.0%	4.2%	5.2%
Residential connections	**0.1%**	**0.9%**	**1.4%**	**1.8%**
20mm	-4.8%	-6.9%	-8.1%	-8.3%
Multi-premises	-1.0%	15.0%	31.0%	30.6%
25mm and above	-4.3%	-5.4%	-5.9%	-6.1%
Non-residential connections	**-4.3%**	**-4.9%**	**-4.9%**	**-5.2%**

Source: Hunter Water supplemental AIR (billable connections), IPART 2016 Determination, Aither analysis

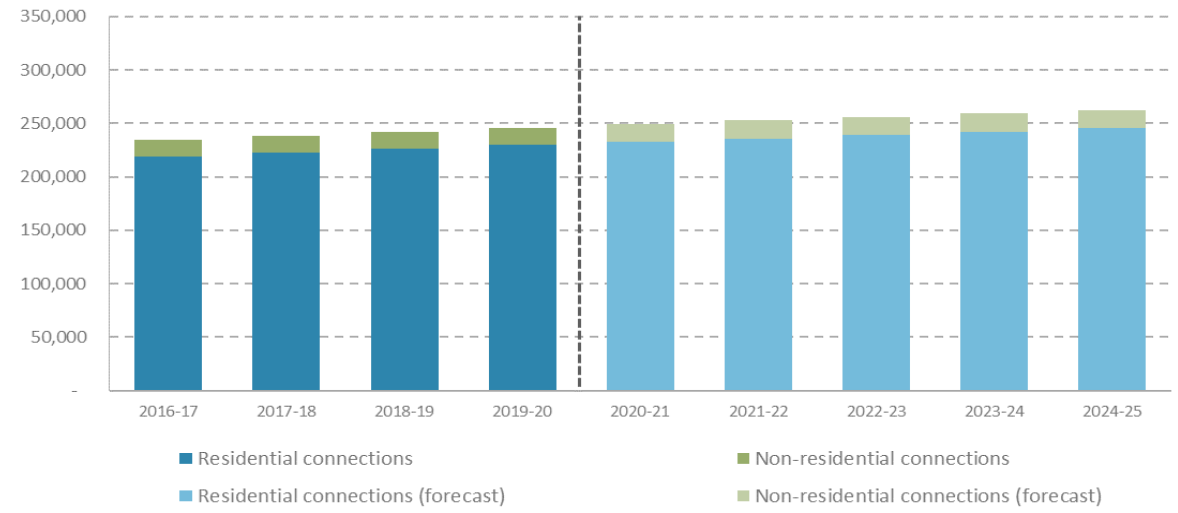
Table 64 presents forecast wastewater connections over the subsequent regulatory period. Marginally higher residential connection growth is forecast relative to the current regulatory period (1.1 per cent vs. 1.3 per cent annually). Multi-premise residential connections are forecast to grow by 2.5 per cent annually. Non-residential connections are forecast to grow by 1.1 per cent annually.

Table 64 Hunter Water's forecast wastewater connections (count, Meter Equivalent)

Financial year	2020-21	2021-22	2022-23	2023-24	2024-25
Residential connections	232,964	236,042	239,213	242,401	245,520
Non-residential connections	16,432	16,655	16,834	16,993	17,152
Total	**249,396**	**252,697**	**256,047**	**259,394**	**262,672**

Source: Hunter Water supplemental AIR (billable connections)

Figure 53 graphically presents actual/projected and forecast wastewater connections.



Source: All data sourced from Hunter Water Submission and supplemental data provision

Figure 53 Hunter Water's actual and forecast wastewater connections

Stormwater drainage customers

Hunter Water's actual and proposed stormwater connections over the current regulatory period are presented in Table 65. These are contrasted against the forecast connections that formed part of IPART's 2016 Determination.

Table 65 Hunter Water's actual/projected and forecast stormwater connections

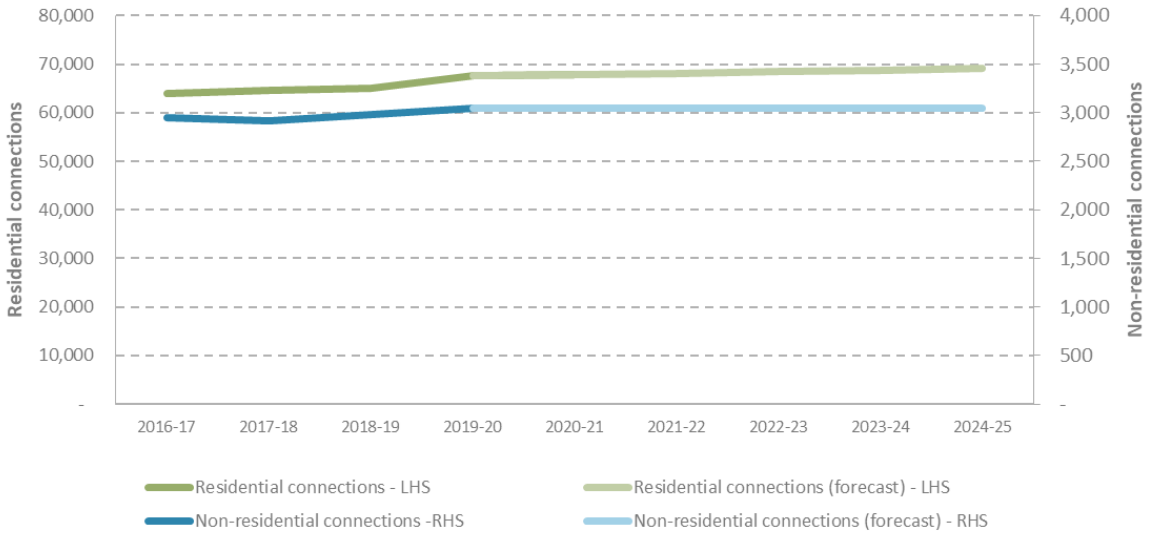
Financial year	2016-17	2017-18	2018-19	2019-20
IPART 2016 Determination				
Residential connections	63,642	63,889	64,136	64,383
Non-residential connections	2,992	2,992	2,992	2,992
Total	**66,634**	**66,881**	**67,128**	**67,375**
Actual/projected				
Residential connections	63,912	64,569	65,090	67,541
Non-residential connections	2,950	2,916	2,980	3,042
Total	**66,861**	**67,485**	**68,070**	**70,583**
Variance				
Residential connections	*0.4%*	*1.1%*	*1.5%*	*4.9%*
Non-residential connections	*-1.4%*	*-2.5%*	*-0.4%*	*1.7%*
Total	***0.3%***	***0.9%***	***1.4%***	***4.8%***

Source: Hunter Water supplemental AIR (billable connections)

The increase in actual connections in 2019-20 is due to a data entry error originating in Hunter Water's billing system in 2006. This issue was outlined in detail in Hunter Water's Technical Paper – Demand for Services. This issue resulted in an additional 2,000 properties being included in this customer base (comprised of approx. 1,850 residential and 150 non-residential properties). Hunter Water is undertaking further analysis to ensure this error is addressed correctly, which is expected to be completed by 30 November 2019.[81]

The actual/projected and forecast stormwater connections are presented graphically in Figure 54. Outside of the once-off increase in connections in 2019-20, these are expected to remain relatively static. Residential connections are forecast to grow from approx. 67,500 in 2019-20 to 69,000 in 2024-25. No growth is forecast for non-residential connections.

[81] Review of Prices for Hunter Water - Response to IPART Issues Paper, Hunter Water. 21 October 2019.



Source: All data sourced from Hunter Water Submission and supplemental data provision

Figure 54 Hunter Water's actual and forecast stormwater connections

8.4.3. Water consumption

This subsection examines potable water consumption in the current and subsequent regulatory period.

Current regulatory period

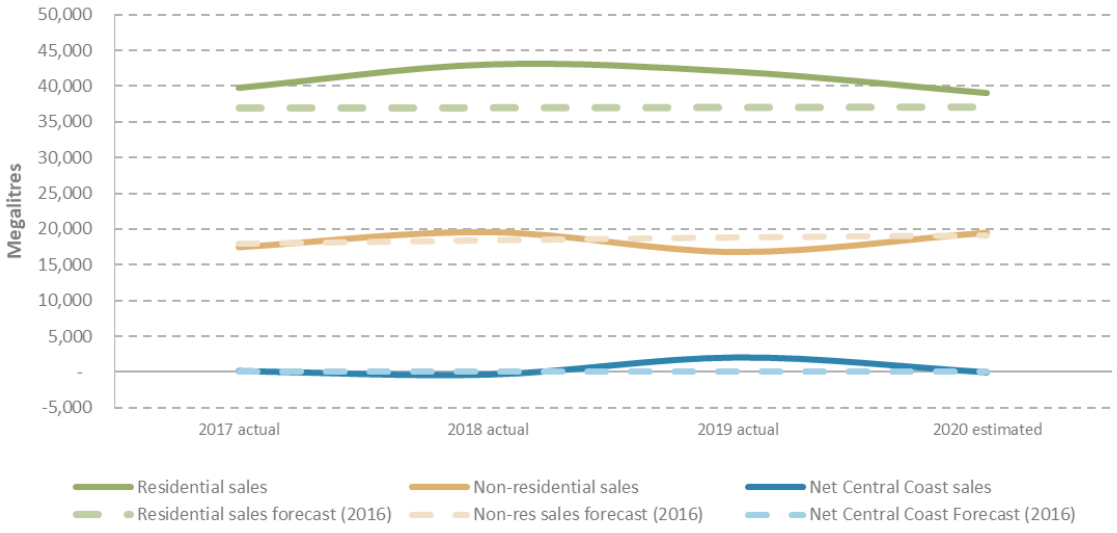
Table 66 presents Hunter Water's actual/projected water sales (ML) in comparison with IPARTs 2016 Determination forecasts. Actual sales were greater than forecast across all years. Hunter Water cite this as being primarily due to climatic factors (i.e. low levels of rainfall). Actual sales over the entire period are expected to be 7.5 per cent greater than forecast in 2016.

Table 66 Hunter Water's actual/projected and IPART 2016 Determination forecast water sales volumes (ML)

Financial year	2016-17	2017-18	2018-19	2019-20
Actual/projected sales				
Residential	39,753	43,065	42,025	39,011
Non-residential (incl. Bulk water sales)	17,460	19,650	16,761	19,573
Net Central Coast sales	165	-316	1,989	-
Total	**57,378**	**62,399**	**60,775**	**58,584**
IPART 2016 Determination				
Residential	36,890	36,951	37,025	37,118
Non-residential (incl. Bulk water sales)	17,889	18,426	18,880	19,172
Net Central Coast sales	-	-	-	-
Total	**54,779**	**55,377**	**55,905**	**56,290**
Variance, %	***+ 4.7%***	***+ 12.7%***	***+ 8.7%***	***+ 4.1%***

Source: All data sourced from Hunter Water submission to IPART

This data is represented graphically in Figure 55.



Source: All data sourced from Hunter Water Submission and supplemental data provision

Figure 55 Actual and forecast water sales volumes from 2016-17 to 2019-20

Next regulatory period

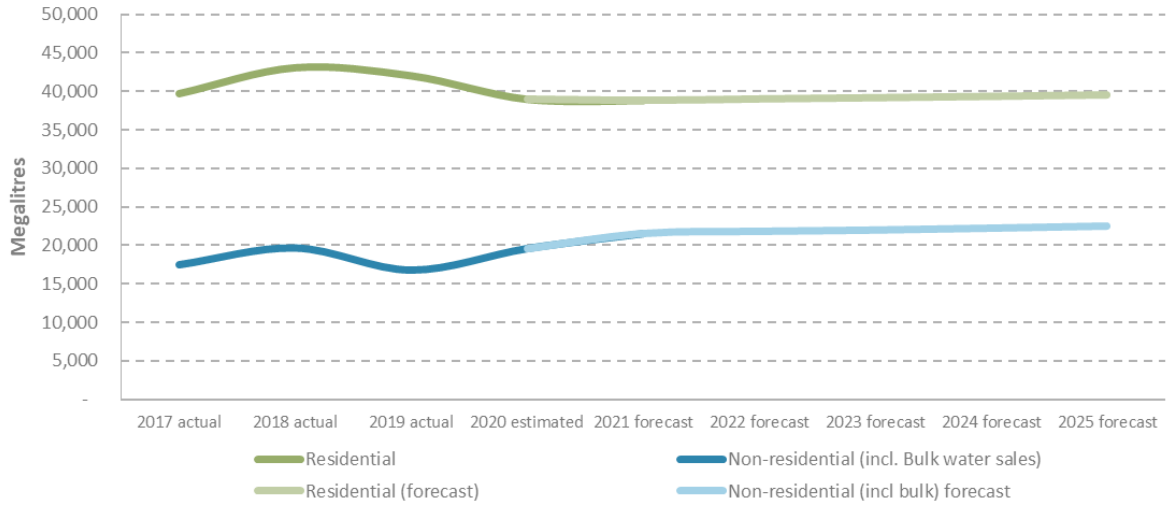
Hunter Water is forecasting continued growth in water sales from 2019-20 onwards, reflecting an assumed return to average rainfall conditions. Annual residential water sales over the next four years are forecast to be less than the average for the 2016-17 to 2018-19 period.

Table 67 Hunter Water's forecast water sales volumes (ML)

Financial year	2020-21	2021-22	2022-23	2023-24	2024-25
Residential	38,855	39,021	39,176	39,344	39,525
Non-residential (incl. Bulk water sales)	21,520	21,790	21,956	22,201	22,460
Net Central Coast sales	-	-	-	-	-
Total	**60,375**	**60,811**	**61,132**	**61,545**	**61,985**

Source: All data sourced from Hunter Water's Submissions to IPART.
Note: This data reflects Hunter Water's updated demand forecasts as presented in Hunter Water's response to IPART Issues Paper.

The actual/projected and forecast water consumption is presented graphically in Figure 56.

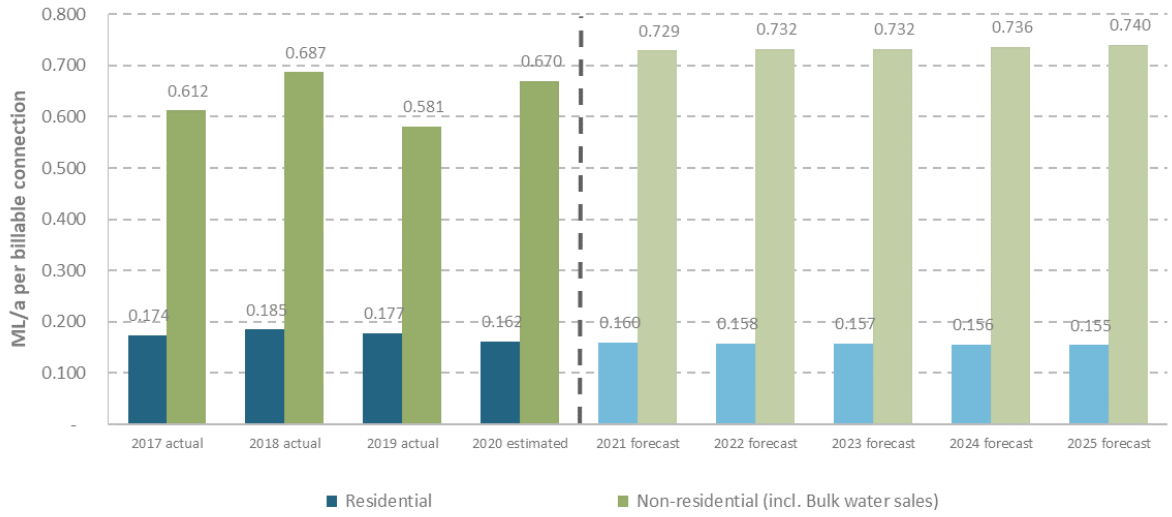


Source: All data sourced from Hunter Water Submission and supplemental data provision
Note: This data reflects Hunter Water's updated demand forecasts as presented in Hunter Water's response to IPART Issues Paper.

Figure 56 Actual and forecast water sales volumes

Per connection water consumption

We have calculated the per customer water consumption for residential and non-residential sales over the 2016-17 to 2024-25 period. Residential per customer use has exhibited a downward trend since 2017-18, which is forecast to continue annually across the next regulatory period. Non-residential per connection consumption is denominated based on meter equivalent connections. Actual non-residential per customer consumption has fluctuated across the current regulatory period. This is forecast to vary from 0.73 – 0.79 ML over the next period.



Source: Hunter Water Submission and supplemental data provision, Aither calculations

Note: This data reflects Hunter Water's updated demand forecasts as presented in Hunter Water's response to IPART Issues Paper. Non-residential connection count is on a Meter Equivalent (20mm) basis

Figure 57 Actual and forecast per capita water consumption

8.4.4. Wastewater

Table 68 presents actual/projected wastewater discharge volumes over the current regulatory period. This fluctuated significantly. However, when comparing across the entire period, actual/projected exceeded the forecast level by only 2.7 per cent.

Table 68 Hunter Water's actual/projected and 2016 proposed wastewater discharge volumes (ML)

Financial year	2016-17	2017-18	2018-19	2019-20
IPART 2016 Determination	5,645	5,620	5,595	5,572
Actual/projected	6,157	6,526	5,296	5,052
Variance, per cent	***+ 9.1%***	***+ 16.1%***	***- 5.3%***	***- 9.3%***

Source: All data sourced from Hunter Water submission to IPART

Note: This data reflects Hunter Water's updated demand forecasts as presented in Hunter Water's response to IPART Issues Paper.

Wastewater discharge volumes are primarily a function of water sales. Hunter Water has applied the historic proportion of wastewater discharge volumes to non-residential water sales across the forecast price period. This results in a slowly growing total discharge amount over the period. Table 69 presents Hunter Water's forecast volume of chargeable discharge volumes over the next price period. This represents updated forecast volumes as presented by Hunter Water in the response to IPART's Issues Paper. Aither do not consider these changes to have a material impact on our findings.

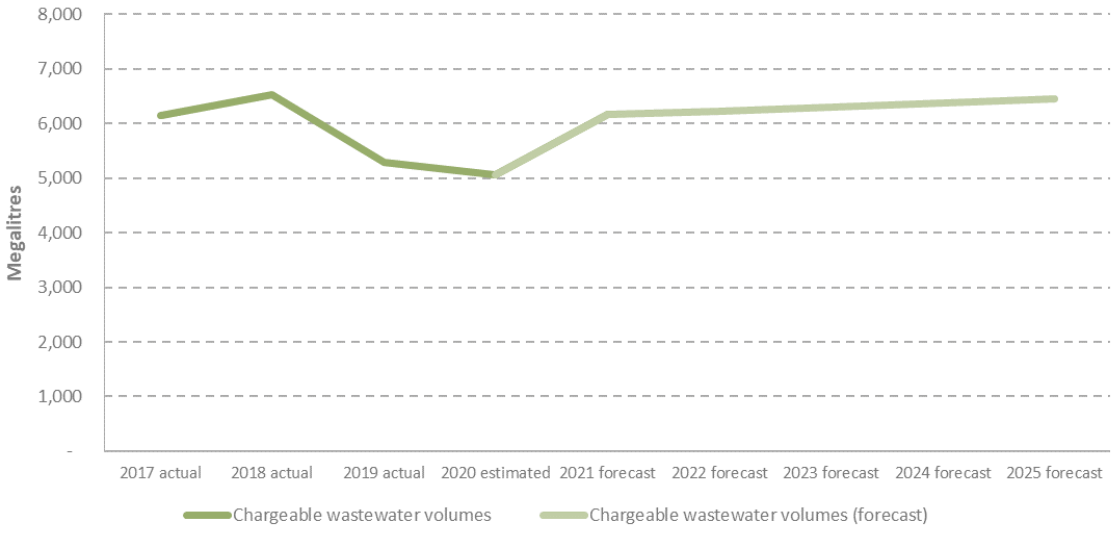
Table 69 Hunter Water's forecast wastewater discharge volumes (ML)

Financial year	2020-21	2021-22	2022-23	2023-24	2024-25
Chargeable discharge volume	6,159	6,232	6,305	6,377	6,449

Source: All data sourced from Hunter Water submissions to IPART

Note: This data reflects Hunter Water's updated demand forecasts as presented in Hunter Water's response to IPART Issues Paper.

Figure 58 presents the historic and forecast wastewater discharge volume. The drop in 2017 is due to a reduction in non-residential water demand which is correlated with wastewater discharge volumes.



Source: All data sourced from Hunter Water Submission and supplemental data provision

Note: This data reflects Hunter Water's updated demand forecasts as presented in Hunter Water's response to IPART Issues Paper.

Figure 58 Actual and forecast chargeable wastewater volumes

8.4.5. Bulk water

There are two components that make up bulk water sales. These are:

- Wholesale supply of water to private operators
- Interregional water transfers

Private developers in Hunter Water's jurisdiction are increasingly using private water network operators. These activities mean that Hunter Water becomes the wholesale supplier of water to these private operators. This is expected to have minimal impacts on the aggregate demand for water, however it results in a reclassification of some water sales to bulk water sales rather than retail sales. Hunter Water indicates that the wholesale water supply forecasts are based on forecasts of private operators in the region.

The interregional transfer forecasts are based on a combined source model. As this model assumes average climatic conditions, there is no net bulk transfers over the next pricing period. This means that any transfers that are made will be reciprocated from the Central Coast and effectively offset.

Hunter Water provided bulk water sales for the current and next regulatory period within the AIR and SIR. Private, residential, and industrial bulk water sales grew rapidly from 2016-17 to present, reflecting the growth in private operators in the region. This is forecast to grow at a slower rate over the next regulatory period. Bulk water sales to Central Coast fluctuated across the period. Net sales of zero are forecast going forward.

Table 70 Hunter Water's actual/projected bulk water sales (ML)

Financial year	2016-17	2017-18	2018-19	2019-20
Private, residential and industrial	19	604	2,022	1,794
Central Coast	165	-316	1,989	-
Total	**184**	**288**	**4,011**	**1,794**

Source: Hunter Water SIR/AIR

Table 71 Hunter Water's forecast bulk water sales (ML)

Financial year	2020-21	2021-22	2022-23	2023-24	2024-25
Private, residential and industrial	1,871	1,948	2,097	2,247	2,396
Central Coast	-	-	-	-	-
Total	**1,871**	**1,948**	**2,097**	**2,247**	**2,396**

Source: Hunter Water SIR/AIR

8.5. Assessment of forecasted demand

8.5.1. Reasonableness of population projections

In the context of this price review, the population projections are reasonable. However, the jump in the population growth post 2025 is noted (which was also flagged by Jacobs). Hunter Water have indicated that work is underway in explaining or addressing this apparent contradiction with State government forecasts. Aither's review has not assessed their final response in relation to this issue. We recommend that IPART consider Hunter Water's response in detail to ensure long-term growth rates are not overestimated.

Impact of demand projections on expenditure

Demand forecasts impact Hunter Water's revenue and some operating expenditure items. In particular, demand forecasts inform operating expenditure associated with the treatment operations contract (which is examined in detail in section 5.6.3). The operations contract has a variable cost component that is dependent the number of megalitres treated at Hunter Water's water treatment plants. The forecast megalitres of treated water is based on a ten-year historical average with growth rates applied for water treatment plant in Hunter Water's asset portfolio. This methodology is considered by Aither in section 5.6.3. In general, we are satisfied with this approach for reasons of materiality.

The demand projections will inform future supply augmentations (by inputting to the supply/demand balance) and therefore capital expenditure. No new capital expenditure for a new water supply source is required in the next price period.

8.5.2. Reasonableness of billable connection forecasts

Dwelling connections

Aither had concerns that the forecast growth rate in dwellings may underestimate actual connections given high growth rates in recent years. We issued Hunter Water with a query related to their assumed slow-down in dwelling connections in the next price period.

Hunter Water have indicated that dwelling approvals are used as a lead indicator for connected properties in the short term. Table 72 presents the number of dwelling approvals in Hunter Water's area of operations alongside the number of new dwelling connections in that year. Comparing connections with the number approvals the year prior gives an estimate of the realisation rate. The 2016-17 period saw a realisation rate of 95 per cent which was the highest across the seven-year period. The realisation rate and the number of dwelling approvals fell in the two subsequent years.

Table 72 Dwelling approval, new dwelling connections, and realisation rate, 2012-13 to 2018-19

Year	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Dwelling approvals	2,859	3,814	3,718	4,048	4,560	5,382	4,744
New dwelling connections	2,655	2,337	2,719	2,983	3,843	4,104	3,814

Realization rate		*82%*	*71%*	*80%*	*95%*	*90%*	*71%*

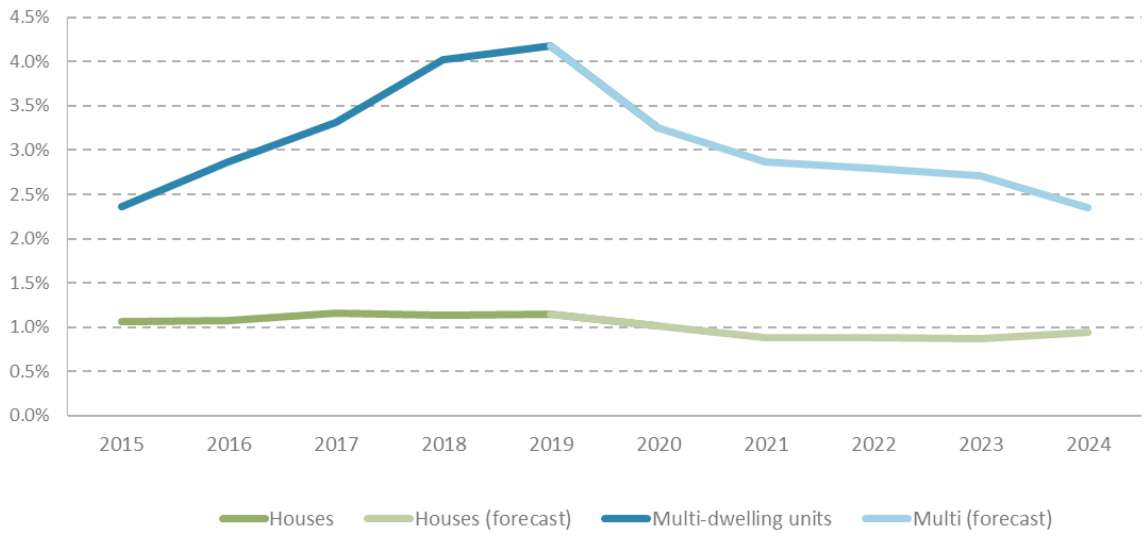
Source: Hunter Water query response

Hunter Water also provided these indicators for selected months which implied a continued slow-down in activity. Technical Paper 7 also states that the development industry indicated they expect a slow-down in activity due to tighter lending standards, the recent historic decline in approvals, an increase in time on market for property sales, and increased discounting of property prices by vendors. We queried Hunter Water as to whether the development industry provided insights as to the influence of recent changes to monetary policy by the Reserve Bank of Australia (RBA) since the completion of Technical Paper 7. We are concerned that the recent recovery of house prices in some areas may spill-over into Hunter Water's area of operations, as well as the continued reduction in RBA cash rates providing ongoing buoyancy for the housing market.[82]

Notwithstanding the final point above, Aither are satisfied that reasonable justification has been provided for a reduction in the growth rate of connections. The Department of Planning latest data is from May 2019 and so we cannot assess quantitatively the impact that these monetary policy changes has had. We recommend that IPART monitor actual connections and dwelling approvals in the Hunter Region.

Dwelling mix

Aither have not been able to independently cross-check the accuracy of the forecast mix of dwelling types as no projections are provided by the NSW Government. We have examined the trend in Hunter Water connections and note the continued growth in the proportion of apartments/flats. Figure 59 presents actual and forecast growth rates by dwelling type. Apartments are forecast to continue to outgrow houses over the next price period. Aither consider it reasonable to assume that this trend will continue.



Source: Hunter Water AIR and SIR

Figure 59 Growth rates of dwelling types, actual and forecast

[82] Two cash rate reductions of 0.25 per cent have been implemented since the publication of Hunter Water's Pricing Proposal (RBA website here)

As a final sense-check on the high expected growth in multi-dwelling units we have compared the proportion of apartments to total customer connections for Sydney Water.[83] In 2016, 33% of Sydney Water's potable water connections were from shared meter dwellings (i.e. apartments). In contrast, in 2018 about 20% of Hunter Water's connections were apartments. The fact that the only other metropolitan utility in NSW had significantly more apartments in relative terms indicates that there is some growth potential for this dwelling type in Hunter Water's area of operation.

8.5.3. Reasonableness of water consumption forecasts

Current price period

Hunter Water has indicated that the primary reason for the underestimate of water consumption across the current price period is the climate (see Section 8.4 for further details). We have tested this claim by examining the three years 2016-17 to 2018-19 for which there is actual data (see Table 45) as well the difference between predicted and climate corrected demand produced by the DTM (see Figure 49). Subtracting the climate corrected demand from the predicted demand should isolate the impact of climate on demand across these three years. A visual inspection of the graph indicates that the DTM estimates a cumulative climate impact of approximately 10 GL. In comparison, the cumulative difference between the IPART 2016 forecast and actual demand is 14 GL. Using this high-level assessment, climate factors could be explaining about 75% of the difference in demand.[84] Aither consider this an acceptable but not optimal result.[85]

Per customer consumption

The assumed per customer reduction in water consumption is considered reasonable given:

- The past performance of Hunter Water's residential customer usage
- The relative usage of Hunter Water's customer vis-à-vis comparator utilities
- Relative insignificance of real customer price changes

The per customer consumption of Hunter Water's residential customers has reduced from 0.174 ML/pa in 2016-17 to 0.162 ML/pa in 2019-20. This represents a 2.2 per cent reduction per annum. However, it should be note that this measure fluctuated between these two years, exhibiting upward and downward swings. Over the forecast period (2020-21 to 2024-25), the annual reduction in water consumption per customer is 1.0 per cent per annum.

Hunter Water's relative performance in terms of average residential water supplied suggests that continued reductions in this measure are possible. According to the Department of Primary Industries data[86], Hunter Water performs relatively strongly when compared against all local water utilities in NSW (ranked 25th out of eighty-three LWUs). However, the results are less favourable relative to other coastal LWUs which will likely better capture factors such as climate equivalently. In this cohort, Hunter Water are ranked 18th out of 28 LWUs. This implies there may be potential capacity to further reduce per capita consumption.

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83 Review of prices for Sydney Water Corporation, 1 July 2016 to 30 June 2020

84 There are some potential reasons for the difference. One difference is that Figure 49 captures total water supply which includes leaks. It is noted that Hunter Water experienced levels of real losses/leaks in 2016-18 (row 357 of AIR 'Non-financial' tab) compared to long-run averages.

85 The similarly in this high-level result and the DTM regression models R-squared (79 per cent) is noted. R-squared measures how much variance in the dependent variable a model can explain.

86 NSW Water Supply and Sewerage Performance Monitoring Report for 2015/16

Given the reasons above, Aither are satisfied that the assumed reduction in per customer consumption is reasonable for the next price period. IPART should continue to monitor actual performance in this area. There may also be potential benefits of retaining the demand volatility adjustment mechanism as a means of customer-risk mitigation.

8.5.4. Reasonableness of bulk water sales forecast

We are broadly satisfied that the assumed bulk water sales forecast presented by Hunter Water represents a reasonable estimate for the next pricing period.

Two forecast methodologies are used. Firstly, a forecast of private operators in the region is used to forecast wholesale water supply. This is assumed to grow by approximately 6.3 per cent annually. Secondly, an interregional model is used to estimate water provision to Central Coast. This model has estimated zero net transfers over the period as the model assumes average climatic conditions. Assuming average climatic conditions is appropriate given the five-year forecasting pricing period.

Given the relatively low significance of this measure, which is underlined by the minimal impact that bulk water sales has on aggregate water demand, the two forecasting approaches are considered acceptable.

Appendix A: Capital projects detailed review

Capital Project 1 – Chichester Trunk Gravity Main (CTGM) Replacement

Table 73 Summary of CTGM Replacement

Service	Water
Capital project summary driver/s	Existing Mandatory Standards 100%
Project stage	Duckenfield to Tarro Section

Table 74 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR (W146)	0	164	8,591	25,813	6,071	0	0	0	0	0
2016 determination	0	930	1,390	8,060	16,540	0	0	0	0	0

A.1.1. Project description

This project consists of the replacement of an 8km section of the Chichester Trunk Gravity Main, from Duckenfield to Tarro. The existing main is a 900mm diameter above ground pipe, constructed in 1923, which has had a series of recent failures.

The proposed replacement pipeline will be a 1200mm diameter below-ground pipeline, constructed at a current forecast cost (June 2019) of $45.2 million. Construction of the new pipeline has commenced and is planned to be completed over the 2020 financial year. The September 2019 AIR has provided an allowance of $40.64 million for the works.

A.1.2. Documentation provided

A range of documents was provided and reviewed for this project, comprising business cases, option development and assessment, economic appraisal and capital expenditure summary information. In addition, this project was discussed with Hunter Water at a site visit in August 2019.

A.1.3. Project need

The Chichester Trunk Gravity Main (CTGM) is an 85km pipeline conveying water from Chichester Dam to water supply systems in the Lower Hunter, as well as townships and small supply systems adjacent to the pipeline route. The CTGM currently supplies approximately 38% of the average demand within the Hunter Water system. The CTGM consists of a series of sections, including tunnels, below-ground and above-ground pipeline.

The section of the CTGM proposed for replacement by Hunter Water is 8km in length and was constructed in 1923, principally as an above-ground pipeline. An asset management report on the CTGM undertaken in 2015 highlighted the risk of failure arising from the pipeline condition. The potential impact from such a failure would be a possible prolonged loss of supply to a large portion of Hunter Water's water supply customers, as well as potentially exposing Hunter Water staff to safety risks when undertaking planned or reactive repairs. The likelihood and consequence of the resulting risk is sufficient to trigger an extreme rating under Hunter Water's Enterprise Risk Management (ERM) framework.

A review of Hunter Water's 2016 Pricing Submission supported expenditure of $26.9 million ($2015/16) for a project with a similar scope to that now proposed to be completed in FY2020. Subsequent failures in 2017 have emphasised the poor condition of the pipeline, with the resulting loss of supply to a significant cohort of customers confirming the extent of the potential supply risks should such a failure occur at a period of peak demand. The EPA has also expressed concern over the risk of environmental impact arising from uncontrolled discharges to the environment from a pipe failure in this section.

A.1.4. Options investigated

A business case completed in September 2016 analysed four options, including a sub-option to increase the size of a replacement pipe from 900mm to 1200mm diameter, the extra capacity from which would enable a major upgrade to water treatment capacity to be delayed. The analysis determined the replaced and upsized pipeline as the preferred option, on the basis that it had the lowest lifecycle (present value) cost and was the only option to address high risks in both the short and longer-term.

The business case supported proceeding to detail design and procurement, at a total capital cost estimate of $29.7 million ($2016-17). Following receipt of tenders, all options were reviewed as part of a Gateway 4 business case in July 2018. A summary of the options analysed as part of the business case review is shown in Table 75 below.

Table 75 Options analysis for CTGM Duckenfield to Tarro (business case review)

Option	Cost ($ million, $2017/18)		
	Project Capex	Project Opex	Present value
Option 1 – do nothing (existing operational and maintenance practices)	$6.363	$43.576	$24.733
Option 2 – optimised operational and maintenance practices	$46.437	$6.938	$44.507
Option 3 – asset rehabilitation and modified operational and maintenance strategy	$62.788	$11.366	$44.940
Option 4 – asset replacement and modified operational and maintenance strategy	$43.536	$1.929	$44.484

Source: Capital Project Summary (CTGM – Duckenfield to Tarro), Hunter Water 2019

Although it has the lowest lifecycle cost, Option 1 was assessed as having an unacceptable business risk, associated with:

- significant loss of water supply during peak demand
- WHS risks arising from continued operation and maintenance

- ongoing environmental risks associated with lead joints
- the potential for catastrophic failure arising from a major flood displacing large sections of the above-ground pipeline.

Of the remaining options, Option 4 was selected as preferred given that it has a comparable (marginally lower present value) cost and is the only option to significantly address each element of business risk.

A.1.5. Cost estimate

The business case total capital cost estimate for the project is $43.536 million. Hunter Water has made an allowance of $40.64 million in the September 2019 AIR. The elements of the capital cost estimate are summarised in Table 76.

Table 76 Cost estimate comparison

Component	Value ($ million)
Design & Development Costs	1.648
Supply & Construct Costs	38.412
Project Management Costs	1.831
Land Matters	0.145
Sub-total	42.036
Risk Allowance	1.500
Total	43.536

Source: CTGM Duckenfield to Tarro Preliminary Business Case – Economic Appraisal Options 1-4, Hunter Water 2019

A.1.6. Procurement

Hunter Water has separated the detailed design and construction tenders for the procurement of the pipeline replacement. Following completion of detailed design, the tender for construction was awarded following receipt and assessment of three conforming tenders.

The approach to procurement is appropriate for works of this nature. The project is being delivered in a timely manner, with completion dates aligning with those set out at the time of the last Price Determination.

A.1.7. Assessment of efficiency

This project was supported ahead of the current regulatory period and an appropriate allowance made at that time. A review of the documentation provided by Hunter Water relating to the condition of the CTGM – and the current service and safety risks – confirms that the issues remain relevant and there remains a strong case for remedial action.

In the course of progressing its investigations (and following initial business case approval), Hunter Water has identified and reviewed four reasonable options to address the risk associated with this section of the CTGM. The breadth of the options considered a reasonable range of feasible maintenance and renewals approaches, each of which expose the organisation to different levels of

risk. The option evaluation also included consideration of system-wide issues associated with each option.

Construction tender prices were significantly higher than previous estimates, with capital cost estimates rising from $29.7 million ($2016-17) to $43.536 million ($2018/19). The drivers of the cost increase relate to the contractors detailed considerations of ground conditions, access, material costs and related issues.

Upon receipt of tenders for construction, Hunter Water undertook a business case review to revisit the assessment of the preferred option. Notwithstanding the increase in estimated capital costs over time, this confirmed that the preferred option of replacing the CTGM section had a comparable (marginally lower) lifecycle present value cost to the alternative of continuing to operate and maintain the existing asset. It also established that it was the only option to substantially mitigate the range of significant risks identified as triggers for the project.

As part of the business case review, Hunter Water also revisited whether the proposal to increase the diameter as part of the preferred option remained efficient. Replacing the 8km section with a pipeline diameter of 1200mm (rather than the existing 900mm) provides greater capacity, which will defer a future upgrade to the Grahamstown Water Treatment Plant. Assessing the preferred option in the context of system-wide operational considerations confirmed the economic merit of upsizing the pipeline section.

More broadly, the project as proposed is considered efficient on the basis that:

- the significant consequences arising from possible failure of the Duckenfield to Tarro section of the CTGM – combined with the increasing likelihood, given the age of the asset – justify remedial action to mitigate the risks identified
- the breadth of options identified by Hunter Water are valid, comprehensive and appropriate
- the processes adopted to develop and investigate the project concepts, analyse and assess options, and inform decision-making, are appropriate
- the approach to procurement, delivery and timing are consistent with good practice.

The actual expenditure in the current regulatory period and forecast expenditure for the forecast regulatory period, as set out in the September AIR, is therefore considered efficient.

A.1.8. Recommended expenditure

It is recommended that the funds proposed by Hunter Water for this project be supported by IPART.

Table 77 Aither's' recommended Capex for the upcoming determination period

Source	Capex Budget (000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission	0	164	8,591	25,813	6,071	0	0	0	0	0
Aither's adjustment of submission	-	-	-	-	-	-	-	-	-	-
Aither recommendation	0	164	8,591	25,813	6,071	0	0	0	0	0

Capital Project 2 – Dungog Water Treatment Plant Upgrades

Table 78 Summary of Dungog Water Treatment Plant Upgrade

Service	Water
Capital project summary driver/s	Asset & Service Reliability 30%, Existing Mandatory Standards 70%
Project stage	In construction

Table 79 Hunter Water Capex - Actuals (2016-19) and proposed (2019-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR (W172)	0	11	798	7,139	3,593	0	0	0	0	0

A.2.1. Project description

The Dungog Water Treatment Plant (WTP) upgrade is comprised of three separate projects being delivered under a combined program of works. The three components are briefly described as follows:

- **Filter to waste capability:** this involves the installation of a system to extract filtered waste from each of the plant's filters, to better control filtered water quality in the event of a failure. This will achieve a reduction in pathogen health risks to levels consistent with the Australian Drinking Water Guidelines, at a forecast capital cost $2.4 million ($2016/17).
- **Chemical containment:** upgrade and replacement of various components of the chemical storage and dosing system to address EPA mandated requirements, improve the reliability of the dosing system and reduce water quality failure events, at a forecast capital cost of $6.1 million ($2016/17).
- **Switchboard replacement:** to replace ageing electrical equipment that does not comply with current regulations, at a forecast capital cost of $3.0 million ($2017/18).

A.2.2. Documentation

Documents provided and reviewed relating to this project included project business cases, investigation and option assessment reports, cost estimates and related expenditure proposals and reviews. In addition, this project was discussed at a site visit at Hunter Water's office in August 2019.

A.2.3. Project need

Water treated at and supplied from the Dungog WTP meets 40 per cent of total demand across Hunter Water's network. It treats water sourced from a catchment with significant water quality challenges, which are caused by land use in the area, steep topography, and the fact that the "run of river" storage must at times harvest water following heavy rainfall that results in high turbidity. These catchment attributes mean that the water quality entering the Dungog WTP can be variable and sometimes more difficult to treat.

Hunter Water identified the risk of failing to meet water quality requirements when working in consultation with NSW Health in 2014. This led to the addition of the Filter to Waste Capability project to the 2016 Pricing Submission, with an allowance of $1.64 million ($2015/16) made for these works in the 2016 Determination. Following further investigation, testing and options review, the estimated cost of works to adequately meet the requirements of the Australian Drinking Water Guidelines has subsequently increased to $2.4 million.

In the course of asset management and improvement planning for Dungog WTP, unacceptable health, safety and environmental risks arising from the chemical facilities were also identified. This risk has manifested as a failure of the chemical containment systems, resulting in discharges to the environment and subsequent prosecution by, and fines issued from, the EPA. Concept development for remediation works to address EPA's ongoing concerns also established the opportunity to improve system performance, which would enhance water quality treatment.

Investigations during concept development of the projects to address both the filter to waste capability and chemical containment also assessed the need to provide associated switchgear and wiring. These reviews, in combination with asset condition surveys, determined that the existing switchboard did not meet current standards. The age of the wiring and switches was identified as leading to an increasing lack of reliability and, in some cases, excessive maintenance. The state of the switchboard was assessed as contributing to an elevated risk for Hunter Water that required remedial action.

A.2.4. Options investigated

Studies to investigate and assess options for each of the three separate project components were undertaken. Summaries of the options identified and considered in each case are provided in Table 80, Table 81 and Table 83 respectively. It is noted that a 'do nothing' (or business as usual) option – with no associated expenditure – was also included for each project.

Table 80 Options analysis for filter to waste capability project

Option	Cost ($ million, $2016/17)		
	Capex	Opex (20-year total)	Present value
Option 1 – Combined filter to waste	$1.8	$0.05	$1.5
Option 2 – Individual filter to waste	$2.4	$0.1	$2.1
Option 3 – Add solids separation process	$39	$34	$43

Note: Present values are based on an analysis period of 25 years and a discount rate of 7 per cent.

The preferred option for this project was identified as Option 2, which was the lowest cost option to address both water quality and environmental non-compliance issues. Although Option 1 has a lower cost (and was the basis for the works proposed in the 2016 Pricing Submission), further investigation established that this approach would not have fully addressed the treatment deficiencies. Of the remaining options that would effectively address the problem, Option 2 does so at a much lower cost than Option 3 and was therefore preferred.

Table 81 Options analysis for chemical containment upgrade

Option	Cost ($ million, $2016/17)		
	Capex	Opex (20-year total)	Present value
Option 1 – Replace but retain existing configuration	$4.40	-$0.40	$3.64
Option 2 – Upgrade chemical systems	$6.00	-$0.29	$5.16
Option 3 – Upgrade chemical systems with additional water quality improvements	$6.13	-$0.59	$5.18

Note: Present values are based on an analysis period of 25 years and a discount rate of 7 per cent.

Option 1 was not preferred because it was deemed to have residual safety and environmental risk issues, with no water quality performance improvements. Of the remaining options, Option 3 was preferred on the basis that it not only provided comprehensive compliance with environmental and OH&S requirements, but also opportunistically improved water quality treatment performance. The additional benefits arising from the water quality improvements of Option 3 were considered to deliver greater value given that the present value of total costs was only marginally higher than Option 2.

Table 82 Options analysis for switchboard replacement

Option	Original business case estimate ($ million, $2017/18)
Option 1 – replace switchboard in new switchroom	$2.94
Option 2 – refurbish existing switchroom	N/A
Option 3 – decommission site	N/A

Of the options identified for the upgrade of the switchboard, only replacement (Option 1) was considered a feasible means of meeting all current Australian Standards. Given the critical importance of the Dungog WTP to Hunter Water's ability to maintain water supply, decommissioning the plant (Option 3) is not feasible, while the option to refurbish the existing switchroom (Option 2) is not practically possible whilst keeping the plant in operation. Similarly, a 'do nothing' option would undermine the ability to deliver the other upgrades at the WTP while meeting relevant Australian Standards. This would further increase Hunter Water's risk in relation to the plant, adding contractor legal exposure to the underlying performance risks.

A.2.5. Cost estimate

An allowance of $12.348 million was made in the AIR at the time of preparation of Hunter Water's Pricing Submission. A revised capital works budget of $13.785 million was approved in February 2019, as summarised in Table 83.

Table 83 Cost estimate comparison

Component	Value ($ million)
Design	0.461
Preliminary Works	0.655
Contract Amount	10.017

Component	Value ($ million)
Project Management	1.267
Sub-total	
Contingency	1.375
Total	13.785

Source: Table 4 Capital funding Request Dungog WTP upgrade, 25 February 2019

An allowance in the September AIR of $11.540 million has been made in the 2016-2020 determination period.

A.2.6. Procurement

Following a major review of delivery options (including detailed supply requirements and a market assessment) a decision was made to complete all three projects at the same time under the management of a single contractor.

Works are being undertaken as a major design construct contract, which is consistent with industry practice.

A.2.7. Assessment of efficiency

The Dungog WTP is of critical importance in ensuring Hunter Water can reliably supply water to meet demand across its network. The separate projects proposed under an upgrade to the Dungog WTP respond directly to water quality, environmental, and health and safety concerns:

- the filter to waste capability addresses the Department of Health's clear concerns about water quality performance, as well as EPA concerns about intermittent waste discharges, which were sufficient drivers to previously include the works as part of the 2016 Pricing Submission
- chemical containment upgrade works are required to address a direction from the EPA (including in response to prosecution and fines)
- the electrical switchboard replacement is required to enable the installation of switchgear associated with the other components of the upgrade, both to address concerns about existing asset condition and to mitigate further risk.

Given the ongoing concern about water quality performance, as well as the focus of the EPA on adequate chemical containment, the upgrade works proposed are justifiable. The corrective action to replace the existing switchboard at the same time is necessary to facilitate the filter to waste and chemical containment works.

Similarly, the preferred option for each component of the Dungog WTP upgrade works is considered appropriate:

- the option to deliver individual filter to waste works is identified as the lowest cost alternative to addressing both water quality and environmental non-compliance issues
- the approach to the chemical systems upgrade achieves comprehensive compliance with environmental and health and safety requirements, but also additional benefits of improved water quality performance that are not delivered by the alternative, at only marginally higher cost

- simultaneously replacing the existing switchboard at the same time is necessary to enable the other upgrade works, with the option identified the only feasible means of achieving this whilst ensuring the Dungog WTP can also continue to operate.

The procurement approach to deliver each of these projects under a single contract ensures that risks associated with their integration, interfaces, co-ordination and health and safety are all aligned under a single entity, who is then best able to manage these risks on a complex operational site. There are strong technical synergies between the works – with an emphasis on pipework, control and power systems – that should also yield project management and delivery efficiencies (relative to the works being undertaken separately by different contractors).

Actual and forecast costs set out in the September AIR are within the final estimated costs for the projects, based on contracted amounts and excluding contingencies.

The actual expenditure in the current regulatory period and forecast expenditure for the forecast regulatory period, as set out in the September AIR, is therefore considered efficient.

A.2.8. Recommended expenditure

It is recommended that the funds proposed by Hunter Water for this project be supported by IPART.

Table 84 Aither's recommended Capex for the upcoming determination period

Source	Capex Budget (000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission	0	11	798	7,139	3,593	0	0	0	0	0
Aither's adjustment of submission	-	-	-	-	-	-	-	-	-	-
Aither recommendation	0	11	798	7,139	3,593	0	0	0	0	0

Capital Project 3 – Water Network Capacity Upgrades

Table 85 Summary of Water Network Capacity Upgrades

Service	Water
Capital project summary driver/s	Growth 100%
Project stage	Ongoing

Table 86 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Existing Network Capacity Upgrades	0	0	0	200	1,299	3,894	7,673	6,998	4,445	2,846
Capacity for Greenfield Growth			1090	126	2,682	2,092	2,092	2,937	3,757	3,757

Source: Hunter Water

A.3.1. Project description

Hunter Water has several programs associated with managing the impacts of growth across their systems. This review examines two ongoing programs that are in place to cater for increasing demand across the water network:

- Incremental upgrades to existing network capacity to address new demand within areas serviced by an established network (for example, arising from infill development and densification). Proposed expenditure in the forecast period is $25.9 million, compared with $1.5 million in the current regulatory period.
- Capacity for Greenfield growth, which involves extending the existing network into new areas to service new urban subdivision and development. Proposed expenditure in the forecast period related to developer-driven growth is $14.6 million, compared with $3.9 million in the current regulatory period.

In each case, the program provides for the construction of new or upgraded water transfer mains, pump stations and associated facilities.

A.3.2. Documentation provided

Documents provided and reviewed relating to this project primarily include responses provided by Hunter Water, as well as the related expenditure proposal documents and reviews. In addition, this project was discussed at a site visit at Hunter Water's office in October 2019.

A.3.3. Project need

During the current regulatory period an average of 3,280 additional dwellings per year have been connected to Hunter Water's water supply network. This trend is forecast to continue, albeit at a slightly reduced rate. Customer connections in the region are forecast to grow by approximately 1% per year over the forecast regulatory period.

Slightly more than half (55 per cent) of new connections in the current period were associated with Greenfield development (new sub-divisions beyond and adjacent to existing service areas). Reticulation in Greenfield developments is mostly funded, built and gifted to Hunter Water by the developers. To ensure that this reticulation is connected to existing water networks, Hunter Water funds and constructs transfer mains and pump stations to service – and align with the timing of – new development.

The remainder of growth (45 per cent in the current period) is associated with development occurring in established service areas with existing infrastructure. The system is progressively upgraded to cater for new customers in these areas, as well as to ensure capacity to manage additional demand as the network expands to service new development. This comprises upgrade or duplication of existing mains, pump stations and associated facilities, both to service new customers but also to maintain the pressure and flow requirements for all customers required under Hunter Water's operating licence.

Other programs that contribute to maintaining or increasing network capacity include:

- opportunistically increasing capacity when replacing pipes, pumps and associated assets due to their condition, performance or planned renewal
- provision of step-change capacity in the network, such as major transfer mains or pump stations.

While works such as these contribute to additional capacity and appropriate costs are allocated under the growth driver, the expenditure also aligns with longer-term growth needs and planning beyond a five-year period. These components are not part of the funds covered by this project. The focus of this project – Project 8 Water Network Capacity Upgrade is on the on-going programme that is triggered by the need to meet the incremental development growth in the forecast period.

A.3.4. Options investigated

Option identification and evaluation occurs as part of the planning stages for specific works. Master plans are prepared based on long-term forecasts of population growth and urban development, but the timing, scale and sequence of works must be modified over time to respond to the actual rate and location of development that occurs, in order to ensure that connection requirements are met and service standards maintained.

Hunter Water's approach is consistent with industry practice for servicing new development.

A.3.5. Cost estimate

Hunter Water has made an allowance in the forecast period of $25.9 million for existing network capacity upgrades and $14.6 million for capacity for Greenfield growth. These estimates include all design, tendering and construction costs for the works required and are based on recent past cost outcomes.

A.3.6. Procurement

Procurement involves tendering detail design and construction on the open market for each separable project.

Since 2017, works within a given Greenfield development have been managed by the first developer to commence works within that subdivision. Where works are driven by the need to connect reticulation to Hunter Water's network, this developer builds assets to Hunter Water's specifications and is reimbursed for the cost. Hunter Water manages tendering processes at arm's length from the developer, which ensures that the risk of timely delivery rests with the developer. This approach is widely adopted in the industry and is considered appropriate and the industry standard for works of this nature.

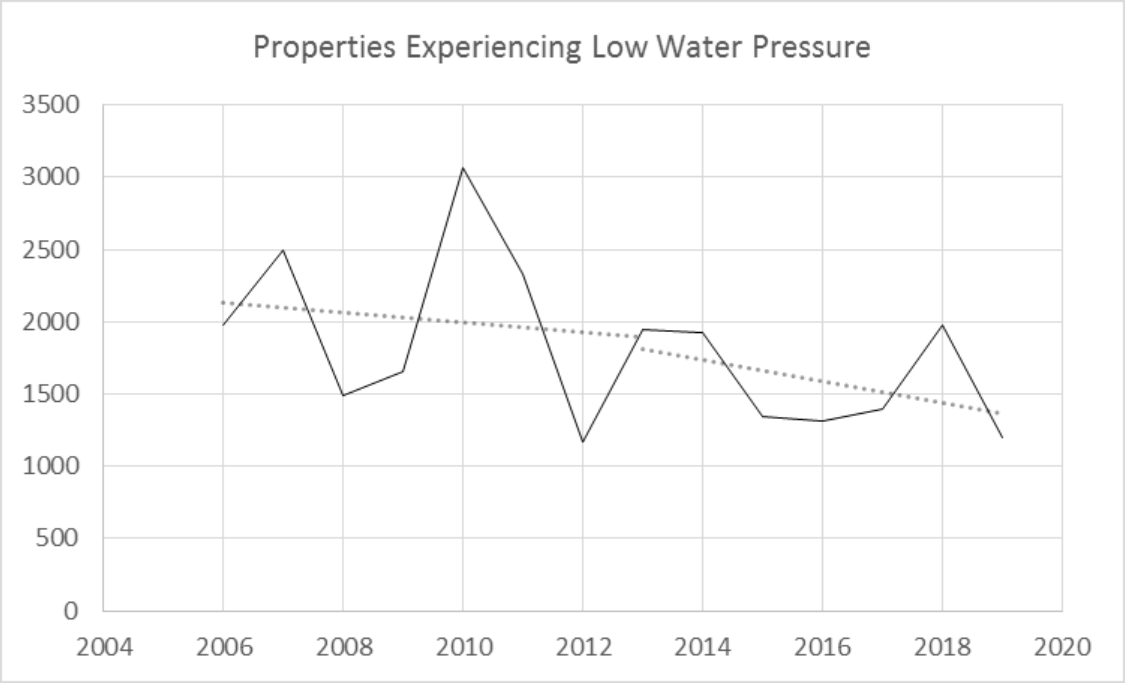
A.3.7. Assessment of efficiency

A best-practice approach to managing water network capacity upgrades is incremental by nature and aims to deliver additional capacity with optimal timing. This means ensuring sufficient capacity to ensure that customer service commitments are not compromised, while avoiding premature investment that is unnecessary or could be deferred. Aligning capacity upgrade expenditure with growth should reflect these objectives and is the appropriate means of achieving this balance,

Hunter Water's approach to procuring works within Greenfield development under developer management means that the consequences of either premature or delayed investment rest with the developer. This is consistent with the approach in the industry and aligns with best practice. Similarly, other aspects of procurement for these programs are consistent with industry standard and considered efficient.

Based on discussions with Hunter Water, Aither's understanding is that the approach to planning and scoping capacity upgrade projects aligns with industry practice. Hunter Water have developed calibrated hydraulic models that are used to develop master plans as a basis for the expansion and upgrade of the network. As urban development progresses, or enquiries for major new connections emerge, Hunter Water is then able to modify the models and plans, forecast any low-pressure service issues, and scope individual projects to address requirements in line with development construction.

One measure of the effectiveness of Hunter Water's planning is the number of properties experiencing low water pressure over time. Figure 60 shows that this has been decreasing, which – although influenced by other factors such as climate and demand reduction programs – provides some evidence that Hunter Water's approach is reasonable.



Source: Hunter Water

Notes: (1) Graph shows the modelled number of properties experiencing less than 20 metres of pressure for a sustained 30-minute period in a year under normal operating conditions; (2) Hunter Water's Operating Licence requirement is for no more than 4800 properties to experience Low Water Pressure

Figure 60 Number of properties experiencing low water pressure

Expenditure on both capacity upgrade programs was surprisingly low in the current period. Actual expenditure on existing network capacity upgrades was less than 10 per cent of that forecast for the period, while Greenfield investment was also less than expected. Hunter Water has provided evidence that there were two significant factors contributing to this reduction:

- a higher proportion of growth than planned eventuating in existing service areas
- customer behaviour that is significantly different to the pre-2016 design standards for peak flows (which determine assessments of the need for capacity upgrades), such that additional demand from growth is being accommodated within the spare capacity arising from these outdated standards.

Hunter Water have stated that there is no "catch-up" provision in the forecast period and customer needs for pressure and flow are being met. **It is therefore considered that expenditure in the current period has been efficient.**

Growth of approximately 3,500 properties per annum is estimated for the forecast regulatory period. Based on the current trend of 45 per cent of development occurring within existing service areas, this rate of growth implies an additional 7,900 properties in these areas and a further 9,600 properties in Greenfield development in the five-year period. The efficiency of each sub-program is considered below.

Capacity for Greenfield growth

Hunter Water took some time to brief Aither regarding some of the details of new development forecasting that drives capacity for Greenfield growth (or the Developer Delivered Works Program). The assumed growth in these areas is based upon "pared down" developer estimates. This is assumed to mean that Hunter Water has compared historical developer forecasts with actual development rates and applied these to the current developer estimates to provide a basis for their

forecasts. Confidence in the short-term (up to five years) forecasts is driven by the fact that much of the developments are already in progress. These estimates are also reconciled with urban planning growth forecasts including adopting revisions based on the proportion of development occurring in Greenfield and infill areas.

The unit cost per property for providing water services in Greenfield areas averages $1,500 per property. The actual unit cost per property will vary with the particulars of location and pressure levels relative to water source and size and distribution of downstream demand, However as this is generally comparable with costs in other locations and without having the opportunity to investigate the veracity of the assumptions underpinning the location and size of forecast growth, the planning processes appear appropriate and unit servicing costs reasonable. Overall the works and expenditure forecast for the period seem reasonable.

Existing Network Capacity Program

Hunter Water's proposed expenditure for the existing network capacity program for the forecast regulatory period is similar to that forecast in the 2016 Determination. However, actual expenditure during the current period was substantially less than forecast, primarily because of the spare capacity that existed in the network.

The spare capacity (and associated reduction in expenditure) is attributed by Hunter Water to a reduction in peak day demand in the system, which they state has been about 1 per cent per year on average since 2001. This enabled the existing system to manage demand, irrespective of an increase in the number of customers, with significantly reduced expenditure in the first four years of the period.

While customer connections continue to grow at around 1 per cent per year, demand management efforts mean that total demand is generally remaining static. While the relationship between peak demand days and average demand is not linear, actual peak demand can be expected to increase at less than the growth rate. The need to upgrade the system also depends on the location and concentration of growth. Nevertheless, if peak demand has continued to decrease over time (indicatively 17 per cent since 2001), a resumption of expenditure at levels previously based on outdated design standards appears inconsistent with the outcome in the current period, when the system managed growth of four to five per cent over the period.

There are three specific projects that comprise an estimated cost of $9 million of the $25.9 million existing network capacity program. The remaining $16.9 million is an allocation for general increases in system capacity across the network. If this allocation is to serve the 7,900 dwellings expected across the existing service area, this equates to $2,200 per property. Greenfield projects, on the other hand, are forecast to service an additional 9,600 properties at $1,500 per property. Hunter Water noted, however, that growth in dwellings in existing service areas should be able to be accommodated at a lower marginal (per property) cost than in Greenfield development. However, this is partially offset by the need to upgrade parts of the existing network to deliver flows to greenfield development areas.

Without a detailed knowledge of the planned upgrades in the existing area, there is insufficient evidence to support the level of expenditure proposed. Given spare capacity in the existing system should still exist and there is no basis for a significantly higher unit cost (relative to Greenfield development), the allocation should be able to be reduced without impacting the prevalence of low-pressure issues. In addition, recent experience of changing customer behaviour suggests a potential opportunity for further savings in the existing network capacity program.

Although most aspects of this program are appropriate and considered efficient, the allocation for general capacity increase within the existing network appears high and is deemed inefficient.

Based on a unit cost per property that is more appropriate than that adopted, it is recommended that the allocation for this component of the program be reduced by 40 per cent, or $6.8 million (and the total program reduced by that amount to $33.7 million).

A.3.8. Recommended expenditure

It is recommended that the funds proposed by Hunter Water for this project be adjusted by $6.8 million.

Table 87 Aither's' recommended Capex for the upcoming determination period

Source	Capex Budget ($000's, 2019-20)							
	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission	1090	326	3,981	5,986	9,765	9,935	8,202	6,603
Aither's adjustment of submission	-	-	-	(1,360)	(1,360)	(1,360)	(1,360)	(1,360)
Aither recommendation	1090	326	3,981	4,626	8,405	8,575	6,842	5,243

Capital Project 4 – Minor Wastewater Asset Renewals Program

Table 88 Summary of Minor Wastewater Asset Renewals Program

Service	Wastewater
Capital project summary driver/s	Mandatory Standards / Reliability
Project stage	Ongoing

Table 89 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR	12,452	11,924	1,593	1,877	2,735	17,195	19,256	21,870	25,287	27,029

Note: Projects include S128, S217, S224, S222, S223

A.4.1. Project description

This program comprises renewal expenditure on minor assets in the wastewater capital program. This includes provision for condition assessment and renewals of the following components of the system:

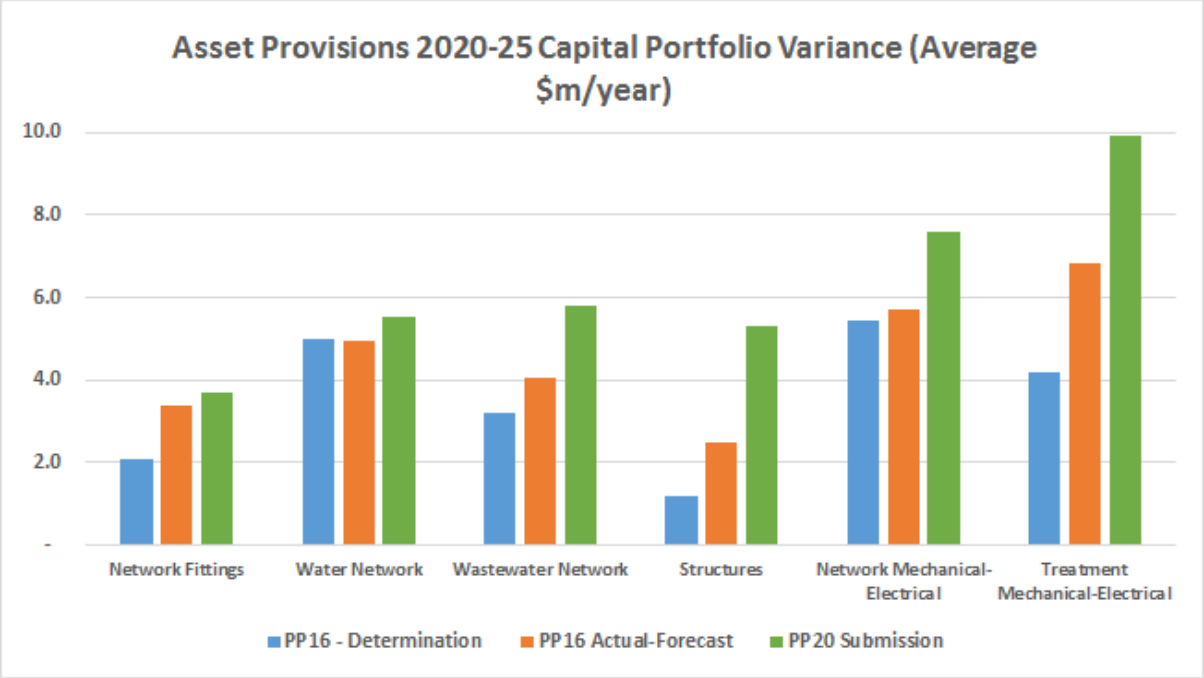
- civil assets, including planned renewals of non-critical sewer mains, reactive renewals of mains, and planned and reactive renewals of wastewater structures and fittings
- mechanical and electrical treatment assets
- mechanical and electrical network assets.

A.4.2. Documentation provided

Documents provided and reviewed relating to this project included file notes, program data, and related expenditure proposals and reviews. In addition, this project was discussed at a site visit at Hunter Water's office in August 2019.

A.4.3. Project need

Asset renewals are essential ongoing programs that support of delivery of wastewater services within the existing network. Hunter Water has proposed major increases across all its minor asset renewal programs, as shown in Figure 61.



Source: Hunter Water

Figure 61 Past and proposed expenditure for minor renewal program components

Renewal decisions are made during the planning period, based on the frequency of failure events for non-critical assets, or the timely renewal of critical assets based on condition assessments. This involves developing forecasts of future performance based on assessment of current condition and performance.

Civil network program

The principle components of this program are:

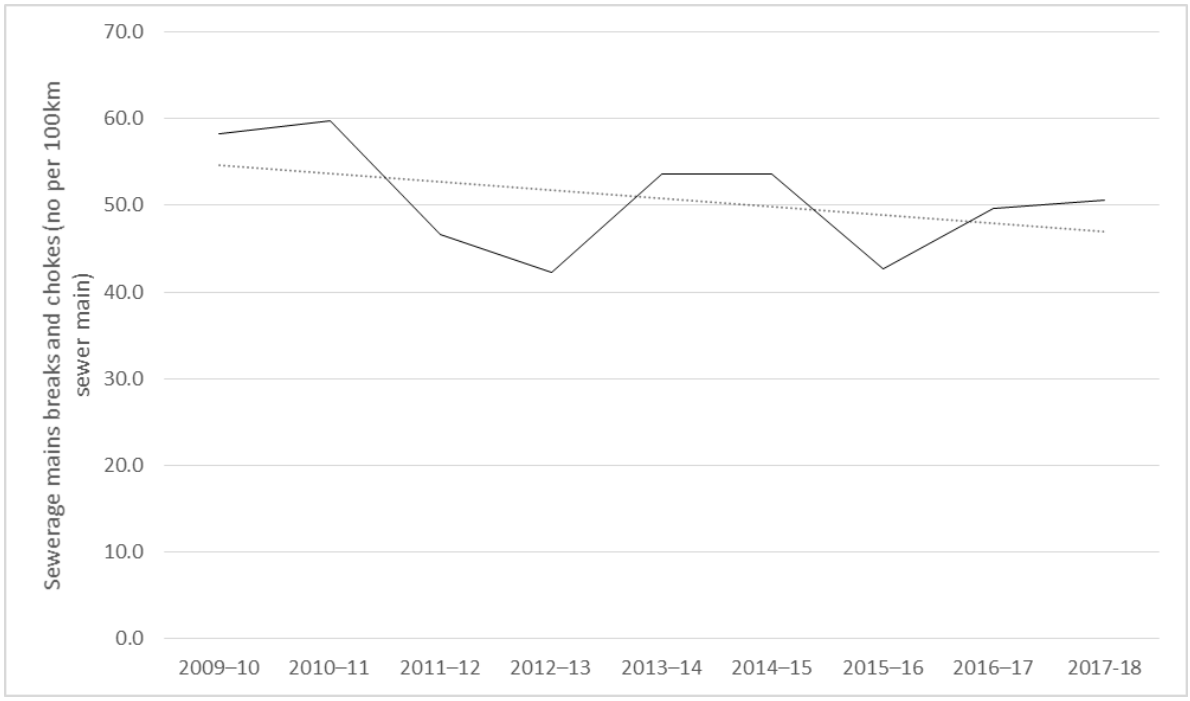
1. the wastewater network asset program, consisting of both critical and non-critical mains renewal and associated activities with total forecast expenditure of $29.007 million (a 145 per cent increase on actual expenditure in the current period)

2. planned and reactive renewals of fittings forecast at $11.034 million (available data does not differentiate between the water and sewer program, but there is a small 5 per cent increase from the current period)

3. wastewater structures, with proposed expenditure of approximately $12.556 million (available data does not differentiate between the water and sewer program for past programs but there is an increase of more than 200 per cent from actual expenditure for the total expenditure in the current period).

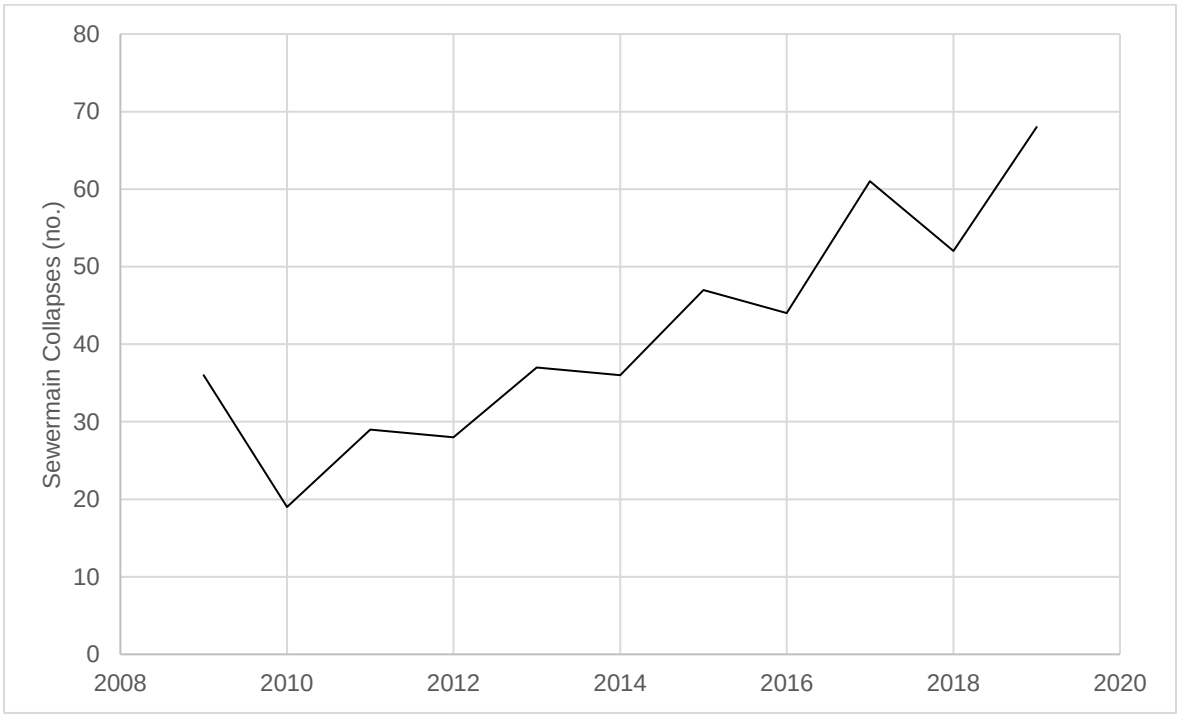
Forecasts for each element of the first of these programs can be related to the performance and condition of the network. Figure 62 shows improving performance (a decreasing rate over time) for sewer breakages and chokes. However, this is likely to be more of a reflection of the effectiveness of maintenance programs. A more critical reflection of asset condition is the trend in collapses and condition assessment (with sewer segments classified as condition 4 or 5 at risk of failure and requiring immediate renewal). Figure 63 shows the upward trend in actual and forecast sewer main failures, while Figure 64 illustrates the increasing number of sewer segments being assessed as condition 4 and 5 in recent years which will drive renewal requirements in the PP2020 period.

Collectively, this data illustrates the general trend in declining performance or condition that Hunter Water is proposing to address with an increased level of expenditure.



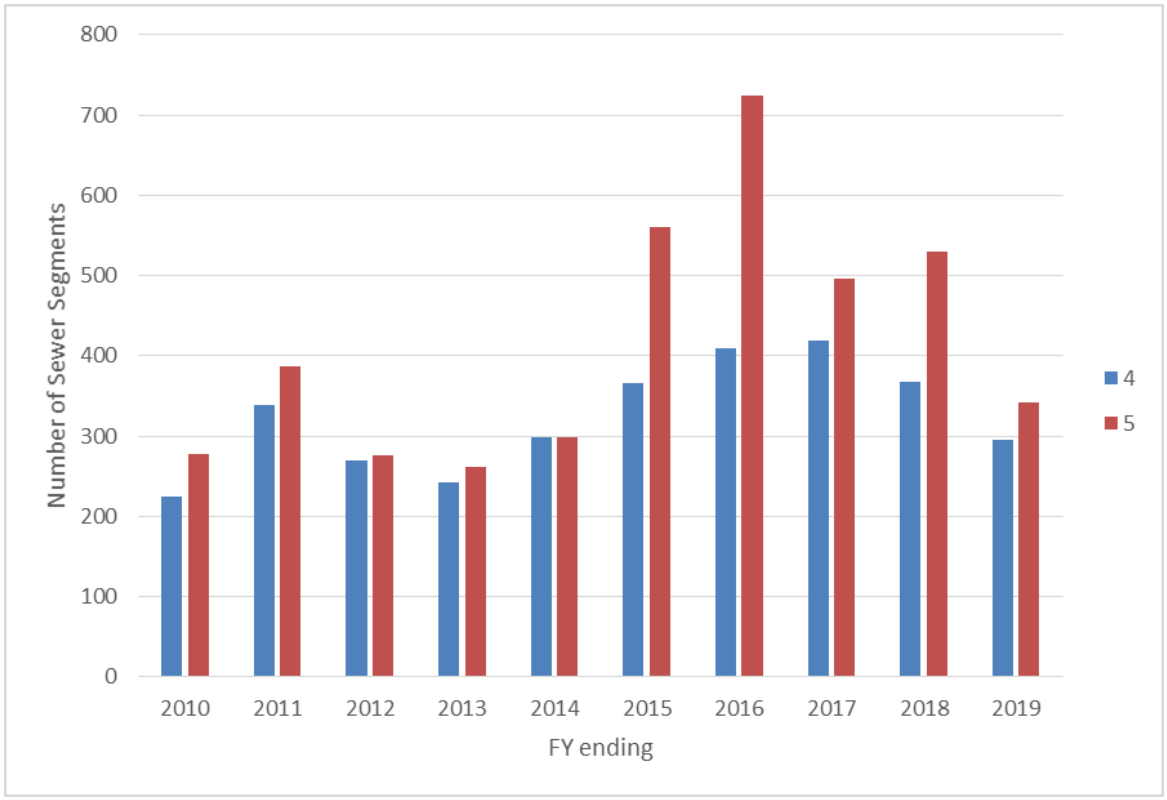
Source: Urban Water National Performance Report, Bureau of Meteorology

Figure 62 Sewer breaks and chokes over time



Source: Hunter Water

Figure 63 Sewer main collapses



Source: Hunter Water

Figure 64 Number of sewer segments assessed with a condition rating of 4 or 5

Mechanical and electrical treatment and network assets

Approaches to forecasting performance and planned expenditure are similar for each group of assets in this program and involve consideration of past equipment loads and actual renewal expenditure, forecasts of future service loads and anticipated performance of recently introduced equipment.

Actual expenditures are based on the need to replace ageing equipment. The decision to replace is made at the time of inspection during regular maintenance or condition assessment or at the time of breakdown. The replacement decision is undertaken by reviewing likely maintenance / reinstatement costs and the assessed future life of the plant.

Systems employed for decision-making by Hunter Water are generally industry standard approaches for the size of equipment in their asset portfolio. They rely on a mixture of performance measurement (e.g. hot spot sensors for switchboard and vibration analysis for larger rotating equipment) and more subjective assessment of remaining life.

To produce a forecast of future needs Hunter Water generally employs a process involving review of long-term equipment records, analyses past run time records and failure information and uses these to forecast expected time of renewal. Where historical information is not available forecasts are based upon current performance trends (e.g. degradation of UV lamps) and published equipment information. Final forecasts are then developed using an assessment of relative risk.

- the mechanical and electrical network program includes proposed expenditure of $25.625 million for the forecast period,
- the mechanical and electrical treatment program includes proposed expenditure of $32.288 million for the forecast period.

A.4.4. Options investigated

Hunter Water provided business cases with a number of generic options for each program which vary from a low risk option to one based on historical renewals forecasts. For example, the mechanical and electrical treatment renewals program has the following four options costed:

- Option 1 - Do Nothing
- Option 2 - Historical renewals forecast
- Option 3 - Prioritised renewals based on condition assessment
- Option 4 - Full condition assessment

Option three was chosen as the preferred option eliminating all high-risk issues. Option 3 was also a step back from an extreme risk averse Option 4 approach. The assessment process appears based on subjective consideration of risk levels associated with different equipment / assets.

A.4.5. Cost estimate

Cost estimates are based on forecast renewals requirements and schedules of rates from current renewals contracts.

A.4.6. Procurement

Hunter Water has long-term contracts for the civil works in this program, based on a schedule of rates. The competitive procurement process, combined with the long-term contract period that enables improving effectiveness on comparable, repeat works, is an efficient approach and consistent with industry practice. The same approach is also taken for the network aspect of the mechanical and electrical program.

The treatment aspect of the mechanical and electrical program is undertaken under Hunter Water's treatment operations contract. The treatment contractor plays a role in nominating equipment for renewal, but Hunter Water relies on the advice of its own experienced operators as well as other independent reviews to verify renewal decisions.

A.4.7. Assessment of efficiency

Civil network program

The figures presented above provide evidence of performance trends that support the proposed increase in expenditure on mains renewals (relative to the current period). The forecast expenditure is therefore considered efficient.

Ongoing poor performance in relation to sewer collapses also supports consideration the increased provision for wastewater mains renewal in the forecast period. While expenditure in the current period was highest in the earlier years, it has yet to have had an effect in reducing collapses. Given the 45 per cent increase in expenditure proposed for the forecast period is proportionate to the observed increase in failure in the current period, the proposed increase in this item appears efficient.

Wastewater structures are usually a minor program, but investment is necessary to ensure public safety, local integrity of the system and manage inflow and infiltration. The significant increase

proposed for the current period has been discussed in general terms in a combined water and wastewater business case.

Figure 61 shows that actual expenditure on structures was higher than the allowance made in the current period and is proposed to increase substantially again in the forecast period. Discussions with Hunter Water identified some wider concerns relating to inflow and infiltration, but that these were considered manageable. Likewise, ensuring public safety remains a concern, but without reference to specific examples or data.

Actual expenditure was a significant increase on the allowance provided for in the 2016 Determination. Hunter Water has provided a mass of detailed reports on condition assessment of access holes and pumping station civil structures. However, there is no rigorous review that links this information with an overview of risks to the public or the environment for what has become a significant program of works.

So, despite the concerns Hunter Water has in relation to inflow and infiltration, and public safety, insufficient evidence was provided to support a further, substantial increase on expenditure in the forecast period. It is recommended that the proposed expenditure for the component of the program be reduced from a total of $12.7 million to $6.7 million, which still represents an almost 100 per cent increase on expenditure in the current period.

Proposed expenditure for the wastewater structures component of the civil minor wastewater asset renewal program is considered inefficient. It is recommended that the proposed expenditure for the forecast period be reduced by $6 million.

Mechanical and electrical treatment and network assets

The approach to forecasting performance of assets of this nature is common and well-established across the industry. More sophisticated methodologies apply modelling based on data relating to asset age, historical performance and the use of benchmarked approaches. Hunter Water does not have the depth of systems (relative to a larger utility) to support this type of analysis, and its approach considered reasonable for its circumstances.

However, Hunter Water's approach does rely on risk assessment, which – while appropriate – involves a subjective assessment. Given that a strong tendency towards more risk averse outcomes has been observed, this raises the prospect that the proposed expenditure is in part underpinned by an overly risk averse approach.

Hunter Water did not present data that clearly distinguished the wastewater-related expenditure at the equipment level on these programs from the water program. Based on combined water and wastewater programs there appears to be an increase of 27 per cent in the network program and 55 per cent in the treatment program for the forecast period.

A scan of the forecasts for the equipment line items (e.g. pumps, blowers etc.) for the preferred options, compared with historical expenditure, was undertaken. There are some arguments that major increases are necessary in some items to cover relatively recently introduced technologies such as UV equipment, PLCs and diffusers, for example, as a result of the time since their installation. In all, these arguments would justify an increase of approximately 45 per cent for treatment and 20 per cent in network expenditure. However, no clear failure data, trends in performance or statistical analysis of forecast lives of equipment were presented that would assist the assessment of these or other proposed increases.

The adoption of a more reasoned methodology for forecasting than that adopted in the past provides some confidence in the proposed budget. Consideration has been given to the arguments for increases in expenditure but also the role of subjective risk assessment has in these programs. Therefore, based on the assessment of the increased scope for renewals, a reduction of approximately 10 per cent (to be applied across the "traditional" and recently introduced technologies) is recommended in both programs to drive further focus by Hunter Water on efficiency reduction on their expanded program. Given the overall increase in size of the total program this recommended reduction should be manageable without significant risk.

Although the majority of expenditure for the mechanical and electrical component of the minor wastewater asset renewals program is considered efficient, it is recommended that proposed expenditure for the forecast period be reduced by $5.913 million (approximately 10 per cent), comprising:

- a reduction to $29 million from $32.288 million for the *treatment* component (a reduction of $3.229 million)
- a reduction to $23 million from $25.625 million for the network component (a reduction of $2.563 million)

A.4.9. Recommended expenditure

It is recommended that the funds proposed by Hunter Water for this project be supported by IPART following the adjustments proposed above.

Table 90 Aither's' recommended Capex for the upcoming determination period

Source	Capex Budget ($000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission	12,452	11,924	1,593	1,877	2,735	17,195	19,256	21,870	25,287	27,029
Aither's adjustment of submission	0	0	0	0	0	(2,030)	(2,287)	(2,338)	(2,594)	(2,543)
Aither recommendation	12,452	11,924	1,593	1,877	2,735	15,165	16,970	19,532	22,693	24,487

Capital Project 5 - Farley Wastewater Treatment Plant Upgrade Stage 3B

Table 91 Summary of Farley Wastewater Treatment Plant Upgrade Stage 3B

Service	Wastewater
Capital project summary driver/s	Existing mandatory Standards 20%, Growth 60%, Asset and Service Reliability 20%
Project stage	Gateway 3 - Delivery Funding Approved – Concept Design

Table 92 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR (S163)		239	103	561	12,198	41,651	15,375			

A.5.1. Project description

The Stage 3B upgrade to the Farley Wastewater Treatment Plant (WWTP) involves: delivery of additional treatment capacity to improve current environmental performance and cater for growth in the catchment; replace existing ageing equipment to increase plant reliability; and upgrade the biosolids treatment and management processes to meet biosolids stabilisation requirements.

Principle components of the upgrade include:

- construction of a new biological treatment plant using a membrane bioreactor (MBR) process
- conversion of the existing biological reactor on site into an aerobic digester
- provision of dewatering equipment and associated facilities for biosolids management on site.

The upgrade to the Farley WWTP has been the subject of planning for several years and an allowance of $70.6 million was made in the current regulatory period for these works. Further investigations have subsequently uncovered some additional challenges, including the need to upgrade the power supply in the area to accommodate the plant, as well as site contamination and biosolids management issues. As a result, the cost has increased by approximately $13 million.

Aither's assessment of capital expenditure for 2019-20 determined that it was unlikely that Hunter Water would be able to fully invest the $14 million works planned for the Farley WWTP upgrade in the current period, given that the tender process was only due to be completed in January 2020. The assessment considered that $5 million should be deferred to the forecast period.

A.5.2. Documentation provided

Documents provided and reviewed relating to this project included project business cases and investigative reports, correspondence with the EPA, and related expenditure proposals and reviews. In addition, this project was discussed at a site visit at Hunter Water's office in August 2019.

A.5.3. Project need

The Farley WWTP is a key asset servicing a major growth area but is subject to a range of challenges. The plant services approximately 16,000 properties across a catchment that includes the area between Rutherford and Lochinvar, which is one of the most rapidly growing urban development areas in the lower Hunter. Hunter Water forecasts that the growth in flows to the plant will result in Farley WWTP failing to meet its EPA licence conditions by 2022.

The plant currently does not meet Class B requirements for biosolids treatment. More broadly, the current approach to managing biosolids is not compliant with regulations, nor a sustainable environmental or social solution. There are concerns about both the impact of current management practices on the environment, as well as the prevalence of odours.

Environmental concerns also extend to significant groundwater contamination that is arising from some of the assets on the Farley WWTP site. While the principle driver for this project is growth in the catchment, the project need cannot be considered in isolation of the environmental constraints arising from the sensitive environment in which the plant is located, as well as some major issues with existing assets on the site.

Growth

High levels of ongoing development within the catchment are forecast to materially increase flows to the Farley WWTP. Much of the growth anticipated over the next five years is associated with subdivision development that is already occurring, providing a high degree of certainty that the increased flows will eventuate as forecast. The new connections in the catchment are anticipated to increase total flows by approximately 15% by the time the proposed project is complete.

Existing performance and reliability

The performance of the Farley WWTP has been of interest to the EPA, which is symptomatic of the broader concerns about compliance with environmental and regulatory requirements. An environmental assessment of Fishery Creek (to which Farley WWTP discharges treated effluent) does not support any increase in nutrient loads to the creek beyond current limits. This effectively means that Hunter Water must, over time, manage increasing loads to the plant without exceeding the levels of nutrient discharge that are currently permitted.

Even with the proposed upgrade, increasing flows to the plant will eventually mean that the nutrient loads from the treated effluent will exceed the capacity of the receiving waters. This is forecast to occur by 2026, when another upgrade will be required (which is the subject of a separate project that has also been reviewed[87]).

Hunter Water's historical performance has also triggered concerns for the EPA about effluent discharges to sensitive environments, which Aither has confirmed in discussion with the EPA. Effluent quality requirements are yet to be finalised by the EPA, although the EPA has indicated that these will be a matter of reliability of plant performance. Given the nature of the process upgrade proposed, this is unlikely to be a major issue.

Existing asset condition is also contributing to environmental concerns, specifically that several major structures are leaking into, and contaminating, the groundwater in the area. There is also evidence of the presence of toxic PFAS materials, which have been linked to the site.

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87 See project review of 'Other Wastewater Treatment Plant Upgrades', which incorporates the project entitled 'Farley WWTP effluent pumping & pipeline to Hunter River'.

The management of biosolids at the plant does not currently meet the requirements specified by relevant guidelines. The EPA has expressed uncertainty about Hunter Water's business-wide biosolids strategy more broadly, but regardless this is not expected to be in place until 2026 and therefore will not address the immediate issues at the Farley WWTP. It is also possible that aspects of the proposed solution at the site are inconsistent with the broader biosolids strategy.

Assessment of project need

Notwithstanding the potential opportunity to delay the project if demand reduction efforts are successful and material, and the lack of clarity about a business-wide biosolids management strategy, there remain some compelling reasons for the project to proceed on its proposed timeframe:

- any variations from forecast demand that help delay the capacity upgrade is highly uncertain, particularly in comparison to the increase in flows that will arise from development that is already occurring
- the emerging issue of groundwater contamination requires a prompt response
- the issues with biosolids management are immediate and cannot wait for a business-wide strategy
- the EPA has a high degree of interest in, and concern relating to, this plant.

Given these drivers, it is considered appropriate that the project proceed at this time.

A.5.4. Options investigated

Several discharge options were reviewed ahead of the 2016 Pricing Submission. The preferred option to continue to discharge treated effluent to the local waterway was the basis of the submission and supported in the 2016 Price Determination. The options considered were:

- Option 0 – do nothing
- Option 1 – treat and discharge effluent to Fishery Creek, and also to the Hunter River in the future
- Option 2 – agricultural reuse scheme
- Option 3 – transfer excess effluent to the Hunter River

The preferred option (Option 1) was selected on the basis that it had a lower cost, similar risk and similar qualitative assessment to Option 3, while Options 0 and 2, respectively, failed to address the problem and had a much higher cost.

Notwithstanding the subsequent emergence of issues associated with groundwater contamination, power supply and biosolids management, the underlying circumstances relating to the original discharge options had not changed. Nonetheless, Hunter Water undertook a further review of onsite treatment options, including with consideration of the objectives articulated by the EPA as well as the need to align with a future business-wide biosolids strategy.

This led to the identification of two shortlisted technical sub-options (summarised in Table 93) relating to the onsite treatment processes required as part of Option 2.

Table 93 Options analysis

Option	Cost ($ million, $2019/20)		
	Capex	Total Cost	Present Value^
Option 2A – upgrade based on MBR	84.2	121.8	87.3
Option 3A – conventional treatment	89.7	125.0	91.9

^Present value based on an analysis period of 25 years and discount rate of 7%

Source: Farley WWTW Stage 3B Revised business Case Farley WWTW Stage 3B Upgrade – July 2019

Option 2A was selected as preferred. The report documenting the options evaluation[88] and supporting the identification of the preferred solution demonstrates a robust assessment, which is thorough and consistent with the level of review that is appropriate at concept design stage.

A.5.5. Cost estimate

The business case based on this project has a total cost of $84.5 million with a capital cost of $75.2 million within the current period as opposed to the Hunter Water allowance in their submission of $70.5 million and $57 million respectively.

A.5.6. Procurement

The proposed works will be procured through a combined detail design and construction (D&C) contract. This is a standard approach for large treatment facility works and recognised for the delivery of low-cost construction outcomes.

Alternative contracting approaches often include an ongoing operations and maintenance component, which aims to ensure that consideration is also given to the longer-term robustness of the design and construction outcomes. However, given the arrangements of Hunter Water's existing and ongoing treatment operations contract, there are barriers to establishing such a contract in this instance.

The contract will be sourced through the D&C contractor panel, the members of which have expertise and capability relevant to works of this size and nature.

A.5.7. Assessment of efficiency

This project was supported as efficient in the 2016 Price Determination. The scope has increased significantly but based on the issues that have arisen since that time (relating to power supply, biosolids management and groundwater contamination), a review of the project is warranted. As described above, it is clear that – considering the range of issues – there is a need for the plant upgrade to proceed.

The range of options identified are consistent with industry practice and the options have been comprehensively explored. The process to identify, investigate and assess the options appears robust. The preferred solution is the option with the lowest lifecycle cost that is feasibly able to address environmental and regulatory concerns, and is therefore the most efficient.

[88] Farley WWTW Stage 3B Upgrade Options and Constructability Review – Options Review – April 2019

The procurement approach adopted is appropriate and consistent with industry practice for works of this nature. The tenders sought under a design and construct methodology should support identification of the lowest capital cost and achieve efficient delivery.

In reviewing Hunter Water's forecast expenditure for the last year of the current period (2019-20), Aither considered it unlikely that the full extent of the investment proposed for the Farley WWTP upgrade would be feasible in the time available. It was recommended that $5 million of the 2019-20 expenditure proposed for this project by deferred into the forecast period.

The funds allowed for this project by Hunter Water in the 2016-2020 and 2020-2025 periods are considered efficient. It is recommended that $5 million proposed in 2019-20 be deferred to the forecast period.

A.5.8. Recommended expenditure

It is recommended that the funds proposed by Hunter Water for this project be supported by IPART.

Table 94 Aither's' recommended Capex for the upcoming determination period

Source	Capex Budget ($000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission		239	103	561	12,198	41,651	15,375	0	0	0
Aither's adjustment of submission	-	-	-	-	(5,000)	5,000	-	-	-	-
Aither recommendation	0	239	103	561	7,198	46,651	15,375	0	0	0

Capital Project 6 - Wyee Backlog Sewer Program

Table 95 Summary of Wyee Backlog Sewer Program

Service	Wastewater
Capital project summary driver/s	Government Programs 75%, Growth 25%.
Project stage	Under Construction

Table 96 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR (S153)		379	393	2,283	17,087	2,050	[redacted]	107	107	107

A.6.1. Project description

The Wyee Backlog Sewer Program involves provision of wastewater services to 450 properties in the existing Wyee community by December 2020, comprising a new reticulation (sewer) network and pumped wastewater transfer to Dora Creek WWTP. The transfer system has been sized to allow for a phased expansion that will cater for growth in the township to 2,100 properties.

A.6.2. Documentation provided

Documents provided and reviewed relating to this project included project business cases, a price submission capital summary, cost estimates and related expenditure proposals and reviews. In addition, this project was discussed at a site visit at Hunter Water's office in August 2019.

A.6.3. Project need

The provision of wastewater services to existing Wyee customers was based on a November 2014 Government directive. The 2016 Determination subsequently included an allowance of $9 million for expenditure in the current regulatory period, based on an overall cost of $22.3 million ($2015/16) for this service (including wastewater collection and transfer for treatment at Dora Creek WWTP).

The Government's requirement for customer connection by 2020 had been clear to Hunter Water at the time of the 2016 Determination. Nevertheless, at that time Hunter Water made the decision to base their planned expenditure on a later delivery date.

In 2017 Hunter Water sought to clarify the completion date requirements with the Government, who confirmed the need to provide a wastewater service for Wyee customers by 2020.

A revised business case was subsequently approved in January 2018, based on ensuring the directive to connect customers by 2020 was achieved, as well as incorporating a phased increase in the capacity of the transfer component to cater for regional growth (up to 2,100 properties) at an estimated additional cost of $8 million.

The current total estimated cost of the project is $34.1 million.

A.6.4. Options investigated

In the course of the project development, a wide range of options was identified and considered. The large number of options arose as a result of the alternatives that exist for each component of the system, comprising:

- the reticulation (wastewater collection) system, for which gravity, low pressure or hybrid (combined gravity and pressure) systems were considered
- the transfer system, which considered three alternative treatment locations
- three different approaches to delivering the preferred treatment option (comprising pumping and transfer main arrangements).

Nine options were considered as part of a 2016 business case, which led to the identification of the preferred option to pump wastewater from Wyee to Dora Creek WWTP. A hybrid of gravity and pressure sewers was selected as the preferred approach to reticulation within Wyee. This option was selected on the basis that it provided flexibility, utilises Hunter Water's existing WWTP assets, and provides opportunities to service existing and future development in other areas. It was also assessed as having the lowest lifecycle (present value) cost.

A revised business case in 2018 updated the project objective to not only provide backlog sewer service to 450 properties in the current township but to size the connecting infrastructure between the township and the servicing treatment plant to cater for future growth in the Wyee region. This growth of 2100 properties is forecast to occur over the next 20 years but would not be part of the backlog program. Within this revised business case Hunter Water investigated three options, each of which was a detailed variation on the preferred option established in the 2016 business case, with additional consideration about infrastructure staging to manage growth in flows over time.

The transfer infrastructure option with the lowest lifecycle cost was selected as preferred.

A.6.5. Cost estimate

An allowance of $20.3 million has been made in the current regulatory period and $13.6 million for the forecast period. The change in scope for the project (between the original and revised business case) to cater for future growth led to an $8 million ($2017/18) increase in the total budget.

Table 97 Project cost estimate ($2017-18)

Component	Value ($ million)
Concept & detail design	1.844
Construction	28.968
Project Management	1.501
Land Matters	0.511

Component	Value ($ million)
Sub-total	29.980
Contingency	2.843
Total Budget Estimate	32.824

Source: Hunter Water Wyee Sewerage Scheme Business Case 17 January 2018

A.6.6. Procurement

Delivery of the infrastructure has been split into two separate contracts for, respectively, the reticulation (wastewater collection) sewer system in Wyee, and the transfer network to Dora Creek WWTP. This arrangement has been adopted to better manage uncertainty associated with connections and odour impacts.

Each contract is being delivered under a separate design and construct contract. These arrangements are appropriate for the nature of the works involved.

A.6.7. Assessment of efficiency

The Wyee Backlog Sewerage Program responds to a clear, long-standing directive from the NSW Government. There is therefore a clear basis for the project need and the requirement to deliver it by 2020 to meet community expectations and the Government directive.

Hunter Water has given detailed consideration to the range of potential delivery options, including possible approaches to the respective reticulation, transfer and treatment components. The options identified span the range of approaches that are standard within the industry. Selection of the preferred option was based on adopting the solution with the lowest lifecycle (present value) cost.

The process to identify the preferred solution is considered thorough and appropriate, with the option identified a product of establishing firstly the lowest cost option to address the project need (resolving to transfer wastewater to Dora Creek WWTP), then the least cost way in which to deliver the required infrastructure. The adopted solution is consistent with industry practice and considered efficient.

The total budget for the program increased by $8 million as a result of increasing the scope of the infrastructure to cater for wider development and growth. This is considered an efficient increase, given that it addresses growth business drivers and will facilitate phased expansion in support of further development in the region. There is also evidence that the change in scope was prompted by customer and community understanding that the scheme addresses current environmental concerns and consequently renewed developer interest in the area

The procurement process has also been well-considered, minimises risk, aligns with industry practice, and is considered efficient.

Delivery date requirements have been confirmed by Government public announcements and modification of the program to comply with these requirements is necessary.

The proposed expenditure for this project in the forecast period is considered efficient.

A.6.8. Recommended expenditure

It is recommended that the funds proposed by Hunter Water for this project be supported by IPART.

Table 98 Aither's recommended Capex for the upcoming determination period

Source	Capex Budget ($000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission		379	393	2283	17,087	2,050	[redacted]	107	107	107
Aither's adjustment of submission	-	-	-	-	-	-	-	-	-	-
Aither recommendation	0	379	393	2283	17,087	2,050	[redacted]	107	107	107

Capital Project 7 – Treatment Plant Chemical Containment and Safety Upgrades Program

Table 99 Summary of Treatment Plant Chemical Containment and Safety Upgrades Program

Service	Water & Wastewater
Capital project summary driver/s	Maintaining Standards 90%, Asset & Service Reliability 10%
Project stage	Under Construction

Table 100 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR Wastewater (S215)	0	0	0	0	256	1,281	3,075	3,075	3,075	1,538
SIR/AIR Water (W198)	0	0	0	0	256	1,281	3,075	3,075	3,075	1,538

A.7.1. Project description

This project involves the upgrade of 20 chemical dosing facilities at 13 wastewater treatment plants (WWTPs) and 22 facilities at 6 water treatment plants (WTPs), to address environmental contamination risks and ensure the facilities meet current health and safety requirements. The project comprises a range of different works across the sites, from rebuilding facilities and replacing tanks, to replacing ageing equipment, pipework instruments and control systems, and rectification of containment works.

This follows on from work commenced in the current regulatory period, to address EPA-directed upgrades at Dungog WTP and at 23 sites in the network system.

A.7.2. Documentation provided

Documents provided and reviewed relating to this project included project business cases, investigation and option assessment reports, cost estimates and related expenditure proposals and reviews. In addition, this project was discussed at a site visit at Hunter Water's office in August 2019.

A.7.3. Project need

Hunter Water owns and operates 43 chemical dosing systems on a total of 19 WWTP and WTP sites where chemicals are used. The chemicals are either classed as hazardous or, in the event of a significant spill or loss of containment, would at least trigger a report to the EPA as a pollution event.

Since 2013, environmental impacts from several such pollution have arisen from chemical system leaks, involving water and wastewater systems and both their treatment and network activities. This has led to significant concern from the EPA associated with the standard of Hunter Water's chemical

dosing systems, including prosecution. In September 2016, a directive from the EPA mandated improvements to a significant number of Hunter Water's related systems.

In the current regulatory period, Hunter Water has commenced chemical system improvements works at Dungog WTP (subject of Project 2 detailed review), and $8 million expenditure on improvement of chemical dosing systems within the water and wastewater network.

More broadly, as part of the wider treatment plant program during the past four years Hunter Water has undertaken various assessments of its chemical systems across treatment and network sites, increasing awareness and understanding of the chemical-related risks. A series of comprehensive reports by expert consultants have detailed the risk of loss of containment, and increased safety and operational risks from a number of chemical systems throughout Hunter Water's treatment plants. Additionally, multiple chemical systems are approaching the end of their useful life, and all but the newest of these systems demonstrate various levels of non-compliance with mandatory health and safety and environmental regulations.

The review has produced a prioritised list of activities, which is the basis for Hunter Water proposing this program in order to address this prioritised list in accordance with their risk appetite. The options below outline the decision-making process to determine the final scope of this project and the proposed expenditure.

A.7.4. Options investigated

Hunter Water developed four different approaches to addressing the priorities identified, preparing a scope and cost estimate for each option and analysing the extent to which they addressed the containment and safety risks. The options are summarised in Table 101 and the associated risk assessment provided in Table 102 and Table 103.

Each option includes a component of ongoing equipment renewal. The greater the amount that is invested as a result of this project, the less the renewal investment required in the future. As shown in Table 101, the present value of the cost of each option is therefore the sum of the up-front capital investment and the associated lifecycle renewal cost.

Table 101 Options cost analysis

Option	Cost ($ million, $2018/19)		
	Project Capex	Lifecycle renewal cost	Present value^
Option 1 – Do Nothing	[redacted]	[redacted]	[redacted]
Option 2 – Upgrade chemical dosing systems at Kurri Kurri & Raymond Terrace WWTPs	[redacted]	[redacted]	[redacted]
Option 3 – Reduce environmental risk to medium and safety risk to low	[redacted]	[redacted]	[redacted]
Option 4 – Upgrade chemical systems to achieve risk appetite	[redacted]	[redacted]	[redacted]
Option 5 – Upgrade all chemical systems to Australian Standards	[redacted]	[redacted]	[redacted]

Source: Hunter Water Business Case, 2019

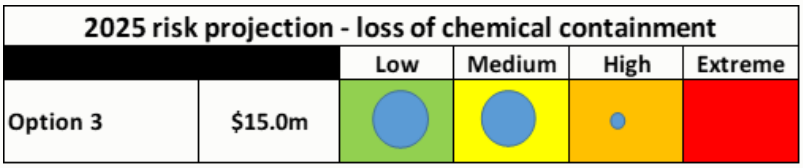
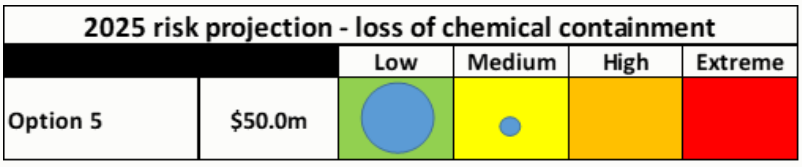
^Present value is based on an analysis period of 25 years and discount rate of 7%

The risk assessment displayed in Table 102 shows the projected risk outcome from the proposed investment, where the relative size of the circles reflects the number of installations with a risk rating in each respective category. Hunter Water's proposed expenditure is based on the selection of Option 4 (over Option 3) as the preferred option, on the basis that it aligns with the business' risk appetite.

Option 4 includes investment for upgrades at an additional eight facilities (four water and wastewater treatment plants, respectively) beyond those in Option 3. The critical difference between these two options is the provision for additional secondary containment of in-ground pipework and associated assets at these eight particular sites.

These sites are not the subject of EPA directives. However, Hunter Water's position is that – should an issue arise at any of these sites – there is a significant risk of EPA action, given the focus of and directives from the EPA arising from related past performance.

Table 102 Options risk analysis

Option	Risk Assessment
Option 1 – Do Nothing	
Option 2 – Upgrade Kurri Kurri & Raymond Terrace WWTW systems	
Option 3 – Reduce environmental risk to medium and safety risk to low	
Option 4 -Upgrade chemical systems to achieve risk appetite	
Option 5 – Upgrade all chemical systems to Australian Standards	

Source: Hunter Water Project Business Case, 12 March 2019

A.7.5. Cost estimate

Forecast cost estimates are currently based on a Gateway 2 project business case, which seeks approval to proceed to a full business case. The estimates have been based upon concept designs developed for several plants, which have then been modified to meet the needs of different systems. Given the estimating methodology and the nature of the works, the amount allowed for contingency (less than 10%) is reasonable.

Table 103 Cost estimate comparison

Component	Value ($ million, $2018/19)
Development Contracts	$1.600
Delivery Contracts	$16.500
Hunter Water costs (including $0.5 million sunk costs)	$3.900
Sub-total	$22.000
Contingency (Inherent Risk)	$2.000
Total	$24.000

Source: Gateway 2 Technical Case, Hunter Water 2018

A.7.6. Procurement

Concept and functional designs are being undertaken in-house and using consultant services from the panel. Delivery will be procured via open tender and project management services, with multiple contracts across the various sites where works are to occur.

There is a large amount of complexity in the delivery of so many relatively small projects, which need to be closely coordinated with operational activities. Bundling the works at individual sites into one or more larger contracts for tendering would generate technical risk as a result, and because of the uncertain scope would be unlikely to achieve economies of scale.

The approach being taken by Hunter Water is therefore reasonable given the detailed in-house knowledge and skills related to chemical systems and the complexity involved with these projects. Small contracts should enable mid-level contractors to participate and potentially deliver keener prices.

A.7.7. Assessment of efficiency

The need for this project is well-established by extensive evidence of past and potential failures of high-risk chemical dosing systems across Hunter Water's treatment plants and network. This includes documentation outlining mandatory directives from the EPA, reflecting significant EPA concern about this risk. It is considered appropriate that Hunter Water should proceed with a Treatment Plant Chemical Containment and Safety Upgrades Program.

The program has proceeded through, and includes cost estimates for, a Gateway 2 business case. Data provided by Hunter Water of cost estimates for comparable works provides some confidence that the estimates are accurate; the difference between cost estimates at Gateway 4 and Gateway 2 for similar network chemical dosing upgrades was just 4 per cent.

Given the potential complexity associated with having works distributed across various operating sites, the approach to design and procurement appears appropriate. Leveraging in-house knowledge and skills to deliver much of the design process is a practical means of ensuring that the works interface soundly with operational requirements and address the conditions of each site. Similarly, tendering for multiple contracts, rather than one or more larger package of works, is appropriate for the nature and complexity of the works. Any benefits from possible economies of scale from a larger contract (which may not be realised) are likely to be offset by greater scope risk and delivery uncertainty. Likewise, marginal effort from administering multiple contracts should be offset by the ability for smaller contractors to provide more competitive prices, as well as the ability to learn and adapt each subsequent contract.

The main consideration in evaluating the efficiency of this upgrade program is the identification of the preferred option. Although the works are justified – including responding to concern and specific directives from the EPA – the selection of the preferred option is premised on the mitigation of risk in alignment with Hunter Water's risk appetite.

Hunter Water's preferred option proposes greater investment based on a more risk averse position. Selecting this option presupposes that – based on past performance – the EPA will be more inclined to take action in relation to more of Hunter Water's related facilities, regardless of whether those assets have been constructed to industry standards and are otherwise not currently the subject of specific EPA directives.

Specifically, Hunter Water has taken the view that the need for secondary containment is required across all facilities, on the basis that the EPA has specified this need for selected facilities where directives are currently in place. Hunter Water's approach at these sites will be to undertake condition assessment of the assets and where asset condition requires it the asset will be replaced. It is unclear what assumptions have been made regarding the extent of secondary containment required in the budget. Regardless there is no strict requirement or basis for this level of containment at facilities that are not the subject of EPA action, reflecting an overly risk averse position that arises because of the recent attention from the EPA. If not for the related directives, it is unlikely that this position would be taken, and a more risk tolerant approach would be acceptable (which is also consistent with wider industry practice).

Hunter Water's preferred option implies that upgrades to some facilities are based on Hunter Water's past poor performance of related assets, in the absence of which a more balanced position (consistent with Option 3) would have been acceptable. As a result, it is considered that the basis for selecting the more costly Option 4 over Option 3 is an expense Hunter Water and its customers would have not incurred but for the past performance by Hunter Water and is therefore considered inefficient. As consequence and it is proposed that the supported expenditure should be reduced from $24 million to $15 million.

The proposed level of expenditure for chemical containment works for the forecast regulatory period is considered efficient based on Option 3 above. It is recommended that expenditure be reduced by $9 million from $24 million to $15 million, comprising:

- a reduction of $4.5 million for works at *water* treatment plants
- a reduction of $4.5 million for works at *wastewater* treatment plants.

A.7.8. Recommended expenditure

It is recommended that the expenditure proposed by Hunter Water for this project be reduced by $9 million.

Table 104 Aither's' recommended Capex for the upcoming determination period

Source	Capex Budget ($000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission	0	0	0	0	513	2,563	6,150	6,150	6,150	3,075
Aither's adjustment of submission	-	-	-	-	-	(1,800)	(1,800)	(1,800)	(1,800)	(1,800)

Source	Capex Budget ($000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Aither recommendation	0	0	0	0	513	763	4,350	4,350	4,350	1,275

Capital Project 8 - Major Wastewater Treatment Works Upgrade Program (Other than Farley WWTP stage 3B)

Table 105 Summary of Other Wastewater Treatment Plant Upgrade Program

Service	Wastewater
Capital project summary driver/s	As per Table 107 below
Project stage	As per Table 107 below

Table 106 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

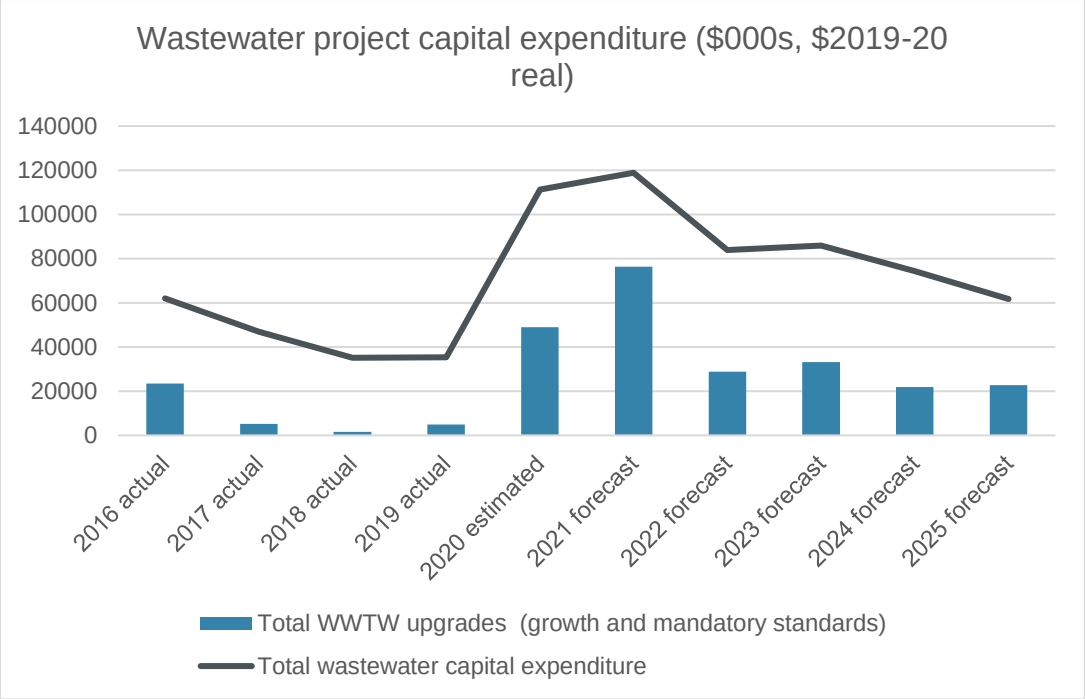
Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR	0	390	791	4,189	18,296	22,460	9,088	27,486	26,789	22,748

Note: Projects include S184, S220, S156, S214, S134, S161, S144.

A.8.1. Project description

Hunter Water has proposed several major upgrades to wastewater treatment plants in 2019-20 and the forecast regulatory period. The works comprise renewal, improvements or expansion of assets within Hunter Water's wastewater treatment plants, typically to address growth and or compliance concerns.

Wastewater treatment plant (WWTP) upgrades represent a significant investment and substantial proportion of total expenditure proposed in the forecast period. Figure 65 illustrates proposed expenditure on WWTP upgrades as a proportion of total wastewater expenditure for the period.



Source: Hunter Water AIR

Figure 65 Wastewater capital expenditure proposed for the forecast period

Hunter Water identifies eight major WWTP projects in its price submission (detailed in Technical Paper 4). The largest project – the Farley WWTP Stage 3B upgrade – has been reviewed separately and is discussed in more detail elsewhere.

The remaining seven projects and their principal drivers are summarised in Table 107.

Table 107 Major WWTP projects with proposed expenditure exceeding $10 million

Upgrade Project	Capex ($million)	Total Capex ($million)	Project status / Planned completion date	Drivers		
				Growth	Existing / New Mandatory Standards	Asset & Service Reliability
Morpeth WWTP Stage 4 AIR S184	[redacted]	[redacted]	G1/2026	60%	20% / 10%	Nil
Farley WWTP effluent pumping & pipeline to Hunter River AIR S220	[redacted]	[redacted]	G1/2024	50%	50% / 0%	Nil
Burwood Beach WWTP Stage 3 AIR S156	[redacted]	[redacted]	G1/2026	25%	50% / 25%	Nil
Cessnock WWTP AIR S214	[redacted]	[redacted]	G2/2023	20%	50% / 0%	30%
Dora Creek WWTP Stage 2B*AIR S134	[redacted]	[redacted]	G1/2021	Nil	100%	Nil

Dungog WWTP*AIR S161 AIR S134	[redacted]	[redacted]	G4/2021	10%	40% / 10%	40%
Raymond Terrace WWTP Stage 3 AIR S144	[redacted]	[redacted]	G1/2026	30%	30% / 0%	40%

Source: Hunter Water

A.8.2. Documentation provided

Documents provided and reviewed relating to this project included project business cases, investigation and option assessment reports, cost estimates and related expenditure proposals and reviews. In addition, this project was discussed at a site visit at Hunter Water's office in October 2019.

A.8.3. Project need

The principle drivers for each of the major WWTP upgrades are summarised below.

Morpeth WWTP Stage 4

This project is principally driven by growth within the WWTP catchment, based on a detailed assessment of new subdivision development requirements expected during the forecast period. Hunter Water's modelling forecasts the plant's capacity will be exceeded by 2027.

Farley WWTP effluent pumping & pipeline to Hunter River

Although the Farley WWTP upgrade (assessed separately) is addressing compliance and capacity concerns in the short-term, there are still longer-term constraints (specified by the EPA) on the ability of the receiving waterway to continue to receive increasing volumes of treated effluent. Levels of growth in the catchment – based on detailed assessment of new subdivision development requirements – will put increasing pressure on the ability of the Farley WWTP to meet its licence conditions.

Hunter Water has identified transfer of excess volumes to the Hunter River as the preferred solution. The capacity of the plant is forecast to be exceeded within 5 to 10 years, but the timing of the works will be subject to the rate of development and requirements to maintain compliance with discharge conditions.

Burwood Beach WWTP Stage 3

This plant has had environmental compliance failures in both dry and wet weather events, as well as some safety concerns. Although the WWTP is only 10 years old, it may have been poorly designed and is operating at 20 per cent below its design capacity. However, the nature of the plant issues suggest that the timing of upgrade works is less urgent.

Cessnock WWTP

Specific issues with levels of ammonia in treated effluent from this WWTP are the key driver of upgrade works. Although ammonia is not currently specified within Hunter Water's EPA-issued operating licence for the plant, there is a risk that the levels are toxic to the receiving environment and could lead to fish kills. Aside from public perception and reputational risks, such an event would likely generate action from the EPA irrespective of the licence parameters.

Dora Creek WWTP Stage 2B

Upgrade works at this plant are driven by non-compliance with environmental requirements associated with biosolids management.

Dungog WWTP

Upgrade works at the Dungog WWTP are currently under construction and originate from a directive from the EPA. Although ongoing, aspects of the works (associated with sludge management) have been deferred while Hunter Water prepares its business-wide biosolids strategy.

Raymond Terrace WWTP Stage 3

A range of assets at this facility have been assessed as in poor condition, which is contributing to incidences of non-compliance with EPA licence conditions.

A.8.4. Options investigated

Each project has identifiable options that have been or are under consideration as part of typical option identification and assessment processes. The range and nature of the options identified appear reasonable and consistent with the types of approaches and solutions that would be expected.

The detailed options development and assessment process, including associated cost estimates, have not been reviewed in detail for each project. However, based on the detailed review of the Farley WWTP upgrade project, it is expected that the approach adopted for these projects is similarly thorough and well-structured.

A.8.5. Cost estimate

The cost estimates across all seven projects have not been reviewed in detailed. However, based on Hunter Water's recent record of under-estimating scope and costs of projects of this nature at the Gateway 1 stage, there is some risk that the scope of necessary works increases, along with the associated costs.

The recent experience of the progression through the Gateway process of upgrade works at Farley WWTP demonstrated that Hunter Water's estimates were around 10 per cent below tender prices. This process will have provided learnings that – along with an incremental improvement in understanding of asset condition which will help reduce scope creep – should ensure that projects approaching Gateways 3 and 4 should have acceptable cost estimates.

A.8.6. Procurement

Major works of this nature are procured through design and construction contracts, which are competitively tendered by approved contractors on Hunter Water's panel. Design and construct contracts are an industry standard approach for works of this type. Efficiencies are realised by requesting tenders from a pre-approved panel whilst still retaining sufficient competitive tension to ensure that scope and quality expectations are delivered at best value.

A.8.7. Assessment of efficiency

The efficiency of the proposed projects in this program is influenced by three issues in particular:

- perceptions about the risk of environmental non-compliance
- uncertainty around future environmental compliance requirements
- the status of Hunter Water's business-wide biosolids strategy and the associated implications for projects to address biosolids management.

The assessment of efficiency is described below in relation to each of these key issues.

Risk of environmental non-compliance

The primary driver of related WWTP works in the current period has been a series of directives from the EPA relating to failure to comply with licence conditions. The prevalence of this has generated concern within Hunter Water about compliance risk across similar assets more broadly.

Projects that are still in a planning phase appear primarily to be driven by corporate concerns about the approach that the EPA may take to future non-compliance. The planning is therefore being conducted in an environment of risk minimisation in this regard.

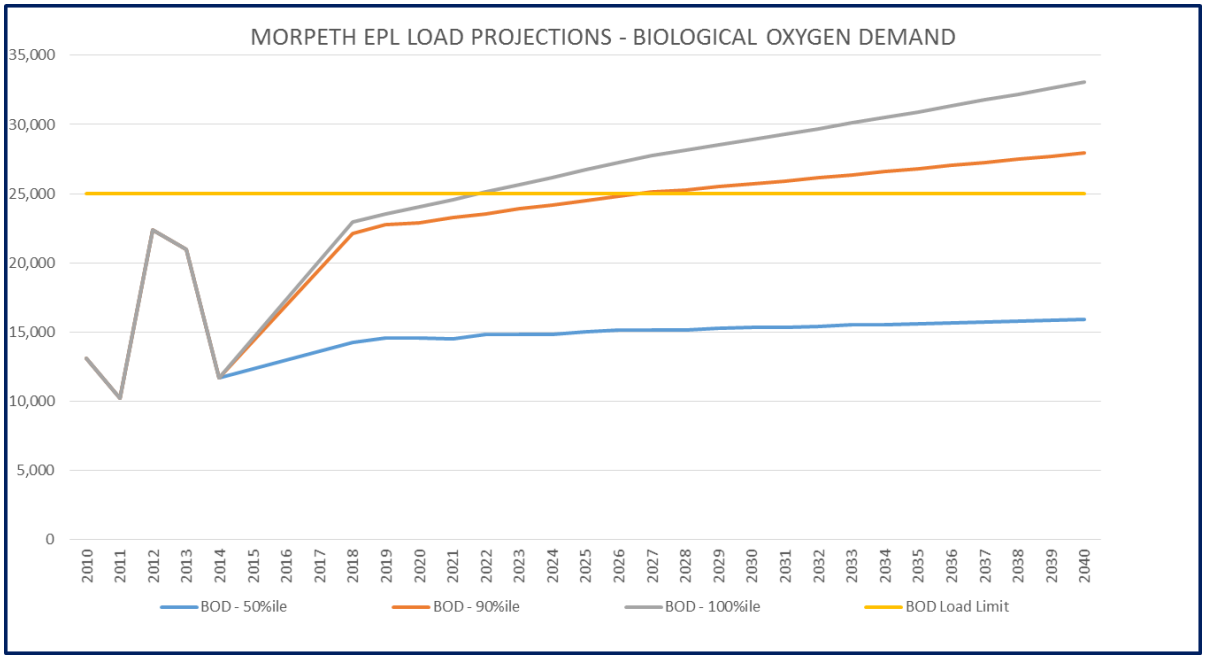
Nevertheless, most of the planned projects in this program (Burwood Beach, Cessnock, Dungog, Raymond Terrace and Dora Creek) have either specific EPA directions or clear current evidence has been presented on environmental non-compliance challenges and Hunter's Water position on these plants is considered reasonable.

However, in the absence of recent and heightened attention from the EPA, it is likely that a more risk tolerant approach to two major projects would have been taken, deferring their upgrade until such time as the risk genuinely required mitigation.

Morpeth WWTP Stage 4 upgrade and Farley WWTP effluent transfer are upgrades driven by concerns about growth leading to challenges complying with current discharge licence conditions. The growth itself is associated with new urban subdivision, the timing and extent of which is inherently uncertain.

Hunter Water provided presentations on the development of growth rates in each of these catchments and how that growth impacts treatment capacity at the plants and its ability to meet current licence conditions.

Data provided by Hunter Water (see Figure 66) indicates that Morpeth WWTP Stage 4 upgrade – currently planned for completion in 2025-26 – will exceed its critical EPA licence condition (90th percentile on BOD) in 2026-27. Growth in the Morpeth catchment within the 9-year period from 2018 is forecast at approximately 10 per cent over this period and appears to taper off beyond that period.

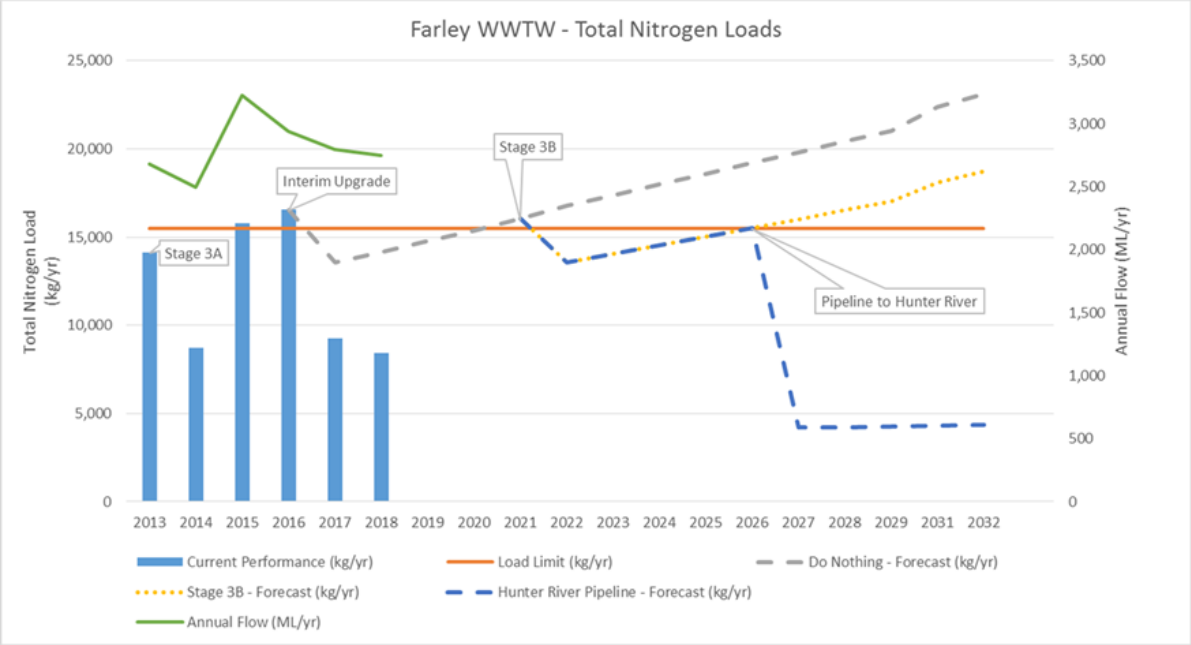


Source: Hunter Water

Figure 66 Equivalent population load projections for Morpeth WWTP

However, Greenfield development long-term growth forecasts are typically conservatively high. Morpeth is in a comparatively large catchment, with forecast growth that is a relatively small percentage increase in total load over a long time period. Given the experience of the past few years there is also continuing uncertainty in the location of growth across the wider Hunter Water area. The growth forecast is therefore not considered an immediately critical issue in determining the timing of the upgrade of this plant. A delay in expenditure on this program by two years would appear reasonable when comparing the load projection information above in Figure 66 with Morpeth's demonstrated plant capacity. Given the pressure on Hunter Water to invest in more critical activities, a delay in implementing this upgrade is proposed. This would shift some $12.6 million beyond the forecast period.

Figure 67 indicates that Farley WWTP is forecast by Hunter Water to exceed its critical EPA limits on Total Nitrogen Load at its current discharge location in 2025-26. Hunter Water proposes expenditure to complete the Farley WWTP effluent pipeline project in 2024 to deliver treated effluent to the Hunter River. Joint investigations between Hunter Water and the EPA are also ongoing, with the exact nature of the EPA discharge requirements still uncertain.



Source: Hunter Water

Figure 67 Forecast total nitrogen loads for Farley WWTP

The forecast point at which the effluent transfer pipeline is required is based on anticipated performance of the Farley WWTP Stage 3B upgrade and forecast growth in flows over a nine-year period.

Typically, the timing for further plant upgrades would be determined when the performance of such a major plant upgrade as that involved with Stage 3B is thoroughly commissioned and testing. So, to some extent Hunter Water's forecast is based on the usually conservative plant performance requirements set out in the stage 3B specification.

Long-term forecast growth in the Farley catchment, similar to that of Morpeth, would also be the subject of optimistic local government and developer estimates. Flow growth at Farley has been based on a forecast of 4,830 new properties in the 9-year period starting from 2018-19. Approximately 30 per cent of these are in areas zoned for development where development has not commenced. The forecast growth rate is some 10 per cent higher than that experienced in the catchment in previous years.

Given a range of factors (performance of the yet to be completed Stage 3B upgrade is likely to be a conservative assessment; property development driving the growth estimates is at an early stage; wider issues with recent experience of uncertainty in the location of growth and new connections; and ongoing pressure on other parts of the program) it is suggested that the current planned completion date of 2024 is unnecessarily conservative. The project completion date could be deferred to at least a forecast date of 2026. This would shift one year of expenditure (some $11.3 million) beyond the forecast period.

It is recommended that proposed expenditure be reduced for the forecast period by $24 million on the basis that aspects of the program can be deferred without unreasonable risk to Hunter Water.

Uncertainty about future environmental compliance requirements

In some instances, the licence requirements for effluent discharges to receiving waterways are under consideration by the EPA and yet to be resolved. Based on a discussion Aither and IPART held with the EPA, it is evident that these issues are unlikely to be finalised for some time.

It is inappropriate for Hunter Water to proceed with upgrade works until such time as the objectives of those works (that is, compliance with licence conditions) are clear and certain. However, in the meantime, Hunter Water has taken a reasonable view that future licence obligations will be similar to current conditions and is proceeding with planning on this basis. Given that licence conditions are unlikely to be made less onerous than current arrangements, this provides confidence that forecast expenditure is at least unlikely to over-estimate associated costs.

Status of the Biosolids Strategy

An action arising from *Strategy 2017+3*, Hunter Water's Biosolids Strategy – which has identified centralised management of biosolids as a preferred strategy – is currently at Gateway 1. Several of the projects in this program include an expenditure allocation for biosolids management, which would be redirected towards the construction of a centralised facility if this is approved to proceed. Based on an assessment of the draft Biosolids Strategy (presented to the Hunter Water Board in October 2019 with a recommendation for further investigation), there are some relevant recommendations for changes to the capital expenditure profile over the forecast period.

Notwithstanding the implications of uncertainty about licence conditions in some instances and Hunter Water's Biosolids Strategy, the majority of proposed expenditure is considered efficient. Decisions about (and investment of) expenditure should be deferred until the outcomes of these evolving directions are clear, but the basis for planning and estimating costs is appropriate. However, it is considered that the timing of some projects within the program is not sufficiently urgent and is underpinned by an unreasonable perception of risk. It is considered that expenditure on these projects is inefficient and could be deferred without impacting Hunter Water's performance. Accordingly, it is recommended that proposed expenditure for the forecast period be reduced by a total of $24 million.

A.8.8. Recommended expenditure

It is recommended that most of the expenditure proposed by Hunter Water be supported by IPART, except for a reduction of $24 million associated with deferring unnecessary works.

Table 108 Aither's' recommended Capex for the upcoming determination period

Source	Capex Budget ($000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission	0	390	791	4,189	18,296	22,460	9,088	27,486	26,789	22,748
Aither's adjustment of submission	-	-	-	-	-	-	-	-	(16,238)	(7,688)
Aither recommendation	0	390	791	4,189	18,296	22,460	9,088	27,486	10,551	15,061

Capital Project 9 - Stormwater Major Rehabilitation / Renewal Program

Table 109 Summary of Stormwater Major Rehabilitation / Renewal Program

Service	Stormwater
Capital project summary driver/s	Asset and Service Reliability 100%
Project stage	Gateway 1 Approval – Preliminary Business Case

Table 110 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR (R13)	0	0	0	0	0	800	1,538	3,075	4,100	4,100

A.9.1. Project description

This program covers major stormwater rehabilitation projects undertaken by Hunter Water, to ensure that it continues to meet the obligations of its Operating Licence to provide, operate and maintain its stormwater drainage system.

No explicit provision was made for these works in the current regulatory period. While minor stormwater renewal and rehabilitation works are addressed through a separate business case, there are also a number of established priorities for more significant work. The exact nature of the work required is subject to further investigation, but major rehabilitation work has been identified as required at four locations at a total cost of $13.612 million ($2017/18):

- Macquarie St, Mayfield
- Belford to Chatham St, Hamilton
- Station St, Waratah
- Christo Rd, Waratah.

A.9.2. Documentation provided

Documents provided and reviewed relating to this project included project business cases and related expenditure proposals and reviews. In addition, this project was discussed at a site visit at Hunter Water's office in August and October 2019.

A.9.3. Project need

Hunter Water manages 96km of stormwater assets, the majority of which were constructed between 1920 and 1940. Other than capacity issues arising from extreme weather events, there have been no significant issues with the system since its construction.

Condition inspections and assessments of the open (above-ground) parts of the system have been undertaken at approximately five-year intervals. In 2011, a program to assess the condition of the underground assets within the system was commenced.

In 2017 a failure in the Mayfield System under dry weather conditions highlighted issues of public safety. This failure, together with the outcomes of the condition assessment program, resulted in capital expenditure of $7.4 million on the Mayfield system and other high-priority works (commencing in 2018-19), including $1.57 million forecast for 2020-21 that is not part of this project. There was no provision for this expenditure at the time of the previous Price Determination.

The results of the condition assessments completed to date form the basis of the program proposed for the next regulatory period. These assessments identified that the quality of concrete culverts and pipework and consequently the rate of deterioration varied across the system. Hunter Water is concerned that parts of the stormwater system have deteriorated to the extent that there is an unacceptable risk of failure, which could lead to loss of system functionality and uncontrolled subsidence. The consequences of such failures include the potential for property damage and impacts on public safety.

Hunter Water's Asset Management Plan (July 2019) summarises the condition assessment findings, the risk assessment process and a prioritised works program. Below-ground inspection processes utilise established techniques and Australian Standard approaches to condition identification, with a systematic approach adopted to evaluate the density of defects. Following application of these techniques, relevant structural expertise has been sought to identify those areas with highest probability of failure.

The condition assessment is combined with the application of an appropriate risk assessment technique. In combination with the information on failure probability, this considers the consequences for the public from asset failure mechanisms (such as collapse during storm events leading to public exposure, consequential flooding and traffic impact) to determine a risk rating for each asset section.

A.9.4. Options investigated

Based on the condition assessments and a risk-based assessment, Hunter Water developed a risk-based priority list. The works proposed by Hunter Water in its business case for this project have been restricted to the highest risk sections with a risk of failure within the next 5 years.

A.9.5. Cost estimate

An allowance of $13.612 million has been made for the forecast period, which includes some $5.0 million for detail scoping, design and construction. This work will involve working with the public, other stakeholders, and further testing to fully scope and specify the work and is not unreasonable at this stage of the works.

A.9.6. Procurement

The project will be delivered by separate design and construct contract packages with specialist contractors shortlisted where required.

A.9.7. Assessment of efficiency

A historical lack of detailed understanding about the condition of Hunter Water's stormwater understanding culminated in a series of performance issues in the current period. A thorough condition assessment process has now been undertaken, utilising appropriate techniques and relevant specialist expertise. A systematic and phased program for addressing observed deficiency and risks in the system has been developed.

Enhanced monitoring and annual minor remedial programs have also been proposed in the ongoing stormwater program, with the aim of minimising major rehabilitation works in the future. This should contribute to rectifying the historical deficiency in management of these assets over time.

It is appropriate that Hunter Water should respond to risks to public safety and property arising from the condition of their assets. The extent of the works proposed appear reasonable, with the rehabilitation approaches tailored to the issues at each site. The measures proposed to rehabilitate sections of the system are appropriate and consistent with industry practice.

The expenditure proposed for the stormwater major rehabilitation and renewal program for the forecast period **is considered efficient**.

A.9.8. Recommended expenditure

It is recommended that the funds proposed by Hunter Water for this project be supported by IPART.

Table 112 Aither's' recommended Capex for the upcoming determination period

Source	Capex Budget ($000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission						800	1,538	3,075	4,100	4,100
Aither's adjustment of submission						-	-	-	-	-
Aither recommendation						800	1,538	3,075	4,100	4,100

Capital Project 10 – Water Loss Improvement Program

Table 113 Summary of Water Loss Improvement Program

Service	Water
Capital project summary driver/s	Growth (30%); Asset and service reliability (60%); Business efficiency (10%)
Project stage	Ongoing

Table 114 Hunter Water Capex - Actuals (2016-20) and proposed (2021-25)

Source	Capex Budget ($000's)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SIR/AIR						3,485	7,790	9,840	8,405	3,280

Source: Annual Information Return, projects include (W200, W201, W202, W203)

A.10.1. Project description

The objective of this program of works is to reduce water loss across the network and therefore contribute to water security for Hunter Water and provide additional time for future supply augmentation decisions. The program is based on a forecast of $32.8 million over the upcoming regulatory period to undertake initiatives to reduce water loss to minimise non-revenue water and thereby increase the timing of any future supply augmentation.

This program consists of four primary initiatives:

- **Active Leak Detection**: this project involves contractors walking the water supply network and listening for leaks from the watermain and service mains. This is initially undertaken through the use of listening sticks, then locating actual leaks through installation of acoustic correlators.
- **Pressure Management**: this project involves the installation of automated pressure reducing valves or utilisation of below-grade reservoirs (i.e. reservoirs which are normally only operated in periods of high-demand) to reduce the pressure on the water network and customer fittings. This process reduces the internal stress on the network and thereby reduces both the quantity of leaks/breaks and the volume lost from those leaks/breaks.
- **Specific Asset Losses**: this project involves the investigation of deterioration and leaks of specific assets such as reservoirs or trunk watermains, which can be individually repaired or replaced. Examples include Black Hill Reservoir and the Chichester Trunk Gravity Main.
- **District Metered Areas**: this project involves the installation of network flow meters and zone valves to segment the network to allow for a more tailored monitoring and analysis of localised network performance.

A.10.2. Documentation provided

A range of documents was provided and reviewed for this program, comprising business cases, option development and assessment, consideration of levelised costs and forecast water savings and capital expenditure summary information. In addition, this project was discussed with Hunter Water at site visits in August and October 2019.

A.10.3. Project need

Hunter Water states that the current supply system is vulnerable to drought due to relatively small storages and high evaporative losses. Based on the most recent National Performance Report (2017-18) indicates that:

- Hunter Water's residential demand is approximately 10 per cent higher than other similar metropolitan water utilities, and
- Hunter Water has a high rate of network losses compared to other similar metropolitan water utilities.

Hunter Water notes that these factors exacerbate the risks associated with its water storage capacity. Given the long lead-time for the planning for supply augmentation, reducing water loss and conserving water are important factors in ensuring sufficient time to make efficient supply augmentation decisions.

As part of its Operating Licence, Hunter Water was required to submit to IPART a proposed methodology for determining its economic level of water conservation (i.e. Economic Level of Water Conservation Methodology). This methodology is required to outline the principles relating to water conservation for the following elements:

- Water leakage (within and downstream of its water treatment plants)
- Water recycling, and
- Water efficiency (including demand management).

Following the approval of this methodology, Hunter Water was required to develop and submit (as part of its pricing submission) a water conservation work program based on this methodology. This program of work is the proposed work program to comply with this conservation methodology.

The methodology involves the calculation of levelised costs of different water conservation initiatives and comparing these costs with the value of water to determine whether the initiative is economically efficient. Hunter Water has adopted the SRMC to value water for more temporary nature initiatives, with the LRMC to value water for longer-term initiatives.

Through discussions with Hunter Water, the recent introduction of water restrictions on the customer base has brought forward some of this work as a higher priority for the business.

A.10.4. Options investigated

The business case completed in June 2019 analysed five different options. These options were variations of the level of conservation activities.

The business case supported the adoption of Option 4 from the options considered. This is based on the fact that the investment provides a reduction in water loss that is within the ELWC Methodology and provide a significant contribution to the deferral of supply augmentation.

The business case sought to approve development funding for the design and development of 10 pressure management zones and approve the design and construction of a further eight per cent of DMAs.

Table 115 Options analysis

Option	Cost ($million; $2018-19)		
	Project Capex	Levelised Cost	Water Loss Reduction
Option 1 – Do Nothing	$0	NA	NA
Option 2 – Historical Water Loss Programs	$1.0	$0.20/kL	(0.1GL)
Option 3 – Lower Service Risk ELWC Program	$13.4	$0.45/kL[1] / ≤$2.11/kL	1.3GL
Option 4 – ELWC Program	$31.9	$0.45/kL[1] / ≤$2.34/kL	2.4GL
Option 5 – Aspirational Water Loss Reduction	$117.6	$1.95/kL[1] / ≤$29.74/kL	3.3GL

[1] Short-run marginal cost projects

A.10.5. Cost estimate

The cost estimate for the overall program for the forecast period is $32.8 million. This is broken up into the four projects as:[89]

- District Metered Areas - $15.4 million
- Pressure Management - $10.3 million
- Active Leak Detection - $6.2 million
- Point Source Control - $1.0 million.

A.10.6. Procurement

Works proposed would be undertaken by separate consultant detail design and construction contracts. This is appropriate for works of this nature.

A.10.7. Assessment of efficiency

Hunter Water currently has a high water loss compared to other similar utilities. Given this and the introduction of the ELWC methodology, water loss initiatives are a key focus for the business going forward. As a result, Hunter Water has proposed a considerable increase in expenditure relating to water loss compared to previous.

The proposed program involves considerable capital expenditure investments in pressure management and district meters. These two initiatives comprise over 85 per cent of the total capital budget for the program. These initiatives are common among water utilities to address water loss and it would be expected that a water utility, operating efficiently, would have these measures in place. It

[89] Annual Information Return

is noted that this level of expenditure is not expected to continue into the future as a significant proportion of the initial expenditure is unlikely to be required in the near future.

Following the review of the program, Aither considers that the initiatives proposed by Hunter Water are appropriate to invest in from a water conservation perspective and are common for metropolitan water utilities to manage water conservation. Initiatives in pressure management and district metering areas are not considered unique and more of a 'catch-up' in water conservation measures.

The cost estimates were based on previous experience with the technologies or activities, while estimates of water savings for each initiative were based on previous studies and work undertaken by Hunter Water and other utilities (e.g. Sydney Water). Where Hunter Water proposed a range of possible water savings for the initiative, it adopted an estimate at the lower end of that range as a way of adopting a conservative approach in relation to water savings (and thereby creating a higher hurdle for the ELWC).

Aither considers the concept of applying the SRMC and LRMC to value water depending on the type of initiative to be reasonable. It provides an additional layer of analysis to acknowledge that not all initiatives should be treated equally in relation to water savings.

As part of the ELWC Methodology, Hunter Water is required to produce an annual Conservation Report. This Conservation Report essentially outlines Hunter Water's performance in relation to its conservation initiatives to ensure that the actual expenditure incurred by Hunter Water is consistent with the ELWC Methodology.

Through discussions with Hunter Water, it was stated that all identified leaks were rectified by Hunter Water as this was business-as-usual activities. These rectification costs are not captured as part of the levelised cost estimate for the methodology. The calculation of the levelised cost was based on only the upfront cost for identifying water savings with each initiative, where further rectification costs are required to realise the water savings these costs have not been included. As an example, Hunter Water has identified the upfront costs for active leak detection, however the costs of rectifying the leaks have not been considered.

Aither considers it appropriate that these rectification costs be captured as part of the estimate of the levelised costs within the ELWC Methodology. This is a more holistic approach to ensuring that the capturing of water losses is economically efficient and beneficial to customers. The rectification costs would vary depending on the size of the leak, however similar assumptions could be made to ensure a levelised cost estimate.

The costs of rectification are generally relatively low and therefore we do not expect the change in the levelised costs for the initiatives proposed by Hunter Water to result in the initiatives no longer being viable under the methodology.

The expenditure proposed for the water loss reduction program for the forecast period **is considered efficient**.

A.10.9. Recommended expenditure

It is recommended that the funds proposed by Hunter Water for this program of expenditure be supported by IPART.

Table 116 Aither's' recommended Capex for the upcoming determination period

Source	Capex Budget ($000's, 2019-20)									
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Hunter Water's submission						3,485	7,790	9,840	8,405	3,280
Aither's adjustment of submission						-	-	-	-	-
Aither recommendation						3,485	7,790	9,840	8,405	3,280

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