4 Capital expenditure

Technical Paper 4

- Hunter Water's capital expenditure program is forecast to exceed IPART's 2016 allowance by $111 million or 28% over the current period. We expect to spend $508 million over the 4-year period, including $181 million in 2019-20.
- We expect to spend $229 million on wastewater assets, $199 million on water assets, $12 million on stormwater assets and $70 million on corporate assets in the current period.
- The vast majority of our capital investment is driven by mandatory standards (76% of expenditure in the current period and 70% in the next).
- We are proposing to spend $871 million on our capital works program over the next 5-year period: $424 million on wastewater, $273 million on water, $23 million on stormwater and $150 million on corporate assets. This includes $255 million on wastewater treatment assets.
- We are applying leading risk-based practices through our Enterprise Risk Management Framework and investment planning processes. This ensure that our investment is prudent, efficient, targeted and prioritised to provide customers with safe drinking water, a healthy local environment and acceptable service levels.

Contents

1. Overview

Hunter Water is a regional provider of essential services. To meet our regulatory obligations and the reasonable expectations of customers and stakeholders, we maintain and improve our services, in part, through a prudent and efficient capital investment portfolio.

Our service outcomes can be divided into five areas – see below. These are described in detail in Technical Paper 2, including the investments that we have made, and are proposing to make, to maintain and improve service levels.

Figure 1.1 Service outcomes and levels

Hunter Water's ability to meet obligations and deliver service outcomes is a function of our historical capital expenditure profile (Figure 1.2). We substantially reduced capital investment between 2014 and 2018 in response to credit-rating concerns. During this period we absorbed much of the 'headroom' between our actual performance and mandatory standards – we were pushing close to our regulatory limits and carrying compliance risks in a range of areas. This could not be sustained indefinitely.

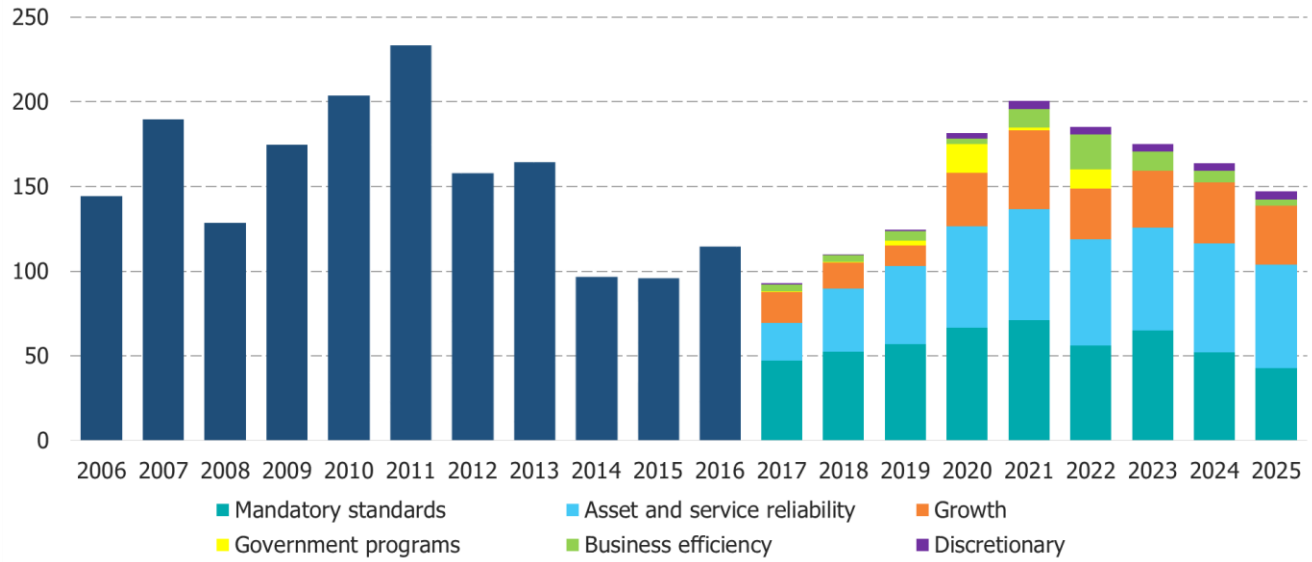
We increased our capital works program during the latter part of the current price period and propose to continue recent spending levels into the next regulatory period. This would see our annual capital investment return to longer-term trend levels.

The vast majority of our capital investment is driven by mandatory requirements, as shown in Figure 1.2. We aim to meet our obligations at the lowest lifecycle cost, improve the efficiency of our business and deliver liveability and environmental improvements where we have the explicit support of our customers.

Technical Paper 2 details changes we have made to our Enterprise Risk Management (ERM) framework that have facilitated this improved approach. Mature risk management ensures that our capital investment is appropriate and that we protect customers from higher prices by having a greater appetite to bear a level of risk in defined areas. Our Board has set out explicit risk appetites and risk tolerance as part of our planning processes. We apply leading risk-based practices and investment planning processes to ensure that our investment is prudent, targeted and prioritised. We seek to be efficient and minimise customer bills by:

- Meeting compliance obligations by investing in solutions that have the lowest lifecycle cost.
- Having robust investment and asset management processes to ensure efficiency and value for money.
- Undertaking 'business efficiency' projects where there are ongoing operating expenditure savings; examples include renewable energy generation and investing in technology to improve productivity.
- Delivering all investments through efficient procurement and construction programs.

Figure 1.2 Hunter Water's capital expenditure profile over time ($millions, $2019-20)



Notes:

1. 2006-2016 figures are based on IPART's assessment of prudent and efficient actual capex, as contained in IPART's Price Determinations in 2009, 2013 and 2016.
2. 2016-2018 reflect Hunter Water's actuals.
3. 2019-2025 are based on Hunter Water's forecast.

2. Introduction

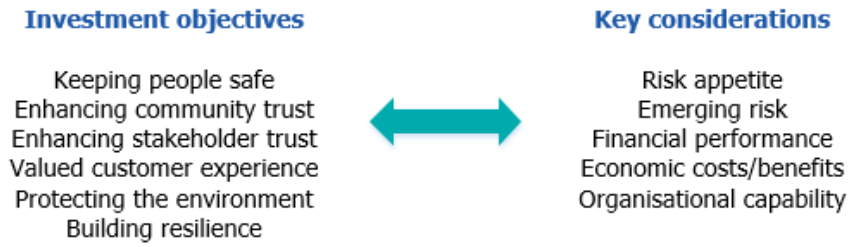
In this Technical Paper, we:

- Describe the objectives and drivers of our capital investment
- Compare actual regulated capital expenditure for the current price period with the regulated capital expenditure allowance set in IPART's 2016 Determination
- Describe proposed forward capital investment portfolio for the next price period and longer-term (10-year) investment plans, and
- Explain our processes for planning and delivering our capital portfolio to ensure capital investments are prudent and efficient.

3. Investment objectives and drivers

3.1 Capital investment objectives

The regulatory obligations faced by Hunter Water are in place to protect customers, the community and the environment. We are improving our focus on delivering positive outcomes that result from complying with these obligations. Prudent and efficient investment planning and delivery is critical for achieving these outcomes.



We have made a number of improvements to help us achieve our investment objectives. These improvements involve:

- Better engaging with the community and stakeholders
- Realigning corporate strategy
- Undertaking strategic planning programs in water resilience and sustainable wastewater
- Revising risk management processes
- Updating investment management processes
- Supporting growth and good development
- Investing in technology and digital solutions to catch-up to other comparable service providers, and
- Taking opportunities to improve productivity and efficiency.

3.2 Investment drivers

3.2.1 IPART capital expenditure drivers

Hunter Water's capital investments are prudent and driven by IPART's capital expenditure drivers. Table 3.1 provides a definition of each of the investment drivers.

3.2.2 Mandatory standards/regulatory requirements

Meeting our regulatory obligations and providing high quality services requires significant capital investment. The regulatory obligations that are mainly met through capital investment relate to:

- staff and community safety
- reliable water supply and security
- drinking and recycled water quality
- operating licence requirements and performance standards
- Environment Protection Licences (EPLs)
- dam safety requirements, and
- Australian codes of practice.

We describe our regulatory requirements in further detail in Technical Paper 2 and Technical Paper 10.

Table 3.1 IPART's capital expenditure drivers

IPART driver	Definition
Existing mandatory standards	Asset expenditure because of an existing mandatory standard. Examples include expenditure to improve the reliability of assets to ensure compliance with existing mandatory standards.
New mandatory standards	Asset expenditure because of a new mandatory standard.
Asset and service reliability	Capital expenditure intended to enhance asset and service reliability.
Growth – funded by cash capital contributions	Asset expenditure to meet the requirements of new customers or increased requirements of existing customers in accordance with mandatory standards. Expenditure is funded through cash income from developer charges and should be verifiable through the DSP process.
Growth – other	Asset expenditure to meet the requirements of new customers or increased requirements of existing customers in accordance with mandatory standards. Expenditure is funded through cash income from charges other than developer charges.
Government programs	Asset expenditure to meet specific Government programs. The expenditure is driven by the Government program which may override other objectives such as commercial return.
Business efficiency	Asset expenditure that is wholly justified on the grounds of expected reductions in operating expenditure. The resulting savings should be reflected in the operating budget.
Discretionary standards	Asset expenditure because of a discretionary standard. Agencies may need to supply additional justification for this type of expenditure such as "community willingness to pay" analysis.

3.2.3 Risk management

We use our risk management processes in conjunction with mandatory investment drivers (mandatory standards, asset replacement and growth) to identify, prioritise and implement risk-based investment decisions and meet our obligations at the lowest possible lifecycle cost. In Technical Paper 2, we provide a detailed description of our rigorous and transparent risk management processes that are set out in our updated Enterprise Risk Management (ERM) framework.

Our mature approach to risk management means that we are willing to bear a higher level of risk in some areas than others. This approach helps to ensure that we don't invest more than is required to meet our obligations and, in turn, keep customers' bills affordable.

Nine of the strategic risks identified in our ERM framework require capital infrastructure solutions to effectively manage the risks. These risks are:

1. Uncontrolled drinking water leakage
2. Non-compliance with environmental legislation
3. Inability to manage biosolids
4. Inability to manage recycled water
5. Non-compliance with Operating Licence requirements
6. Non-compliance with agreed water quality standards
7. Inadequate water/wastewater capacity
8. Critical asset failure, and
9. Unsafe work environment/behaviours.

The impact of risk on capital investment has been thoroughly considered to identify both the upper order of magnitude of required investment and timeframes to implement future solutions. These assessments have been included within our investment management processes: specific risk-analysis is captured in business cases and risk-based prioritisation has been undertaken across the entire capital portfolio.

3.2.4 Asset replacements

Hunter Water's asset base includes assets such as dams, treatment plants, pump stations, pipelines, channels, tunnels, storages and ICT infrastructure. The assets are valued at approximately $7.9 billion (gross replacement cost). Our infrastructure:

- Has a mixed age profile that varies in condition, integrity and compliance with asset standards, and
- Is spread across a wide and geographically diverse area of operations, requiring continual monitoring, operation, maintenance and assessments.

If an asset deteriorates and fails, there is potential for services to customers to be interrupted, environmental impacts, or the safety of the community and our employees to be put at risk. To continue to provide services and meet regulatory requirements we must effectively maintain and eventually replace assets when they reach end of service life.

We monitor, maintain and replace assets through a certified Asset Management System that involves using a risk-based lifecycle decision framework. We plan and implement any replacements through robust capital investment processes.

3.2.5 Growth and regional development

Hunter Water works with developers and the community to support and facilitate residential and non-residential growth and development in the region. We do this by:

- Providing additional service capacity for new regional development by upgrading water and wastewater infrastructure
- Facilitating connections to existing services, and
- Effectively engaging with developers, the community and other stakeholders including local councils, government departments and industry bodies.

Enabling good development in the Lower Hunter region is a strategic priority for Hunter Water. Part of this work includes publishing better information on projected growth in our area of operations and planned capital expenditure. We have also enacted changes to the funding arrangements for those assets that connect new developments and provide shared infrastructure in our water and wastewater systems.

Growth plan

We publish an annual Growth Plan[1] that provides information on the likely timing of residential and non-residential development and also outlines the anticipated timing of investment in new network infrastructure to meet regional planning objectives.

The Growth Plan is based on data on actual development activity from various sources, including the Hunter Regional Plan 2036, the NSW Department of Planning and Environment, local councils, our customer connections database, developer servicing strategies and 'Section 50' connection applications.

The Growth Plan includes detailed growth maps showing the likely timeframe for development using a colour-coding system. We use these growth maps to help prioritise capital works and to determine the funding and delivery category for infrastructure necessary to connect a new development to our system.

[1] Our annual Growth Plan is available at: https://www.hunterwater.com.au/Resources/Documents/Building-and-Development/Funding-of-Growth-Infrastructure-(FoG)/Growth-Plan---Funding-and-Delivery-of-Growth-Infrastructure.pdf.

The Growth Plan provides details of growth-related infrastructure projects that Hunter Water plans to fund and deliver in the next five years. The costs associated with these regional assets are recovered through tariff pricing. We fund regional assets where it is in the best interests of the broader community. Typically, this would occur where the asset provides servicing capacity for potential growth in a geographic region serving a broad population.

Funding and delivery of growth infrastructure

We recognise that capital investment in infrastructure to connect new developments can provide shared capacity for future developers and future customers to connect to our networks.

We will consider entering into a commercial agreement with the lead developer (a Developer Delivered Infrastructure Contribution Deed) that provides for the repayment of infrastructure costs incurred by the developer in building right-sized assets when delivery milestones are met. Our decision to enter into such agreements depends on a number of factors, including how the proposed development aligns with the indicative timing of urban growth in the Lower Hunter, as shown in growth maps contained in the Growth Plan.

Hunter Water introduced this funding mechanism in 2018 to appropriately share risk and facilitate urban growth by repaying developers for infrastructure projects that meet agreed development milestones. We must approve the servicing strategy associated with each Developer Delivered Infrastructure Contribution Deed. The servicing strategy will ensure that the new connection and reticulation assets are sized and configured for the new development and any known or likely development that would make use of the new infrastructure.

3.2.6 Business improvement

We must be efficient in order to sustain performance and ensure that prices remain affordable for customers. It is expected, and we are regulated to ensure, operations and activities are performed efficiently. When we assess capital investment options (for instance, upgrading infrastructure to meet a mandatory standard) we seek to optimise lifecycle (capital and operating) costs.

Throughout the current price period, we have investigated and completed capital investments with the primary driver of creating operational efficiencies and lowering lifecycle costs. Typically, these initiatives also have other benefits than saving money, for example, for the environment or for customers.

Some of the improvement initiatives included in our proposed forward capital works portfolio include: energy optimisation, maintenance efficiency, and utilising technology to increase output efficiency and improve outcomes.

3.2.7 Community improvement and liveability

Water utilities are transforming from technically driven organisations to customer-centric organisations where customers are encouraged to have meaningful input in the decisions the businesses make. In recent years, we have increased our focus on understanding what customers want and are willing to pay for. We use this understanding to inform decision-making, including the expenditure proposed in this price submission.

In Technical Paper 1, we describe our customer engagement activities and the willingness-to-pay assessment that we have undertaken to support proposed (material) discretionary expenditure on liveability projects. We describe these projects in Technical Papers 1 and 2.

4. Capital expenditure in the current price period (2016-17 to 2019-20)

4.1 Actual and forecast capital expenditure

Hunter Water's reported capital expenditure during the current price period comprises actual expenditure from 1 July 2016 to 31 December 2018, with forecast expenditure for the remainder of the price period to 30 June 2020. Combined, we expect to invest $508.7 million ($2019-20) during the current price period to meet our regulatory requirements and investment objectives. The composition of the expenditure is shown by product in Table 4.1 and product sub-category in Figure 4.1 and Figure 4.2.

We compare past actual and forecast capital expenditure for the current price period with IPART's 2016 capital expenditure allowance in section 4.3.

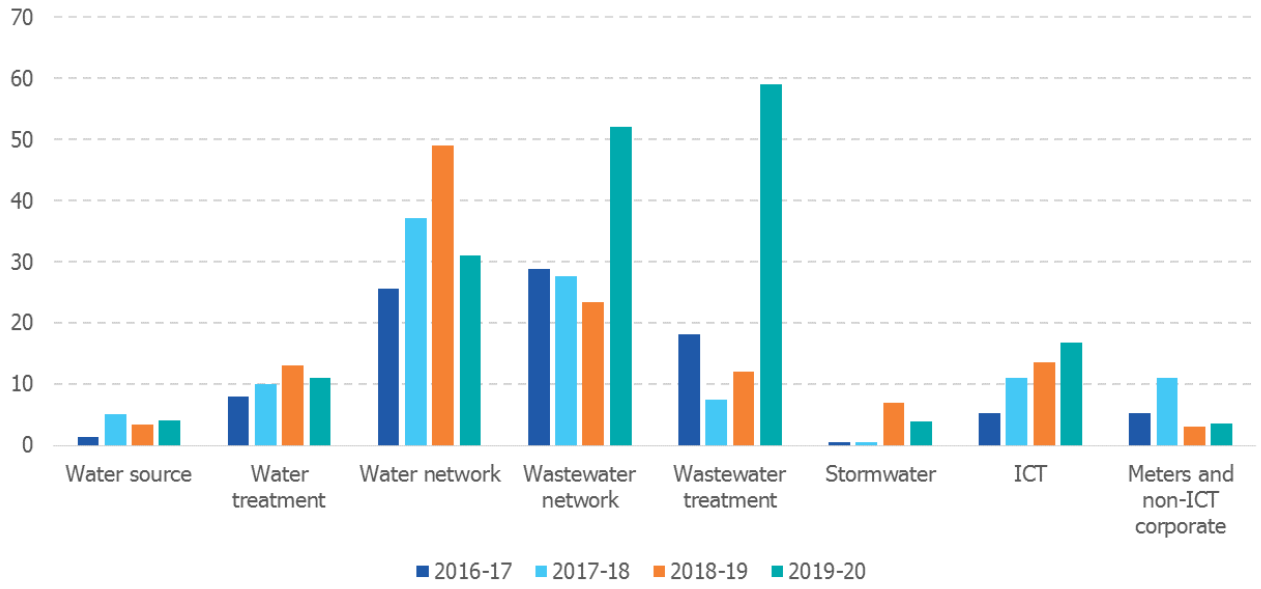
To calculate the revenue requirement to be recovered via tariffs for each of Hunter Water's regulated products (water, wastewater and stormwater), corporate capital expenditure is reallocated across each of these products and recycled water. Although ring-fenced from regulatory revenue calculations, the component of corporate capital expenditure that is allocated to recycled water is included in the corporate and total values in this Technical Paper.

Table 4.1 Capital expenditure in current price period, by product ($million)

Product	2016-17	2017-18	2018-19	2019-20	Total	Total
$terms	*$nominal*	*$nominal*	*$nominal*	*$nominal*	*$nominal*	$2019-20
Water	32.7	49.9	63.8	46.0	**192.5**	**198.7**
Wastewater	43.9	33.5	34.5	111.2	**223.2**	**228.7**
Stormwater	0.5	0.5	6.8	3.8	**11.6**	**11.8**
Corporate	9.8	21.1	16.3	20.3	**67.5**	**69.6**
Total	**86.9**	**105.0**	**121.4**	**181.4**	**494.6**	**508.7**

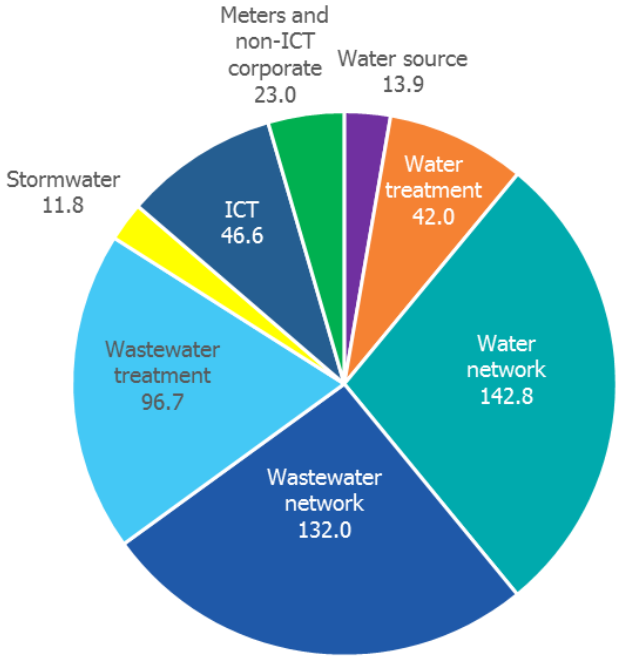
Note: 1. 2018-19 and 2019-20 based on forecast.
Source:
1. Nominal: Hunter Water AIR/SIR, Capex by RAB, rows: 21, 38, 54 and 62 and AIR/SIR, SIR Capex 2, rows 1714, 3492, 5348 and 10,695.
2. $2019-20: Hunter Water AIR/SIR, SIR Capex 1, rows: 15, 69, 142 and 188.

Figure 4.1 Capital expenditure in current price period, by product sub-category ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water analysis, derived from Hunter Water AIR/SIR, SIR Capex 3.

Figure 4.2 Total capital expenditure, by product sub-category ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water analysis, derived from Hunter Water AIR/SIR, SIR Capex 3.

Hunter Water's capital portfolio investment in the current regulatory period is primarily concentrated in the water network, wastewater network and wastewater treatment. The major investments are in:

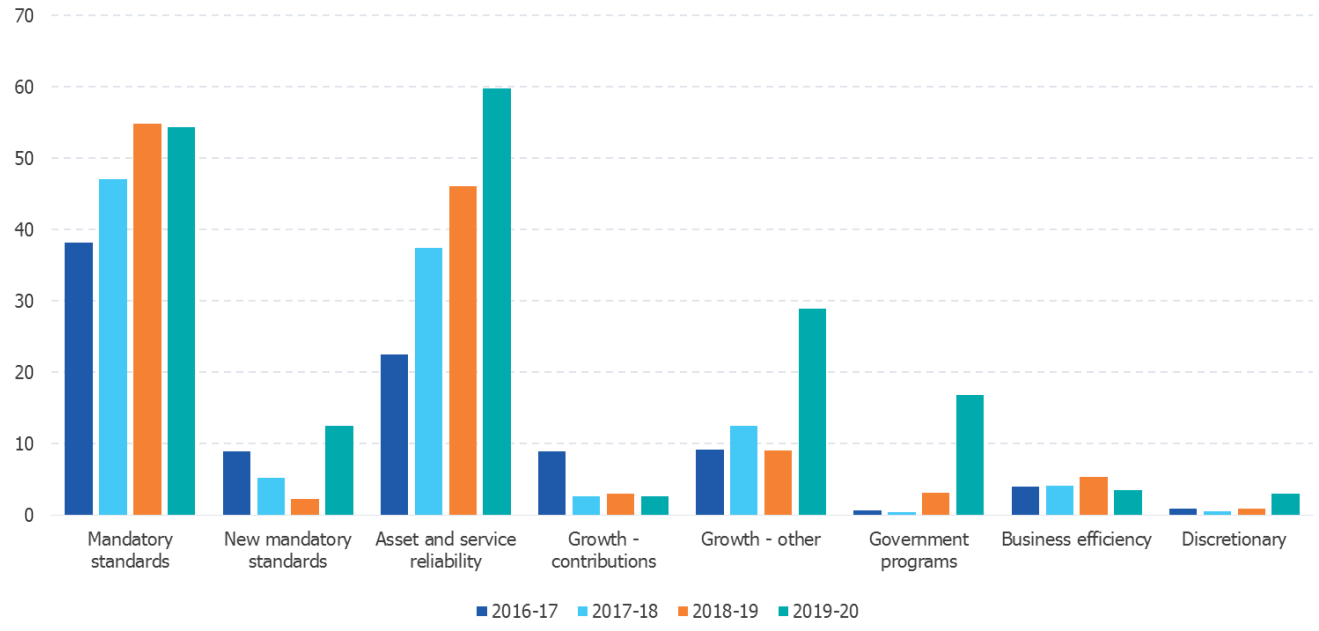
- Renewal of major trunk and reticulation mains to meet regulatory obligations for water continuity
- Upgrades to wastewater treatment and wastewater network assets to minimise environmental impacts and provide capacity for growth and development (particularly in 2019-20)
- Ensuring the safety of our employees and community by upgrading high voltage infrastructure and hazardous chemical facilities, and
- Replacing minor assets to sustain high quality water and wastewater services.

The drivers of our overall capital expenditure in the current price period are shown in Figure 4.3.

During the current price period, we expect to spend $389 million (76 per cent of total capital expenditure) to meet mandatory standards and ensure asset and service reliability. We expect to spend $77 million (15 per cent) on providing service capacity for growth and regional development. The expenditure profile highlights the progressive increase in expenditure on asset and service reliability (increasing from $22 million in 2016-17 to $60 million 2019-20). This increase is due to replacing assets that are at the end-of-life or that are critical assets with a risk of failing.

The increase in growth expenditure in 2019-20 relates to major wastewater treatment upgrades at Farley and Tanilba Bay wastewater treatment plants that are required to meet environmental regulatory requirements and provide capacity to service future development (growth). The increase in government programs in 2019-20 is for the backlog sewer scheme for Wyee.

Figure 4.3 Capital expenditure in current price period, by driver ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 2.

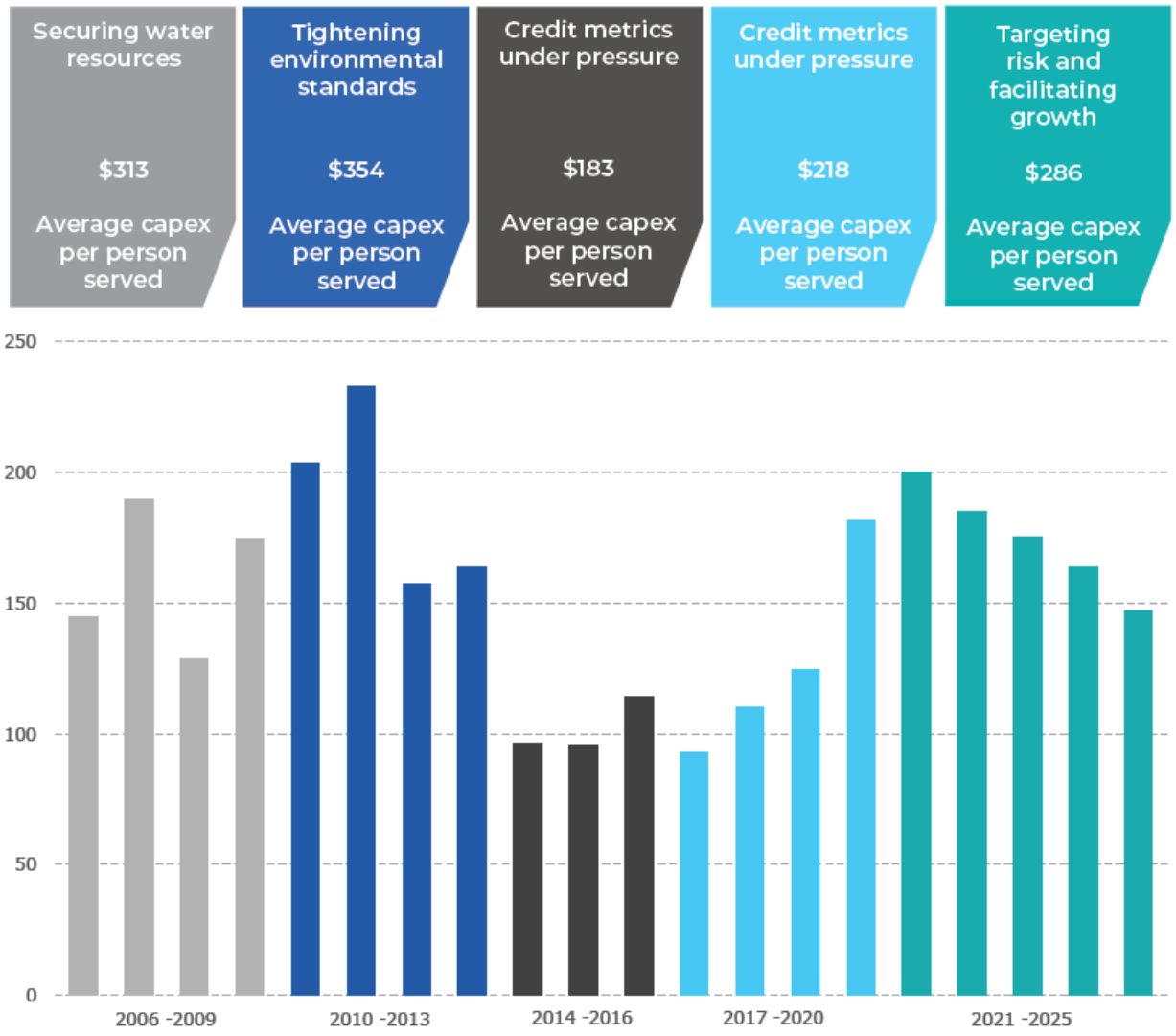
4.2 Capital expenditure trends

The proposed increase in expenditure in 2019-20 should be considered in the context of Hunter Water's longer-term expenditure profile. Through time there are expected variations in expenditure levels due to changing priorities and drivers, and because investment in long-lived assets is staged or 'lumpy'. The increased investment for 2019-20 is consistent with investment levels between 2005 and 2011.

Between 2014 and 2019, we substantially reduced capital investment in response to concerns about maintaining our credit metrics. The low capital expenditure has meant absorbing much of the 'headroom' between actual performance and mandatory limits. While service standards were generally met, the passage of time and lower rate of replacement due to reduced expenditure have increased the average age of assets. Consequently, assets have continued to deteriorate. This has necessitated Hunter Water to increase our capital investment to effectively manage the risk of not meeting both mandatory regulatory standards and growth requirements.

During the next price period, the level of expenditure will return to and broadly remain consistent with the long-term average expenditure that was required in the past to deliver services with an acceptable risk.

Figure 4.4 Hunter Water's capital expenditure profile over time ($millions, $2019-20)



Notes:

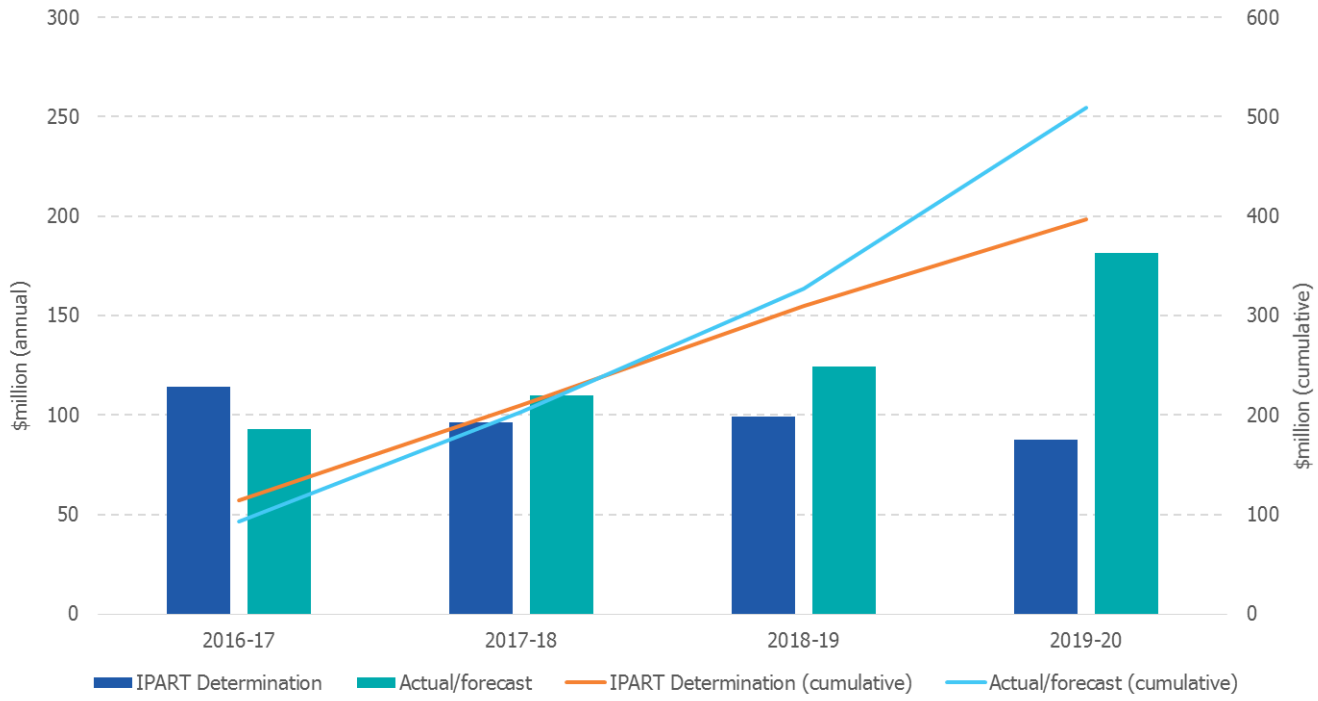
1. 2006-2016 figures are based on IPART's assessment of prudent and efficient actual capex, as contained in IPART's Price Determinations in 2009, 2013 and 2016.
2. All figures are in $2019-20.
3. Expenditures associated with Tillegra Dam have been excluded.

4.3 Expenditure compared to IPART's 2016 allowance

4.3.1 Total expenditure

Hunter Water's regulated expenditure during the first three years of the current price period is broadly consistent with IPART's regulated capital expenditure allowance set in the 2016 Determination (six per cent higher). We spent less than IPART's allowance in the first year of the price period, followed by spending above the allowance in the second and third year. We forecast to be $94 million above IPART's allowance in the final year of the price period (2019-20). This equates to $111 million (28 per cent) above IPART's allowance for the four-year period (see Figure 4.5 and Table 4.2).

Figure 4.5 Total capital expenditure compared with IPART's 2016 allowance ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source:
1. IPART determination: Hunter Water AIR/SIR, SIR Capex 1, Rows 18, 19, 72, 73, 145, 146, 191 and 192.
2. Actual/forecast: Hunter Water AIR/SIR, SIR Capex 1, Rows 15, 16, 69, 70, 142, 143, 188 and 189.

The forecast variance is relatively evenly split across each of Hunter Water's product categories (see Table 4.2). Figure 4.6 shows the major movements, by category, between IPART's 2016 allowance and Hunter Water's actual/forecast expenditure.

The forecast variance is a combination of:

- Changes in the expenditure profile for projects, including projects: brought forward, incurring higher tendered costs, or delayed.
- More investment in asset provisions (e.g. annual allowances for renewing deteriorating assets).
- Undertaking new projects not identified as part of Hunter Water's 2015 price submission.

We note that IPART understands that our business is dynamic and as asset condition assessments are progressively undertaken – or as unexpected issues arise due to extreme or unforeseen events – all regulated businesses will identify new expenditure needs. In this sense, it is essential that Hunter Water has the ability to prudently and efficiently address emerging priorities – and make capital investments if required – that may not have been forecast at the time of the previous price review.

The major project movements are a combination of project efficiencies being realised, projects being delivered earlier than anticipated, projects incurring increased costs as a result of competitive market tenders or conservative estimation, and projects being postponed based on more detailed investigations being undertaken.

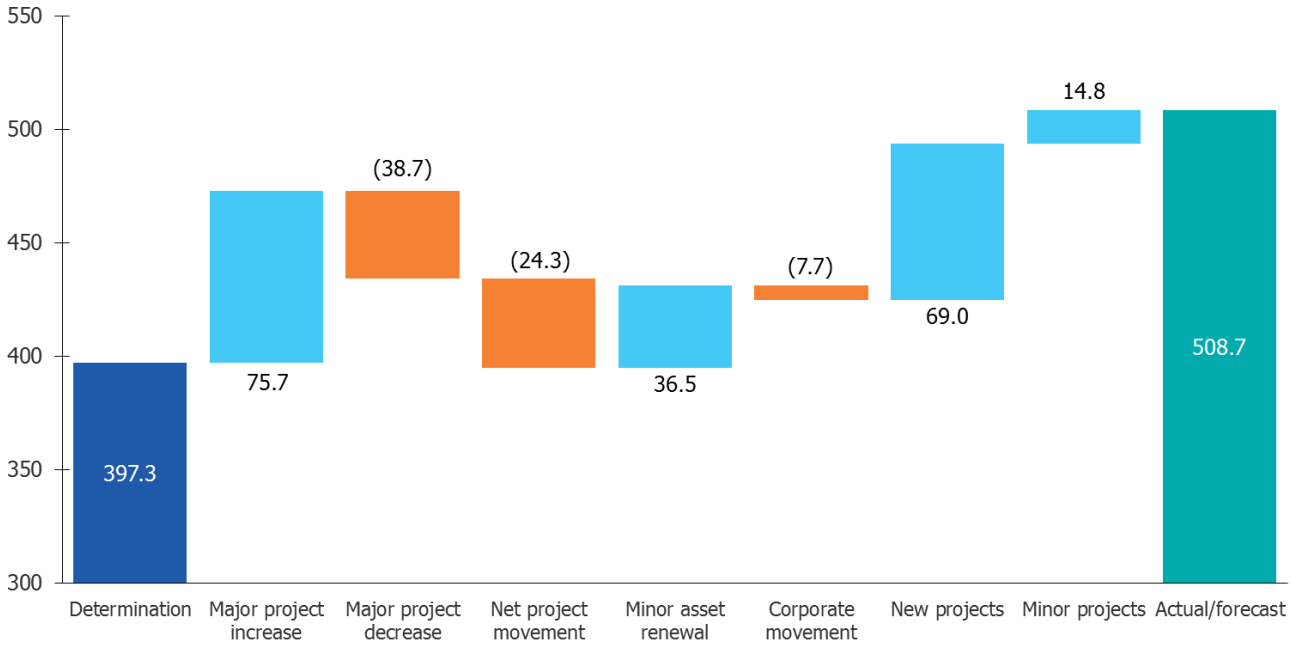
As a complex and dynamic business our culture of prudency and efficiency, transparent investment decision-making and suite of Gateway and business case documentation are important to us. They ensure that our expenditure discipline is maintained under the inevitably changing and uncertain conditions that prevail in this (and other) sectors.

During the current price period we experienced increased risks that materialised through operational incidents and identified deteriorated asset condition. We managed these risks by bringing projects forward, increasing minor asset renewals and undertaking new projects. The increased investment needs were challenged through our structured internal gateway processes, resulting in prudent and efficient budget constraints being systematically imposed upon the business and the capital investment proposal embodied in this price submission.

Proposed capital investments were assessed and prioritised through our investment planning and capital portfolio processes. We postponed or delayed investment where required service levels and obligations could be met without near-term investment. The major investment movements through the current price period are discussed within each product category.

Some of the key variances in expenditure demonstrate that, if anything, we have a tendency to underestimate capital expenditure, based on experience in similar projects and reflecting our procurement and operational commitment to minimising costs and ensuring value for money. This approach means that capital expenditure enters the regulatory asset base later – after detailed IPART review – not prematurely. Consequently, customers do not pay until subsequent regulatory periods, and only if needed.

Figure 4.6 Major expenditure movements compared with IPART allowance ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water analysis, derived from Hunter Water AIR/SIR, SIR Capex 1.

Table 4.2 Actual/forecast expenditure compared with IPART 2016 Determination, by product ($millions, $2019-20)

	2016-17	2017-18	2018-19	2019-20	Total
Water					
IPART Determination	38.0	35.0	43.0	39.7	**155.7**
Actual/forecast	35.0	52.3	65.4	46.0	**198.7**
Variance $	(3.1)	17.3	22.4	6.4	**43.1**
Variance %	(8%)	50%	52%	16%	**28%**
Wastewater					
IPART Determination	55.8	47.6	38.8	39.9	**182.0**
Actual/forecast	46.9	35.1	35.4	111.2	**228.7**
Variance $	(8.8)	(12.4)	(3.4)	71.3	**46.6**
Variance %	(16%)	(26%)	(9%)	179%	**26%**
Stormwater					
IPART Determination	0.6	1.2	1.5	0.4	**3.8**
Actual/forecast	0.5	0.5	7.0	3.8	**11.8**
Variance $	(0.1)	(0.7)	5.5	3.4	**8.0**
Variance %	(21%)	(60%)	366%	765%	**213%**
Corporate					
IPART Determination	19.6	12.7	16.0	7.6	**55.8**
Actual/forecast	10.5	22.1	16.7	20.3	**69.6**
Variance $	(9.1)	9.4	0.7	12.7	**13.7**
Variance %	(46%)	74%	4%	166%	**25%**
Total					
IPART Determination	114.0	96.4	99.2	87.7	**397.3**
Actual/forecast	92.9	110.0	124.4	181.4	**508.7**
Variance $	(21.1)	13.6	25.3	93.7	**111.4**
Variance %	(19%)	14%	25%	107%	**28%**
Total cumulative					
IPART Determination	114.0	210.4	309.6	397.3	**397.3**
Actual/forecast	92.9	202.9	327.3	508.7	**508.7**
Variance $	(21.1)	(7.5)	17.7	111.4	**111.4**
Variance %	(19%)	(4%)	6%	28%	**28%**

Notes:
1. 2018-19 and 2019-20 based on forecast.
2. Total includes corporate costs reallocated to recycled water.

Source: Hunter Water AIR/SIR, SIR Capex 1, rows: 15, 18, 69, 72, 142, 145, 188 and 191.

4.3.2 Water

Hunter Water expects to invest $198.7 million ($2019-20) for the provision of water services in the current price period. This is $43 million (28 per cent) above IPART's 2016 allowance. The majority of expenditure is on the water network (72 per cent) and water treatment (21 per cent) as shown in Table 4.3.

Table 4.3 Water: capital expenditure compared with IPART's allowance ($millions, $2019-20)

Product sub-category	2016-17	2017-18	2018-19	2019-20	Total
Water source	1.4	5.1	3.3	4.0	**13.9**
Water treatment	7.9	10.0	13.1	11.0	**42.0**
Water network	25.6	37.2	49.0	31.1	**142.8**
Total	**35.0**	**52.3**	**65.4**	**46.0**	**198.7**
IPART Determination	**38.0**	**35.0**	**43.0**	**39.7**	**155.7**

Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 1.

Asset replacement (renewals) accounts for 77 per cent ($154 million) of expenditure on water during the current price period. This involves a combination of:

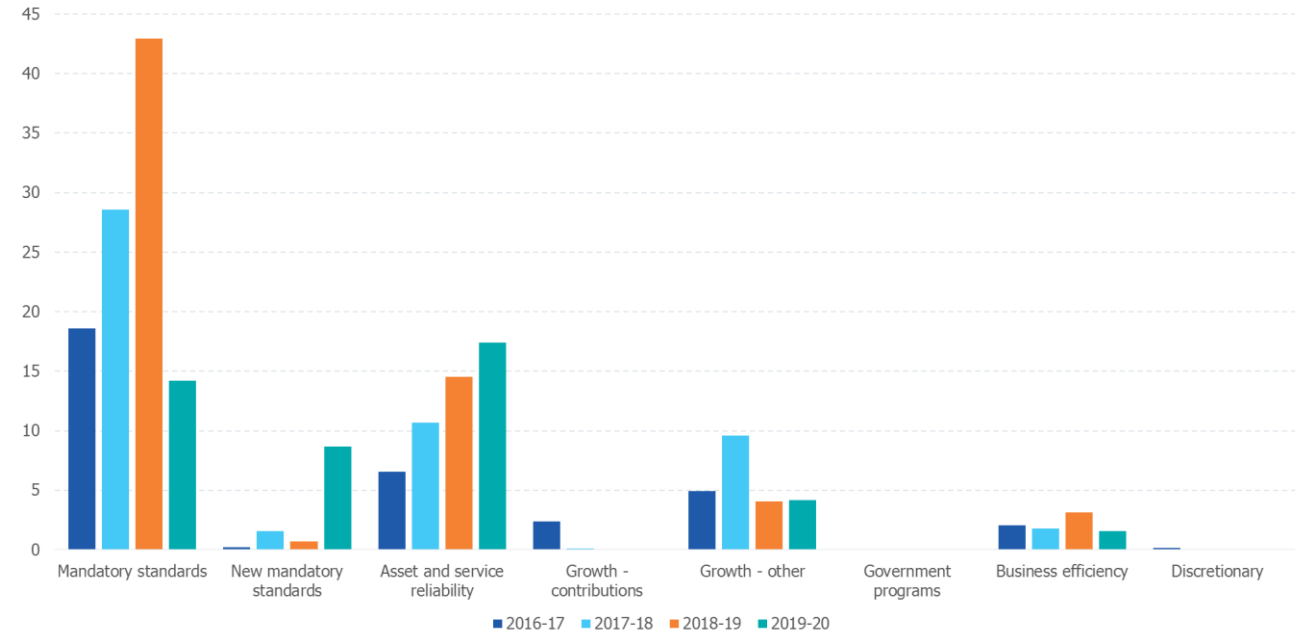
- Replacement of reticulation water mains within residential areas which break and interrupt customer supply
- Proactive replacement of large bulk-trunk supply critical water mains based on asset deterioration to prevent large interruption to customer supply, and
- Electrical/mechanical equipment replacements at treatment plants or pump stations to either ensure continued operation or to ensure safety and environmental standards are maintained.

The expenditure has resulted in infrastructure being constructed that:

- Maintains water security by replacing or refurbishing dams, weirs, canals, pump stations and bore-fields to ensure source water can be transported from the water catchments to the dams for supply
- Ensures safe drinking water, through replacing or upgrading water treatment plants and chemical dosing within the water network, and
- Provides reliable water supply to both existing customers and new growth through a pressurised water network directly to the customers.

Figure 4.7 shows annual expenditure over the price period, split by IPART driver. The majority of expenditure is required to meet mandatory standards and asset and service reliability ($165 million or 83 per cent), or to provide service capacity for growth and regional development ($25 million or 13 per cent).

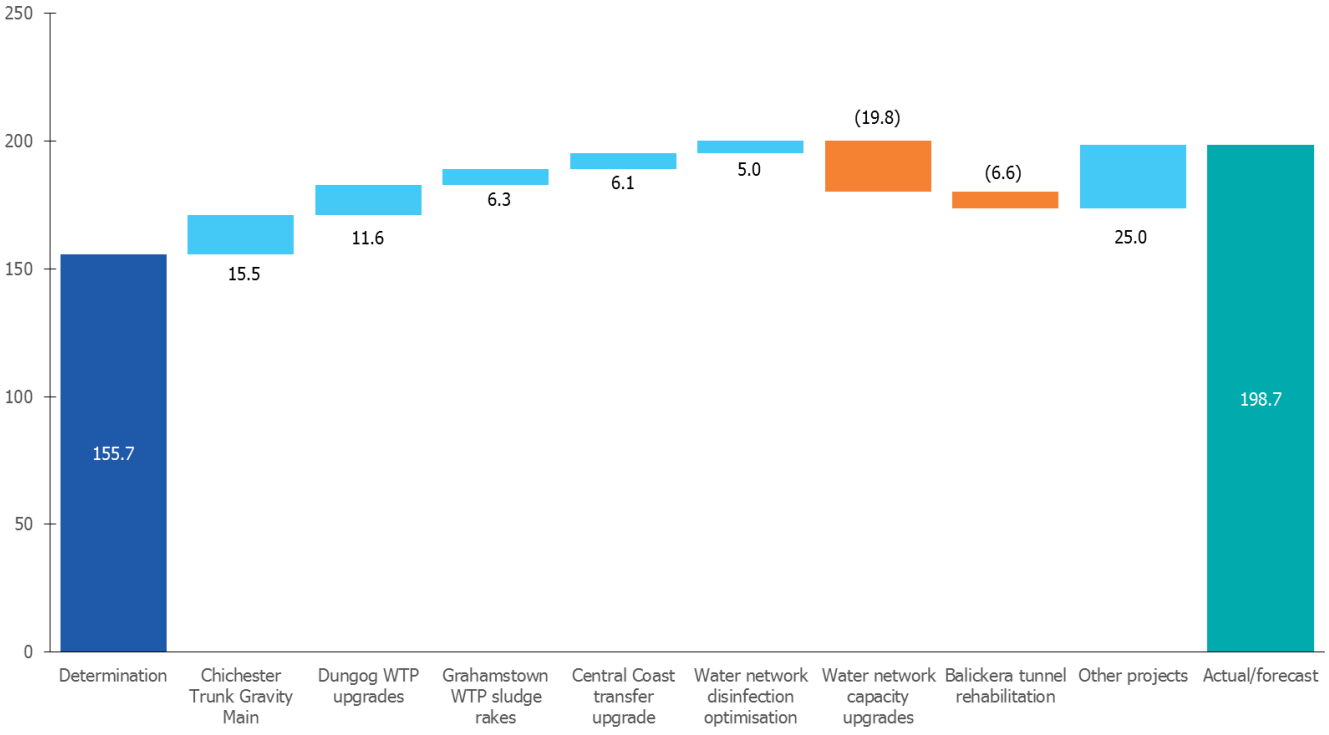
Figure 4.7 Water: capital expenditure, by driver ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: AIR/SIR, SIR Capex 2, rows: 315, 618, 921, 1224, 1514, 1617, 1677 and 1712.

The variance of actual/forecast expenditure compared with IPART's 2016 allowance (see Figure 4.8) is the result of: projects being brought forward, increased project scope/costs, new projects, and a net increase of accumulated minor project adjustments. These increases have been offset by project reductions and delays. The major project movements through the current price period are described below.

Figure 4.8 Water: major movements compared with IPART's allowance ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water's 2019 AIR/SIR, SIR Capex 1.

Chichester Trunk Gravity Main replacement

This bulk supply water main provides 40 per cent of Hunter Water's average water supply and directly supplies 100,000 customers. Throughout 2017-18, an increased rate of operational failures occurred due to asset deterioration. The increased failure rate and poor asset condition necessitated $44.6 million in planned replacement being brought forward by two years. This results in additional expenditure of $15.5 million in the current price period.

Dungog water treatment plant upgrades

This project was a combination of reducing the risk of non-compliant drinking water quality, and asset replacements for electrical and hazardous chemicals to meet mandatory standards. The project increased by $11.6 million primarily due to required asset replacements that were identified throughout the price period based on operational incidents and asset condition assessments.

Grahamstown water treatment plant sludge rakes replacement

This is a new project ($6.3 million in current price period) to ensure reliable supply that was not foreseen at the time of Hunter Water's 2015 price submission. A condition assessment program identified the deteriorated asset condition that requires replacement before failure occurs and consequent impacts on water continuity.

Central Coast transfers upgrade

This project is a core component of the Lower Hunter Water Plan to enable a two-way transfer of 30ML of water per day between Hunter Water and the Central Coast Council. The transfers improve system yield and resilience for both utilities. The increased expenditure ($6.1 million) relates to increased scope; the inclusion of an upgrade to a chlorinator at Toronto to ensure water quality outcomes.

Water network disinfection optimisation strategy

This project is to ensure adequate drinking water quality through upgrades to the disinfection system throughout the network. The project has incurred increased costs ($5.0 million) due to incorporating employee safety compliance initiatives at network chlorinator facilities.

Water network capacity upgrades

Planned expenditure on this program ($19.8 million) was primarily deferred to reflect updated knowledge of network capacity requirements. Capacity requirements were lower than forecast due to reduced peak demands, slower growth in Cessnock and a detailed supply assessment undertaken for Cameron Park.

Balickera tunnel rehabilitation

The reduced expenditure ($6.6 million) is associated with the requirement to undertake more detailed geotechnical and refurbishment investigations, resulting in a 2-year delay to the project.

4.3.3 Wastewater

Hunter Water expects to invest $228.7 million ($2019-20) to provide wastewater services in the current price period. This is $47.6 million (26 per cent) above IPART's 2016 allowance. The majority of expenditure is on the wastewater network (58 per cent), with remaining expenditure on wastewater treatment (42 per cent) as shown in Table 4.4.

Table 4.4 Wastewater: capital expenditure compared with IPART's allowance ($millions, $2019-20)

Product sub-category	2016-17	2017-18	2018-19	2019-20	Total
Wastewater network	28.84	27.68	23.34	52.12	**132.0**
Wastewater treatment	18.08	7.45	12.07	59.08	**96.7**
Total	**46.92**	**35.13**	**35.40**	**111.20**	**228.7**
IPART Determination	**55.78**	**47.57**	**38.76**	**39.92**	**182.0**

Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 1.

Asset replacement (renewals) comprises 58 per cent ($132 million) of expenditure on wastewater during the current price period. Replacements are required to ensure continued operation and that safety and environmental standards are met.

The upgrades involve constructing new infrastructure to both reduce the likelihood of environmental impacts from system discharges and to provide capacity for growth and regional development.

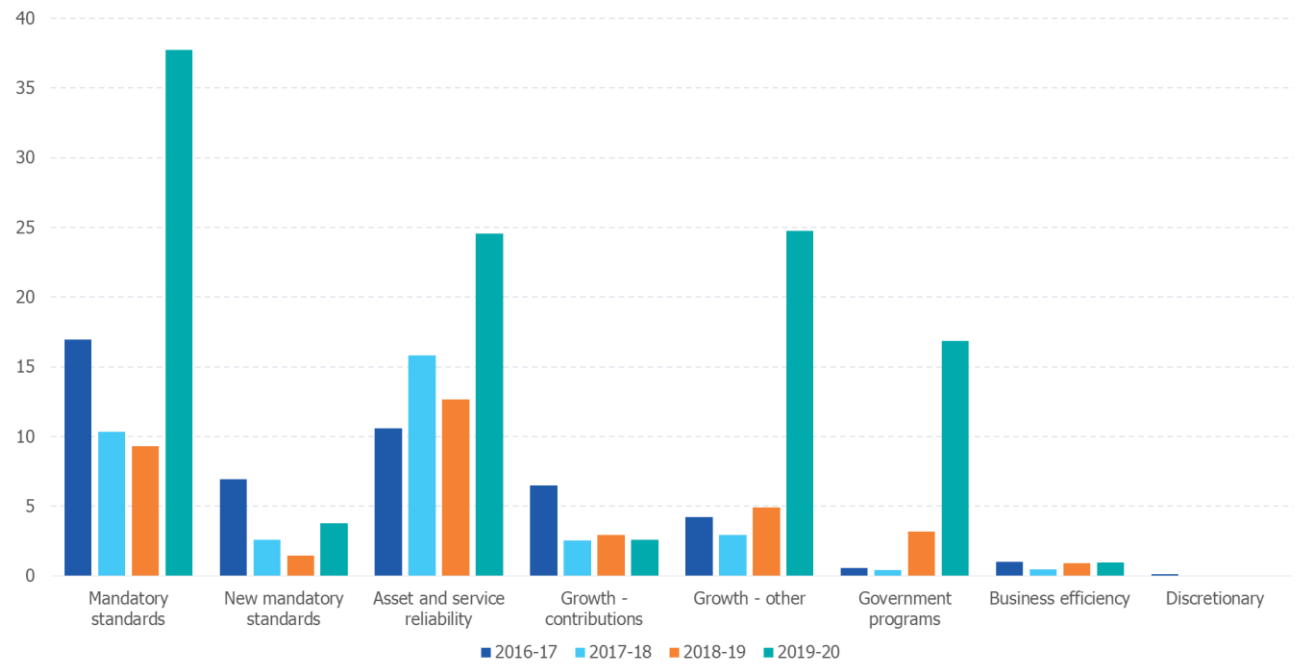
The remaining major expenditure is associated with: providing capacity for growth, providing backlog sewer, or to improve the existing system for better environmental performance.

The expenditure has resulted in infrastructure being constructed that:

- Provides wastewater service capacity for new growth and regional development
- Provides reliable wastewater assets to transport wastewater from customers to wastewater treatment plants, and
- Processes wastewater through treatment plants prior to the effluent being discharged to either recycled water customers or receiving environments.

Figure 4.9 shows annual expenditure over the price period, split by IPART driver. The majority of expenditure is required to meet mandatory standards and asset and service reliability ($153 million or 67 per cent) or to provide service capacity for growth and regional development ($51 million or 22 per cent).

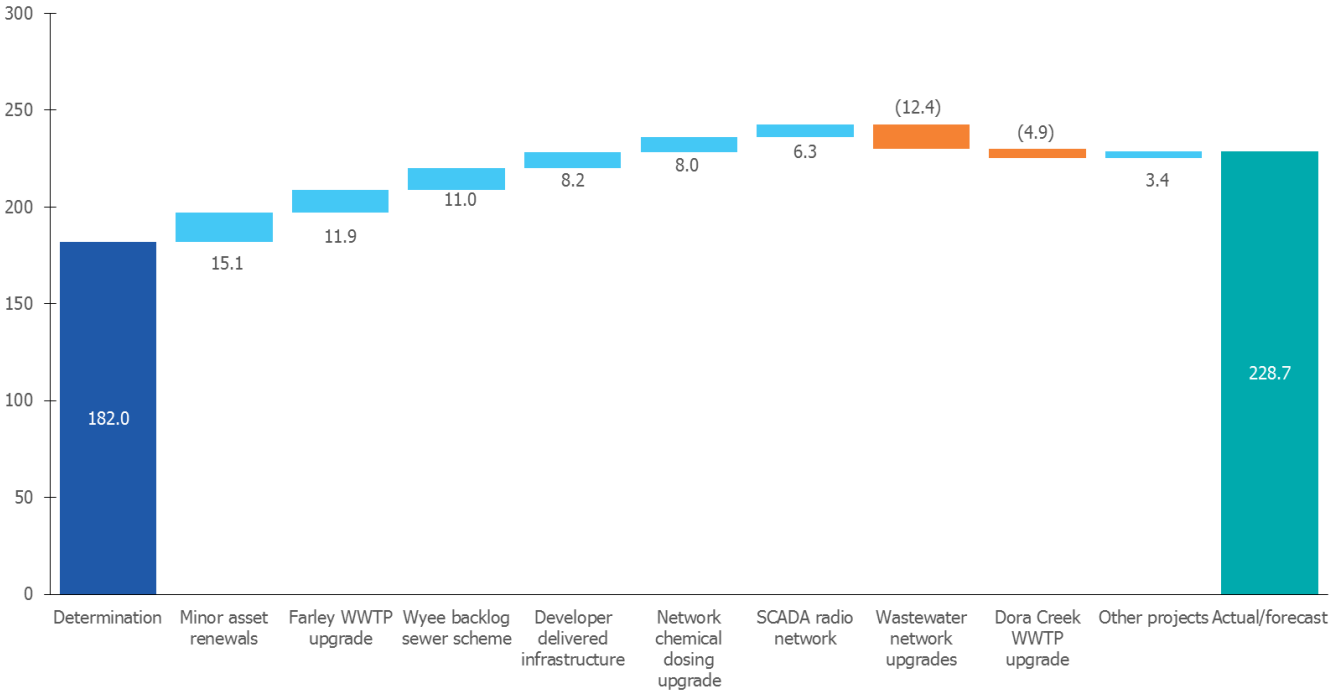
Figure 4.9 Wastewater: capital expenditure, by driver ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 2, rows: 2005, 2303, 2607, 2909, 3195, 3298, 3387 and 3490.

The variance of actual/forecast expenditure compared with IPART's 2016 allowance (see Figure 4.10) is the result of: projects being brought forward, increased asset renewals, increased project scope and costs, new projects, and a net increase of accumulated minor project adjustments. These increases have been offset by project reductions and delays. The major project movements through the current price period are described below.

Figure 4.10 Wastewater: major movements to IPART allowance ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 1.

Minor asset renewals

We have experienced an increasing rate of asset failures at wastewater treatment plants and with sewer mains. To ensure services are maintained within environmental requirements, these assets have been replaced resulting in expenditure that is $15.1 million higher than anticipated.

Farley wastewater treatment plant upgrade

This major project is driven by a need to improve effluent quality and rehabilitate assets to meet mandatory standards. The project requires an additional $11.9 million expenditure in the current price period as annual operational performance monitoring identified the need to bring forward the planned upgrade.

Wyee backlog sewer program

We are constructing wastewater infrastructure to service the Wyee township that currently has a septic sewerage system. The government has directed Hunter Water to deliver the project to improve health and environmental conditions. Construction is to be brought forward into the current price period ($11.0 million variance).

Developer-delivered wastewater infrastructure

Under our new developer-delivered infrastructure program, we expect to spend $8.2 million on repayments during the current price path to developers as new wastewater infrastructure are delivered and new customer lots are connect to Hunter Water's system.

Network chemical dosing upgrades

We identified asset deterioration and deficiencies in chemical dosing equipment used to reduce and prevent wastewater network odours and corrosion. To address these deficiencies we are upgrading these units, requiring an additional $8.0 million expenditure within the current price period.

SCADA radio network upgrade

This project involves replacement of the outdated telemetry radio network that has a high failure risk and is necessary to meet requirements of the Australian Communications and Media Authority. This project has additional expenditure of $6.3 million in the current price period due to higher than forecast construction costs and earlier project completion.

Wastewater network upgrades

This project involves construction of additional capacity to minimise wastewater overflows associated with wet weather performance. Hunter Water is undertaking industry-leading strategies to determine effective improvement solutions, resulting in more detailed investigations and delayed upgrade expenditure ($12.4 million).

Dora Creek wastewater treatment plant (WWTP) Upgrade

We spent less on this project in this price period than previously forecast ($4.9 million) due to the project being deferred to allow consideration of the corporate biosolids strategy.

4.3.4 Stormwater

Hunter Water expects to invest $11.8 million ($2019-20) for the provision of stormwater services in the current price period. This is $8 million (213 per cent) above IPART's 2016 allowance (see Table 4.5). The majority of expenditure involves the replacement or rehabilitation of stormwater culverts within the Throsby Creek catchment.

Table 4.5 Stormwater: capital expenditure compared with IPART's allowance ($millions, $2019-20)

Product	2016-17	2017-18		2018-19	2019-20	Total
Stormwater total	0.5	0.5		7.0	3.8	**11.8**
IPART Determination	0.6	1.2		1.5	0.4	**3.8**

Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 1.

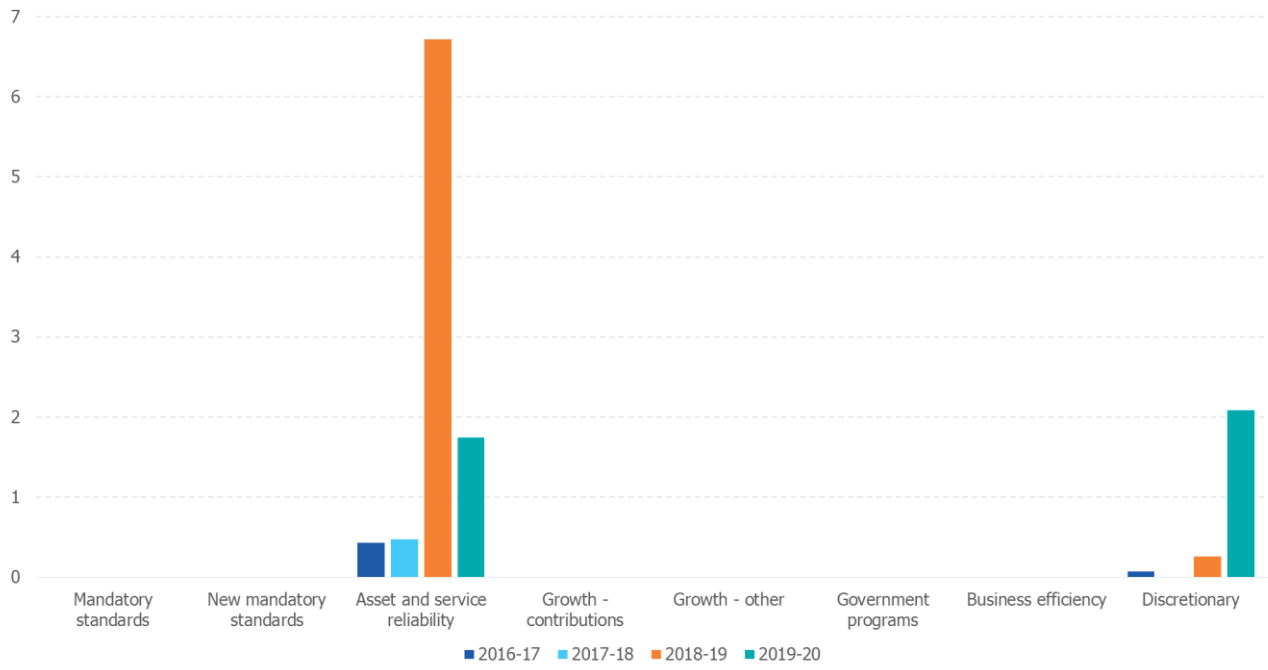
There was minimal capital investment on stormwater assets in 2016-17 and 2017-18. This increases in 2018-19 and 2019-20 due to:

- Replacement and rehabilitation of stormwater culverts, due to concrete deterioration and corrosion. This expenditure was necessary to ensure safety for the community (to prevent collapse) and minimise flooding.
- Naturalisation of an existing stormwater channel (Cottage Creek). This discretionary expenditure is supported by a customer willingness to pay survey and is co-funded by a grant from the Newcastle Port Community Contribution Fund that is administered by the Hunter and Central Coast Development Corporation.

These expenditures were unforeseen and were not included in Hunter Water's 2015 price submission.

Figure 4.11 shows annual stormwater expenditure over the price period, split by IPART driver.

Figure 4.11 Stormwater: capital expenditure, by driver ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, *SIR Capex 2*, rows: 3811, 4417 and 5243.

4.3.5 Corporate

Hunter Water expects to invest $69.6 million ($2019-20) in corporate expenditure in the current price period. This is $13.7 million (25 per cent) above IPART's 2016 allowance. The majority of expenditure (67 per cent or $46.6 million) is on Information and Communication Technology (ICT) as shown in Table 4.6.

Table 4.6 Corporate: capital expenditure compared with IPART's allowance ($millions, $2019-20)

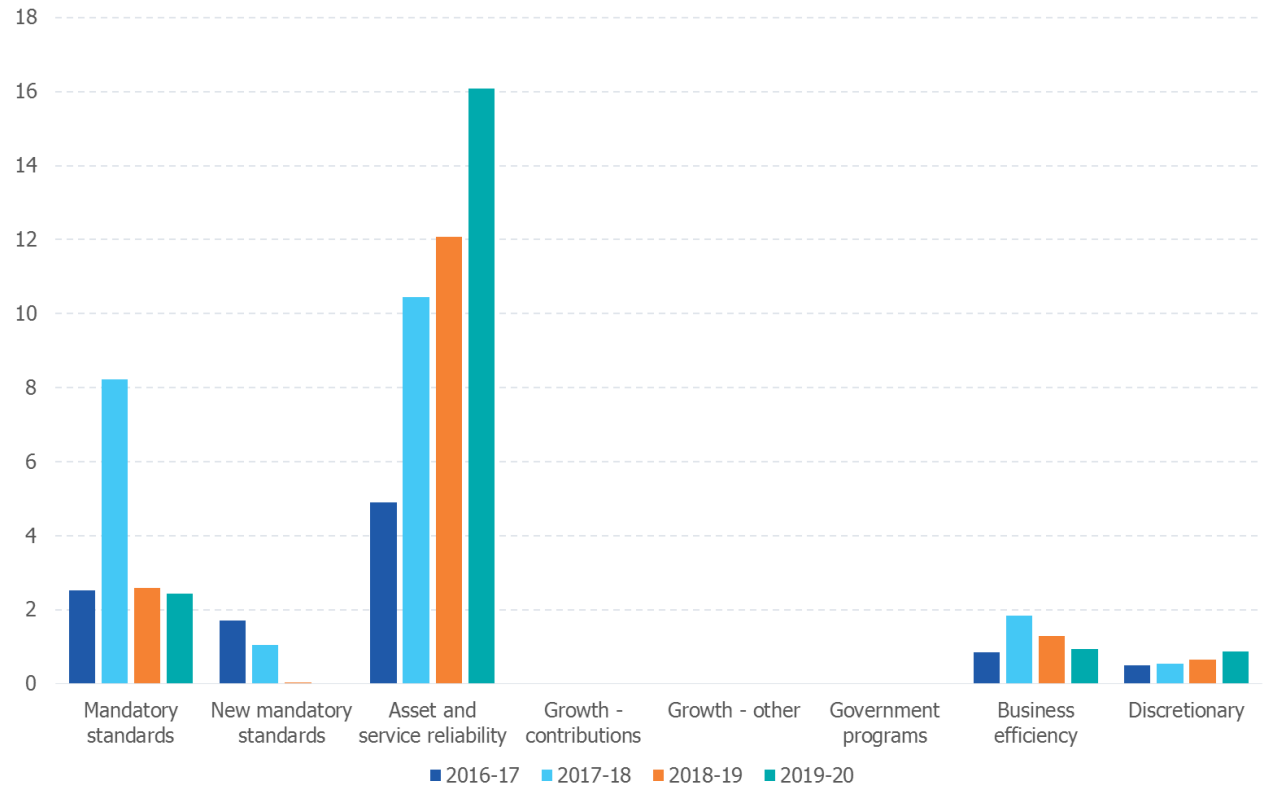
Product sub-category	2016-17	2017-18	2018-19	2019-20	Total
ICT	5.2	11.0	13.6	16.8	**46.6**
Meters	1.9	1.5	1.3	0.8	**5.5**
Corporate services	3.4	9.6	1.7	2.7	**17.5**
Total	**10.5**	**22.1**	**16.7**	**20.3**	**69.6**
IPART Determination	**19.6**	**12.7**	**16.0**	**7.6**	**55.8**

Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 1.

The ICT investment involves replacing essential applications and hardware to support the business and customer services. The Corporate services investment involves upgrades and replacements of fleet, office and depot facilities, common asset replacements (fences, access roads, security) and land management.

Figure 4.12 shows annual expenditure over the price period, split by IPART driver. The majority of expenditure is required to meet asset and service reliability requirements ($43.5 million or 63 per cent) or mandatory standards ($18.6 million or 27 per cent).

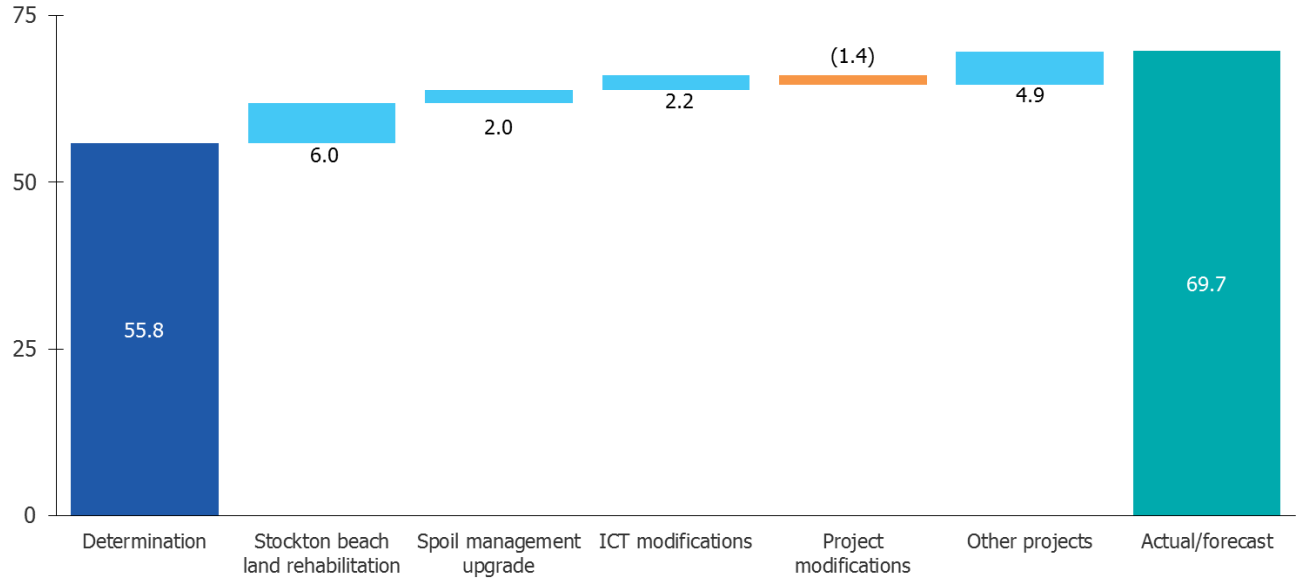
Figure 4.12 Corporate: capital expenditure, by driver ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 2, rows: 9181, 9484, 9787, 10090, 10394, 10497, 10592 and 10685.

The variance of actual/forecast expenditure compared with IPART's 2016 Determination (see Figure 4.13) is the result of a combination of major projects and a cumulative net increase across a number of small projects. The major individual project movements during the current price period are described below.

Figure 4.13 Corporate: major movements to IPART allowance ($millions, $2019-20)



Note: 2018-19 and 2019-20 based on forecast.
Source: Hunter Water AIR/SIR, SIR Capex 1.

Stockton beach land rehabilitation

We experienced an East Coast Low in April 2017 resulting in significant erosion of Hunter Water property at Stockton, exposing a decommissioned waste disposal site. To ensure community safety and meet environmental requirements, emergency and short term restoration and rehabilitation works were required to stabilise the site and minimise future erosion ($6.0 million).

Spoil management upgrade

Changes in environmental regulations have necessitated improvements in the management of spoil generated through pipeline maintenance and construction activities. The changes required modification to depots for the storage, classification and disposal/reuse of the spoil ($2.0 million).

4.4 Output measures for the current price period

IPART's 2016 Determination set capital expenditure output measures as an indication of effective delivery of proposed investment plans.

Our performance against output measures in the current price period indicates that we have exceeded the output expected for all but two of the measures, with switchboard and meter replacements being slightly below the original forecast.

We have more than doubled the output of replacements of critical water and sewer mains. This reflects the deterioration of these assets and need for increased investment in minor asset renewals (above IPART's 2016 allowance). Planning and design for at-risk asset replacements on treatment plants, trunk mains, telemetry and stormwater channels/culverts are likely to result in a substantial increase in asset renewal outputs for the remainder of the current regulatory period.

Table 4.7 Output measures for the current price period

Output measure	Units	Target	2016-17	2017-18	2018-19	2019-20	Price period Total	Variance %	Comments
Water services									
Renewal/reliability of distribution mains	km	20	5.6	7.4	7.8	1.2	22	10%	On target
Trunk mains undergoing condition assessment	km	12	17	0	0.1	37.0	54.1	351%	Hunter Water has initiated additional steel trunk main assessment based on operational incidents
Critical trunk main replacement	km	3	2.1	3.2	0.1	10	15.4	413%	Increased length based on CTGM being brought forward
Wastewater services									
Renew non-critical mains	km	36	14.1	14.0	8.0	8.0	44.1	23%	On target
Critical sewer mains undergoing condition assessment	km	55	31.2	29.8	20.0	2.0	83	51%	Increased critical main condition assessment based on critical asset failures and environmental incidents
Renewal/refurbishment of critical sewerage mains	km	1.5	1.4	0.6	0.6	0.5	3.1	107%	
Mechanical and electrical assets									
Telemetry upgrades (water and wastewater)	sites	250	60	76	105	115	356	42%	Increased telemetry replacements based on increased asset failure and risk of obsolete equipment
Switchboards replaced	sites	40	17	0	0	19	36	(10)%	On target
Replacement or refurbishment of pumps	pumps	430	175	123	123	150	571	33%	Hunter Water has implemented refurbishment improvements

									resulting in reduced lead times and more cost-effective refurbishments
Output measure	**Units**	**Target**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**Price period Total**	**Variance %**	**Comments**
Stormwater drainage									
Stormwater drainage channel rehabilitations	km	0.7	0.1	0.02	0.95	0.30	1.37	224%	Increased rehabilitation based on asset condition assessment and asset deterioration
Corporate									
Replace 20mm customer meters	meters	67,000	25,577	11,354	12,090	13,000	62,021	(7%)	On target

Note: 2018-19 and 2019-20 based on forecast
Source: Hunter Water analysis

5. Proposed capital expenditure (2020-21 to 2024-25)

Hunter Water has investigated and developed strategies and investment plans to meet regulatory requirements and community expectations. Our proposed investment aims to balance the competing challenges of maintaining affordable customer bills while:

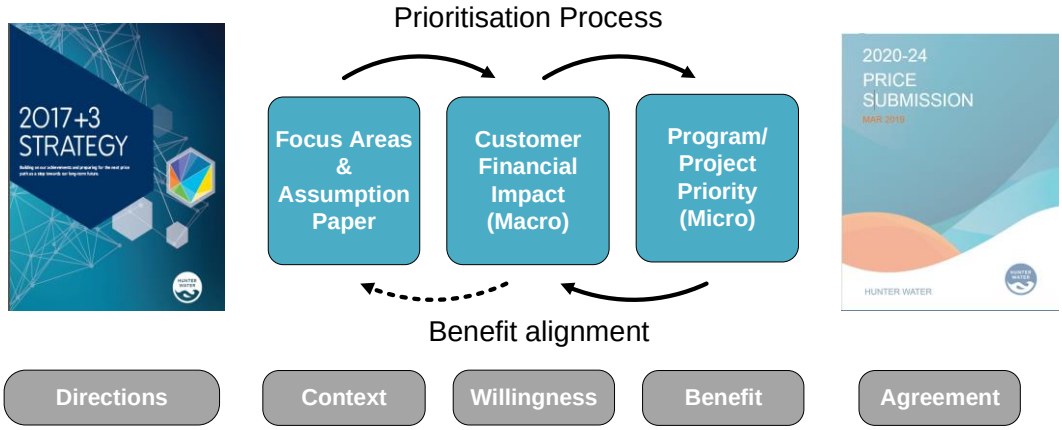
- Meeting community expectations about safety, services and environmental impacts
- Positioning the business to benefit from technological change and catch up with other service providers – simply meeting (not exceeding) minimum corporate standards, and
- Improving community liveability where we have explicit and demonstrated customer and community support to do so, as the result of undertaking a willingness to pay assessment.

5.1 Investment forecasting approach

5.1.1 Assessment of proposed investments

Hunter Water uses an investment management framework to identify, prepare, assess and prioritise the capital portfolio to meet regulatory requirements and community expectations. The framework incorporates: strategic direction alignment, leading industry business case processes, technical review, financial impact assessment and executive governance (see Figure 5.1).

Figure 5.1 Investment management framework



Developing our capital investment proposal involved identifying, preparing, and assessing projects and programs, including the following actions:

- All investments were identified and aligned with IPART's capital expenditure drivers and Hunter Water's risk appetite statements, strategic opportunities and aspirational goals.
- All proposed investments are backed by a business case that is at least at the preliminary business case stage (Gateway 1).
- All new (preliminary and other) business cases were presented to the Management Investment Committee comprised of our Executive Management Team, for assessment of prudency and efficiency and potential exclusion from or inclusion in our proposed capital portfolio.
- Under the better business cases frameworks, each business case details the opportunity/problem, strategic alignment, benefits, options, economic assessment, procurement, financial impact and scheduling. Each case assess the proposal for alignment with IPART's drivers, Hunter Water's strategy, technical accuracy and suitability, and our capability to deliver outcomes and benefits.

5.1.2 Prioritisation of capital investment

Capital investment prioritisation involved assessing all potential capital investments against risk appetite, strategic priorities and the maintenance of affordable customer bills and sustainable credit metrics. Investment scenarios were created and assessed. Trade-offs between each of the objectives were considered and a preferred investment allowance was identified. The optimal mix of programs and projects was then confirmed within the investment allowance.

Hunter Water monitors and manages the influences to service performance and investment requirements, through annual assessments and reporting both internal through planning and management system and externally through Operating Licence audits.

5.2 Overall capital expenditure program (5-year)

Hunter Water aims to meet regulatory requirements, partner with the community for sustainable growth and regional development, implement business improvements and support community-driven environmental and liveability improvements.

Regulatory requirements are met by providing high quality water, wastewater and stormwater services that: meet required standards (e.g. Australian Drinking Water Guidelines and Operating Licence System Performance Standards), ensure the safety of employees and the community, and minimise environmental impacts.

Our proposed capital investment for the next price period is $871.4 million ($2019-20) as shown in Table 5.1.

Table 5.1 Proposed capital expenditure, by product ($million, $2019-20)

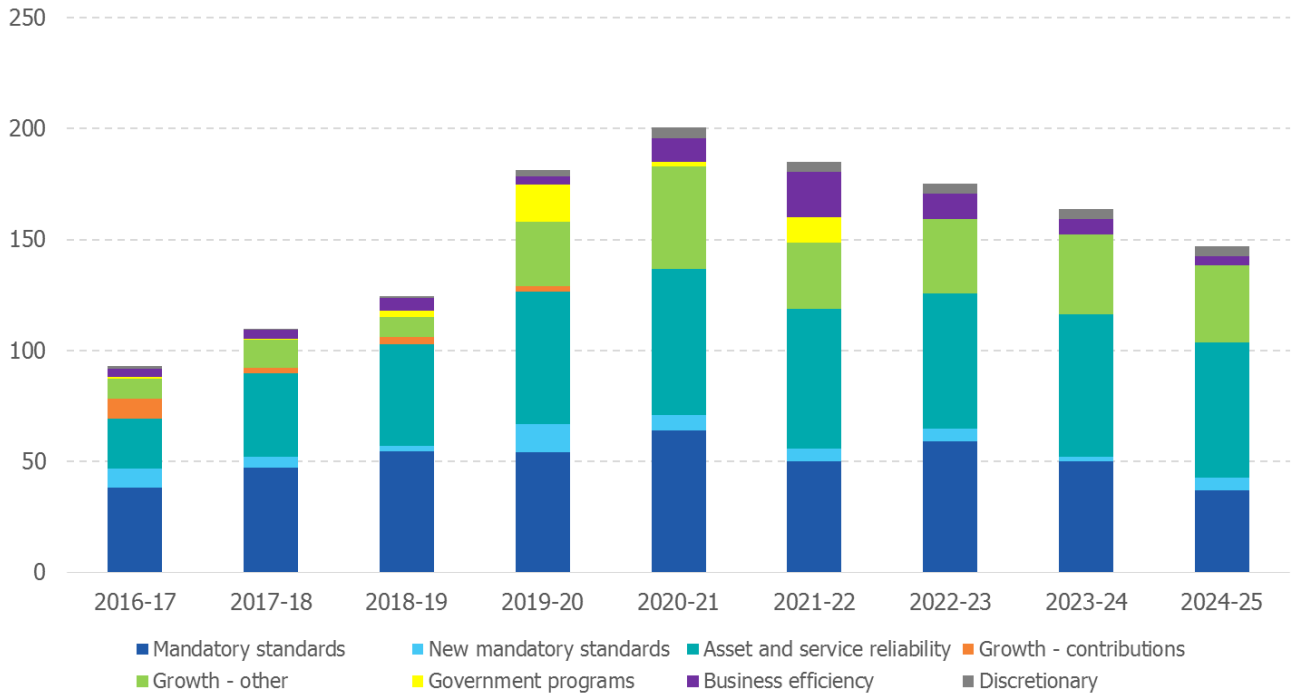
	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Water	39.2	55.3	61.4	57.8	59.6	**273.4**
Wastewater	118.9	83.9	85.8	74.3	61.7	**424.7**
Stormwater	3.7	2.8	4.7	5.9	6.2	**23.1**
Corporate [1]	38.7	43.2	23.2	25.6	19.5	**150.2**
Total	**200.4**	**185.2**	**175.1**	**163.7**	**147.0**	**871.4**

Note 1: 'Corporate' expenditure includes a component allocated to recycled water.
Source: Hunter Water AIR/SIR, SIR Capex 3, rows: 247, 511, 592 and 713.

The drivers of expenditure in Figure 5.2 sets out the proposed return to sustainable levels of investment. The proposed expenditure is necessary and reflects our refined approach to risk management.

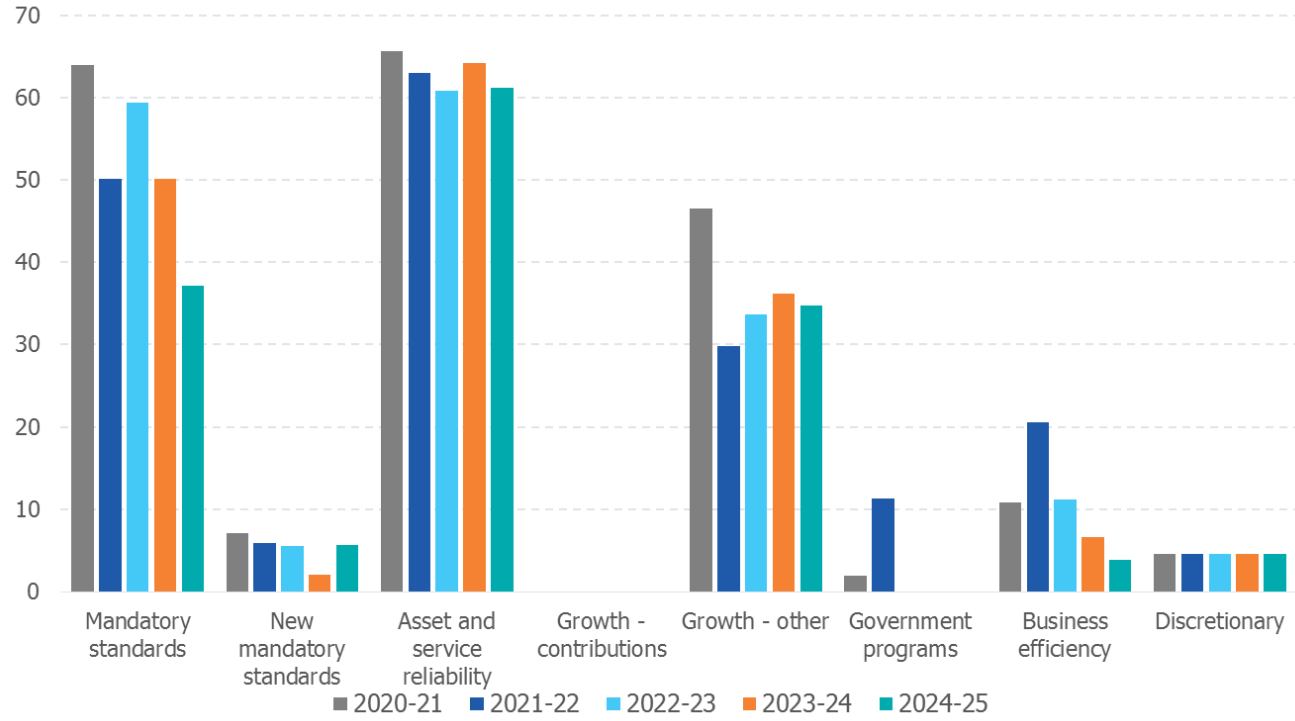
The drivers of projected investment in the next price period are relatively consistent across the five years (Figure 5.3). The exception is the higher investment in 2020-21 for both mandatory standards and growth, due to higher investment in wastewater treatment. Meeting mandatory standards and ensuring asset and service reliability makes up 70 per cent of expenditure during the next price period (Figure 5.4).

Figure 5.2 Expenditure by driver, 2016-17 to 2024-25 ($millions, $2019-20)



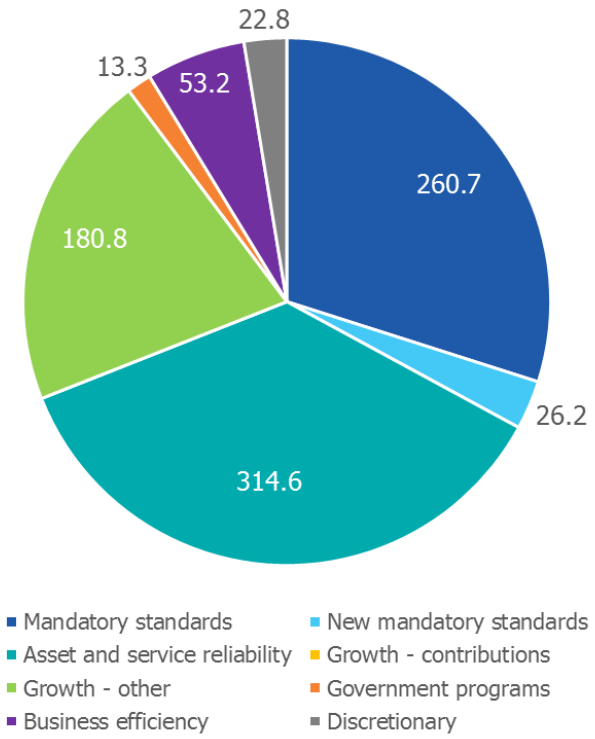
Note: 2018-19 to 2024-25 are a forecast.
Source: Hunter Water AIR/SIR, SIR Capex 2.

Figure 5.3 Proposed capital expenditure, by driver ($millions, $2019-20)



Source: Hunter Water AIR/SIR, SIR Capex 2.

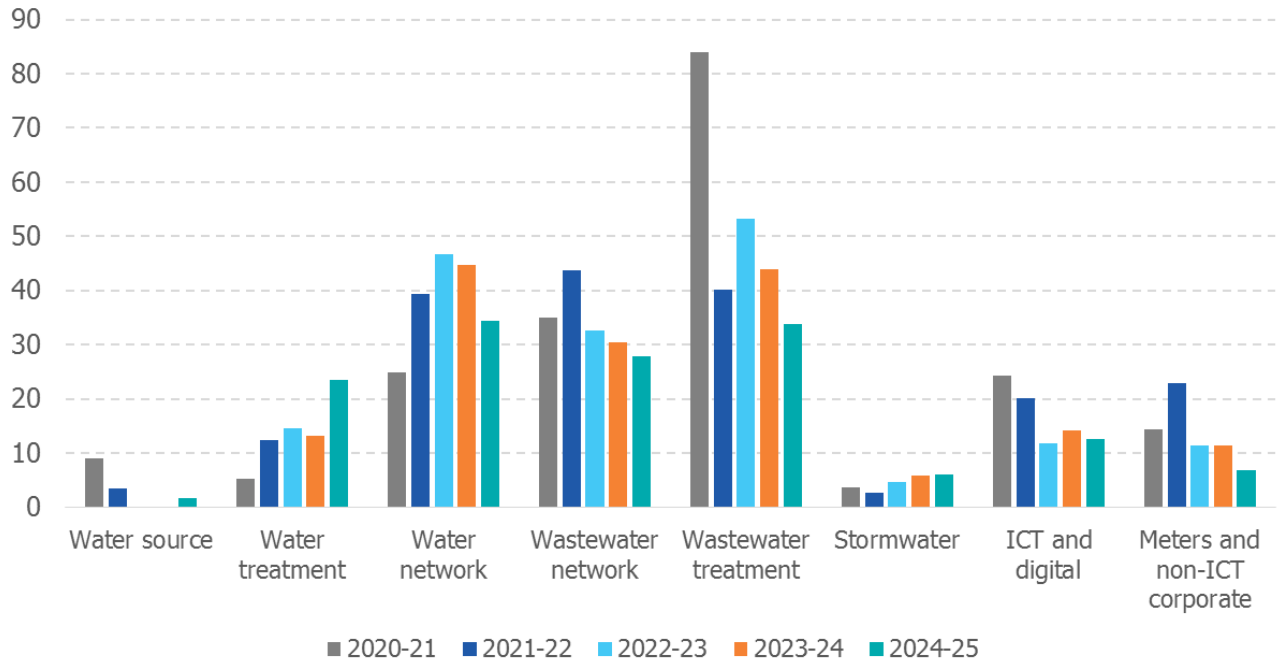
Figure 5.4 Total proposed capital expenditure, by driver ($millions, $2019-20)



Source: Hunter Water AIR/SIR, SIR Capex 2.

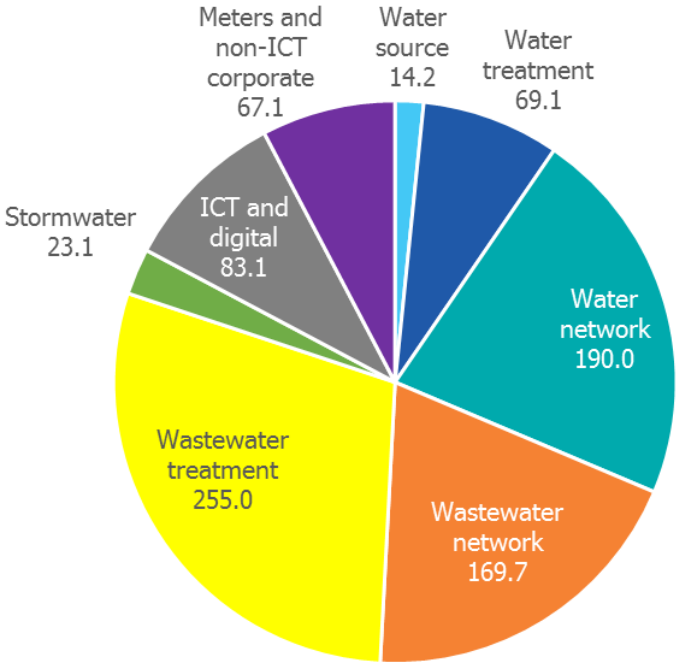
Figure 5.5 and Figure 5.6 show the proposed capital expenditure in the next price period by product sub-category. Approximately half of the total expenditure is on wastewater services: 32 per cent wastewater treatment and 21 per cent wastewater network. Water network expenditure accounts for 24 per cent, water treatment is 9 per cent, ICT is 10 per cent and corporate services are 8 per cent of total expenditure.

Figure 5.5 Proposed capital expenditure, by product sub-category ($million, $2019-20)



Source: Hunter Water analysis, derived from Hunter Water AIR/SIR, SIR Capex 3.

Figure 5.6 Total proposed capital expenditure, by product sub-category ($millions, $2019-20)



Source: Hunter Water analysis, derived from Hunter Water AIR/SIR, SIR Capex 3.

The proposed investment is to deliver the following outcomes:

- Continued wastewater treatment plant upgrades to meet environmental regulations and provide capacity for growth
- The replacement and upgrading of the water network to ensure supply continuity and water quality for existing customers, while providing capacity for growth
- The upgrade of wastewater network infrastructure to meet safety and environmental compliance, while providing capacity for growth
- The upgrade of water resource facilities and water treatment plants to ensure the sustained supply of high quality water
- Asset renewal to sustain high-quality water and wastewater services
- Improved efficiency by reducing (or preventing higher) operating costs or reducing lifecycle costs
- Improved liveability for the community by undertaking investment in areas supported by customer willingness to pay analysis, and
- Continued upgrades and replacement of ICT systems and infrastructure to support the delivery of services.

5.3 Water

Hunter Water's projected investment for water services is $273.4 million ($2019-20), shown in Table 5.2. The majority of this expenditure is on water network infrastructure ($190 million or 70 per cent). Water treatment expenditure accounts for $69 million (25 per cent) and expenditure on water sources is $14 million (5 per cent).

Table 5.2 Water: proposed capital expenditure, by product sub-category ($millions, $2019-20)

Product sub-category	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Water source	9.0	3.5	0.0	0.0	1.7	**14.2**
Water treatment	5.2	12.5	14.7	13.2	23.5	**69.1**
Water network	25.0	39.3	46.7	44.6	34.4	**190.0**
Total	**39.2**	**55.3**	**61.4**	**57.8**	**59.6**	**273.4**

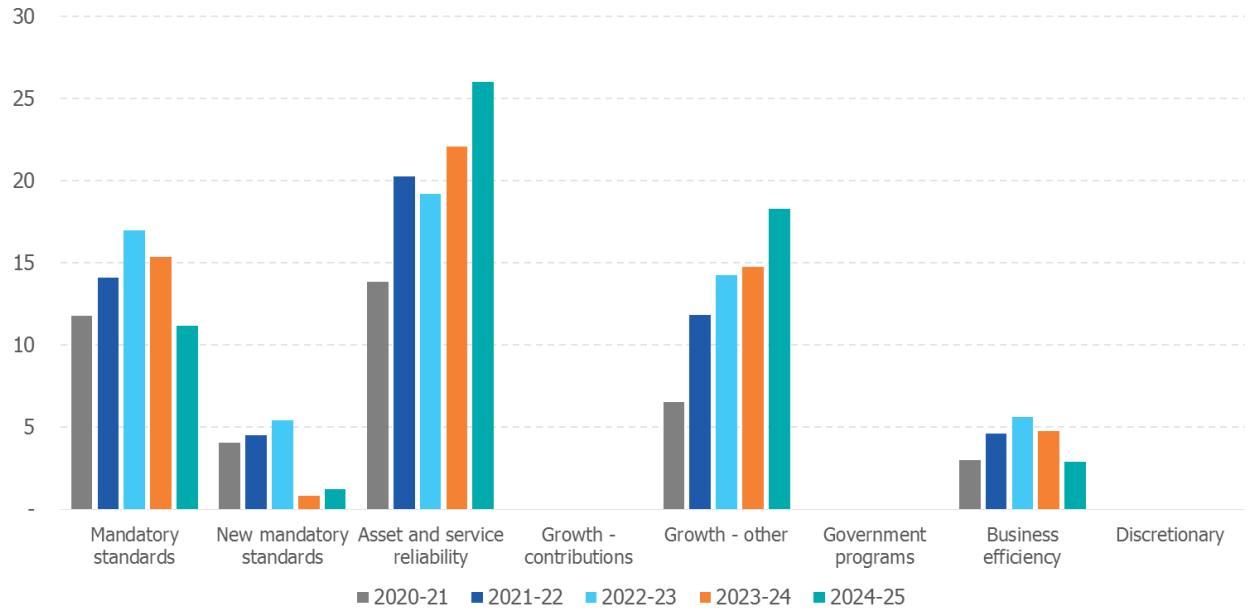
Source: Hunter Water AIR/SIR, SIR Capex 3.

Figure 5.7 shows the proposed expenditure is primarily required to meet mandatory standards and ensure asset and service reliability ($187 million or 68 per cent). Providing service capacity for growth and regional development accounts for $65.7 million (24 per cent).

Increasing expenditure on asset and service reliability (see Figure 5.7) is predominantly due to: replacement of large structures (Balickera Tunnel, Grahamstown water treatment plant clear water tank), critical main replacements (for safety and continuity of supply) and individual asset replacements (asset provisions).

The projected investment in the next price period is a combination of continued investment in water quality upgrades, asset replacements, and network capacity upgrades for the provision of growth. However, two new areas of investment include a program to improve safety risks from failure of critical water mains and proposed investment in reducing water loss in our system. Several of the major water projects/provisions are described below.[2]

Figure 5.7 Water: proposed capital expenditure, by driver ($millions, $2019-20)



Source: Hunter Water AIR/SIR, SIR Capex 2.

[2] Costs are shown for only the next price path (2020-21 to 2024-25).

Critical main safety program

Hunter Water incurred a critical main failure in 2017, which resulted in flooding, safety risks and structural damage to residential buildings. This incident highlighted the potential risks to safety and property associated with pressurised large water mains. In response, we have undertaken an industry-leading investigation and developed a risk-management strategy. The result is proposed investment of $15.8 million to reduce safety risks from the failure of critical mains. The investment involves main replacements, rehabilitation and site controls to minimise the incident and impact of potential flooding.

Water loss reduction program

We have increased our water loss reduction initiatives to ensure adequate long-term water supply and help to defer the next major water source augmentation. The proposed expenditure ($32.8 million) is economic, as measured using Hunter Water's economic level of water conservation methodology.

Water network capacity upgrades

In order to meet our Operating Licence water pressure requirements and cater for growth and regional development, this program involves the construction of increased network capacity. The proposed program ($31.9 million) has been developed in line with our Growth Plan that maps the likely staging of new development across our area of operations.

Developer-delivered water infrastructure

We are investing $14.6 million to support regional development and growth and repay developers for providing lead-in water infrastructure to service new developments and broader growth.

Grahamstown water treatment plant upgrade

This project involves upgrading the existing water treatment plant to manage water quality risks and provide capacity for growth ($18.2 million).

Hazardous chemical equipment upgrades

We propose to spend $12.0 million upgrading all hazardous chemical facilities. This will ensure they are safe for the community and our employees, and minimise potential equipment failures to reduce potential environmental impact.

Asset renewals

We consolidate smaller asset replacements into individual asset provisions. These provisions are managed as investment programs and implemented through asset management principles and risk-based decision models. The asset provisions include treatment plants ($17 million), reticulation pipelines ($15 million), critical pipelines ($13 million), fittings ($7 million) and network pump stations and structures ($15 million and $9 million, respectively).

5.4 Wastewater

Hunter Water's projected investment for wastewater services is $424.7 million ($2019-20). The majority of this expenditure is on wastewater treatment ($255 million or 60 per cent), with the remainder on wastewater network infrastructure ($170 million or 40 per cent).

Table 5.3 Wastewater: proposed capital expenditure, by product sub-category ($millions, $2019-20)

Product sub-category	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Wastewater network	34.9	43.7	32.6	30.4	27.9	**169.7**
Wastewater treatment	83.9	40.2	53.2	43.9	33.8	**255.0**
Total	**118.9**	**83.9**	**85.8**	**74.3**	**61.7**	**424.7**

Source: Hunter Water AIR/SIR, SIR Capex 3.

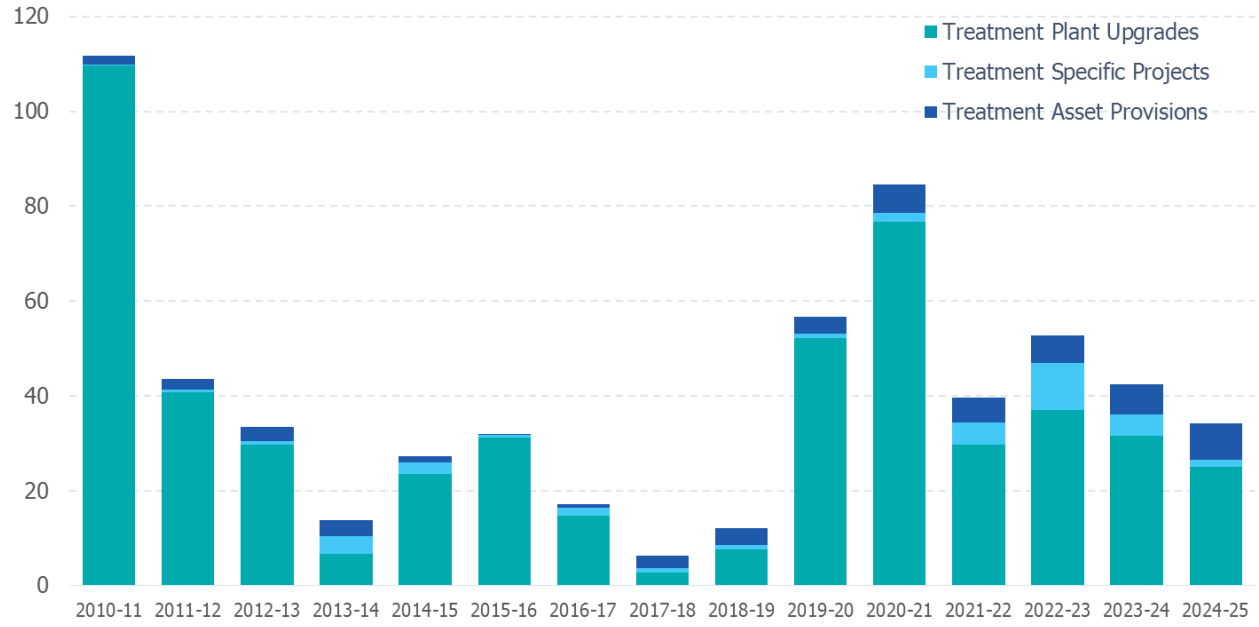
Our proposed expenditure on the wastewater network is similar to the current price period (on an equivalent annualised basis over a comparable five year period). Our expenditure on wastewater treatment will approximately double compared to the current price period. The increase in projected investment is almost entirely due to upgrades to wastewater treatment facilities.

Wastewater treatment plants process wastewater from residential and commercial businesses. The effluent is treated and discharged to either recycled water customers or to the receiving waters in accordance with regulations and conditions set in EPLs. We have regulatory obligation to ensure these environmental requirements are met.

The proposed investment in wastewater treatment plants includes major treatment plant upgrades and smaller individual asset renewals (asset provisions).

Our proposed investment is higher than recent periods of low investment (from 2013 to 2019 – see Figure 5.8). During this time we have utilised the capacity and integrity of existing wastewater treatment assets.

Figure 5.8 Historical capital investment in wastewater treatment ($millions, $2019-20)



Source: Hunter Water analysis

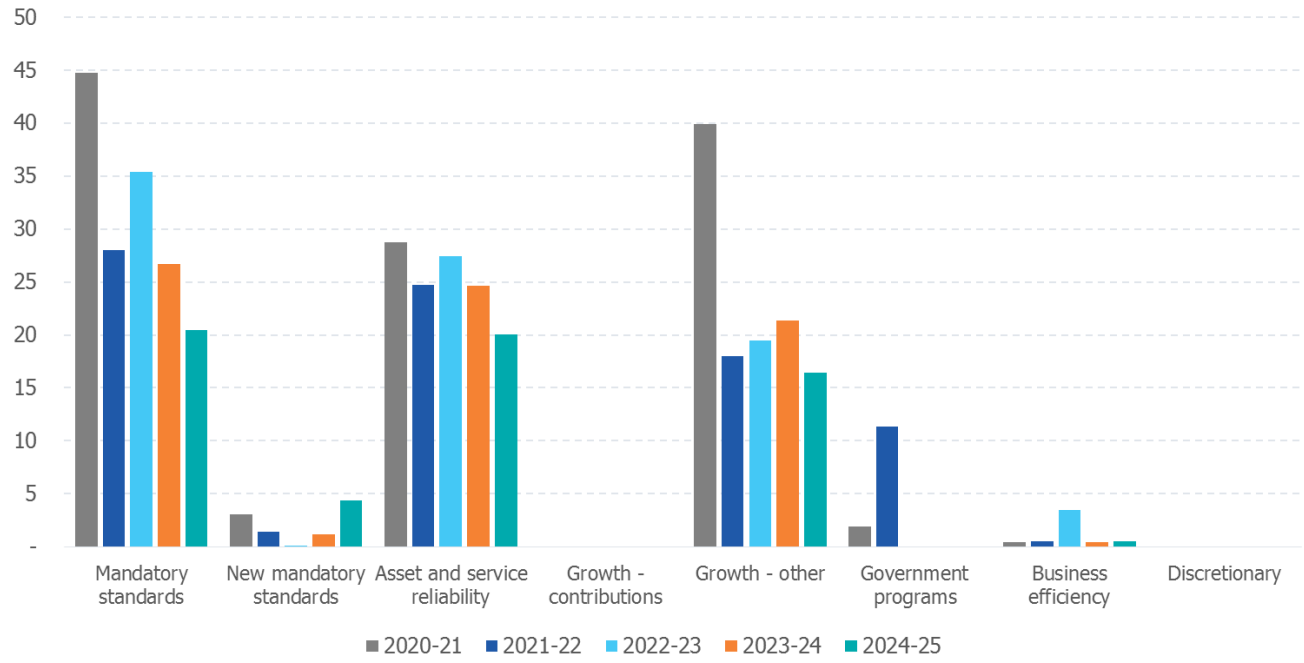
The increase in 2019-20 to 2020-21 includes upgrades to wastewater treatment plants at: Farley ($69 million), Dungog ($23 million), Tanilba Bay ($19 million) and Dora Creek ($18 million).[3]

The major treatment plant upgrades are required to either provide sufficient capacity for large growth precincts (Farley for Aberglasslyn-Rutherford, and Dora Creek for Cooranbong-Morisset and Wyee) or to meet environmental regulatory requirements. For either driver, there is limited opportunity to postpone investment based on the previous investment profile and opportunities for alternative solutions that have previously been implemented.

Projected expenditure on wastewater treatment asset provisions ($32 million) increases from approximately $3 million per year in the current price period to approximately $6 million per year in the next price period. This increased investment is a combination of continued asset deterioration which has resulted in increased asset failures and asset replacements, along with the construction of more complicated process systems within modern treatment plants, which are reaching their end of life and will require replacement within the next price period.

Figure 5.9 shows that proposed wastewater expenditure is primarily required to meet mandatory standards and ensure asset and service reliability ($291 million or 69 per cent). Providing service capacity for growth and regional development accounts for $115 million (27 per cent). Investment in 2020-21 is considerably higher than in other years due to planned major wastewater treatment upgrades.

Figure 5.9 Wastewater: proposed capital expenditure, by driver ($millions, $2019-20)



Source: Hunter Water AIR/SIR, SIR Capex 2, rows: 2005, 2303, 2607, 2909, 3195, 3298, 3387 and 3490.

Other major wastewater investment programs and projects for the next price period are described below.[4]

[3] Project costs for 2019-20 to 2024-25.
[4] Costs are shown for next price path (2020-21 to 2024-25).

Network pipeline and structures minor asset renewals (asset provision)

Hunter Water owns and operates over 5,000 km of sewer mains. We propose to invest $28 million in the replacement of sewer mains, maintenance holes and wastewater structures that have failed or deteriorated. This will ensure that wastewater services are sustained within environmental and safety requirements.

Developer-delivered wastewater infrastructure

We are investing $26.3 million to support regional development and growth. As new customers connect, we will repay developers for providing lead-out wastewater infrastructure to service new developments and broader growth.

Network mechanical-electrical minor asset renewals (asset provision)

Hunter Water owns and operates over 430 wastewater pump stations that transport wastewater to treatment plants. To ensure continued operational within environmental and safety requirements, we propose to invest $25.6 million in replacing wastewater pump station mechanical and electrical equipment that has either failed or has deteriorated to the end of its service life.

Wyee backlog sewer

We are spending $13.8 million to construct wastewater infrastructure to service the Wyee township, currently serviced by septic sewerage systems. This project is a government directive to improve health and environmental conditions.

Hazardous chemical equipment upgrades

This project ($12.0 million) involves upgrading all hazardous chemical facilities to ensure they are safe for the community and our employees, and to reduce potential environmental impact associated with possible equipment failures.

Wastewater network upgrades

This project ($12.6 million) involves construction of additional capacity to meet regulatory requirements for sewer overflows associated with wet weather. This will include construction of wastewater pump stations and new carrier mains. We are undertaking industry leading strategies to determine effective improvement solutions that we plan to implement during the next price period.

5.5 Stormwater

Hunter Water's projected investment for stormwater services is $23.1 million ($2019-20). The majority of this expenditure is associated with structural deterioration of the stormwater culverts, which have required complete replacement.

Table 5.4 Stormwater: proposed capital expenditure, by product sub-category ($millions, $2019-20)

Product sub-category	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Stormwater network	3.7	2.8	4.7	5.9	6.2	**23.1**
Total	**3.7**	**2.8**	**4.7**	**5.9**	**6.2**	**23.1**

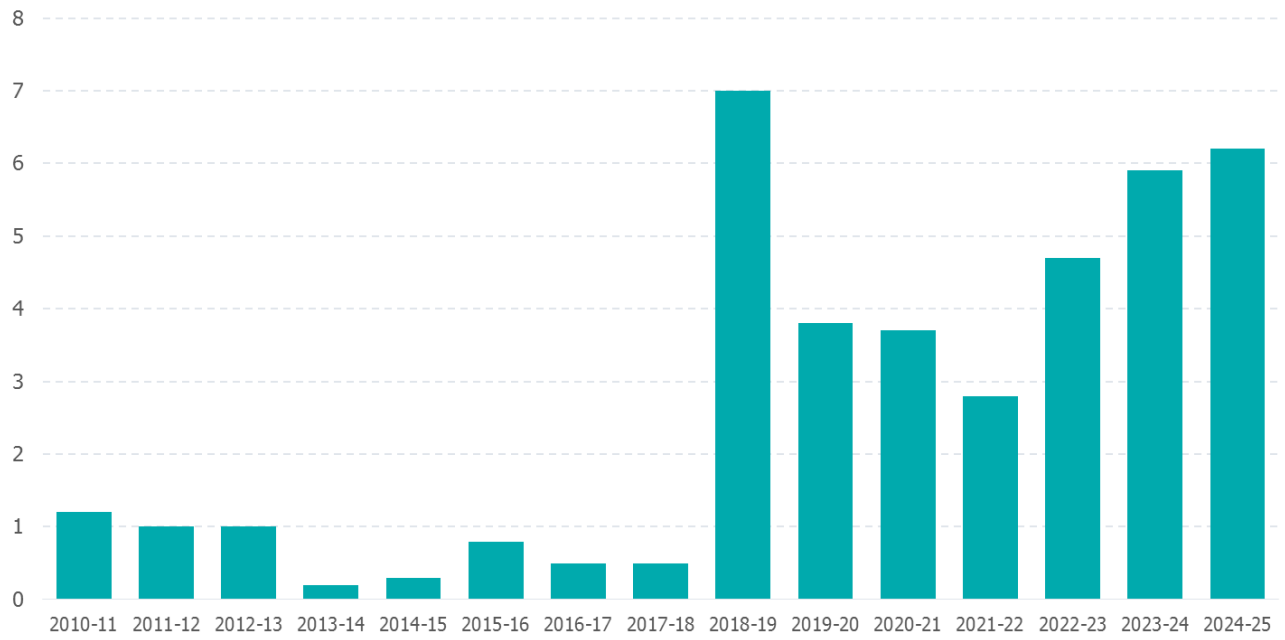
Source: Hunter Water AIR/SIR, SIR Capex 3, row 592.

Proactive condition assessments undertaken during the current price path have identified that sections of the existing 80 year-old culverts have either incurred concrete spalling or have corroded considerably. This has created a short-term risk of structural failure unless replaced or rehabilitated. A number of failures of stormwater culverts have also occurred, requiring these sections to be replaced.

Hunter Water has historically invested in localised stormwater culvert replacements and condition assessments, investing around $1 million per year (Figure 5.10). Through the current price period, detailed condition assessment has identified structural risks that have resulted in an increase to approximately $4-5 million per year required to undertake modern structural replacements.

The increase in investment involves replacing or rehabilitating stormwater culverts before failures occur to ensure community safety is maintained. The proposed investment is primarily allocated to the asset and service reliability driver (94 per cent).

Figure 5.10 Historical capital investment in stormwater infrastructure ($millions, $2019-20)



Source: Hunter Water analysis.

5.6 Corporate

Hunter Water's projected investment in corporate infrastructure is $150.2 million over five years ($2019-20). The largest component of expenditure is on Information and Communication Technology (ICT) projects ($56 million or 37 per cent), with the remaining expenditure spread across digital, liveability, corporate services, energy and meter replacement projects.

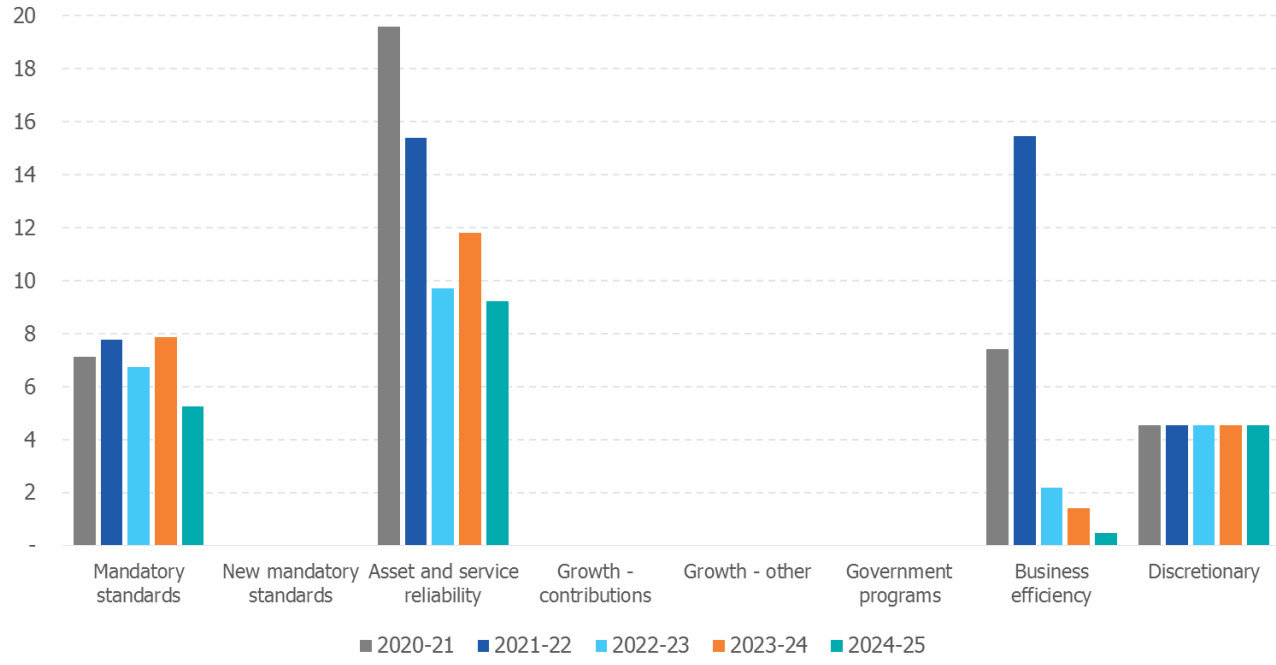
Table 5.5 Corporate: proposed capital expenditure, by product sub-category ($millions, $2019-20)

	2020-21	2021-22	2022-23	2023-24	2024-25	Total
ICT technology	15.1	11.8	7.3	10.6	11.3	**56.1**
Digital projects	9.1	8.4	4.6	3.7	1.3	**27.1**
Meters	1.4	1.4	2.7	2.7	1.4	**9.7**
Corporate services	4.4	4.7	4.1	4.0	1.0	**18.2**
Energy	4.1	12.3	0.0	0.0	0.0	**16.4**
Liveability	4.6	4.6	4.6	4.6	4.6	**22.8**
Total	**38.7**	**43.2**	**23.2**	**25.6**	**19.5**	**150.2**

Source: Hunter Water AIR/SIR, SIR Capex 3.

The drivers of corporate expenditure are shown in Figure 5.11. The proposed expenditure is primarily driven by the need to ensure asset and service reliability. An increase in positive net present value business efficiency investments in 2021-22 is associated with electricity optimisation, and investment related to liveability and sustainability initiatives that have demonstrated community support. Several of the major corporate projects/programs are described below.[5]

Figure 5.11 Corporate: proposed capital expenditure, by driver ($million, $2019-20)



Source: Hunter Water AIR/SIR, SIR Capex 2, rows: 9181, 9484, 9787, 10090, 10394, 10497, 10592 and 10685.

[5] Costs are shown for only the next price path (2020-21 to 2024-25).

ICT technology programs

There are five foundational technology programs that provide the capabilities required for Hunter Water to continue our operations in a safe and reliable manner. A summary of these programs and their drivers is provided below.

Applications program

We maintain core software services that supply essential functionality and capability required to meet our mandatory operational requirements. These applications range from large systems such as Enterprise Resource Planning (ERP) and billing solutions to niche applications that support specialised functions relating to facility control and environmental quality management. Over 100 applications require regular and continual renewal driven by the relatively short asset lives of software.

This program ($22.0 million) will:

- Support compliance with regulatory and legal requirements.
- Ensure the reliability of software services through regular upgrades to avoid exposure to security vulnerabilities.
- Maintain vendor support by replacing software that is end of life.
- Avoid increasing support and maintenance costs as vendors seek to incentivise upgrading to newer versions.

Network and Communications program

We operate an extensive communication network to support business, information and facility control systems. This capability is essential for all operations across the organisation including SCADA, internet services, telephones, mobility and both local and wide area networks. The existing communications network is currently heavily reliant on single service providers, resulting in an increased vulnerability to outages. Changes to national network infrastructure such as the roll out of the National Broadband Network have resulted in inadequate service to some remote locations.

This program ($9.8 million) provides essential infrastructure, delivering:

- Improved redundancy and reduced network outages for distributed systems such as SCADA
- Increased throughput for data generated by a growing network of field devices and systems
- Improved versatility and support for an increasing number of wireless devices, and
- Enhanced resilience for critical operations and business continuity requirements.

Information security program

Similar to other organisations, we are increasingly becoming dependent on technologies, with the majority of data now only existing digitally and the bulk of business processes having some dependence on digital solutions. With the increased reliance on digital systems, the threat of exposure to vulnerabilities that threaten information security also increases. Cyber-attacks have become more common as cybercriminals are increasingly proficient at exploiting systems. Like the wider utilities sector, a growing proportion of our traditionally closed-facility control systems (e.g. SCADA) are becoming internet-connected. This is creating greater accessibility and increased exposure to information security risks.

This program ($9.2 million) includes:

- Renewal or replacement of existing information security controls
- Implementation of additional controls to address new and increasing risks, and
- Improvements to information security practices to better protect digital assets.

Storage and compute program

We operate extensive server, storage and data centre infrastructure. This is essential to provide information storage and backup, facility control systems, communications and support systems. We operate a primary data centre at Head Office and a secondary site for business continuity and disaster recovery. ICT hardware infrastructure has a recommended asset life of 5 years and requires refreshing or replacement at this time to prevent increasing outages, failures and data loss that can adversely affect business operations.

This program ($7.8 million) aims to:

- Maintain server, storage and data centre infrastructure within vendor support, and
- Implement robust backup solutions and avoid escalating support and maintenance costs associated with extended vendor support for aged hardware.

End user computing program

We manage a fleet of desktop and laptop PCs, mobile devices, tablets and other peripheral devices as well as the operating environments they run on. These assets are maintained during their useful life and replaced according to standard asset lives, while operating environments are maintained in line with vendor support periods. As we move towards a more mobile, collaborative and digital workplace, end-user devices and environments must adapt to support these new ways of working.

This program ($7.2 million) will:

- Renew end-user devices and environments as required according to appropriate asset lives.
- Support the growth in mobile and tablet devices used by an increasingly mobile workforce, and
- Maintain modern operating environments to support the needs of the business.

Digital projects

There are a number of programs and projects that aim to meet (not exceed) the market and align us with standard practice in other utilities. In turn this will improve: customer experience; operating performance; and risk management practices across the organisation. A summary of the key projects is provided below.

Workforce management project

Hunter Water currently uses a 20-year old customised software system to log, manage and record civil maintenance work across our operations. We are planning to replace this system with a consolidated, contemporary solution that will:

- Maintain our current capability and efficiency to identify, plan, report on and complete maintenance work in the field.
- Be fully supported, maintained and enable continuous improvement.
- Allow us to achieve efficiencies in work practices and processes. These efficiencies will be used to increase our output of critical maintenance work, while maintaining the minimum resourcing level required to meet core requirements.

Intelligent network projects

Hunter Water proposes to invest in an integrated set of products and systems that provides continuous monitoring and control of operational assets. This will provide us with data that enables us to:

- Better serve customers by improving our prevention, detection and diagnosis of issues that have potential to cause customer inconvenience
- Optimise asset efficiency, longevity, reliability, maintenance and investment
- Reduce the risk of breaching our regulatory obligations, and
- Defer capital expenditure and consequently reduce upward pressure on customer bills.

Customer experience projects

Hunter Water plans to change its service delivery model in order to meet customer expectations, align our digital offerings with industry standards and create platforms that are more adaptive and responsive to changing expectations and future technology opportunities. By doing this, we will move simple transactions and interactions to digital channels and reduce effort on low complexity processing to ensure we are providing our customers with the right channel for the right task, at reduced operating costs.

Key initiatives that we are pursuing include:

- **Self-service for our developers** – building on the success of our online development application lodgement process, we will look at moving the solution to a more secure and stable technology environment and increase the functionality to include real time assessment for low complexity development applications, as well as application status tracking in line with industry peers. This will allow us to achieve efficiencies in work practices and processes and engage more with our development sector on complex matters.
- **Self-service for our customers** – we understand our customers' needs have changed and they compare their interactions with us to other utilities. We want to provide more self-service functionality for our customers by providing a secure online portal that allows customers to pay bills using a credit card and manage their account outside normal business hours. This will ensure we catch-up to, and are consistent with, other utilities by providing customers with choice about how they perform account management tasks. We expect there will be efficiencies for Hunter Water through lower call volumes as customers instead use the online portal.
- **Web applications** – the high levels of customer interest expressed in web-based systems has encouraged further development of digital web applications. These applications will improve customer experience and provide efficiencies for Hunter Water by ensuring that our services are smart, fast and easy, further improving customer satisfaction and sentiment.

Go Digital projects

Hunter Water currently uses a number of disparate systems and manual processes for the management and tracking of risks, incidents and audit actions. This fragmented approach provides convoluted visibility of the corporate risk position and the manual processes introduce increased risk of inaccuracies and inconsistencies in managing risks across the organisation. We are planning to implement a consolidated solution (integrated incident and risk management project) that will:

- Improve our ability to comply with mandatory standards, legislation and laws
- Introduce an integrated approach to managing, assessing and tracking risk through integration of multiple processes into a single source of truth, and
- Increase reporting accuracy by reducing manual intervention in risk management processes.

Meters

Hunter Water is obligated under the National Measurement Act 1960 to ensure that all in-service water meters conform to a level of accuracy outlined in the National Trade Measurement Regulations 2009. Our Customer Contract also requires a working meter be used to measure usage on all properties connected to our network, and our customers have an expectation their water usage charge will be generated by an accurate meter. We expect to replace over 60,000 water meters this price period.

Our proposed water meter replacements program is based on addressing these obligations and ensuring each customer's water usage charge is accurate. We have developed a recommended replacement point for each meter size, in recognition that a meter will degrade in accuracy with increased through-put. These replacement points enable us to schedule replacement of meters before they are expected to significantly under-register usage. This will: ensure accurate bills, improve fairness, and avoid the poor customer experience of a sharp spike in water usage when a severely under-registering meter is replaced. Throughout the course of the price period these replacement points will be validated by a testing program to ensure our investment in replacement remains at an economic level.

Hunter Water has installed data loggers on water meters of large non-residential customers. This is providing better visibility of customer water use and aides in the development of Water Efficiency Management Plans that help to conserve water and lower customer bills. We intend to implement digital metering into our non-residential fleet more over the next five years, in order to improve the knowledge a customer has on their water usage and address unnecessary usage through leaks. Digital metering will also be implemented on multi-dwelling residential properties (e.g. apartments), ensuring these customers receive a water usage charge based on their actual usage, rather than one based on the size of their dwelling (unit entitlement).

Corporate services

Corporate services investment maintains either equipment or common infrastructure including: replacement of fleet, office facilities and depots, common asset replacements (fences, access roads, security), and land management to ensure operations and facilities are maintained.

Workplace project

An integrity and compliance assessment has identified deficiencies with existing offices at North Lambton, Tarro and Tomago which included asset deterioration, safety hazards and inadequate facilities. In addition, workplace improvements have been identified to support employee safety & wellbeing, collaboration, flexibility and retention.

A workplace improvement strategy identified that capital investment ($12 million) is required through the next regulatory period to address mandatory standards, meet minimum acceptable building standards, provide the facilities required for a diverse and inclusive workplace, provide additional space required for growth and to ensure all workplaces are of an equitable standard that meets staff expectations.

Electricity optimisation and renewable energy

Hunter Water consumes electricity to operate all water and wastewater treatment plants, water and wastewater pump stations, instrumentation and office facilities. Total electricity consumption averages approximately 81 GWh per year with peaking fluctuations during hot and dry conditions or heavy rainfall.

An assessment of the installation of renewable energy initiatives indicates that a $16 million capital investment will result in 10MW production. This will decrease both operational expenditure and carbon emissions. This expenditure has a positive present value (i.e. lifecycle cost-savings).

We also undertake a number of other energy efficiency initiatives that reduce operating costs. These are described in depth in Technical Paper 5.

Liveability

In Technical Paper 1 we describe our customer engagement activities including a study that assessed customers' willingness to pay for discretionary expenditure. In response, we are proposing to invest $22.8 million in two projects: $11.3 million on improving stormwater amenity (naturalisation) and $11.5 million on recycled water initiatives. These projects are described in depth in Technical Paper 2.

5.7 Major projects 2020-25

Table 5.6 Major capital expenditure projects ($millions, $2019-20)

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
1	Farley WWTP upgrade - stage 3b	57.0	70.5	Existing mandatory standards Growth - other Asset and service reliability	20% 60% 20%	Upgrade will address age and capacity constraints underlying licence non-compliance risks and variable effluent quality Upgrade will provide additional capacity for projected growth	1. Improve treatment and discharge better quality effluent to Fishery Creek by 2021, and also to the Hunter River in the future (around 2031) 2. Supply high quality effluent for local agricultural reuse on the Hunter River floodplains and at Tocal Agricultural Centre, by 2021 3. Transfer excess effluent to a new discharge point at the Hunter River by 2021	Preliminary developed based on parametric cost estimate	Medium complexity - working on brownfields site
2	Developer delivered infrastructure agreements	41.0	41.0	Growth – other	100%	Lowest cost approach for Hunter Water	1. Receive 'gifted' assets from developer 2. Fund assets through staged payments as growth occurs	Indicative - Based on forecast developer activity	Low complexity - delivered through developer infrastructure agreements

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
3	Water loss management	32.8	32.8	Growth - other Asset and service reliability Business efficiency	20% 40% 40%	Forecast 20% regional growth in 20 years cannot be serviced without water system improvements while keeping options open Water loss management will improve asset and service reliability through increased effectiveness of asset maintenance activities and a reduction in breaks and leaks	1. Do nothing 2. Historical water loss programs 3. Low-risk ELWC program 4. ELWC program with emerging technologies and processes 5. ELWC standard implementation 6. Aspirational program	Indicative based on a program of works	Medium complexity given the early stages of planning
4	Water network pressure program	31.9	31.9	Existing mandatory standards Growth - other	30% 70%	The program is required to ensure Hunter Water complies with its Operating Licence. If no water augmentation works were undertaken, the annual non-compliance count would reach the 4,800 limit by 2026. With completion of planned works, the non-compliance count will reduce to 2,500 in 2026.	1. Do nothing 2. Reduce the non-compliance count to a very low level and improve service to severely impacted customers 3. Maintain acceptable headroom below the non-compliance allowance with optimised investment 4. Maintain acceptable headroom below the non-compliance allowance, and improve service to severely impacted customers between 2020 and 2025 5. Maintain acceptable headroom below the non-compliance allowance, and improve service to severely impacted customers between 2025 and 2030.	Indicative - developed based on parametric cost estimate	Medium complexity given the early stages of planning

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
5	Treatment plant chemical containment and safety upgrades	24.1	24.6	Existing mandatory standards Asset and service reliability	90% 10%	Upgrade will address risk of chemical spills to the environment, which is regulated by the EPA under the POEO Act 1997 and also related to the EPL associated with various treatment plants. The upgrade includes renewal of existing equipment and a portion of the project will allow for maintaining/improving reliability of chemical systems at treatment plants	Options considered included 1. Do nothing 2. Upgrade Kurri Kurri & Raymond Terrace WWTP chemical systems 3. Reduce environmental risk to medium, and safety/water quality risks to low 4. Upgrade chemical systems to achieve overall risk appetite (preferred option) 5. Full compliance upgrade to all current Australian Standards and Hunter Water standards	Indicative - consultant developed based on first principles cost estimate for selected systems, with parametric estimate for remainder of project	Medium complexity with multiple minor upgrades to brownfield sites across multiple treatment plants
6	Farley WWTP effluent pumping station and pipeline to Hunter River	23.6	23.6	Existing mandatory standards Growth – other	50% 50%	Upgrade will address current risk of non-compliance against EPL requirements. Upgrade will provide additional capacity for projected growth	1. Transfer effluent to Hunter River 2. Agricultural Re-use Scheme	Indicative - developed based on parametric cost estimate	Medium complexity given the early stages of planning
7	Grahamstown WTP upgrade - stage 3	18.2	95.8	Growth - other	100%	Upgrade will provide capacity for growth to cater for extreme week demand as well as deteriorating water quality due to increased development in the catchment	Final design will include a combination of: upgrades for capacity and addressing a range of water quality risks including microbial pathogens, algal blooms, emerging contaminants	Indicative based on 2011 concept design work	Low complexity

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
8	Raymond Terrace WWTP inlet works upgrade	17.2	17.4	Existing mandatory standards Growth - other Asset and service reliability	30% 30% 40%	Upgrade will address age and capacity constraints underlying licence non-compliance risks and variable effluent quality Upgrade will provide additional capacity for projected growth	1. Construct new inlet works 2. Balance tank with screened bypass 3. Parallel inlet works	Indicative - developed based on parametric cost estimate	Medium complexity given the early stages of planning
9	Cessnock WWTP upgrade	16.7	17.2	Existing mandatory standards Growth - other Asset and service reliability	50% 20% 30%	Upgrade will address age and capacity constraints underlying EIS non-compliance risks and effluent quality Upgrade will provide additional capacity for projected growth	1. Two new bioreactors 2. Combination of trickling filters and bioreactors 3. Retain trickling filters and add additional trickling filter	Preliminary based on parametric cost estimate	Medium complexity - working on brownfields site and tight timeframe
10	Renewable energy program	16.4	16.4	Business efficiency	100%	Reduce whole of life energy costs	1. Solar photovoltaic 2. Wind turbines 3. Energy storage	Indicative - developed based on parametric cost estimate	Medium complexity given the early stages of planning
11	Critical main safety program	15.8	15.8	Existing mandatory standards Asset and service reliability	90% 10%	High risks to community safety and asset and service reliability from trunk main failure leading to flooding.	1. Do nothing 2. Historical investment forecast 3. Prioritised risk reduction forecast 4. Full risk reduction forecast	Indicative based on a program of works	Medium complexity given the early stages of planning

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
12	Burwood Beach WWTP upgrade - Stage 3	14.0	65.2	Existing mandatory standards New mandatory standards Growth - other	50% 25% 25%	Upgrade will address current risk of non-compliance against EPL requirements Upgrade will provide additional capacity for projected growth	Primary works component: 1. Replacement of existing screens in screen house 2. New screening facility Secondary: 1. Current secondary treatment process with current discharge configuration 2. Others to be investigated	Indicative - developed based on parametric cost estimate	Medium complexity given the early stages of planning
13	Morpeth WWTP upgrade - stage 4 (biological upgrade)	13.6	14.9	Existing mandatory standards New mandatory standards Growth - other	30% 10% 60%	Upgrade will address current risk of non-compliance against EPL requirements Upgrade will provide additional capacity for projected growth	Options to be determined at the conclusion of the Hunter River Estuary Wastewater Masterplan	Indicative - developed based on parametric cost estimate	Medium complexity given the early stages of planning
14	Stormwater major rehabilitation/ renewal program	13.6	13.6	Asset and service reliability	100%	Public safety risk from collapse of deteriorated stormwater assets	1. Do nothing 2. Address major rehabilitation / renewal works	Based on preliminary project cost estimates	Low complexity - standard procurement approach for asset investment

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
15	Wyee Backlog Sewer Scheme	13.3	34.1	Government programs	100%	Government directive for delivery of the scheme	1. Transfer to Dora Creek WWTP 2. Transfer to Charmhaven WWTP 3. Transfer to private local WWTP	Medium - based on preliminary project cost estimating guidelines	Low complexity - however medium complexity components relating to existing customer consultation
16	Dungog WWTP Upgrade	12.8	26.1	Existing mandatory standards New mandatory standards Growth - other Asset and service reliability	40% 10% 10% 40%	Upgrade will address age and capacity constraints underlying licence non-compliance risks and variable effluent quality Upgrade will provide sufficient capacity to cater for projected growth	1. Upgrade – retain trickling filters 2. Convert to modified Ladzuck-Ettinger membrane bioreactor process 3. Convert to membrane bioreactor process	Preliminary developed based on parametric cost estimate	Medium complexity given the early stages of planning

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
17	People workplace	12.3	12.3	Existing mandatory standards Asset and service reliability Business efficiency	40% 55% 5%	The project will provide compliant, diverse, inclusive and equitable quality workspaces as well as allow for provision of additional space required to meet future growth.	1. Do Minimum (Base case) Address mandatory standards by ensuring existing workplaces meet minimum acceptable building standards and provide the facilities required for a diverse and inclusive workplace. 2. Do Minimum + upgrade all workplaces to provide additional space required for growth and to ensure all workplaces are of an equitable standard that meets staff expectations. 3. Build a new co-located workplace and operational depot.	Indicative - developed based on parametric cost estimate	Medium complexity given the early stages of planning
18	Wet weather overflow reduction program - Lake Macquarie	12.0	12.0	Existing mandatory standards	100%	Outcomes of EBA will work towards meeting wet weather containment objectives commitments to the EPA	To be determined	Indicative based on a program of works	Medium given individual projects yet to be confirmed
19	Recycled Water	11.5	11.5	Discretionary	100%	Customer willingness-to-pay for irrigation of public space	1. Do nothing 2. Small-scale local recycled water solutions 3. Integrated recycled water irrigation schemes	Indicative - Comparative scheme costs used	Medium complexity given the early stages of planning

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
20	Generator connection point improvements	11.4	18.0	Existing mandatory standards	100%	Upgrade will address requirement to manage safety risks in accordance with WHS Regulation 2017 and compliance with other mandatory standards in order to comply with NSW service rules and Ausgrid and Essential Energy requirements	Gateway 1 options consisted of 1. Continue existing operational and maintenance practices 2. Upgrade storages less than 1 hour and high priority reliability improvements 3. Upgrade storages less than 2 hours 4. Upgrade storages less than 4 hours	Indicative - developed based on parametric cost estimate	Low complexity given the small scale of upgrades involved at each site
21	Stormwater naturalisation	11.3	11.3	Discretionary	100%	Customer willingness-to-pay for improved amenity and naturalisation of stormwater assets	1. Do nothing 2. Projects to value of willingness to pay from stormwater customer base 3. Projects to value of willingness to pay from whole customer base	Indicative - unit rate cost estimate	Medium complexity given the early stages of planning
22	WWPS compliance improvement program	11.1	11.1	Existing mandatory standards Asset and service reliability	50% 50%	The project relates to reducing the risk of non-compliance with Hunter Water's Operating Licence and environmental regulations associated with dry weather overflows from wastewater pumping stations The project relates to improving reliability of existing wastewater pumping stations, subsequently improving the reliability (reducing risk) of wastewater services	Options considered include provision of emergency storage, standby generators, spare pumps, control upgrades and combination of above	Indicative - developed based on parametric cost estimate	Medium complexity with multiple upgrades to brownfield sites across multiple pumping stations

No.	Project	Total cost PP20	Total project cost	Investment driver	Cost split	Justification	Options considered	Cost estimate certainty	Delivery complexity
23	Grahamstown WTP UV upgrade	10.7	11.1	New mandatory standards	100%	UV upgrade is required to provide an additional barrier to microbial protozoon pathogens (currently only one barrier) and meet new requirements known as the health-based targets which will soon be included in the Australian Drinking Water Guidelines.	Over 20 options assessed broadly covering improved treatment at Grahamstown WTP and diversion of the Campvale canal to avoid water quality risks	Indicative based on manufacturer's rates plus contingencies and project management allowances	Low complexity
24	Field service: work force management project	10.3	10.3	Asset and service reliability Business efficiency	70% 30%	Maintain capability and efficiency of the Service Delivery group to identify, plan, report on and complete maintenance work in the field Replace end of life systems with fully supported and maintained solutions that enable continuous improvement within Service Delivery group Utilising the additional capability inherent in the new solution to drive efficiencies that will be reinvested as productivity	1. Keep AOMS - do nothing 2. Rebuild AOMS 3. Replace AOMS with incumbent ERP supplier's solution 4. Replace AOMS with mature COTS product and essential integration 5. Replace AOMS with Multiple COTS products and all integrations	Indicative - developed based on parametric cost estimate + vendor provided early high-level estimate	Medium/High complexity due to early stage planning and expected change management impact of delivery

Source: Hunter Water business case analysis, project costs provided in AIR/SIR, SIR Capex 3.

5.8 Proposed output measures for next price period

Hunter Water's proposed output measures (Table 5.7) are consistent with the proposed capital investment program detailed in this paper, reflecting condition assessments and asset replacements and renewals planned for the next regulatory period to effectively meet customer, environmental and safety requirements.

Table 5.7 Hunter Water's proposed output measures for next price period

Output (or activity) measure	Target output for next price period (5 years)
Water services	
Renewal/reliability of distribution mains	36 km
Trunk mains undergoing condition assessment	130 km
Critical trunk main replacement	28 km
Wastewater services	
Renew non-critical mains	65 km
Critical sewer mains undergoing condition assessment	95 km
Renewal/refurbishment of critical sewerage mains (cast iron program)	0.8 km
Mechanical and electrical assets	
Telemetry upgrades (water and wastewater)	27
Switchboards replaced	31
Replacement or refurbishment of pumps	550
Stormwater drainage	
Stormwater drainage channel rehabilitations	3.4 km
Corporate	
Replace customer meters 20mm	63,738

Source: Hunter Water analysis.

6. Investment processes

In this section, we describe the processes we have in place to ensure that the planning and delivery of our capital investment is prudent and efficient.

6.1 Investment planning

6.1.1 Strategic investment planning

Our strategic investment planning processes ensure that investment decisions are aligned to IPART's drivers, our strategic direction, and are prioritised to ensure customers' bills remain affordable and deliver value for money.

The objective is to align investment processes (see Figure 6.1) to enable us to best deliver on our strategic purpose. The strategic investment process involves:

- Setting objectives and drivers (strategic opportunities and risk appetite)
- Decision-making to achieve objectives (strategic case and program business cases)
- Prioritisation
- Delivery and control of investment (project and financial control), and
- Performance assessment (benefits realisation) to ensure the proposed investments deliver the planned benefits.

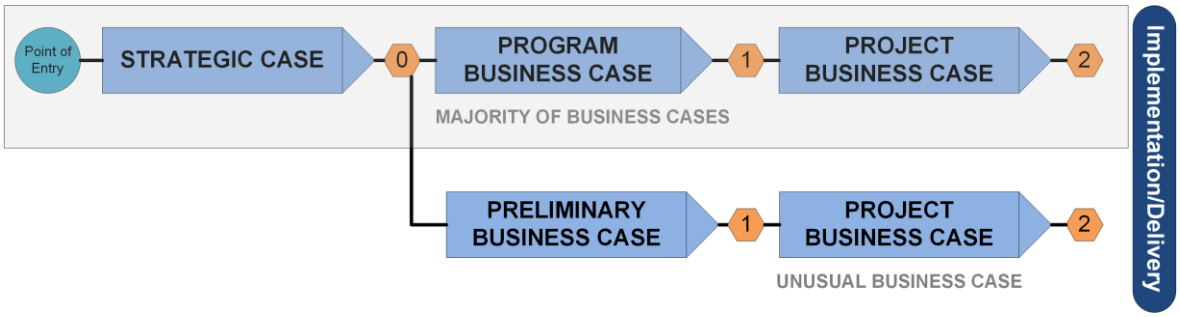
Figure 6.1 Strategic investment planning: overview

Source: Hunter Water.

We are moving towards the use of investment programs that provide a comprehensive and integrated view of the benefits that individual projects achieve. These investment programs clearly demonstrate the case for change and objectives of investment. They are able to deal with uncertainty, complex inter-relationships, and respond to changes in a dynamic environment. Investment programs will inevitably change with evolving organisational strategy, regulatory requirements, and environmental context.

The design of the strategic investment planning processes is to ensure a majority of investment decisions proceed through a strategic case and program business case. Project business cases are then developed and prioritised within the program business case (Figure 6.2). This figure also shows how the different types of cases fit into our Gateway Approval Process (described in section 6.1.3). We are currently transitioning to this new strategic investment planning process. As such, not all of the investments proposed through this price submission have been developed via this process.

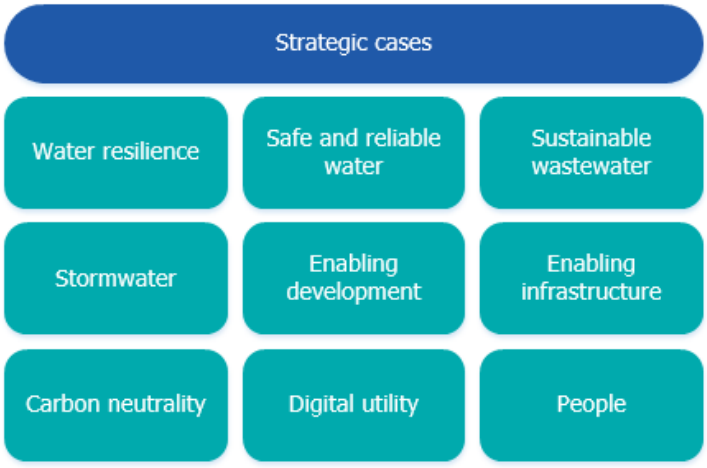
Figure 6.2 Strategic investment planning: business case process



Source: Hunter Water.

Investments can be categorised into a set of programs in a variety of ways. They have areas which overlap, where an individual project contributes to the objectives of and delivers benefits to more than one program. Typically, the project would sit under the program to which its benefits primarily align. If the project also delivers benefits to a secondary program, then this link should be made clear in both the business case for the secondary program and the project-level business case. We have created nine strategic cases and are currently developing the program business cases that comprise the strategic cases.

Figure 6.3 Strategic investment planning: Hunter Water's strategic cases



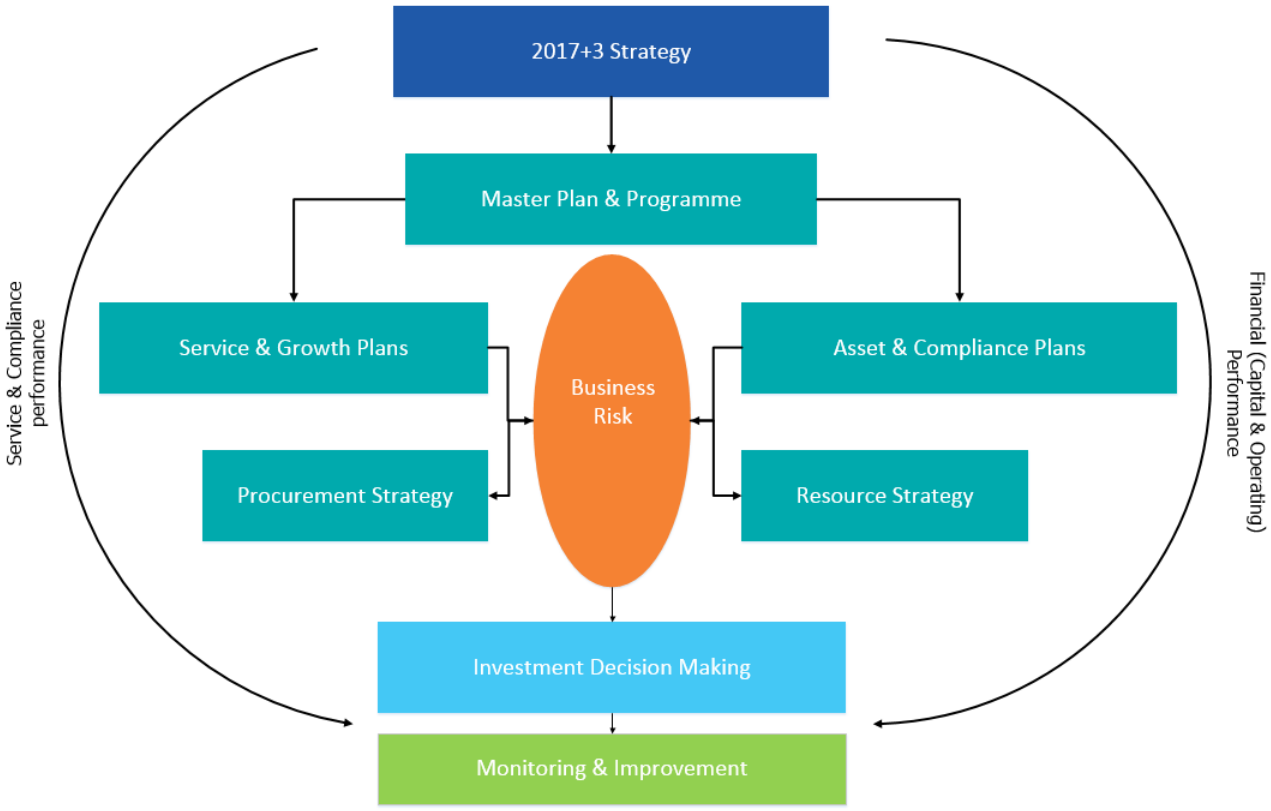
Source: Hunter Water.

6.1.2 Integrated planning

We plan our services using an integrated framework (Figure 6.4) that incorporates strategy and corporate planning, service and asset planning, investment decision-making, program and project management, and financial management. The planning processes span the current strategic horizon (2017+3 Strategy), service and growth plans (5-25 year horizon), asset and compliance plans (5-25 year horizon), and system and facility-specific plans.

These planning activities are part of the business planning cycle and consider risk, financial, social and environmental impacts. There is a high level of interdependency between the various planning documents.

Figure 6.4 Integrated planning framework

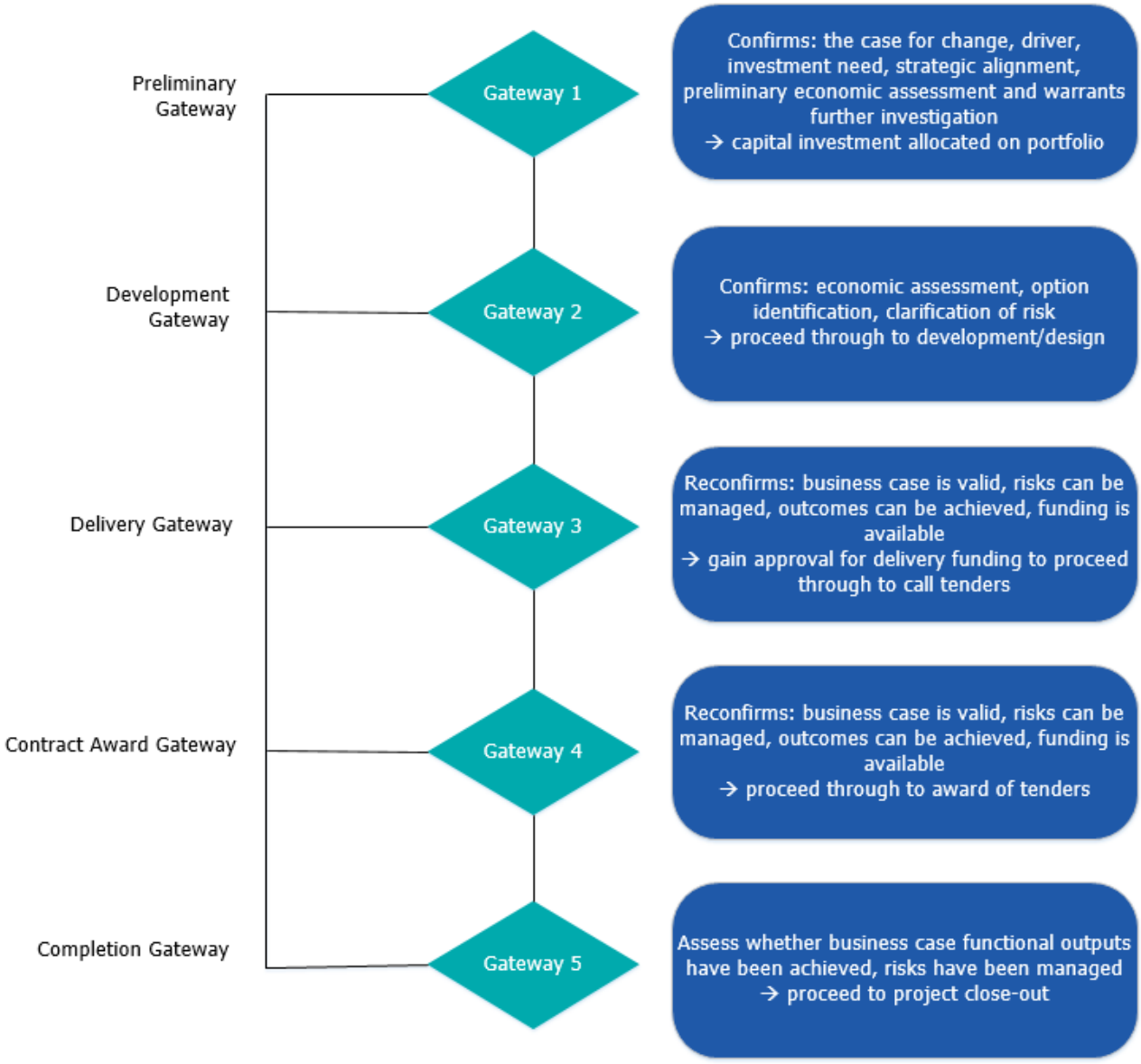


Source: Hunter Water.

6.1.3 Gateway approval process

We govern and prioritise the capital portfolio through a robust gateway approval process. Our gateway process is a modified version of the NSW Treasury process and has matured over a number of years. Individual investment projects or programs are assessed and reassessed throughout their lifecycle to ensure that, at each gate, the proposed investment remains prudent and is delivered in the most cost-efficient manner. An overview of the gateway approval process is shown in Figure 6.5.

Figure 6.5 Hunter Water's gateway approval process



Source: Hunter Water.

6.1.4 Better business cases

We have reviewed and improved investment decision-making processes to deliver on our strategic priorities and meet compliance obligations more efficiently and effectively. The review involved assessing leading practices both nationally and internationally, which identified that our processes could be improved by implementing aspects of the *Better Business Case* investment model, used by Treasuries in the United Kingdom, New Zealand and Victoria. The Better Business Case model assesses each business case according to the five-cases shown in Table 6.1.

We also made process improvements to ensure that:

- Our business cases better demonstrated investment prudency through strategic alignment and prioritisation.
- We prepare business cases in a more productive and efficient manner.

Table 6.1 Better business cases – the five cases

Case	Considerations
Strategic	Strategic alignment and demonstrate need for change
Economic	Optimising value and financial/economic assessment
Commercial	Procurement and other commercial considerations
Financial	Budget, debt, price and revenue impacts
Management	Delivery, contract, risk, change and benefits realisation

Source: Hunter Water.

6.1.5 Asset management

Given the asset intensive nature of our operations, asset management is critical in determining:

- the level of service provided to customers
- compliance with regulations that aim to protect the environment and human health
- the price of services
- Hunter Water's financial performance.

We are required to maintain and implement an asset management system under our Operating Licence (2017-2022). Our asset management system undergoes two separate periodic external audits each year, by specialist auditors engaged by IPART and Hunter Water.

The objective of the asset management system is to ensure that Hunter Water has in place the framework, processes, procedures and resources needed to effectively manage physical assets to support the achievement of business objectives. Effective asset management is essential to provide services in the most cost-effective manner. The benefits of the asset management discipline include:

- Improved governance, accountability and risk management.
- Enhanced service management and customer satisfaction
- Improved financial efficiency and affordability for our customers, and
- Sustainably creating and operating assets.

Asset management system processes include the functions and activities required to effectively manage the full lifecycle (including planning and operation) of each asset, from identification to disposal (Figure 6.6). This covers:

- strategic asset planning
- asset and service planning
- investment prioritisation and decision-making
- asset creation
- asset operation
- asset maintenance
- asset renewal or disposal
- asset information.

In 2018, Hunter Water was the first urban Australian water authority to be certified to the new ISO 55001:2014 standard. Historically, Hunter Water has implemented and improved asset management activities through involvement in water industry assessments (Aquamark and the Water Services Association of Australia) and broader asset management industry learnings (Australian Asset Management Council). The transition to ISO 55001 required us to move beyond technical lifecycle activities to a management system approach enabling better community outcomes through improved management, governance, system processes and procedures.

Figure 6.6 Hunter Water's asset management system

Source: Hunter Water.

6.2 Investment delivery

6.2.1 Procurement

Hunter Water operates a centralised procurement model. We have robust mechanisms, procedures and governance in place to ensure the efficiency and probity of all procurement activities.

Procurement mechanisms

We use the following mechanisms to ensure that we procure efficiently.

Procurement committee

The procurement committee provides governance and independent oversight of all major procurement activities. This ensures that the investment decision is efficient and outcomes are aligned with our strategic and operational objectives.

Estimating guidelines

We have detailed estimating guidelines to assist with the preparation of expenditure estimates for capital infrastructure assets. This provides a standard, traceable method for compiling estimates and budgets. This information is also used, where possible, to evaluate the efficiency of tender prices.

Competitive tendering

Expenditure greater than $200,000 is procured through an open tender process or use of an established panel. A panel can only be established following a procurement activity that is issued to the open market. For expenditure equal to or below $200,000, we require quotes from tenderers based on the total value of proposed expenditure:

- up to $15,000 requires one quote
- $15,001 to $50,000 requires two quotes
- $50,001 to $200,000 requires three quotes.

Price evaluation

Our procedures set the standard evaluation criteria for all procurement activities and requires that the total price of supplying the goods and/or services receives a weighting of at least 50 per cent of the total evaluation score.

6.2.2 Contract management

We implemented a detailed and tiered contract management framework in 2017 that works in conjunction with our asset creation framework. The contract management framework is based on risk and provides tools and resources to assist in the effective, consistent and efficient management of contracts.

To guide decision-making and deliver value for money, a lifecycle approach is used that considers both procurement and contract management processes and applies lessons learnt throughout a contract's life.

The framework contains four phases of contract management: contract development, contract mobilisation, active management, and contract transition and close-out.

6.2.3 Major project program and delivery capability

Our proposed annual capital expenditure in the next few years is higher than the current level. The portfolio of works contains a number of large, complex, resource-intensive projects that are estimated to cost more than $10 million each. In 2017, we assessed that to deliver this portfolio of works, we would either require an increase in resource levels or a change in procurement methods.

We determined that a Program and Project Management (PPM) partner is the most appropriate procurement model to support project delivery. In selecting this model, the following objectives were identified for maximising overall delivery efficiency:

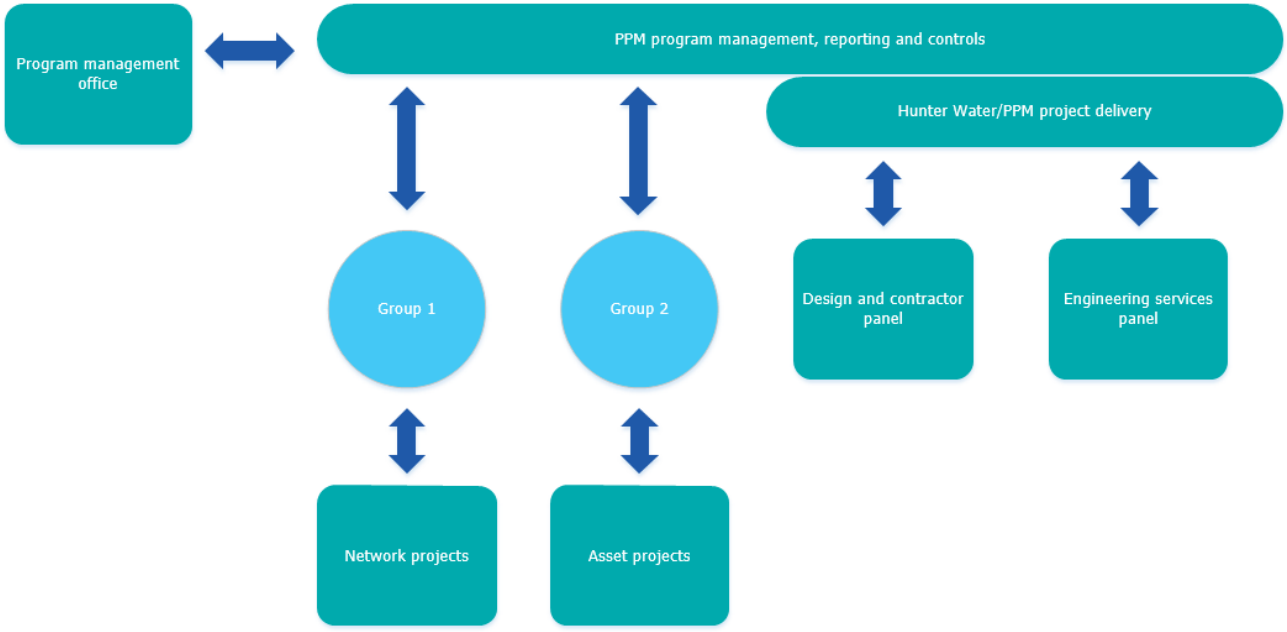
- Efficiency and expertise in strategic procurement and value engineering
- Sustainable procurement
- Increased resourcing
- Development of Hunter Water employees and organisational capability
- Innovation, learning and continuous improvement
- Ensuring competitive tension and certainty in delivery costs
- Enabling flexibility to adjust delivery models and mechanisms
- Enhanced systems and processes to improve delivery efficiency
- Cost-estimating improvements and increased intelligence relating to cost data, and
- Improved customer and stakeholder interaction.

The PPM partnership is a collaborative contracting model that provides benefits relating to: technical resourcing, program/portfolio management, project and cost controls, estimating, safety, environmental and community consultation. The PPM partner does not self-perform design or construction work.

The PPM partnership ensures that we have the resourcing capacity to deliver the upcoming portfolio of works and the capability to delivery these works efficiently.

The delivery model for the PPM is outlined in Figure 6.7.

Figure 6.7 PPM partnership and new delivery model



Source: Hunter Water.

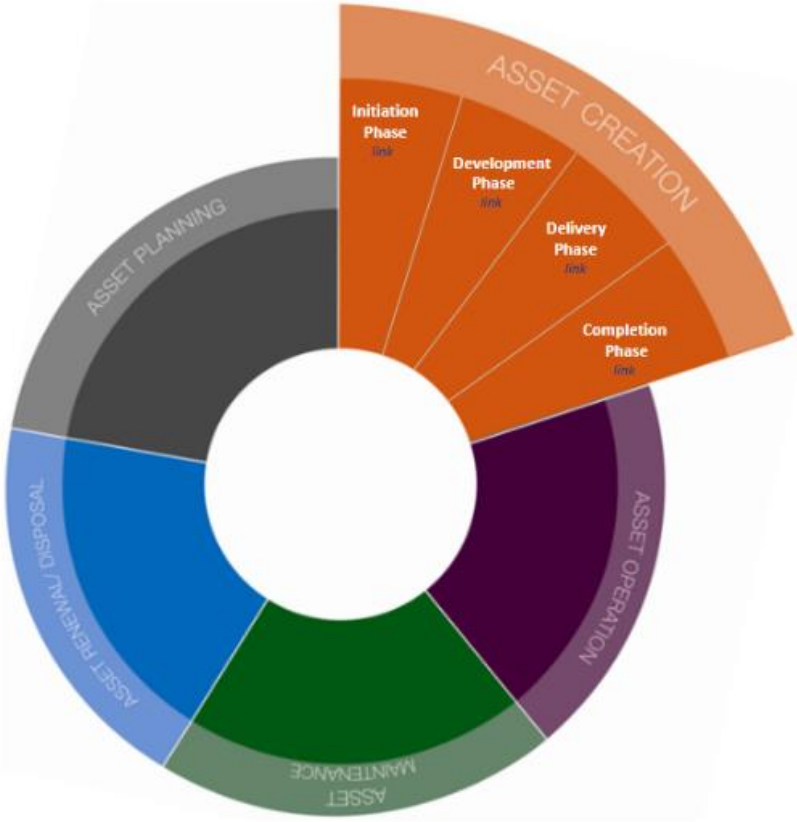
The procurement approach for major projects ensures value for money through the following:

- The PPM partner was selected following a competitive tendering process. The tender process considered the capability and capacity of tenderers. Rates and margin were competitively tendered.
- The PPM is subject to our existing governance processes. Additional governance over the PPM has been established including the program leadership group that provides overall leadership to the PPM and the joint-program management team providing day-to-day management of the PPM.
- A series of Key Performance Indicators (KPIs) have been developed to drive performance and efficiency. The KPIs are developed on an annual basis to align with our objectives and are approved by our Board Investment Committee.
- Performance against the approved KPIs is used as a mechanism for modifying the margin payable to the PPM partner. Exceptional performance against the KPIs ensures 100 per cent payment of the PPM partner's margin, whereas business as usual achievement reduces the margin payable to 85 per cent of the total margin.
- Design and construction projects are competitively tendered. Concept design is typically tendered to our existing engineering services panel. A design and construct contractor panel has been established for delivery of major projects nominally greater than $10 million in value. The engineering and design and construct contractor panels ensure works are carried out by companies with strong experience and demonstrated performance. This provides opportunities for carrying-over lessons learnt from one project to another over the course of delivering the portfolio of works.
- The term of the PPM engagement is four years, with options to extend a further two years. In conjunction with Hunter Water, the PPM partner will develop a transition-out plan to ensure that we have the capacity and capability to continue to deliver the future program of works at completion of the partnership.

6.2.4 Asset creation framework

The asset creation process involves acquiring an asset capable of meeting service requirements at the least lifecycle cost. For Hunter Water, this process commences after a problem has been identified and a solution or investment response is required. The asset creation process is shown in Figure 6.8 and involves: initiation, development, delivery and completion. These phases align with the gates in our gateway approval process.

Figure 6.8 Asset creation process



Source: Hunter Water.

The asset creation framework supports the efficient and timely delivery of the capital portfolio through leading practices including: project risk analysis, cost estimation, identification of asset standards, project compliance, financial risk allowance, project scheduling and time commitments, innovation and learning.

These practices are monitored and controlled through Hunter Water's Portfolio & Project Control Office, which monitor financial, schedule, risk and benefit performance.

6.2.5 Benefit realisation

Benefit realisation management is the process of identifying, planning, tracking, executing and measuring benefits from a program or project. This process leads to the delivery of outputs and outcomes that provide benefits.

Investment planning involves collaboration between stakeholders to develop clear, concise and evidence-based investment proposals for change. This includes clear articulation of the benefits to be achieved from the investment. Benefits cascade through strategic cases and program and project business cases.

We have historically collected learnings and incorporated changes through a number of channels including: project completion reports, commissioning issues, asset standard updates and contract variations. We have recently developed a project works portal containing a systematic learning improvement process (lessons learnt and issues register) that is embedded in our investment planning and asset creation framework. In addition, the PPM contract has incorporated a learning and improvement element.

7. Long-term investment plans

Hunter Water undertakes long term investment planning to determine optimum solutions to meet existing and future customer service and regulatory requirements within the accepted risk appetite.

We acknowledge that the Hunter region is entering a new and exciting phase with a growing metropolitan area and greater economic diversification. We have commenced new planning initiatives to meet future challenges.

7.1 Long term planning improvements

7.1.1 Strategic planning

Our strategic planning processes are described in section 6. We are using investment logic maps, strategic cases and benefits realisation to ensure investment decisions deliver the best community value.

7.1.2 Long term planning programs

Our water and wastewater operations face potential disruptors including changes in: population growth, climate, technology, carbon and electricity production, regulations and customer and community expectations.

We have established strategic planning programs in water resilience and sustainable wastewater with a longer-term focus. These programs involve reassessing planning techniques, identifying challenges and opportunities and engaging with the community to identify their preferences and collectively determine a path forward.

7.1.3 Adaptive planning

Infrastructure planning in the water industry has traditionally focused on the robustness of solutions to manage uncertainty and minimise risk. This can lead to over-investment and over-reliance in infrastructure solutions. Hunter Water is challenging this approach by focusing on resilience, which is a function of both robustness and adaptability.

We are undertaking long-term scenario planning and using an adaptive pathways approach. This strategic and adaptive decision-making allows us to be more agile and better prepared to respond to future uncertainties and opportunities, avoiding over-investment and preventing path-dependencies.

7.1.4 Investment radar

Long-term investment is influenced by changes in:

- regulations
- community expectations
- demographics
- technology
- asset condition
- the climate
- the environment (including emerging contaminants)
- the workforce
- competition.

We undertake strategic planning and frequently review our investment plans to identify current and emerging trends which influence our performance and the need for investment.

7.2 10-year capital investment plans

Our strategic planning activities allow us to maintain a long-term capital portfolio. All projects in the 10-year portfolio (2020-21 to 2029-30) have passed through Gateway 1 (preliminary business case stage). This gateway confirms the preliminary (high-level) business case is valid and ensures key documentation has been completed before the investments are added to the capital portfolio.

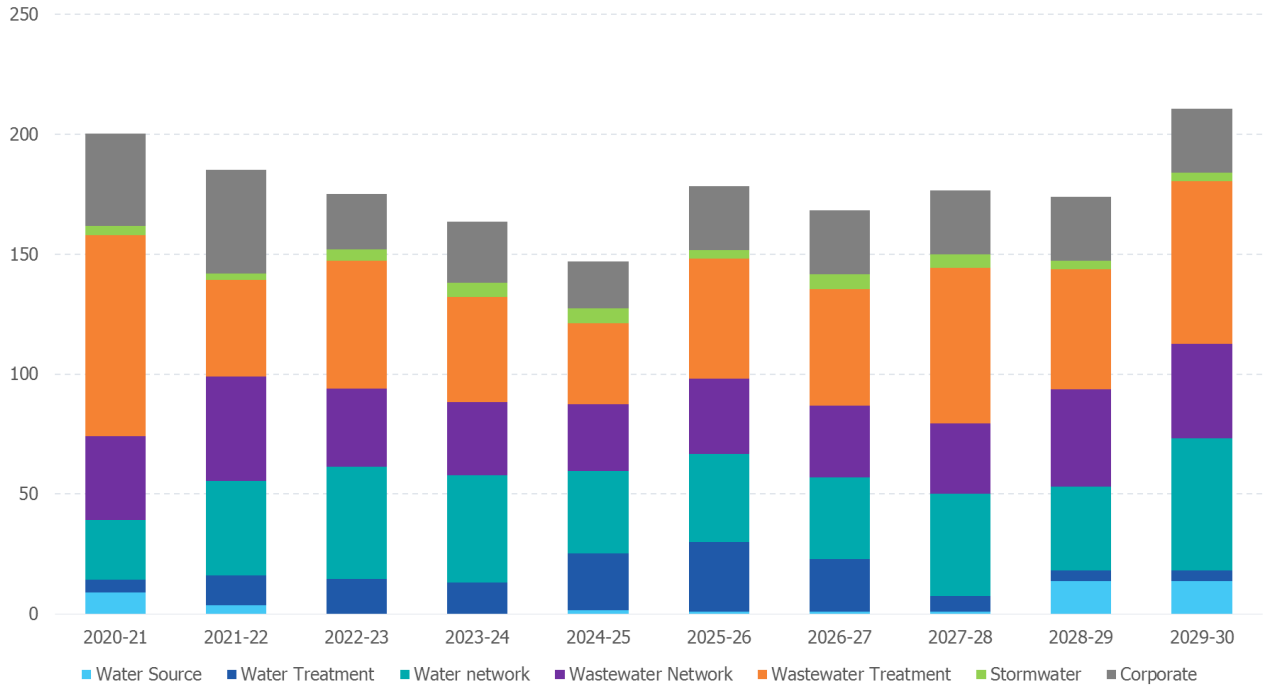
As discussed in section 6.1, we are currently transitioning to an investment planning approach that ensures our portfolio aligns with coherent, higher-level strategic cases.

The ten-year capital expenditure forecast of $1.8 billion allows us to meet customer service and regulatory requirements within an acceptable strategic risk profile. We expect to maintain a stable investment-grade credit rating. Annual capital expenditure is forecast to remain stable at around $170 million across the period, which is similar in magnitude to that proposed for the 2020-25 price period. The exception is 2029-30, which is higher due to an expected upgrade of sludge management at Burwood Beach wastewater treatment plant ($35 million).

This projection is based on a stable regulatory regime and actual growth in line with current projections.

The ten year projection is shown below by product sub-category (Figure 7.1 and Table 7.1) and by IPART's capital expenditure drivers (Figure 7.2 and Table 7.2).

Figure 7.1 Long-term capital expenditure, by product sub-category ($million, $2019-20)

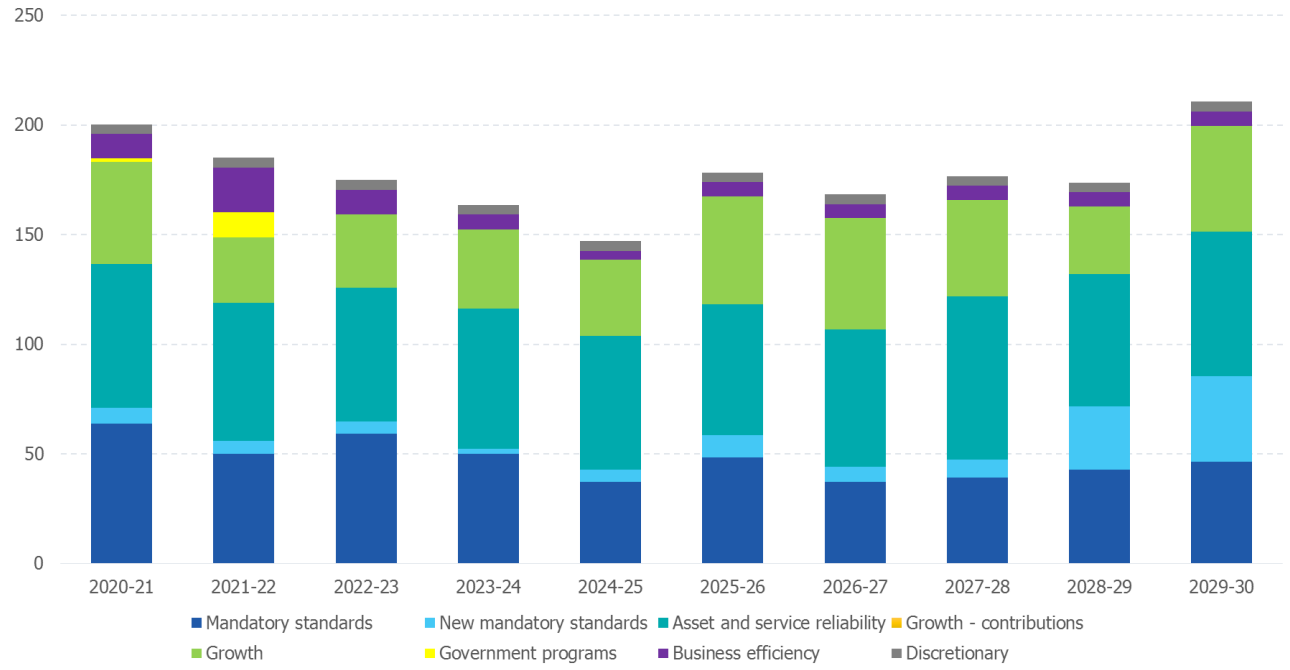


Source: Hunter Water analysis.

The most significant investments in the proposed 10-year portfolio include:

- $108 million investment in upgrading Burwood Beach wastewater treatment plant to cease disposal of biosolids to the ocean and to meet environmental requirements associated with growth.
- A further $112 million investment in other wastewater treatment plant upgrades to allow for growth and to meet environmental legislative requirements.
- $37 million investment an upgrade to Grahamstown WTP to manage water quality risks.
- $243 million investment in asset provisions to effectively manage asset renewals and critical asset risks.

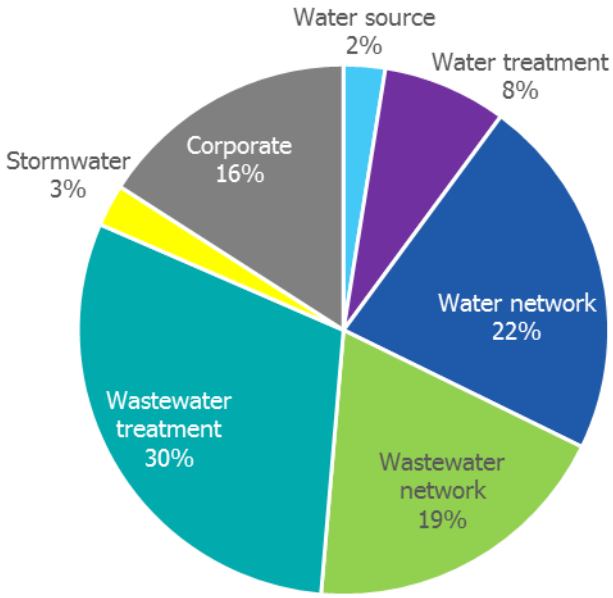
Figure 7.2 Capital expenditure 2020-21 to 2029-30, by driver ($million, $2019-20)



Source: Hunter Water analysis.

A summary of the ten-year expenditure plan by product sub-category is provided below in Figure 7.3. Wastewater is the largest expenditure category (49 per cent) of the projected investment, followed by water (32 per cent), corporate (16 per cent) and stormwater (3 per cent).

Figure 7.3 Ten-year capital expenditure by product component ($million, $2019-20)



Source: Hunter Water analysis.

Table 7.1 Expenditure for 2020-21 to 2029-30, by product sub-category ($millions, $2019-20)

Product sub-category	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Water source	9.0	3.5	0.0	0.0	1.7	1.0	1.0	1.0	13.8	13.8	**45.0**
Water treatment	5.2	12.5	14.7	13.2	23.5	28.9	21.8	6.4	4.3	4.3	**134.7**
Water network	25.0	39.3	46.7	44.6	34.4	36.9	34.2	42.7	35.2	55.2	**394.1**
Wastewater network	34.9	43.7	32.6	30.4	27.9	31.3	29.9	29.4	40.4	39.3	**340.0**
Wastewater treatment	83.9	40.2	53.2	43.9	33.8	50.1	48.5	64.9	50.2	68.0	**536.7**
Stormwater	3.7	2.8	4.7	5.9	6.2	3.7	6.4	5.7	3.4	3.4	**45.6**
Corporate	38.7	43.2	23.2	25.6	19.5	26.5	26.6	26.6	26.6	26.6	**283.2**
Total	**200.4**	**185.2**	**175.1**	**163.7**	**147.0**	**178.4**	**168.4**	**176.7**	**173.8**	**210.6**	**1,779.4**

Source: Hunter Water analysis.

Table 7.2 Expenditure for 2020-21 to 2029-30, by driver ($millions, $2019-20)

Driver	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Mandatory standards	63.9	50.1	59.3	50.2	37.1	48.3	37.2	39.3	42.8	46.4	**474.6**
New mandatory standards	7.1	5.9	5.5	2.0	5.6	10.2	6.9	8.2	28.8	39.0	**119.3**
Asset and service reliability	65.6	62.9	60.8	64.2	61.2	59.8	62.6	74.3	60.4	66.0	**637.7**
Growth – contributions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Growth - other	46.5	29.8	33.7	36.2	34.7	49.1	50.8	44.1	31.1	48.4	**404.3**
Government programs	1.9	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**13.3**
Business efficiency	10.8	20.6	11.2	6.6	3.9	6.4	6.4	6.4	6.4	6.4	**85.0**
Discretionary	4.6	4.6	4.6	4.6	4.6	4.5	4.5	4.5	4.5	4.5	**45.3**
Total	**200.4**	**185.2**	**175.1**	**163.7**	**147.0**	**178.4**	**168.4**	**176.7**	**173.8**	**210.6**	**1,779.4**

Source: Hunter Water analysis.

7.3 Investment opportunities and vulnerabilities

This proposed ten year 2020-30 capital investment has both opportunities and vulnerabilities, which include:

- Opportunities include improved understanding of asset condition, reduced regional growth, improved integrated planning and delivery improvements and transformational outcomes from the digital utility initiatives.
- Vulnerabilities include emerging contaminants, changing community expectations, deteriorated assets, tighter regulation (in particularly environmental and water quality), third party impacts and increased growth.

Specific capital investment projects which are currently being investigated and have not progressed to the investment phase include:

- $30 million estimate for Chichester Dam refurbishments
- $47 million estimate for the remaining Chichester Trunk Gravity Main lead jointed section, and
- $57 million estimate for major asset renewals (including critical mains, wastewater pump stations, stormwater culverts and mechanical-electrical equipment).

Hunter Water is also progressing investigations and strategies for the Water Resilience program, with outcomes to be developed with the community and stakeholders. No investment allowance has been included in the proposed 10-year capital portfolio for any potential significant infrastructure, as any potential investment will need to be incorporated into the Lower Hunter Water Plan in partnership with Department of Industry (Water).

8. Abbreviations

Acronym	Term
AIR	Annual information return
AOMS	Asset and Operations Maintenance System (software)
Capex	Capital expenditure
CO_2	Carbon dioxide (gas)
CO_2e	Carbon dioxide equivalent (global warming capability)
COTS	Commercial off-the-shelf (product or system)
ERM	Enterprise risk management
GL	Gigalitres (i.e. 1,000,000,000 litres)
GWh	Gigawatt-hours (equal to 1,000,000 kilowatts of power output or consumption for a period of one hour)
ICT	Information and communications technology
IPART	Independent Pricing and Regulatory Tribunal (NSW)
km	Kilometre (i.e. 1,000 metres)
KPI	Key performance indicator
ML	Megalitres (i.e. 1,000,000 litres)
MW	Megawatts (i.e. 1,000,000 watts of power generation capability)
Opex	Operating expenditure
PC	Personal computer
PPM	Program and project management
SCADA	Supervisory control and data acquisition (monitoring system)
SIR	Special information return
UV	Ultra-violet (light)
WTP	Water treatment plant
WWPS	Wastewater pumping stations
WWTP	Wastewater treatment plant

9. References

Department of Planning and Environment (NSW), 2018, **Greater Newcastle Metropolitan Plan 2036**, September, Part 1 and Part 2, Sydney.

Department of Planning and Environment (NSW), 2016, **Hunter Regional Plan 2036**, October, Sydney.

IPART (Independent Pricing and Regulatory Tribunal (NSW), 2017, **2017-22 Operating Licence – Hunter Water**. This document also contains also contains the **Customer Contract** (beginning page 23). Sydney.

Hunter Water, 2017, **Investing in Growth Infrastructure for the Lower Hunter,** Consultation Paper, Hunter Water Corporation, May, Newcastle, NSW.

IPART, 2016, **Hunter Water Corporation: Maximum prices for water, sewerage, stormwater drainage and other services from 1 July 2016**, Water – Determination, Sydney.

IPART, 2016, **Review of prices for Hunter Water Corporation, From 1 July 2016 to 30 June 2020**, Water – Final Report, June, Sydney.

IPART, 2013, **Maximum Prices for Hunter Water Corporation from 1 July 2013 to 30 June 2017**, Water – Determination, Sydney.

IPART, 2013, **Maximum Prices for Hunter Water Corporation from 1 July 2013 to 30 June 2017**, Water – Final Report, Sydney.

IPART, 2009, **Review of prices for water, sewerage, stormwater and other services for Hunter Water Corporation, from date of Gazettal**, Water – Determination and Final Report, Sydney.