Attachment 1
Our role and function

Price proposal 2020–24

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Our role and function

Key messages

- We are Australia's largest water utility, serving over five million people and 1.8 million homes and businesses – providing water, wastewater, stormwater, recycled water services and infrastructure to support growth for over 130 years.
- We are a statutory State Owned Corporation, wholly owned by the NSW Government.
- The services we provide to our customers are regulated by the *Sydney Water Act 1994*, and declared as government monopoly services under the *Independent Pricing and Regulatory Tribunal (Water, Sewerage and Drainage Services) Order 1997.*
- Our Operating Licence sets out the standards and requirements we must meet. It is granted by the Governor, and the Independent Pricing and Regulatory Tribunal (IPART) assess our performance against it each year. The licence also includes our Customer Contract.
- We also have 27 Environmental Protection Licences under the *Protection of the Environment Operations Act 1997.*
- We follow compliance systems and processes to ensure we meet our requirements, and can show how we meet them. We have relationships and agreements with key regulators including various Memoranda of Understanding (MoUs).
- We work with stakeholders representing our customers, community, government and industry groups. We're committed to involving them in our decision making for better whole of community outcomes.
- Water plays a vital role in the Greater Sydney Commission's vision for a metropolis of three cities. We will continue to work with our customers, government, and the private sector to find solutions to rapid population growth and climate challenges.
- We're partnering with our stakeholders, so we can make Greater Sydney a water sensitive city – liveable, resilient, productive and sustainable for generations to come.

1 About Sydney Water

At Sydney Water, we are proud to have served our customers and communities with some of the best water and wastewater services in the world for the past 130 years. We believe water is key to Sydney's identity and plays a vital role in making our city great.

We are Australia's largest water and wastewater service provider, supplying more than five million customers across Sydney, the Blue Mountains and the Illawarra with safe, high quality drinking water. We also look after wastewater, recycled water and some stormwater services to ensure our communities can enjoy healthy rivers and clean beaches. We're focused on the future, and we work with our stakeholders and regulators to make smart business decisions that our customers value, to keep Sydney liveable, productive, and thriving for a sustainable future.

We are a statutory State Owned Corporation, wholly owned by the NSW Government. We operate under the *Sydney Water Act 1994*, and have three equal principal objectives:

- **to protect public health** by supplying safe drinking water to our customers and other members of the public, in compliance with Operating Licence requirements
- **to protect the environment** by conducting our operations in compliance with the principles of ecologically sustainable development contained in section 6 (2) of the *Protection of the Environment Administration Act 1991*
- **to be a successful business**, and to this end:
    - to operate at least as efficiently as any comparable businesses
    - to maximise the net worth of the State's investment in the Corporation
    - to exhibit a sense of social responsibility by having regard to the interests of the community in which it operates.

1.1 Our purpose, mission and vision

We protect public health and the environment by providing essential water and wastewater services. It's our mission to be world-class, delivering essential services that our customers love, in our great city. Our vision is to be the lifestream of Sydney for generations to come.

1.2 Our Corporate Plan

Our Corporate Plan was launched in 2015 to bring our vision to life, while delivering on our core business objectives. It has evolved into three key parts:

- **Rock solid –** working safely to deliver essential services to our customers every day.
- **Lifestream** – our strategy to ensure we're future fit and customer-centric.
- **Long term strategy** – a resilient water sensitive future for Greater Sydney.

Our long-term strategy is in line with the Greater Sydney Commission's vision – to keep Sydney liveable, productive and thriving for a sustainable future. We're gearing up to meet the challenges of the future – population growth, climate change and delivering the NSW Government's vision for a metropolis of three cities: Harbour City, River City and Parkland City.

2 Our function and structure

Sydney Water is a statutory State Owned Corporation (SOC) under the *State Owned Corporations Act 1989*. There are two shareholding Ministers, and a Portfolio Minister who has the duty to administer the *Sydney Water Act 1994*.

Sydney Water's shares are fully owned by the shareholding Ministers, on behalf of the people of New South Wales. A key role of the shareholding Ministers is to appoint our directors. The primary role of the Board of Directors is to set strategic direction, oversee long term planning and review organisational performance.

The Statement of Corporate Intent is an annual agreement with the NSW Government via its shareholder Ministers. It is essentially a five-year corporate plan and budget. The Statement of Corporate Intent sets customer service, environmental, public health, commercial and employee performance objectives and targets.

Day to day responsibility for providing strategic direction to the organisation sits with Sydney Water's Executive, the peak management committee. The Executive determines policies and procedures. It seeks to ensure resources are allocated to meet the demands of the organisation. It approves budgets and expenditure decisions, endorses corporate plans and business plans and establishes ethical and performance standards.

Our organisational structure and functions are detailed in our Annual Report, available at sydneywater.com.au.

3 Our regulatory and legislative framework

As shown in Figure 3-1 we have a complex regulatory and legislative framework.

We have various regulators:

- IPART regulates prices and reviews our Operating Licence
- NSW Health regulates drinking water quality and guidelines
- the Department of Planning and Environment regulates our planning approvals and assessments
- Safe Work NSW regulates work, health and safety
- the Environment Protection Authority regulates key elements of our operations and our environmental performance, including wastewater treatment plant discharges
- the Office of Environment and Heritage regulates our compliance with other environmental and heritage obligations, including vegetation conservation and Aboriginal heritage obligations.

The *Sydney Water Act 1994* also sets up a legal framework, with three key documents that direct us. They are the Statement of Corporate Intent, the Operating Licence and the Customer Contract.

Our Operating Licence sets out the standards of service and some environmental performance requirements to be met. It includes the Customer Contract, which establishes customer rights through performance targets for service delivery, and redress for customers if these are not met. IPART conducts an end-of-term review of the licence on behalf of the Portfolio Minister, roughly every five years. IPART also audits our performance against the Operating Licence annually and reports this to the Portfolio Minister.

We have performed strongly against all aspects of the current 2015–20 Operating Licence. Our new Operating Licence and Customer Contract is expected to start in October or November 2019. Detailed information about our requirements in the 2015–20 Operating Licence and the anticipated 2019–23 Operating Licence is provided in **Attachment 2: Service levels and performance**.

Our 27 Environment Protection Licences are issued by the NSW Environment Protection Authority and focus on minimising the potential for negative environmental and public health impacts related to the delivery of water and, particularly, wastewater services.

The Portfolio Minister is also able to, with the approval of the Treasurer, give the Board of a statutory State Owned Corporation a written direction in relation to the corporation if the Portfolio Minister is satisfied that, because of exceptional circumstances, it is necessary to give the direction in the public interest. A direction may also be made to undertake an activity that is not in the corporation's commercial interests. Examples of past directions include building the Sydney Desalination Plant, Rosehill-Camelia recycled water scheme and the St Marys Recycled Water Project (formerly known as the Replacement Flows Project).

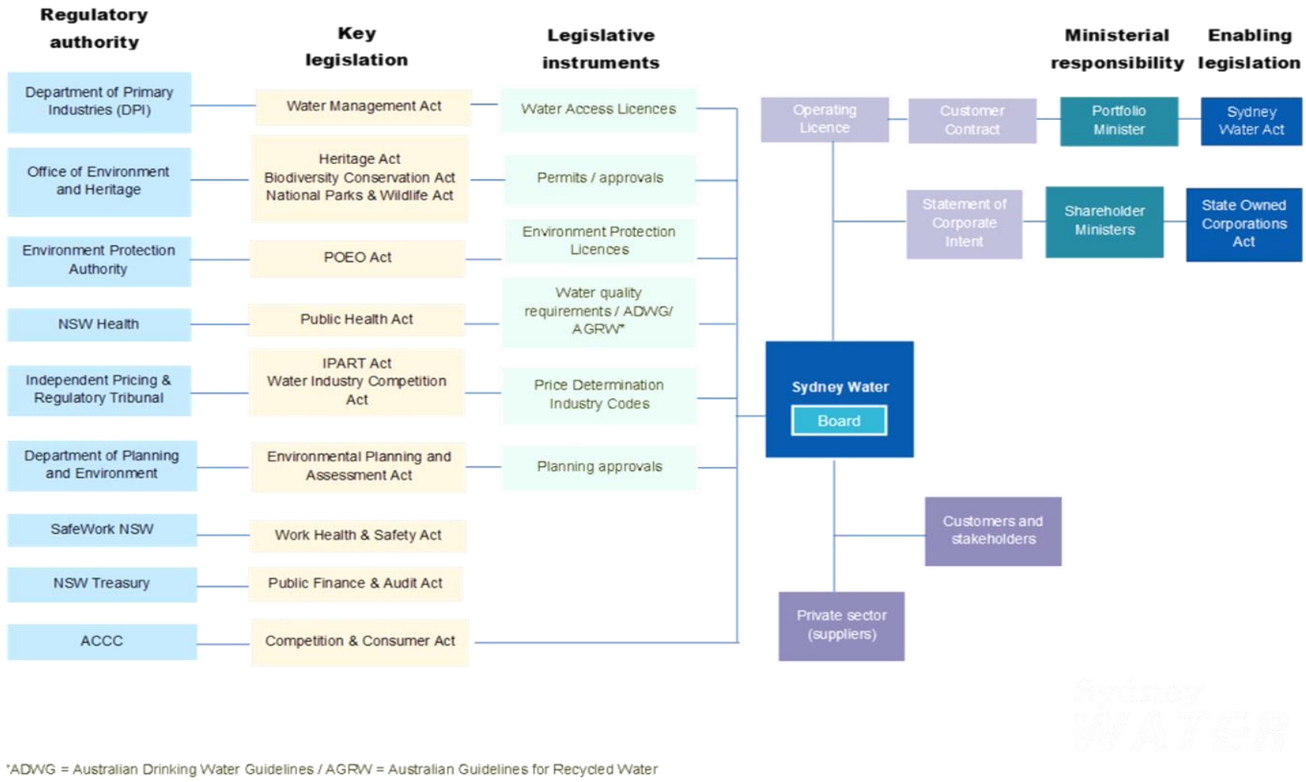

Figure 3-1 Our regulatory and legislative framework

3.1 Our legislation and licences

Legislation or instrument	Description
Sydney Water Act 1994	This Act establishes Sydney Water Corporation as a statutory State Owned Corporation (SOC) with the equal objectives of being a successful business, protecting the environment, and protecting public health by supplying safe drinking water. Our area of operations is defined in Section 10 of the Act and comprises the greater Sydney area, the Illawarra, and the Blue Mountains. Our functions are to provide, operate, or maintain systems/services for storing or supplying water, providing sewerage services and stormwater drainage systems, and disposing of wastewater. We may also provide ancillary services and undertake any other activity it considers will further its objectives.
Sydney Water Regulation 2017	This Regulation is subordinate legislation made under the *Sydney Water Act 1994.* It governs access to our land around Prospect Reservoir, regulates specified plumbing and drainage work, and prescribes the Minister’s powers to impose water restrictions.

Legislation or instrument	Description
***Protection of the Environment Operations Act 1997* (POEO)**	The POEO Act is the primary pollution law in NSW, regulating air pollution, water pollution, noise pollution and waste management. We are licensed to undertake certain activities under the Act.
State Owned Corporations Act 1989	This Act outlines the structure, objectives, constitution and reporting requirements of SOCs. It also sets out the legal capacity and powers of statutory SOCs, the role of the CEO and the duties and liabilities of Directors. As a statutory SOC, we are subject to Part 3 of the SOC Act. Two voting shareholders (currently the Treasurer and the Premier) appoint the Board of Directors. We also have a Portfolio Minister who, with the Treasurer's approval, can direct the Board to undertake activities that are non-commercial or in the public interest. We may be reimbursed for the net cost of doing so, including the cost of capital. The Portfolio Minister is currently the Minister for Water, Property and Housing. As a SOC, we must pay tax equivalents to NSW Treasury, have a share dividend scheme approved by the Treasurer, and prepare a Statement of Corporate Intent each year.
Independent Pricing and Regulatory Tribunal Act 1992	This Act establishes the Independent Pricing and Regulatory Tribunal (IPART) as an independent regulator of NSW utilities.
Operating Licence 2015–2020	The objective is to enable and require us to provide services within its area of operations. The Operating Licence includes the Customer Contract and there is an associated Reporting Manual.
Environment Protection Licences	Environment Protection Licences issued by the NSW Environment Protection Authority (EPA) focus on minimising the potential for negative environmental and public health impacts related to the delivery of water and, particularly, wastewater services.
Water Industry Competition Act 2006 **(WIC Act)**	This Act was established to encourage competition in the water sector and facilitate recycling. It primarily regulates the activities and operations of other water utilities. However, some obligations for us do arise from the WIC Act, particularly in relation to third party access, the retailer and operator of last resort regime (no appointments have been made to date), and requirements for codes of conduct where other utilities interconnect with our assets.

Legislation or instrument	Description
	We work closely with a number of current and prospective private water utilities licensed under the WIC Act, on schemes that variously involve wastewater, recycled water, drinking water, stormwater and desalinated drinking water. The Act has been subject to several reviews and amendments and is continuing to evolve with the emerging contestable market in the water sector.
Water NSW Act 2014	This Act integrated the Sydney Catchment Authority and State Water Corporation. WaterNSW is now responsible for the management of Sydney's storage dams and catchment areas. WaterNSW's role is to manage and protect the catchment areas and catchment infrastructure, supply raw water, and regulate certain activities affecting the catchment areas. We purchase bulk water from WaterNSW and are its major customer. IPART sets the prices WaterNSW can charge us.

4 The services we provide

We supply water, wastewater, recycled water, some stormwater, and a range of ancillary services. Our service area extends from the Hawkesbury River in the north to Gerroa in the south, and from the Pacific Ocean in the east to Mount Victoria in the Blue Mountains in the west.

Our principal statistics as set out in our Annual Report 2017–18 are shown in Figure 4-1 and Table 4-1:

Table 4-1 2017-18 Annual Report Principal Statistics

Our area of operation	12,700 square kilometres
Population serviced by drinking water	5,130,000 people
Quantity of drinking water we produced	593,069 million litres
Length of drinking water mains we own and operate	22,822 kilometres
Number of drinking water reservoirs in service	247 drinking water reservoirs
Number of drinking water pumping stations in service	151 drinking water pumping stations
Connections to drinking water service	1,980,838 properties
Wastewater we collected (includes discharge, bypass, overflows and other)	463,191 million litres
Length of wastewater mains we own and operate	25,863 kilometres
Number of wastewater treatment plants in service	16 wastewater treatment plants
Number of wastewater pumping stations in service	686 wastewater pumping stations
Connections to wastewater service	1,932,569 properties
Population serviced by recycled water	92,000 people
Quantity of recycled water we supplied	42,834 million litres
Length of recycled water mains we own and operate	726 kilometres
Number of water recycling plants in service	14 water recycling plants
Number of recycled water reservoirs in service	9 recycled water reservoirs
Number of recycled water pumping stations in service	10 recycled water pumping stations
Length of stormwater channels we control	452 kilometres
Properties with stormwater drainage	620,110 properties

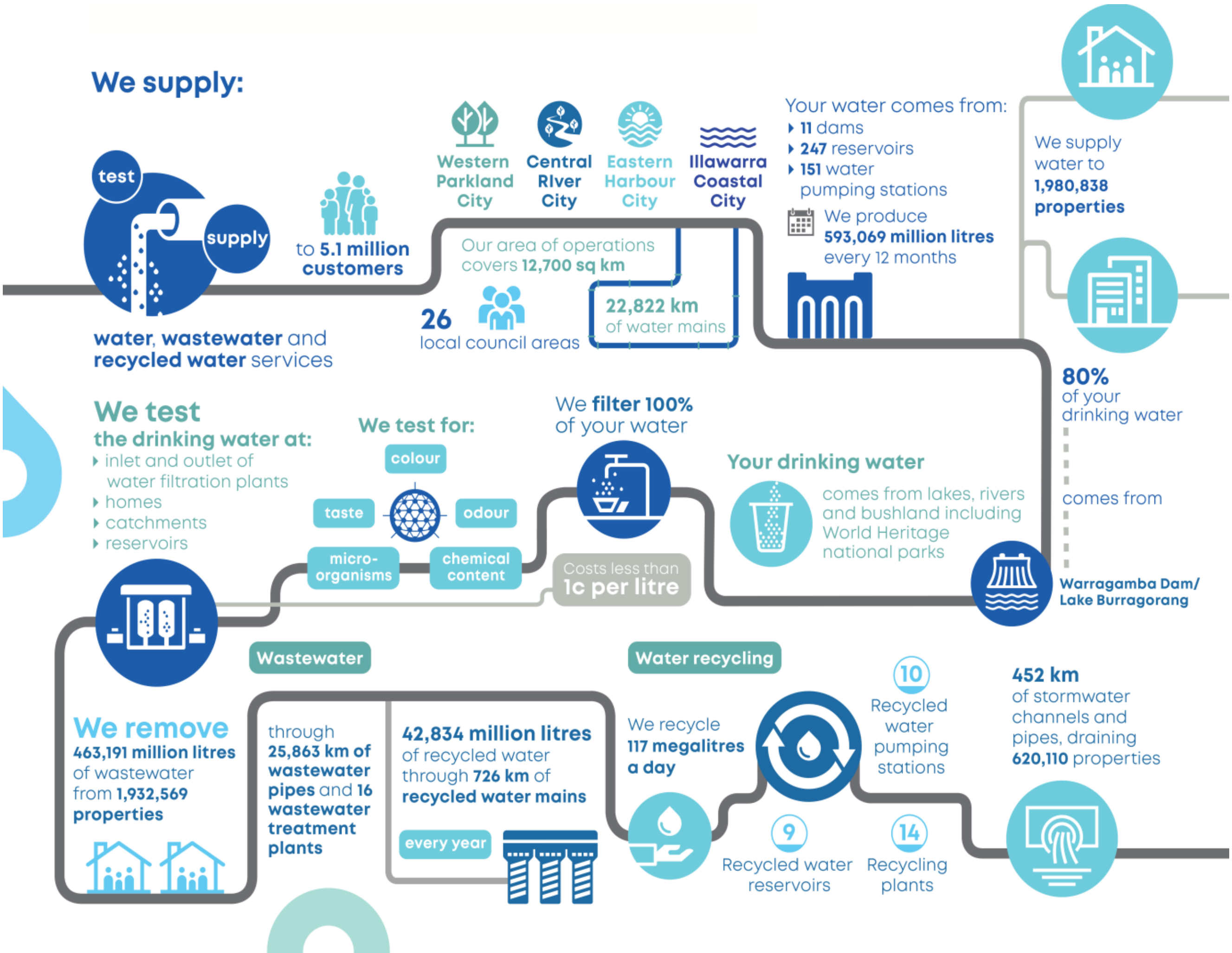

Figure 4-1 2017-18 Annual Report Principal Statistics

4.1 Water supply services

Every day, we supply over 1.5 billion litres (or 1.5 gigalitres, GL) of drinking water to over 5.1 million people, in over 1.9 million properties. Households use about 70% of the water supplied; businesses use about 30%. Dam water is treated at nine water filtration plants. Treated water is delivered to customers through a network of over 22,000 km of water pipes, 247 reservoirs and 151 water pumping stations.

The water supply system is shown in Figure 4-2. Customers pay a fixed service charge and a variable usage charge for drinking water.

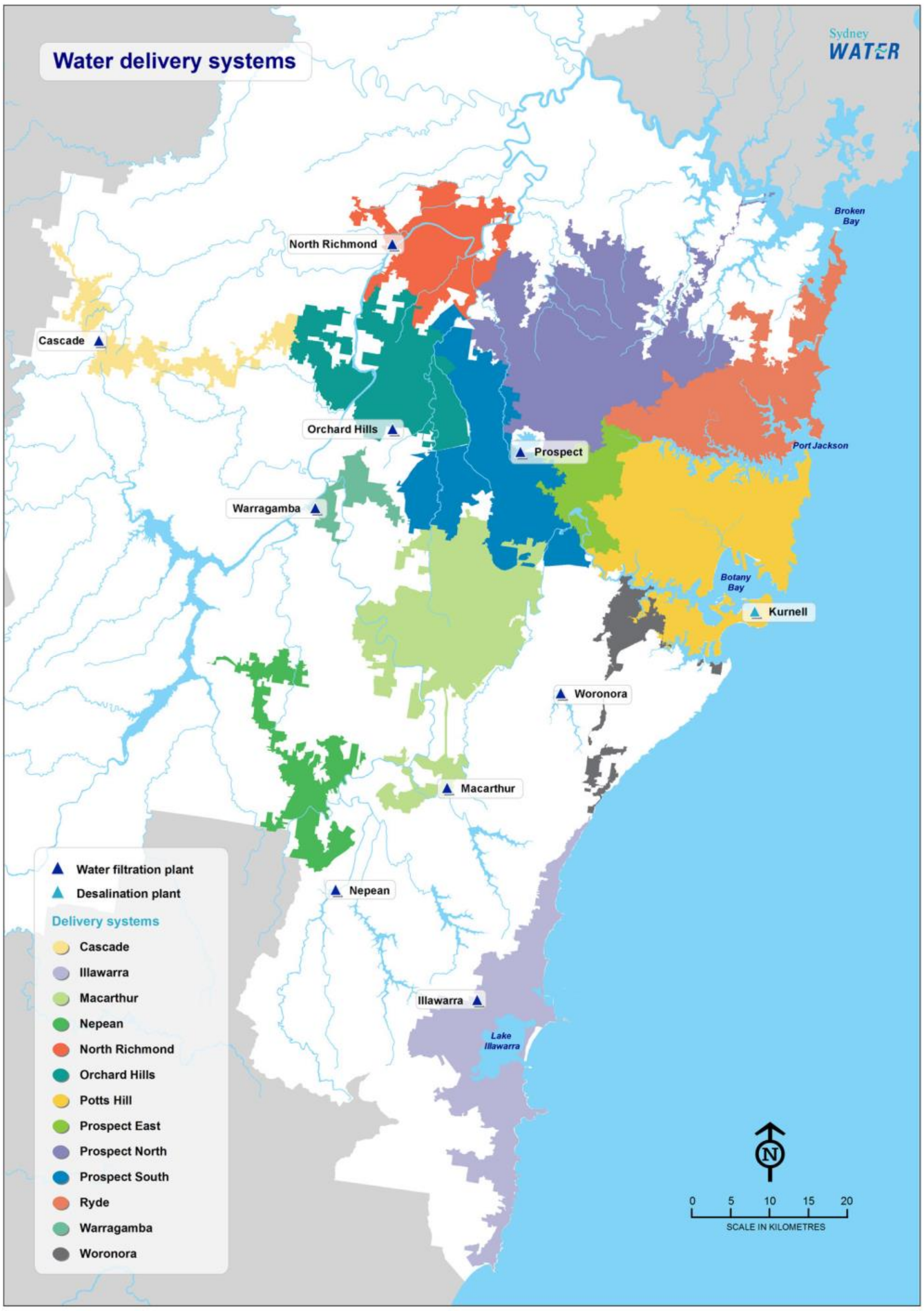

Figure 4-2 Our water supply system

4.2 Wastewater services

We collect and treat over 1.6 billion litres (1.6 GL) of wastewater a day through a network of over 25,000 km of wastewater pipes, 696 wastewater and recycled water pumping stations, and 30 wastewater treatment and water recycling plants. After treatment, the wastewater is reused or discharged to rivers or the ocean under environment protection licence conditions. Inland plants discharging to the Hawkesbury Nepean River treat waste to high levels.

The wastewater system is shown in Figure 4-3. Residential customers pay a fixed service charge for wastewater services while non-residential customers pay a fixed charge and a variable usage charge, if they discharge volumes above the threshold set by IPART.

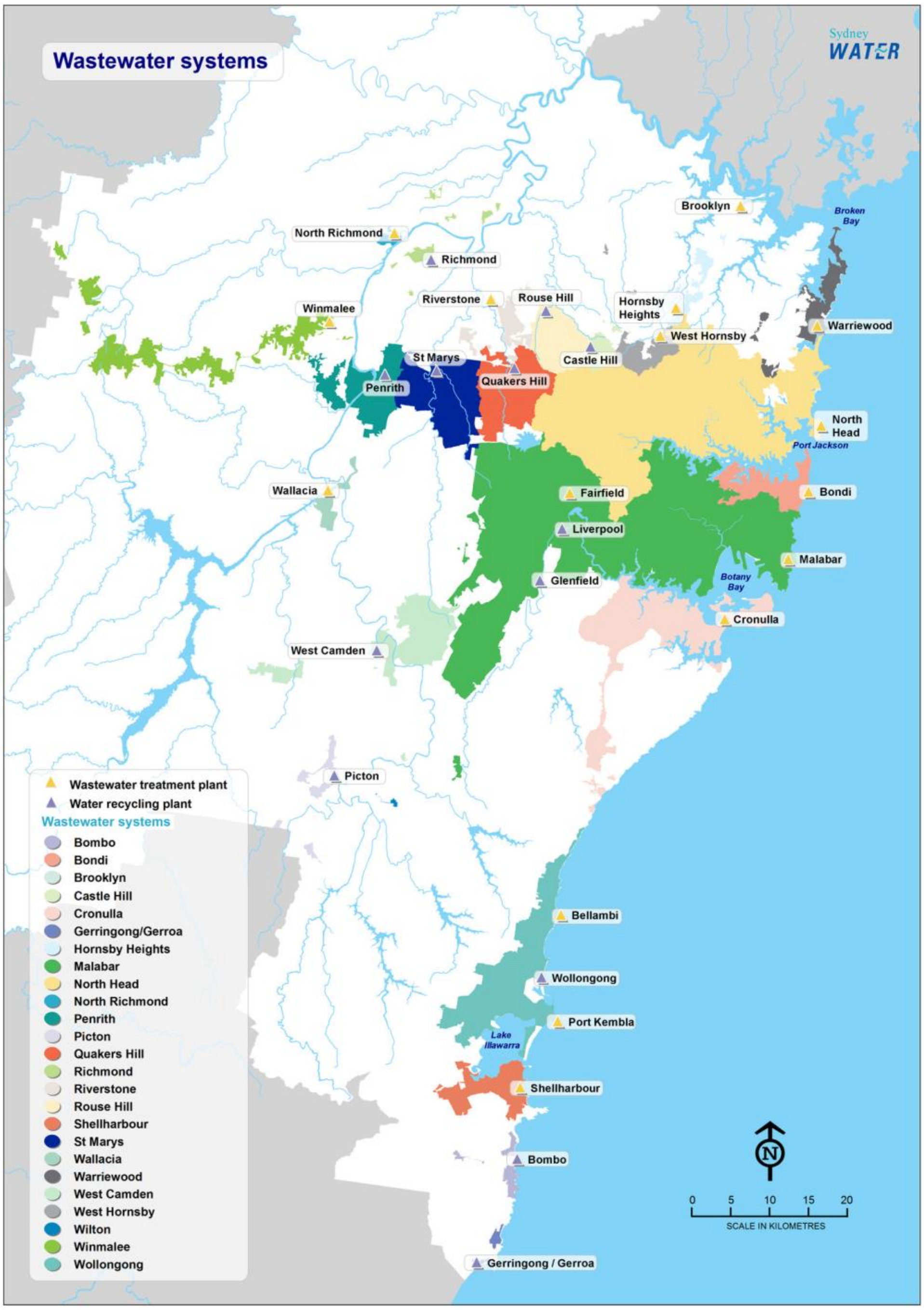

Figure 4-3 Our wastewater system

4.3 Stormwater drainage services

Most stormwater channels and drains are the responsibility of local councils. However, we manage 452 km of stormwater channels mainly in the eastern suburbs and south-west Sydney, as well as flood-prone areas and trunk drainage at Rouse Hill (Figure 4-3).

Our stormwater charges are applied to properties within declared stormwater catchment areas. We also apply different charges to properties in the Rouse Hill stormwater catchment area. These areas include about 600,000 properties.

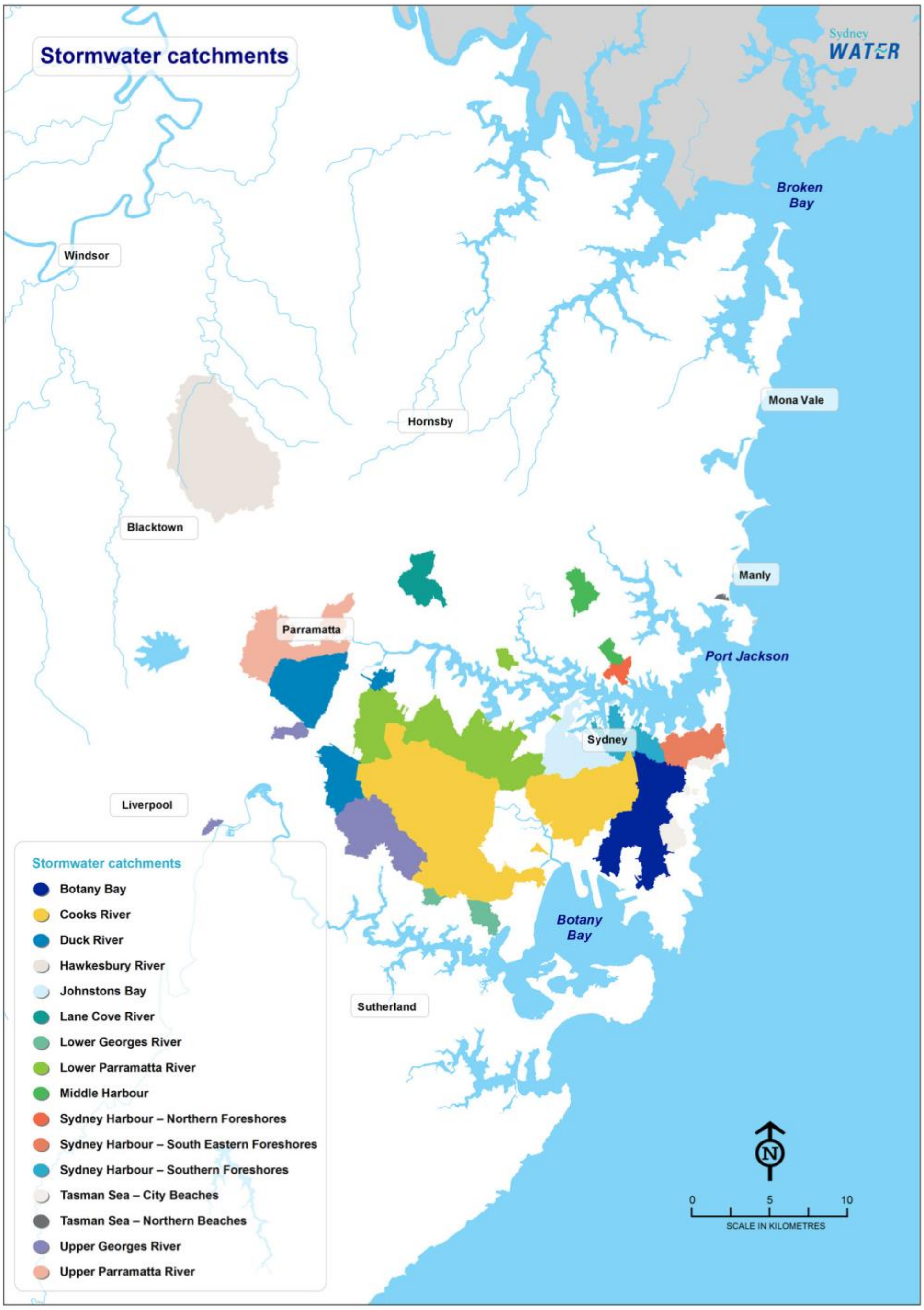

Figure 4-4 Our stormwater drainage system

4.4 Recycled water

We recycle about 43 billion litres of water a year, of which about 32 billion litres is supplied to customers or used for environmental flows. For a map and details about our recycling schemes, visit www.sydneywater.com.au.

Mandated recycling schemes are mainly residential schemes to which customers must connect due to a government policy, such as BASIX. IPART does not determine prices for these schemes (except Rouse Hill) but issued 2006 pricing guidelines that cover costs that can be recovered, any offsets such as subsidies, and price structures. Updated guidelines are expected in June 2019.

Voluntary recycling schemes are where customers can connect at their discretion and have an alternative water service available at a regulated price. IPART does not determine prices for these schemes but has produced high-level pricing principles for negotiating the price with customers.

4.5 Growth services

Water plays a vital role in the Greater Sydney Commission's vision for a metropolis of three cities. We provide water, wastewater and some stormwater drainage infrastructure to support urban growth. We service new growth areas by installing new networks, and upgrading existing infrastructure as appropriate. Most of our investment will be in Sydney's north west and south west. We're partnering with our stakeholders to make Greater Sydney a water sensitive city – liveable, resilient, productive and sustainable for generations to come. For more detail on our work in urban water planning, see section 5.2.

Developer charges are a mechanism for recovering the costs of providing infrastructure to new developments from developers. The NSW Government set water, wastewater and stormwater developer charges to zero in 2008; recycled water developer charges are still levied. We believe there is merit in maintaining discussions about their potential role as part of the overall water funding framework. In the past, developer charges have been the subject of a separate IPART determination. However, since 2008, we now fund all water, wastewater, and stormwater works in growth areas except for minimum-sized reticulation.

4.6 Trade waste

Trade waste is any liquid produced by an industrial or commercial activity. The presence of toxic substances can adversely affect the biological processes within wastewater treatment plants, damage infrastructure and present a safety risk to wastewater system personnel. Our Trade Waste Requirements outline the terms and conditions under which we will accept trade waste discharges, and our fees and charges. Commercial and industrial customers must seek our permission and if approved, an agreement is established with ongoing requirements and conditions. IPART determines maximum charges for trade waste services, reflecting the cost of providing the service.

4.7 Ancillary and miscellaneous services

We provide services such as developer compliance certificates, system diagrams and plans, network connections and disconnections, system inspections and technical services. IPART determines the fees for these services on a cost-recovery basis.

5 The customers and city we serve

5.1 Working with our customers

We are committed to supporting the communities we serve and meeting customers' needs and values. We are committed to ensuring that our programs are efficient and effective.

Our customer research program has grown over time to better meet our information needs. Information gathered through research provides measures of corporate performance from customers' perspectives, and is used to track our performance over time. Customer research also assists with decision making, planning of products and services to align with customers' expectations, and developing corporate strategies and initiatives.

Our Customer Council enables us to regularly engage directly with organisations that represent different types of customers. We seek members' advice and feedback on a range of products and projects. We plan to review the role and function of the Customer Council as part of our Operating Licence requirements.

Our current Customer Council members are:

- Multicultural NSW (formerly Community Relations Commission NSW)
- Ethnic Communities' Council of NSW
- Illawarra Forum Inc.
- Local Government NSW
- Nature Conservation Council NSW
- Public Interest Advocacy Centre (PIAC)
- Sydney Business Chamber
- Council of the Ageing (COTA) NSW
- People with Disability (PwD) Australia
- NSW Council of Social Service (NCOSS)
- Total Environment Centre
- Urban Development Institute of Australia (UDIA)
- Illawarra Local Aboriginal Land Council

5.1.1 Our customer numbers

Table 5-1 provides a summary of estimated customer numbers by water, wastewater and stormwater over the 2016–20 price period, and forecast numbers for the 2020–24 price period. Tables 5-2, 5-3 and 5-4 break down these numbers by property type for water, wastewater and stormwater respectively.

Table 5-1 Overall dwelling numbers for water supply, wastewater and stormwater services

	Current determination period				Next determination period			
Service	**2016–17**	**2017–18**	**2018–19**	**2019–20**	**2020–21**	**2021–22**	**2022–23**	**2023–24**
Water[1]	1,950,436	1,995,142	2,036,712	2,076,055	2,114,182	2,152,613	2,189,326	2,224,351
Wastewater[1]	1,913,412	1,955,219	1,995,666	2,033,253	2,069,952	2,106,657	2,141,919	2,175,696
Stormwater[2]	558,951	572,401	585,331	597,058	608,812	620,487	631,787	642,725

Table 5-2 Customer numbers for water supply services broken down by customer type

	Current determination period				Next determination period			
Category	**2016–17**	**2017–18**	**2018–19**	**2019–20**	**2020–21**	**2021–22**	**2022–23**	**2023–24**
Residential								
Houses	1,095,090	1,107,285	1,119,059	1,132,171	1,146,442	1,160,970	1,173,685	1,185,561
Strata common meters	471,586	488,038	492,467	495,749	498,142	500,363	502,573	504,725
Strata individual meters	114,129	126,193	150,155	172,153	192,576	213,218	233,966	253,923
Flats	109,761	111,925	112,591	112,591	112,591	112,591	112,591	112,591
Mixed developments	14,583	14,653	14,569	14,604	14,639	14,674	14,709	14,744
Total residential	1,805,149	1,848,094	1,888,841	1,927,268	1,964,390	2,001,816	2,037,524	2,071,544
Non-residential								
Stand alone	78,628	79,121	79,685	79,741	79,911	80,081	80,251	80,421
Strata common meter	36,676	36,978	37,355	37,361	37,935	38,509	39,083	39,657
Strata individual meter	16,290	16,604	17,339	18,193	18,454	18,715	18,976	19,237
Total non-residential	131,594	132,703	134,379	135,295	136,300	137,305	138,310	139,315
Unmetered (res + non-res)	13,693	14,345	13,492	13,492	13,492	13,492	13,492	13,492
Total	**1,950,436**	**1,995,142**	**2,036,712**	**2,076,055**	**2,114,182**	**2,152,613**	**2,189,326**	**2,224,351**

[1] These totals are a sum of residential, non-residential and unmetered dwellings.
[2] These totals are a sum of residential, non-residential, vacant land and exempt properties.

Table 5-3 Customer numbers for wastewater services broken down by customer type

	Current determination period				Next determination period			
Category	**2016–17**	**2017–18**	**2018–19**	**2019–20**	**2020–21**	**2021–22**	**2022–23**	**2023–24**
Residential								
Houses	1,064,370	1,076,582	1,087,632	1,099,751	1,112,829	1,126,238	1,138,106	1,149,322
Strata common meters	471,114	487,613	492,142	495,424	497,817	500,038	502,248	504,400
Strata individual meters	113,295	125,359	149,506	170,741	191,200	211,506	231,921	251,561
Flats	108,396	110,317	111,034	111,034	111,034	111,034	111,034	111,034
Mixed developments	14,275	14,465	14,411	14,446	14,481	14,516	14,551	14,586
Total residential	1,771,450	1,814,336	1,854,725	1,891,396	1,927,361	1,963,332	1,997,860	2,030,903
Non-residential								
Stand alone	65,110	65,458	65,336	65,392	65516	65640	65,764	65,888
Strata common meters	36,170	36,457	37,043	37,049	37,468	37887	38,306	38725
Strata individual meters	16,015	16,318	17,054	17,908	18,099	18,290	18,481	18,672
Total non-residential	117,295	118,233	119,433	120,349	121,083	121,817	122,551	123,285
Unmetered (res + non-res)	2,812	2,715	2,728	2,728	2,728	2,728	2,728	2,728
Total*	**1,891,557**	**1,935,284**	**1,976,886**	**2,014,473**	**2,051,172**	**2,087,877**	**2,123,139**	**2,156,916**

*Excludes vacant

Table 5-4 Customer numbers for stormwater services broken down by customer type

	Current determination period				Next determination period			
Category	**2016–17**	**2017–18**	**2018–19**	**2019–20**	**2020–21**	**2021–22**	**2022–23**	**2023–24**
Residential								
Dwelling not in multi premises	202,931	203,267	203,944	204,969	205,973	207,092	208,217	209,308
Multi premise	295,556	309,381	321,268	331,313	341,747	351,987	361,846	371,377
Mixed multi premise	9,039	8,550	8,640	8,677	8,687	8,697	8,707	8,717
Total residential	507,526	521,198	533,852	544,959	556,407	567,776	578,770	589,402
Non-residential								
Small (200 m^2 or less)	8,566	8,508	8,495	8,511	8,461	8,411	8,361	8,311
Medium (201-1,000 $m^{2)}$	14,819	14,655	14,639	14,671	14,599	14,527	14,455	14,383
Large (1,001 – 10,000 m^2)	5,341	5,274	5,279	5,287	5,283	5,279	5,275	5,271
Very large (10,001-45,000 m^2)	770	765	774	774	775	776	777	778
Largest property (45,000 m^2 or greater)	145	145	144	144	146	148	150	152
Non-residential property within non-residential multi premises	19,759	19,934	20,248	20,767	21,151	21,535	21,919	22,303
Total non-residential	49,400	49,281	49,579	50,154	50,415	50,676	50,937	51,198
Vacant land and exempt properties	2,025	1,922	1,900	1,945	1,990	2,035	2,080	2,125
Total	**558,951**	**572,401**	**585,331**	**597,058**	**608,812**	**620,487**	**631,787**	**642,725**

5.2 Partnering with our stakeholders

We work with a range of stakeholders representing government, community and industry groups for better whole of community outcomes. We are committed to involving stakeholders in our decision making through effective engagement and relationship building. Key relationships include:

- customers – business and residential
- employees and contractors
- developers
- state and local Government
- regulators
- advocacy and special interest groups.

We serve 38 local government areas:

- Bayside
- Blacktown
- Blue Mountains
- Burwood
- Camden
- Campbelltown
- Canada Bay
- Canterbury-Bankstown
- Cumberland
- Fairfield
- Georges River
- Hawkesbury
- Hornsby
- Hunters Hill
- Inner West
- Kiama
- Ku-ring-gai
- Lane Cove
- Liverpool
- Mosman
- Northern Beaches
- North Sydney
- Parramatta
- Penrith
- Randwick
- Ryde
- Shellharbour
- Shoalhaven
- Strathfield
- Sutherland
- Sydney (City of)
- The Hills
- Waverley
- Willoughby
- Wingecarribee (part)
- Wollondilly
- Wollongong
- Woollahra

State Government's Infrastructure Planning and Prioritisation

Infrastructure NSW released its updated State Infrastructure Strategy 2018–2038 in 2018. It and the Future Transport Strategy 2056, the Greater Sydney Region Plan and the Regional Development Framework, bring together infrastructure investment and land-use planning for Sydney. The State Infrastructure Strategy 2018–2038 contains several recommendations (agreed to by the NSW Government) that directly influence our infrastructure planning:

92. Develop a 20-year Strategic Capital Plan for Sydney's water and wastewater systems for consideration by the NSW Government and inclusion in our Pricing Submission to IPART.

93. Complete the South Creek Corridor strategic business case.

94. Develop options for the augmentation of Sydney's water supply, including the findings of the South Creek strategic business case, and provide advice to the NSW Government.

This is consistent with our obligations under the NSW Government's new Greater Sydney Urban Water Framework. In 2018 our Minister asked us to develop (with WaterNSW):

- a long-term capital and operational plan consistent with stated NSW government policy objectives (the 2017 Metropolitan Water Plan, the Greater Sydney Region Plan, the State Infrastructure Strategy 2018–2038 and outcomes of the South Creek Sector Review)
- a drought response plan by December 2020 (to be reviewed at least every 5 years).

Based on infrastructure modelling and analysis, our long term investment planning identifies that the most cost effective and beneficial future water infrastructure solutions will improve system resilience and increase overall levels of water recycling.

Infrastructure NSW asked us to contribute to the South Creek sector review and development of the strategic business case. Stage 1 showed that integrated water cycle management options, combined with improved land use patterns, have similar costs to "business as usual" approaches, but greater economic benefits. Stage 2 work will cover regional waterways governance, a waterway health regulatory framework, an urban cooling strategy, and a biosolids and organics waste strategy.

Our internal product and regional Masterplans, including the Water Masterplan, the Collection Products Masterplan, the Western Sydney Regional Masterplan, and the Eastern City Regional Masterplan, inform broader planning by government. Potential infrastructure solutions required to achieve the most beneficial servicing pathways are determined in detailed sub-regional planning.

Greater Sydney Region Plan

We will continue to work with the Department of Planning and Environment, WaterNSW and other stakeholders to meet our responsibilities under the Greater Sydney Urban Water Framework. We are happy for these responsibilities to be reflected in our proposed 2019–23 Operating Licence, so long as they align with our role as a State Owned Corporation.

We have responsibilities under The Greater Sydney Region Plan: A Metropolis of Three Cities – the NSW Government's vision to develop a liveable, productive and sustainable Greater Sydney by rebalancing growth, and align land use, transport and infrastructure planning. Under it and the District Plans, we are actively planning to ensure Sydney's long-term water needs are adequately catered for, to support population growth, collaborative infrastructure and city planning, and build liveable and resilient communities.

Water security planning

We are also involved in the review and development of water security and integrated water strategies. We are working with the Department of Planning and Environment to deliver the Greater Sydney Water Strategy (previously the Metropolitan Water Plan) by 2020.

We contribute to relevant governing committees and working groups such as the Water Coalition CEOs committee, Senior Officers Group and Technical Working Group, and the Sydney Drought Committee. We provide:

- demand and dwelling forecasts
- advice and expertise on demand side options (such as water restrictions and water conservation options)
- advice on supply side options (such as water recycling)
- insights on customer behaviour, attitudes, values, support for customer communications
- advice on the interaction of urban water policy, environmental regulation, planning, and wastewater management.

Improved waterway management and governance

We are taking leadership to improve the coordinated management of the Parramatta River catchment. We are the lead coordinating agency for the Parramatta River Masterplan, which aims to improve water quality to enable swimming and improvements in ecological health, through effective collaborative leadership, consistent waterway health objectives, reduced wastewater overflows, improved stormwater quality, and monitoring.

The future of Sydney's water

To achieve the Greater Sydney Commission's vision, Greater Sydney needs to become a *resilient, water sensitive city.* Our long term strategy to create a water sensitive Sydney by 2040 was endorsed by the Board in late 2018. *Water Sensitive Sydney 2040* sets our path to achieving a water sensitive Greater Sydney and Illawarra. It will enable Sydney to become a water sensitive city, that is liveable, resilient, productive and sustainable for generations to come.

The strategy shows how we need to evolve from a traditional water utility to become Greater Sydney and the Illawarra's master water planner and waterway manager.

As the master water planner, we will shape our city by considering waterways at the start of urban planning. We will collaborate to shape policy, legislation and regulations to recognise the value of water. As the waterway manager we will coordinate with government agencies, local councils and the community to deliver healthy waterways, as well as catering for growth and flood management, by providing advice on:

- using integrated water cycle management to build resilient cities
- using water in the landscape to reduce heat and enhance productivity.

We will continue to work with government, businesses and the private sector to encourage innovation in the water industry to solve some of the city's complex challenges.

SW231 06/19

Attachment 2
Service levels and performance

Price proposal 2020–24

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Service levels and performance

Key messages

- We have a long history of providing high quality services to our customers, in line with our regulatory requirements and our understanding of customer expectations.
- Our performance is regulated by our Operating Licence and our Environment Protection Licences (EPLs). These are set in isolation, by different bodies, to achieve different things. Operating Licence performance standards largely focus on protecting customer service levels. EPL requirements focus on protecting the environment and public health.
- Over 2016–20, we have continued to perform well against most Operating Licence conditions. However, our regulated standards do not cover all aspects of our performance and are not the sole drivers of our operating and capital expenditure. During this price period, we have experienced a significant increase in leaks and breaks, wastewater chokes and dry weather wastewater overflows to waterways. This is due to a combination of factors, including weather, soil moisture levels and past reductions in preventative maintenance and response programs.
- Our performance against our EPLs has also declined. We are committed to improving our environmental performance and have begun to implement initiatives to do this. At the same time, the EPA has indicated an expectation for improved performance and incident response.
- We have maintained high levels of customer satisfaction. We have been working hard to improve customer experience, for example through establishing the Customer Hub to reduce the impact of service faults and improve proactive communication with our customers.
- Over 2020–24, we will continue to strive to meet our regulatory requirements and provide services in line with our understanding of customer expectations.
- We expect the 2019–23 Operating Licence to include a new target for water interruptions and requirements to improve pressure in chronic problem areas. The review of our Economic Level of Water Conservation methodology could also affect our level of water conservation activity.
- Key known changes to environmental standards include revised concentration limits for all wastewater treatment plants from 2019 and tighter nutrient load and concentration limits for treatment plants in the Hawkesbury Nepean from 2024, which will require upgrades in 2020–24. Other potential changes include revised wet weather overflow requirements, and further changes to load and concentration limits.
- We will keep engaging with our customers to better understand their preferences and willingness to pay for service levels. Our 2018 engagement program largely focused on our current Operating Licence standards and rebates and pricing issues. Moving forward, we aspire to have a broader conversation with customers on service levels.

1 Overview

We provide services in line with our broad range of regulatory requirements, the contractual obligations in our Customer Contract, and our understanding of customer and community expectations. In our 2015 price proposal we committed to meet service levels set out in:

- our *Operating Licence 2015–2020*, which focus on the provision of services to customers
- Environment Protection Licences (EPLs) issued by the NSW Environment Protection Authority (EPA), which focus on minimising the potential for negative environmental and public health impacts related to the delivery of water and, particularly, wastewater services.

Other drivers of Sydney Water's activities and service levels include:

- specific Ministerial requirements in relation to performance under the Operating Licence – current ones relate to recycled water (see section 2.7.1)
- Directions under the *State Owned Corporations Act 1989* (see **Attachment 1: Our role and function**, section 3) – to date, there are no new Directions in 2016–20
- other legislative requirements, such as from the *Water Industry Competition Act 2006*
- Customer Contract commitments.

Our service standards represent minimum levels we are required to meet. We aim to perform to achieve these minimum standards, but our actual performance levels can vary, due to external impacts (such as weather), the interaction of regulatory requirements (for example, activities implemented to meet leakage requirements can affect our performance against unplanned interruption requirements) or how we manage our assets to achieve efficient life cycle costs.

This attachment reports on performance against IPART and EPA regulated service levels for the current determination period up to 2017–18 and forecast performance for 2018–19 and 2019–20.

We also outline our forecast service levels for 2020–24. We have assumed proposed new Operating Licence requirements will begin later in 2019. Expected EPL requirements are based on discussions and correspondence to date with the EPA, including proposed changes for the Hawkesbury Nepean from 2024.

2 Operating Licence performance

In relation to service levels, the *2015–2020 Operating Licence* (Operating Licence) includes performance standards for:

- water quality
- water pressure and continuity (water interruptions)
- wastewater overflows onto private properties
- water conservation, including planning for water conservation activities and reporting on response times to attend leaks and breaks.

System performance standards

We do not have performance standards relating to stormwater services, only a requirement to maintain a stormwater drainage system in line with our obligations under the Sydney Water Act.

System performance standards are designed to provide a minimum level of service for customers – a breach leads to an Operating Licence non-compliance. We also report to IPART each year on a broader range of performance indicators, for which there is no threshold.

The Operating Licence has recently been reviewed and will be replaced later in 2019. The end-of-term licence review was brought forward by one year, to allow it to precede the price review. IPART provided a recommended 2019–2023 Operating Licence to the Minister in April 2019. This attachment is based on our understanding of final licence conditions at the time of drafting.

Overall, we do not expect the maximum threshold limits for service interruptions to change significantly. This is in line with our research indicating there was little customer willingness to pay for changes in levels of service, apart from a small improvement for water interruptions.

We have some new Operating Licence obligations to improve performance in line with customer willingness to pay. These include:

- a new target level of performance for water interruptions (referred to as an 'optimal level')
- a requirement to address chronic low-pressure areas by October 2022
- a new requirement for us to undertake customer engagement on service levels.

Water conservation obligations are still based on the Economic Level of Water Conservation, with the methodology to be reviewed and more information to be made publicly available. We also now have a specific requirement to implement water conservation activities assessed as economic.

We expect to meet IPART's proposed performance standards for service interruptions from 2019 and through the next price path largely by continuing existing practices. For this price proposal, we have assumed the proposed standards continue through to 2024.

2.1 Overall compliance

Over many years, we have maintained an excellent record of Operating Licence compliance. Overall, our performance across 2016–18 has remained high, with independent audits finding Sydney Water achieved high or full compliance for the majority of licence areas.

However, we recently received an audit grading of 'Compliant (minor shortcomings)' for several areas, including recycled water management, the fluoridation code, customers and consumers, and performance monitoring; and 'Non-Compliant (non-material)' for pricing. Our pricing non-compliances were technical and did not result in detrimental outcomes for customers. We also came close to breaching our system performance standard for properties impacted by an unplanned water interruption over five hours in 2017–18 and will likely breach this standard in 2018–19.

Our compliance against the Operating Licence over time is shown in Figure 2-1 below.

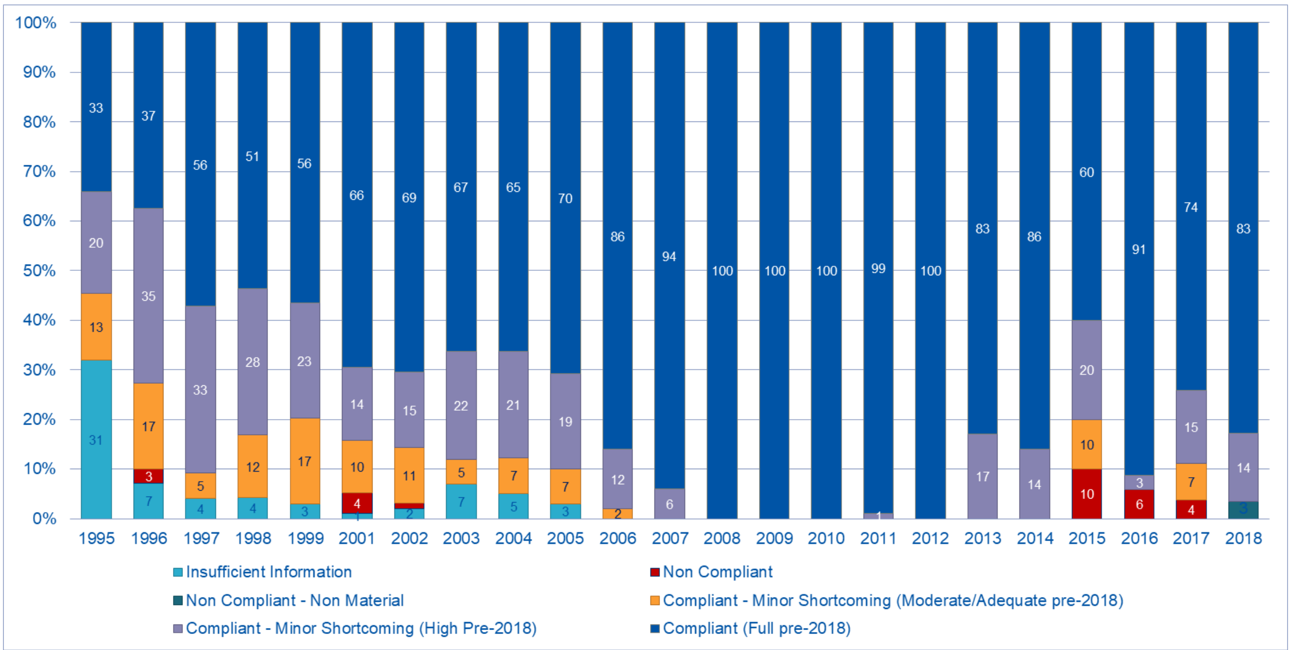


Figure 2-1 Sydney Water's Operating Licence compliance 1995–2018 (% compliance achieved)

2.2 Water pressure

2.2.1 Service levels and performance 2016–20

The current service level is:

> *Sydney Water must ensure that, in any financial year, no more than 6,000 Properties experience a Water Pressure Failure (the Water Pressure Standard).*

Under the Customer Contract, Sydney Water commits to supply drinking water at a minimum of 15 metres head of pressure at the point of connection to Sydney Water's water system.

We continue to perform within the limit, as shown in Figure 2-2.

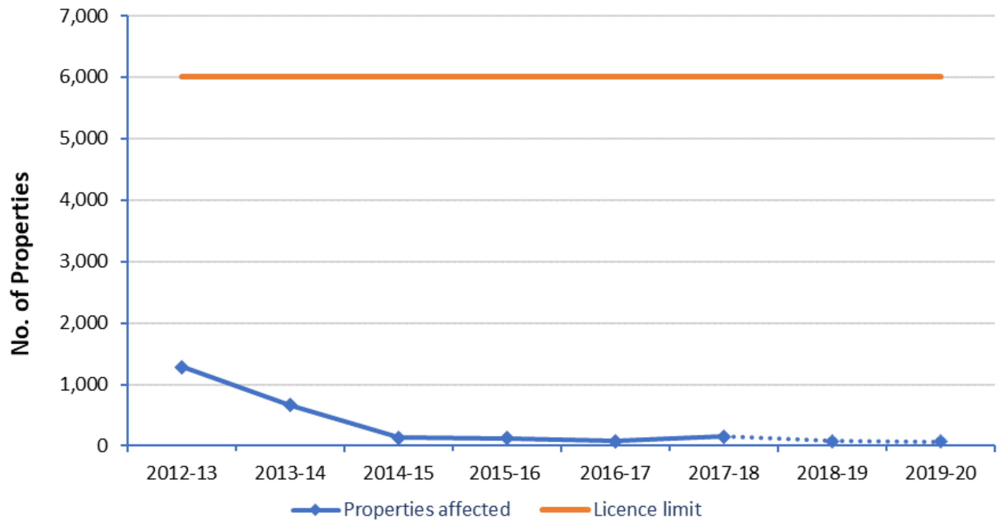


Figure 2-2 Water pressure standard performance

A new standard will come into effect later in 2019 (outlined in section 2.2.2). We forecast we will meet the new standard in 2019–20.

2.2.2 Service levels 2020–24

Key changes in IPART's proposed 2019–2023 Operating Licence include:

- the standard now focuses on properties experiencing repeat water pressure failures (12 or more in a year), not properties experiencing one or more events in a year
- the duration of a water pressure failure is now defined as one hour, not 15 minutes. This aligns with customer feedback on inconvenient events and Sydney Water's design standards.

We support this. The new standard aligns with feedback from our customers that single water pressure failures and events of shorter duration are not a high inconvenience event.[1]

Under the proposed new standard, we must ensure that, each financial year, at least 9,999 properties per 10,000 properties served are affected by fewer than 12 water pressure failures. This is in line with current performance.

We must also:

- by June 2020, update business processes to inform new properties about risks of connecting to defined areas that experience recurring low water pressure
- by October 2022, minimise or eliminate water pressure failures in those areas, in line with customer willingness to pay.

[1] In our 2018 customer engagement program, water pressure failures were identified as low inconvenience events in both discussion forums and online surveys, particularly if only lasting for 15 minutes and occurring at a non-peak time. Appendix 3A *CIPA Phase 1 report*, page 77.

Rebate values have slightly increased. Rebates will continue to be paid for one water pressure failure event per quarter.

Throughout the next price period, we will continue to supply drinking water at a minimum of 15 metres head of pressure and aim to meet our new obligations.

There is still significant uncertainty about the technical solution and cost to minimise or eliminate low pressure problems in the chronic areas identified in the Operating Licence. We estimate it will cost between $2–7 million, depending on the solution adopted. We will continue investigations into the most effective way to do this, including consultation with customers directly affected. Depending on the solution adopted, this work will be funded from existing budgets or, if involving capital expenditure, we will seek to recover this in the next price period.

2.3 Water interruptions

We aim to provide a continuous supply of water to our customers. However, it is inevitable that occasionally customers may experience a temporary interruption. Interruptions where a customer receives prior notice, for example to undertake planned maintenance or to extend our network, are known as "planned interruptions". [2] Interruptions where a customer does not receive prior notice, for example to repair a water main break, are called "unplanned interruptions".

2.3.1 Service levels and performance 2016–20

The current service levels are:

> *Sydney Water must ensure that, in any financial year:*
>
> i) *No more than 40,000 Properties experience an unplanned water interruption that lasts for more than five continuous hours.*
>
> ii) *No more than 14,000 Properties experience 3 or more unplanned water interruptions that each lasts for more than one hour.*

Under our Customer Contract, we also make commitments about providing notice, timeframes for restoring water supply, customer support and rebates.

Unplanned interruptions – single events

Performance against our Operating Licence standard for unplanned interruptions over five hours is shown in Figure 2-3.

[2] In practice, notice of the interruption is provided to the occupant of the property, who may not be the billpayer. This is to ensure the persons impacted by the planned interruption are aware it will occur.

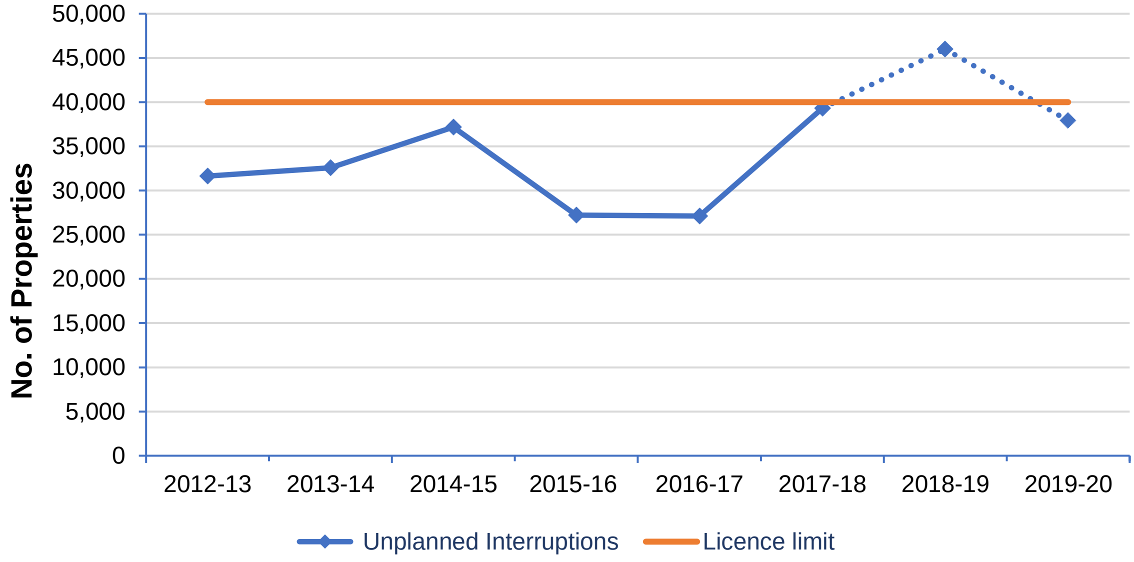


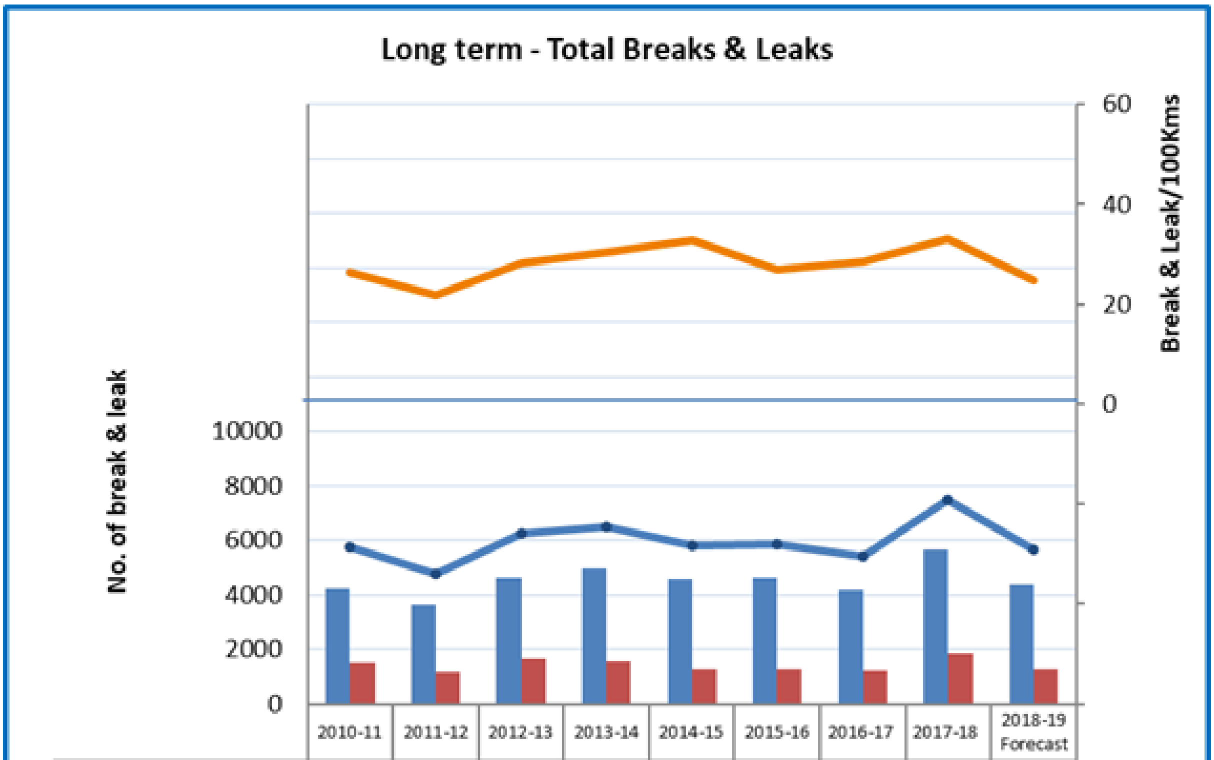
Figure 2-3 Unplanned water interruptions over five hours standard

While we have performed below the Operating Licence limit for the first two years of this price period, we came close to breaching the limit in 2017–18. This was largely due to the higher number of water main breaks and leaks (an increase of around 40%) and an increase in the number of significant events requiring complex shutdowns with longer durations. In some cases, lack of access to valves was also a contributing factor.

We expect to breach the licence limit in 2018–19. This is mainly due to a single event in April 2019 on a critical water main, that affected up to 15,000 properties – the largest event of this type that we have ever experienced. Apart from that event we were on track to be slightly below the 2017–18 level.

IPART's proposed 2019–2023 Operating Licence sets a new maximum limit which is comparable to the current limit but expressed as a ratio against the customer base (see section 2.3.2). Barring more extreme events occurring, we forecast we will meet the new standard in 2019–20.

In 2017–18, staff attended to increased water main breaks and leaks, plus a growing number of wastewater incidents, which contributed to a significant backlog. Having additional crews available will not necessarily reduce the duration of a single interruption (which depends on the location and complexity of the repair). However, staffing levels affect the overall backlog over time. As the backlog increases, smaller leaks can turn into bigger leaks or breaks. These in turn can increase the number of properties affected when supply needs to be turned off to do the repair; or can lead to a major break that affects supply immediately. Figure 2-4 shows long-term trends and the increase in total breaks and leaks in 2017–18.

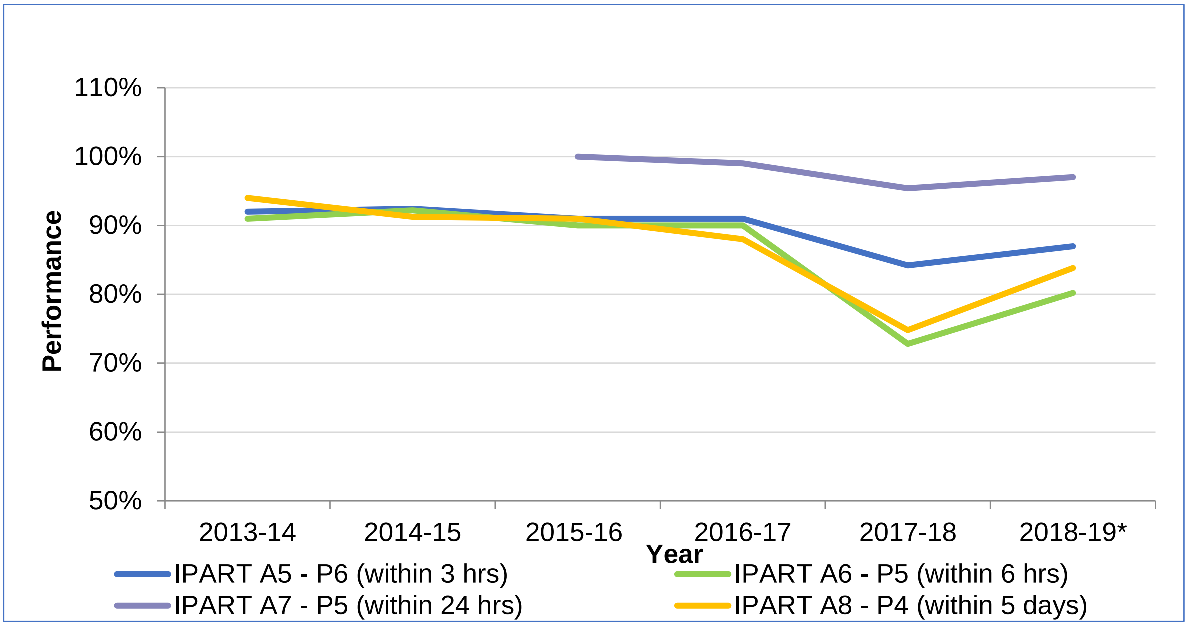


	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19 Forecast
Break	4,242	3,639	4,603	4,958	4,576	4,627	4,203	5,654	4375
Leak	1,521	1,156	1,648	1,557	1,251	1,255	1,214	1,839	1278
Break & Leak	5,763	4,795	6,251	6,515	5,827	5,882	5,417	7,493	5652
B&L/100km(12 MRA*)	26	22	28	31	33	27	29	33	25

Figure 2-4 Long term total breaks and leaks and breaks and leaks per 100km of main

The increased backlog had a flow-on impact on how quickly we could repair to leaks and breaks. We have employed additional field staff and extra contract crews to reduce the impact of breaks and leaks, with permanent teams focusing on more complex repair work. We increased our frontline resources in 2018–19 to deal with the impact of breaks and leaks as well as wastewater incidents (see section 2.4 for more detail).

We report to IPART each year on our response times to cease high priority water main leaks and breaks, as a performance indicator. ‘Cease’ refers to the time it takes us from being notified until we stop the loss of water. Our response time performance against the indicator categories declined in 2017–18, due to the large number of leaks and breaks in our system (see Figure 2-5).



Note:2018–19 based on year to date data as of April 2019

Figure 2-5 Response times to cease water main break or leak, 2012–13 to 2018–19

For response time definitions, refer to the current Sydney Water Reporting Manual.

Unplanned interruptions – multiple events

We have performed below the limit for multiple unplanned water interruptions over one hour (see Figure 2-6).

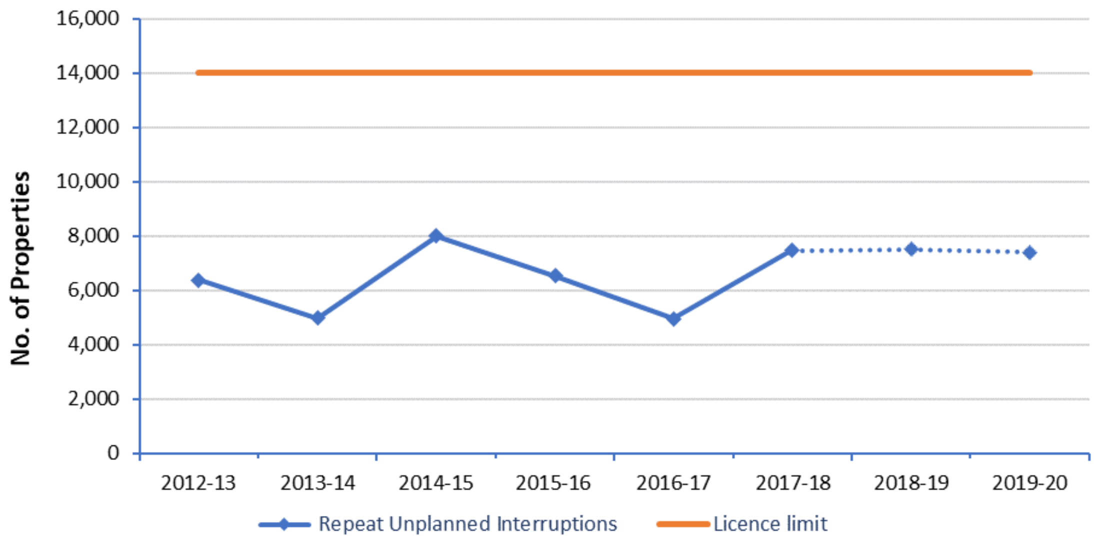


Figure 2-6 Multiple unplanned water interruptions standard

Feedback from customers in our 2018 engagement program was that repeat events are much more inconvenient than one-off events, and an indication that we had not fixed the problem properly the first time.[3] Repeat service fault events are a much better indicator of how we manage our system, particularly over the longer term. Multiple failures can be a sign that a pipe is reaching the end of its service life. This will trigger an NPV analysis to determine whether renewal of the main is the most cost-effective outcome compared to continuing to repair it.

2.3.2 Service levels 2020–24

The 2019–2023 Operating Licence retains a performance standard for *single* water interruptions over five hours only, with additional requirements for a targeted level of improved performance. Limits are now expressed as a ratio compared to our customer base and refer to the number of customers unaffected by the service fault event – we must ensure that, each financial year, at least 9,800 properties per 10,000 properties served are not affected by an unplanned interruption to their drinking water supply that lasts for more than five hours.[4]

There has been little change to the maximum allowable number of properties that can experience an unplanned water interruption over five hours, though it will now slowly increase each year in line with our customer base. Barring extreme events, we aim to meet the standard for water interruptions throughout 2020–24, largely based on existing practices for water main repair and replacement.

IPART's proposed new Operating Licence has removed the standard for *multiple* unplanned water interruptions over one hour; however, it will remain as a performance indicator, to be reported upon. We will continue to try and minimise repeat water supply interruptions to customers.

Going forward, we must also use the water continuity 'optimal level' and 'tolerance band' as inputs to decisions about asset management and service provision. The 'optimal level' was informed by our customer engagement program, based on customer willingness to pay for a small improvement in the average risk of water interruptions (assuming average conditions). We are purchasing additional equipment to do more repairs without interrupting supply, and improving the scheduling of jobs, where possible. The 'tolerance band' was based on the historical band of performance for this measure.

We will adjust our internal decision making processes to aim for the 'optimal level' of water interruptions each year. However, performance can vary significantly year on year due to factors beyond our control. Our planning and the options presented in our engagement program were based on assumptions about performance in an average year. Weather conditions can lead to a worse, or better, performance outcome.

We will continue to meet our Customer Contract commitments on water interruptions in 2020–24. These are largely unchanged in the proposed new Customer Contract; although, in line with customer feedback, we proposed to increase the rebate for *unplanned* water interruptions over five hours but to reduce the rebate for *planned* water interruptions over five hours.

[3] Appendix 3A *CIPA Phase 1 report*, page 68.
[4] The measure based on 'x properties in every 10,000' allows the standard to change with growth in the number of properties on the system and avoids the target becoming unintentionally more stringent over time.

2.4 Wastewater overflows onto private properties

2.4.1 Service levels and performance 2016–20

The current requirements are:

Sydney Water must ensure that:

i) *In any financial year, no more than 14,000 private properties experience an uncontrolled wastewater overflow in dry weather.*

ii) *In any financial year, no more than 175 private properties experience three or more uncontrolled wastewater overflows in dry weather.*

Under our Customer Contract, we make commitments around minimising overflows due to a failure of our system, our clean up, minimising inconvenience and damage, and rebates.

Wastewater overflows on private properties – single events

The Operating Licence regulates wastewater overflows onto private properties that occur due to a choke (blockage or collapse, usually caused by tree roots) in our wastewater system.[5] Wastewater overflows onto public property or to the environment are regulated by our EPLs (see section 3).

Performance during this price period has been under the Operating Licence standard for wastewater overflows onto private properties (single events) (see Figure 2-7).

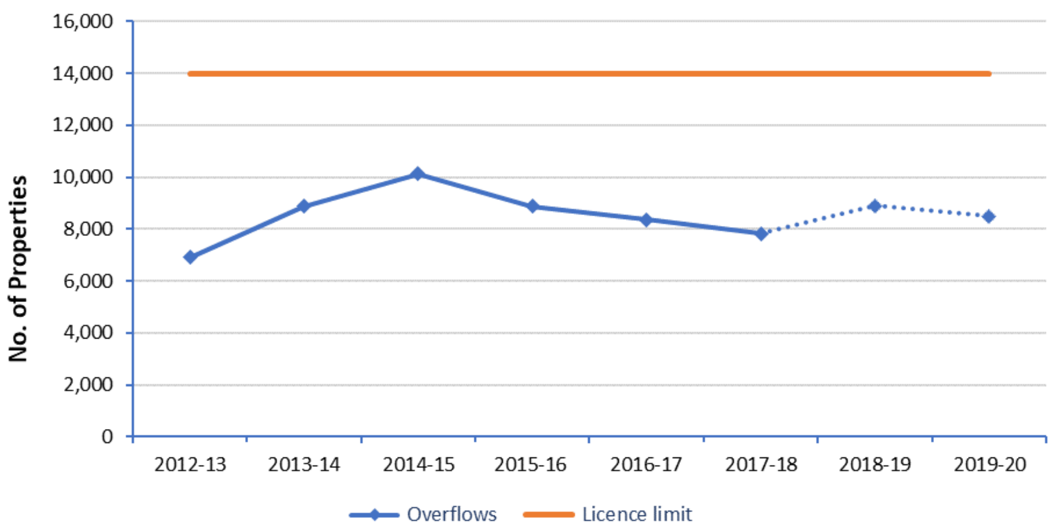


Figure 2-7 Properties experiencing a wastewater overflow standard

Our performance has remained stable, despite a steady increase in chokes in our wastewater network since 2016, and an overall increasing trend since 2008. The increase in chokes is forecast to continue in 2018–19. Two years of very dry weather and high evaporation have led to extremely

[5] Uncontrolled overflows result from a blockage or collapse of a pipe in our wastewater system; whereas controlled, or directed, overflows occur from designed overflow points to prevent blocked sewers from discharging at sensitive locations that could endanger public health (including on private properties) and/or cause environmental damage. All wastewater overflows onto private properties are uncontrolled overflows. Dry weather overflows regulated by Environment Protection Licences are defined by the amount of rain that has occurred within a specified time period prior to the overflow occurring.

low soil moisture, which has driven an increase in wastewater chokes caused by tree roots. If total chokes continue to increase, performance against the standard for single wastewater events could move closer to the Operating Licence limit. The increasing trend in chokes is one of the factors that has led to a decline in our environmental performance and an increase in wastewater overflows to the environment. For further detail on the impact of weather on our wastewater system, our environmental performance and our response see section 3.2.

The performance standard for single wastewater overflows onto private properties has been retained in IPART's proposed new Operating Licence. The new maximum limit is comparable to our current limit, though expressed as a ratio. We forecast we will meet the proposed new standard in 2019–20.

Given the recent increase in chokes and decline in our environmental performance, we have increased our preventative maintenance programs and are conducting access chamber inspections to identify high risk areas and direct further inspection and remediation work.

Wastewater overflows on private properties – multiple events

Our performance has been under the Operating Licence standard for wastewater overflows onto properties (multiple events) during this price period (see Figure 2-8).

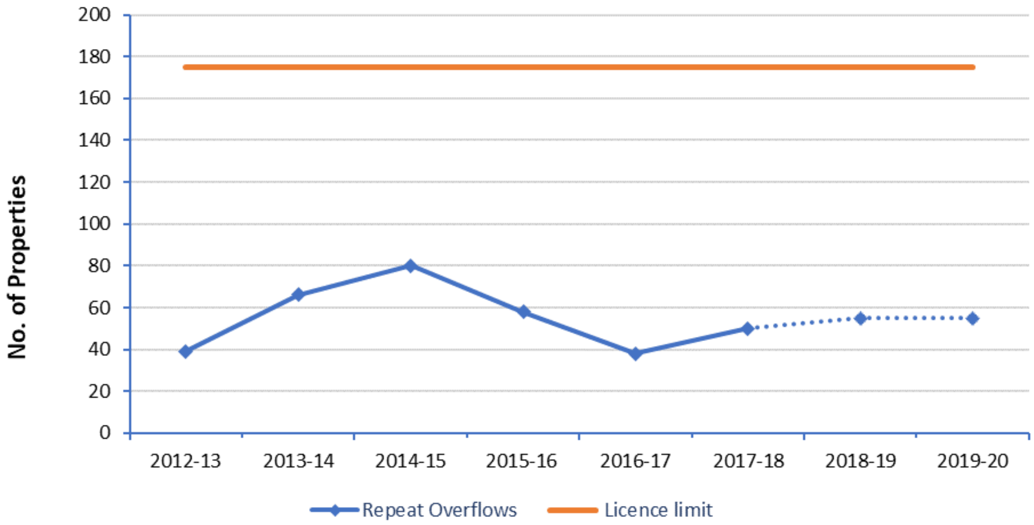


Figure 2-8 Properties experiencing three or more wastewater overflows standard

Repeat chokes within a single year are rare, because it takes time for tree roots to grow back after being cleared by a high-pressure water jetter. For this reason, repeat chokes within a year are often related to other causes, such as wipes, fats or building materials. These causes can sometimes be identified and addressed at source. If not, customer education campaigns can discourage people from putting these materials in the wastewater system. We have been conducting campaigns to better educate customers (residential and commercial) about the impact of what they put in the sewer including wet wipes, grease and fat.

IPART has retained a performance standard for multiple wastewater overflows onto private properties in the proposed 2019–2023 Operating Licence. The new maximum limit is comparable to our current limit. We forecast we will meet the proposed new standard in 2019–20.

2.4.2 Service levels 2020–24

The proposed new Operating Licence retains performance standards for both single and repeat wastewater overflows onto private properties. Limits are relatively unchanged but are now expressed as a ratio compared to our customer base and refer to the number of customers *unaffected* by the service fault event.

Under the proposed new standards, Sydney Water must, each financial year, ensure that at least 9,928 properties per 10,000 properties served (excluding public properties) are not affected by an uncontrolled wastewater overflow, and 9,999 properties per 10,000 properties served are affected by fewer than three uncontrolled wastewater overflows.

There has been little change to the actual limit for either standard, though they will now slowly increase each year in line with our customer base. This is consistent with our customer research that indicated customers preferred retaining the current level of service for wastewater overflows onto private properties. However, we note that we did not ask customers to value changes to performance regarding wastewater overflows to the environment.

We will continue to meet Operating Licence standards for wastewater overflows onto private property in 2020–24. We are also striving to improve our performance regarding wastewater overflows to the environment (see section 3.2).

2.5 Water conservation

While water conservation is not a direct ‘service level’, it is an area of importance for customers and stakeholders. Water conservation activities can defer or avoid the need for new water sources and provide a buffer to help respond to drought conditions or rising demand. Investing in water conservation is a key strategy in the NSW Government’s *2017 Metropolitan Water Plan* to ensure secure and affordable water supplies for greater Sydney. Customers also identified ensuring a secure supply for the future as one of their top priorities for Sydney Water (see **Attachment 3: Customer engagement**, section 2.2).

Water conservation includes:

- **water efficiency (sometimes known as demand management)** – programs designed to reduce residential or business water use, such as rebates for water efficient appliances, plumbing services to replace faulty fixtures, or advisory services
- **leak management** – activities to reduce leakage, such as active leak detection and repair, pressure management and optimising response times to cease leaks and breaks
- **water recycling** – we consider recycled water to be a water conservation initiative when recycled water is provided instead of a drinking water source.

In 2016–17 and 2017–18 our Water Conservation Plan included a range of initiatives, including:

- water efficiency programs, such as WaterFix Residential, WaterFix Strata, PlumbAssist, Rainwater Tank Repair
- leak management, including Active Leak Detection

- established water recycling schemes – residential, industrial and irrigation
- education initiatives
- regulatory measures (BASIX).

2.5.1 Service levels 2016–20

In the 2015–20 Operating Licence, new obligations for water conservation were introduced:

> *Sydney Water must develop and obtain IPART's approval for a methodology to determine its economic level of water conservation (ELWC) by 31 December 2016.*
>
> *By 1 September 2017, Sydney Water must develop a water conservation program consistent with its economic level of water conservation (ELWC) and in accordance with the methodology approved by IPART under clause 3.2.3.*[6]
>
> *Sydney Water must report to IPART, in accordance with the Reporting Manual, on water conservation.*[7]

Until the new methodology was developed, we had to meet previous static water use and leakage levels; and to promote the efficient use of water, and use of recycled water where financially viable.[8] The previous requirements were replaced as they may not always incentivise efficient water conservation investment decisions. We supported moving to a more flexible approach. The ELWC methodology is designed to promote economically efficient investment in water conservation activities, including the consideration of social and environmental costs and benefits. It evaluates whether the cost to society of a water conservation project is less than the value of water it saves, based on a marginal cost approach (see Figure 2-9).

The value of water used to assess projects with short and intermediate term water savings is dependent on its scarcity, so a higher dam level results in a lower value of water. Projects with long term water savings are assessed against the long run value of water, which is intended to reflect long term investment in infrastructure and supply and is not directly affected by dam levels.

[6] A rolling five-year program is required.
[7] Annual reporting is required.
[8] The previous water use level was 329 litres per person per day (LPD), a per capita measure based on water used by all Sydney Water customers (including the residential sector, business, industry, irrigation and leaks) and set based on a 35% reduction compared to water use levels in the early 1990s. The previous water leakage level was 105 +/- 16 ML per day, with the maximum limit of 121 ML/day being retained as the transitional measure in the 2015 licence.

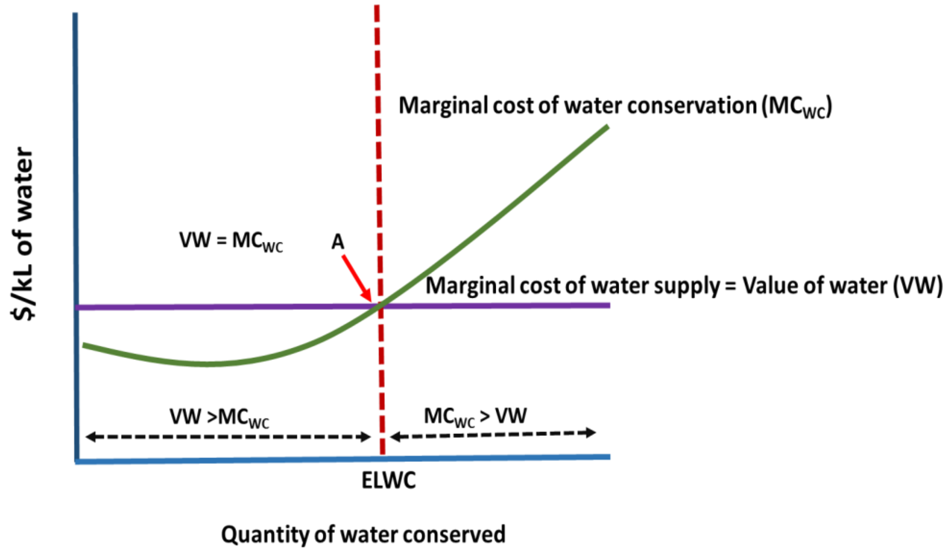


Figure 2-9 Economic Level of Water Conservation

2.5.2 Performance 2016–20

We obtained IPART's approval for the ELWC methodology in December 2016. From 2016–17, we have presented the ELWC, how it aligned to our water conservation program, and other information in our annual Water Conservation Report.[9]

The report includes information on the current value of water, the ELWC for our forward five-year program, water conservation activities that are being implemented in line with the ELWC, water conservation projects that are being implemented for other reasons (including social hardship and previous recycled water schemes) and projects that may be implemented in the future, depending on dam levels and the resulting value of water. It also reports on measures such as water use, actual leakage and actual volumes of recycled water.

While we delivered on all the projects identified in our Water Conservation Reports for 2016–17 and 2017–18, actual new water savings delivered in 2017–18 were lower than the forecast economic new water savings. This was primarily from a rise in leakage due to prolonged hotter and drier weather. Participation in the WaterFix Residential and WaterFix Strata programs was also lower than expected, while PlumbAssist had higher participation than expected.

In 2016–17, the ELWC for our forward five-year water conservation program was 23.5ML/day. Despite dam levels falling, in 2017–18, the ELWC for the forward five-year program decreased to 10 ML/day. This is because of a reduction in predicted savings from some water efficiency and leak management projects across the five-year program.[10] The ELWC is a measure of estimated water savings from currently available projects that have been assessed as economically efficient, not a target level of savings linked to dam levels.

[9] Our first Water Conservation Report that used the ELWC methodology was provided to IPART on 1 September 2017.
[10] Prior to 2016, savings from leak management were reported against a baseline of 2002. A new business case was developed in 2016–17. Savings going forward will be reported against a 2016–17 baseline. Predicted savings from a water efficiency project were also revised down in 2017–18, based on actual savings achieved during pilot delivery.

Water efficiency

The context for water conservation activities has evolved over time. We have developed and implemented water conservation initiatives since the 1990s. Our early programs tended to achieve high participation rates and produced significant savings during the Millennium Drought. As programs matured and the market for water efficient appliances (for example, dishwashers and washing machines) evolved, the large gains of early years became much harder to replicate. From 2012, we moved to a more commercially focused framework.

Our 2017–18 Water Conservation Report included ongoing offerings of our existing programs, launching a public awareness and education campaign and a number of new initiatives, including the Council Partnership program and a rainwater tank assessment service. However, compared to our activity during the Millennium drought, our current water efficiency programs remain quite limited. To date, programs delivered during 2016–20 have been largely self-funded, based on the commercially focused framework adopted in 2012. The exception was the PlumbAssist program, which is delivered to assist customers experiencing financial hardship.

Delivery of business water efficiency programs on a commercial basis has been ineffective, and we discontinued our existing business programs in 2018–19 due to low customer uptake. We are planning to develop and pilot new business initiatives that engage customers better.

This price proposal presents an opportunity to establish a new baseline program, including funding for ongoing research and development. This will position us to identify a broader range of new initiatives that are economically efficient at varying dam levels. This capability is needed so that we can rapidly ramp up water efficiency and other water conservation initiatives if required due to drought, rapidly rising demand or bulk water supply interruptions. We are also looking to return to funding economically efficient programs, in line with the value of water. This is likely to increase participation rates, while still achieving an economic outcome.

Leakage

We experienced a significant increase in leakage volume in 2017–18 due to the increased number of leaks and breaks in our network, triggered by a prolonged period of hotter and drier weather compared to average conditions. These factors lead to a higher backlog of repair jobs and an increase in the time leaks are running before repair.

Our leakage is still within the top band of the International Leakage Index and compares well against other developed countries. By world standards, we rate in the top 10% of water utilities for minimising leaks. We have increased resources to bring the backlog of leaks and breaks under control, however, leakage is likely to remain above the ELL for 2018–19 (see Figure 2-10). This is partly due to the time period that leakage is measured across (a rolling 12-month measure). There is also a lag between implementing leak management activities and seeing improved results.

We inspected around 8,000 km of water mains in 2016–17, 9,000 km in 2017–18 and are targeting inspection of 15,0000 km in 2018–19. Our proactive inspection program identifies minor leaks that do not appear on the surface and require detection through specialist equipment.

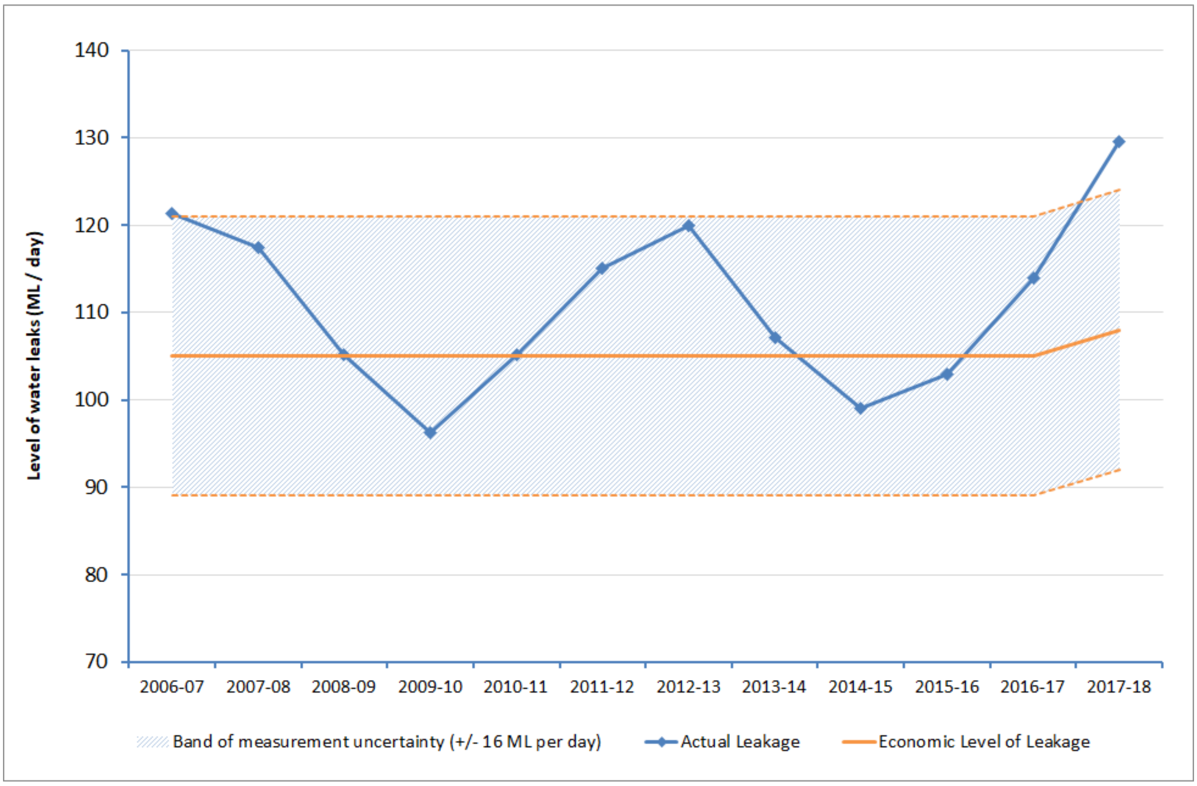


Figure 2-10 Actual leakage vs the Economic Level of Leakage (ELL)[11]

Water recycling

We currently operate 23 recycled water schemes, including 15 irrigation schemes. We also provide recycled water for use at our own wastewater treatment plants. Our recycled water schemes currently produce around 43 billion litres of recycled water each year.

2.5.3 Service levels 2020–24

The proposed 2019–2023 Operating Licence retains ELWC-based water conservation conditions, with some additional requirements that we must:

- implement economically efficient projects
- report the ELWC each month (plus the value of water)
- provide more information in our annual Water Conservation Report on research and development and pilot programs.

We understand that the Minister will also request IPART to review the ELWC methodology.

We also have a new requirement to implement aspects of the *2017 Metropolitan Water Plan* that are relevant to our functions. We have always been a key agency involved in the review and implementation of the Plan, particularly relating to demand side options. The 2017 Plan anticipates that we will maintain a foundation capacity of knowledge, skills and investment in water

[11] Prior to 2017–18 our ELL target range was set in our Operating Licence. In 2017–18, the ELL was set using the ELWC methodology.

conservation programs. We will continue to meet our Operating Licence requirements and Metropolitan Water Plan responsibilities relating to water conservation over 2020–24.

From 2019–20, we are planning to increase the delivery of water conservation activities, particularly water efficiency initiatives, to deliver water conservation activities up to the current value of water. Likely projects include:

- continuing and expanding WaterFix programs (strata, residential, commercial)
- reintroducing business water efficiency programs
- optimising recycled water schemes and seeking out new opportunities where economically viable
- enhancing leak management.

In periods of drought, further activity would be justified beyond our proposed baseline program. The review of the ELWC methodology may also lead to different levels of water conservation activity, both as a baseline program and in an expanded program aligned to falling dam levels.

Further detail on proposed water conservation expenditure for 2020–24 is provided in **Attachment 10: Operating expenditure**, section 4.2.3.

2.6 Drinking water quality

2.6.1 Service levels and performance 2016–20

The current requirements are:

> *Sydney Water must maintain a Management System that is consistent with the Australian Drinking Water Guidelines, except to the extent that NSW Health specifies otherwise (the Drinking Water Quality Management System).*
>
> *Sydney Water must comply with the Fluoridation Code.*

We also commit to provide drinking water in accordance with the above requirements in our Customer Contract.

One of our principal objectives under the Sydney Water Act is to protect public health by supplying safe drinking water. Unsurprisingly, drinking water quality is also a top priority for our customers. In our 2018 customer engagement program, we asked participants to identify outcomes from a water and wastewater utility that were most important to them. Clean, fresh, safe drinking water was consistently identified as the number one priority.[12]

We manage drinking water in accordance with our Drinking Water Quality Management System. Independent audits have confirmed the system is consistent with the ADWG and implemented to the satisfaction of NSW Health. Across this price period, 100% of drinking water supplied by

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[12] Discussion at forums and small groups indicated that most customers thought Sydney Water is performing well with regard to quality of drinking water, particularly customers who had experienced living in other parts of Australia or the world. There was a strong desire for this to continue. See Appendix 3A *CIPA Phase 1 report*, pages 47-59.

Sydney Water to date has met drinking water microbiological targets. Independent audits have confirmed we have complied with Operating Licence requirements.

2.6.2 Service levels 2020–24

There are no substantive changes in the proposed 2019–2023 Operating Licence. We will continue to manage drinking water quality in line with the ADWG and to the satisfaction of NSW Health.

During 2020–24, the ADWG may be revised to include the concept of health-based targets for the microbial safety of drinking water. We will work with NSW Health to confirm an appropriate implementation plan if this occurs. This could have associated pricing impacts, but the quantum and scope of potential impacts cannot be confirmed at this time, as they depend the nature of the final guidelines, our agreed implementation plan with NSW Health, and the timing of required investment (which may fall in later price paths).

2.7 Recycled water quality

2.7.1 Service levels and performance 2016–2020

The current requirements are:

> *Sydney Water must maintain a Management System that is consistent with the Australian Guidelines for Water Recycling (AGWR), except to the extent that NSW Health specifies otherwise (the Recycled Water Quality Management System).*

We also commit to provide recycled water in accordance with the above requirements in our Customer Contract.

Independent audits have confirmed we have complied with Operating Licence requirements. We are responding to several Ministerial recommendations on recycled water. The recommendations relate to end users' preventative measures, staff skills and procedures to interrupt supply. We are pursuing these improvements in consultation with NSW Health.

2.7.2 Service levels 2020–24

There are no substantive changes in the proposed 2019–2023 Operating Licence. We will continue to manage recycled water quality in accordance with the AGWR and to the satisfaction of NSW Health, for specific end uses and any specific requirements determined by NSW Health and/or the EPA. We will also continue to look for opportunities to fully utilise our existing recycled water schemes and meet customer specific requirements in customer agreements.

During 2020–24, the AGWR may be revised. We will work with NSW Health to confirm an appropriate implementation plan if this occurs. This could have associated pricing impacts, but the quantum and scope of potential impacts are unknown at this time, as they depend the nature of the final guidelines, our agreed implementation plan with NSW Health, and the timing of required investment (which may fall in later price paths).

2.8 Stormwater

2.8.1 Service levels and performance 2016–20

The current requirements are:

> *Sydney Water must provide, operate, manage and maintain a Stormwater Drainage System as described in section 14(1)(b) of the Act, except to the extent that the Minister is satisfied under sections 14(4) and 14(5) of the Act that satisfactory arrangements have been made for the applicable Service to be provided by another appropriate body, including a council (within the meaning of the Local Government Act 1993 (NSW)).*

Amendments to the 2015–2020 Operating Licence also clarified that Sydney Water may increase the capacity of its stormwater drainage system, where necessary.

We provide trunk drainage services within declared stormwater catchment areas, in accordance with our Operating Licence obligations. Reticulation services and trunk drainage services outside of declared stormwater catchment areas are provided by councils. We have not been audited for compliance against stormwater related clauses under the current Operating Licence.

2.8.2 Service levels 2020–24

There have been no substantive changes proposed in the 2019–2023 Operating Licence. However, a note has been added to clarify that we can provide stormwater systems and services for the purposes of improving water quality and/or waterway health. We proposed this change, as it aligns with our current approach to delivering stormwater services, and future desire to provide services consistent with an integrated water cycle management approach. This was strongly supported by stakeholders during the Operating Licence review.

Over 2020–2024, we will continue to deliver stormwater services to manage flood mitigation, improve waterway health and renew end-of-life assets. We will also continue to work collaboratively with councils and other stakeholders to manage waterway health.

3 Environmental performance

Our environmental performance is important to our stakeholders, the community and our customers. Protecting the environment is also one of our principal objectives under the Sydney Water Act.[13]

Our environmental impacts are primarily regulated through Environment Protection Licences (EPLs) issued by the Environment Protection Authority (EPA). EPLs are reviewed every five years but can also be varied by the EPA at any time. This makes our environmental standards less certain than regulated standards under our Operating Licence.

We have 27 EPLs:

- 23 for wastewater treatment systems
- two for water filtration plants
- one of an advanced recycled water filtration plant
- one to transport waste.

The objectives of the EPLs are to:

- require practical measures to be taken to protect the environment and public health from wastewater treatment plant effluent and overflows
- require proper and efficient management of the wastewater treatment system to minimise harm to the environment and public health
- require no deterioration and continuing improvement of the environmental performance of the wastewater treatment system, relative to existing conditions, and
- minimise the frequency and volume of overflows and wastewater treatment plant bypasses.

There are some common clauses, but each EPL is unique to the system it regulates.[14]

The licensing process involves an environmental management rating from A–E, with E being the poorest. Most of our plants are currently rated A, with four rated between B to E.[15] Ratings affect yearly licence fees.[16] Annual EPL licence fees currently total around $11 million.

[13] Under section 21(1)(b) one of the principal objectives of the Corporation is to protect the environment by conducting its operations in compliance with the principles of ecologically sustainable development contained in section 6 (2) of the *Protection of the Environment Administration Act 1991*.

[14] EPLs are administered using a risk-based process that establishes an overall level of risk for each wastewater system from Level 1-3, with 3 posing the highest risk. The level of risk affects licence conditions, with high risk EPLs likely to contain more stringent conditions. Most of our wastewater systems are assessed as Level 2, with North Head and Malabar as Level 3.

[15] All plants are currently rated A except for Castle Hill (B), Malabar (C), Cronulla (D) and North Head (E).

[16] An average rating (level B) pays the standard annual licensing fee. A good rating (level A) can attract a five percent discount; however, a poor rating (level E) will result in the fee being doubled.

3.1 Service levels 2016–20

Our EPLs contain numerous conditions that impose limitations and obligations for operating our wastewater treatment systems including:

- pollutant concentration limits (eg nutrients, ammonia, faecal coliforms, oil and grease, etc)
- pollutant load limits
- conditions regarding dry and wet weather overflows
- Pollution Reduction Programs for plant and network upgrades
- pollution studies (for example, to assess public health and environmental risk for outfalls)
- performance monitoring.

Individual conditions vary for each EPL, depending on the size of the system, level of treatment and the nature of the environments receiving the discharges. Some conditions apply across EPLs:

- **EPL Condition L1.3** – prohibits the pollution of waters at any time from overflows that result from a failure by us to operate and maintain the wastewater reticulation system in a proper and efficient manner.
- **EPL Condition O2.1** – requires us to maintain and operate all plant and equipment in a proper and efficient manner.
- **EPL Condition O3.1** – requires us to take all reasonable and feasible actions as soon as practicable to minimise the impact on the environment and public health of an overflow from the reticulation system or bypass from a wastewater treatment plant.
- **EPL Condition O4.7** – requires us to manage, operate and maintain wastewater reticulation systems to result in ongoing improvement in environmental performance (partly assessed by performance against EPL Condition O4.8a).
- **EPL Condition O4.8a** – requires us to compare the five-year rolling average of chokes per 100km of pipe for all of our wastewater treatment systems for the period 1 July 1995 to 30 June 2000 with the current five-year rolling average.

3.2 Performance 2016–20

We report annually to the EPA on compliance against each of our EPLs. The level of EPL compliance is considered a strong indicator of our environmental performance.

In our 2015 price proposal, we noted that our overall environmental performance was improving over time, and that we would continue to engage with the EPA to improve environmental and community outcomes. However, in recent years we have seen a deterioration in our environmental performance. In 2017–18, we reported 277 EPL non-compliances to the EPA. The majority of EPL non-compliances relate to wastewater overflows to the environment, with approximately 60% occurring in the North Head and Malabar systems. The increase in non-compliances is due to the complex interaction of weather conditions, demands from growth (impacting both spare capacity in our infrastructure and our ability to respond to incidents), and changes to maintenance programs and resourcing. Recent years have been characterised by extremely dry soils, as recognised by the Bureau of Meteorology. This has led to an increase of chokes in our wastewater systems, placing strain on our resources and leading to longer response times.

We have begun to implement several programs and initiatives to improve our environmental performance, including:

- improving choke management to reduce wastewater overflows, through more proactive inspections, clearing, and repair/relining of pipes each year
- increasing the number of frontline staff to respond to incidents and do more proactive repair work
- introducing a range of incident escalation triggers and criteria for responding to wastewater overflows to improve the quality control of incident response, including site remediation
- increasing the number of reporting staff to provide more timely responses to the EPA when an incident occurs
- conducting an independent review of our environmental management to identify improvements in how we manage our environmental accountabilities. This will follow an EPA audit of our incident response processes.

Based on our experience, these actions will take time to deliver a step-change in our environmental performance. For example, the choke management program will need to be sustained for at least four to five years, to address the extensive tree root intrusion in the network. However, we expect the impact of improvement initiatives to start to become evident from 2020.

See **Attachment 10: Operating expenditure**, section 4.2 for more detail on proposed expenditure to improve environmental performance in 2020–24.

3.2.1 Chokes limit

Dry weather wastewater overflows are caused by chokes, or blockages, in wastewater pipes. Chokes are typically caused by tree roots searching for water, which is exacerbated in dry conditions.

Our EPLs require us to compare the current five-year rolling average of chokes per 100 km of pipe for that system with a historical average.[17] We are currently still performing within the EPL choke limit (see Figure 3-1). However, if current trends continue, we predict we would breach this limit in 2021 without a proactive and sustained intervention program. Chokes continue to increase during prolonged dry conditions and, once established, will only decrease if there is a program to clear the blockages created by tree roots.

[17] Calculated as 81 chokes per 100km per year (EPL condition 4.8). The five-year choke condition is in all EPLs, except for Picton WWTP.

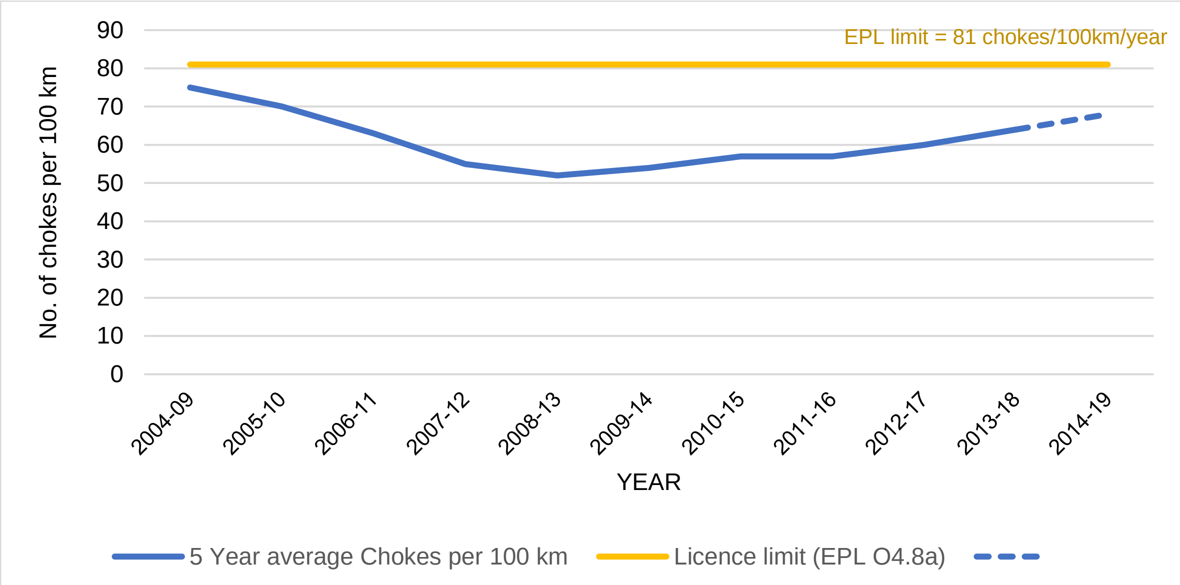


Figure 3-1 Five-year average choke per 100km sewer

Figure 3-2 shows the long-term trends in soil moisture and chokes in our wastewater pipes since 2000. Choke performance is influenced by underlying weather patterns, as well as ongoing operations and maintenance activities. Preventative maintenance can mitigate the effects of weather and reduce the need for reactive works.

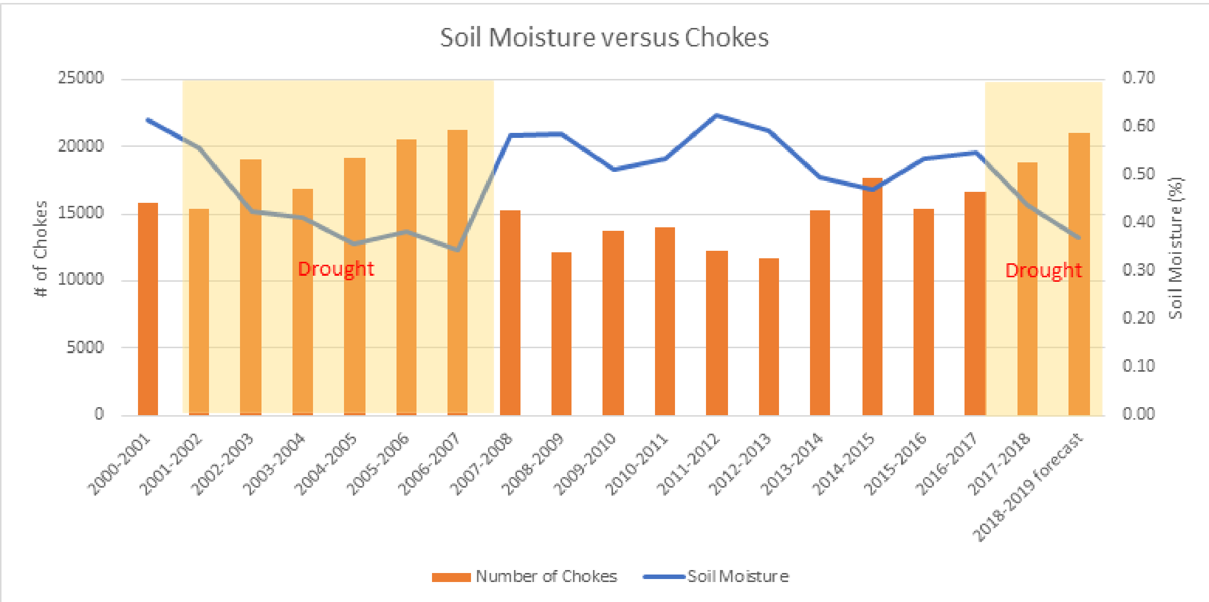


Figure 3-2 Historical soil moisture and wastewater chokes

As noted above, we are responding to the increase in chokes in our systems and the subsequent decline in our environmental performance. We have implemented remedial maintenance activities and are revising our wastewater asset strategies to increase proactive inspection and maintenance in targeted, high risk areas.

3.2.2 Dry weather overflow limits

Out of our 23 EPLs for wastewater systems, 12 have limits for the number of dry weather overflows to waterways.[18] Most systems comply with their limits, as shown in Figure 3-3. However, typically, around two to four systems breach their limit each year and an additional one to two are approaching their limits.

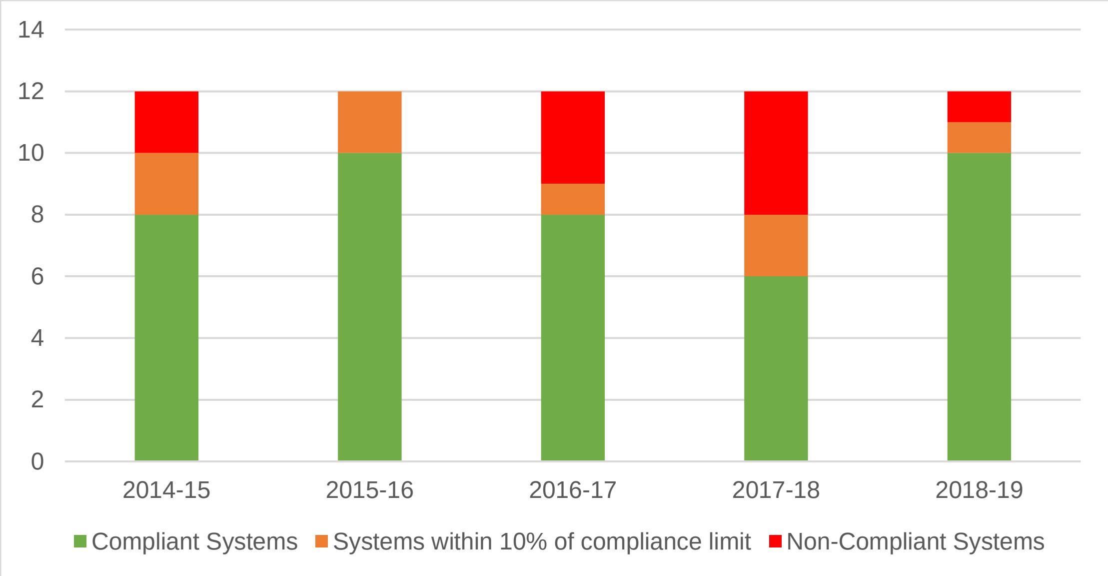


Figure 3-3 Dry weather overflows to waterways limit compliance (L7.4)

3.2.3 Notifiable incidents

Under section 148 of the POEO Act, we have a duty to notify the EPA of a pollution incident that causes or threatens material harm to the environment. This duty is over and above any EPL requirements.[19]

While most chokes lead to an overflow, we are only required to report a small percentage of overflows to the EPA as a notifiable incident, if they meet one or more of the following criteria:

- wastewater reaching a waterway
- impact on waters posing a potential public health risk
- monitoring indicates a high level of faecal contamination
- an overflow requiring significant clean up (more than one day)
- dry weather overflows from any sewage pumping station.

Since 2015–16, we have had a significant increase in wastewater overflows that are required to be reported to the EPA (see Figure 3-4). We expect to report 870 overflows to the EPA in 2018–19.

[18] EPL condition L7.4.

[19] A pollution incident may not result in a breach of an EPL, if the incident occurs within licence conditions and Sydney Water responds, as soon as practicable, to minimise the impact using all reasonable and feasible actions. However, most notifiable incidents eventually result in a non-compliance being recorded against the relevant EPL.

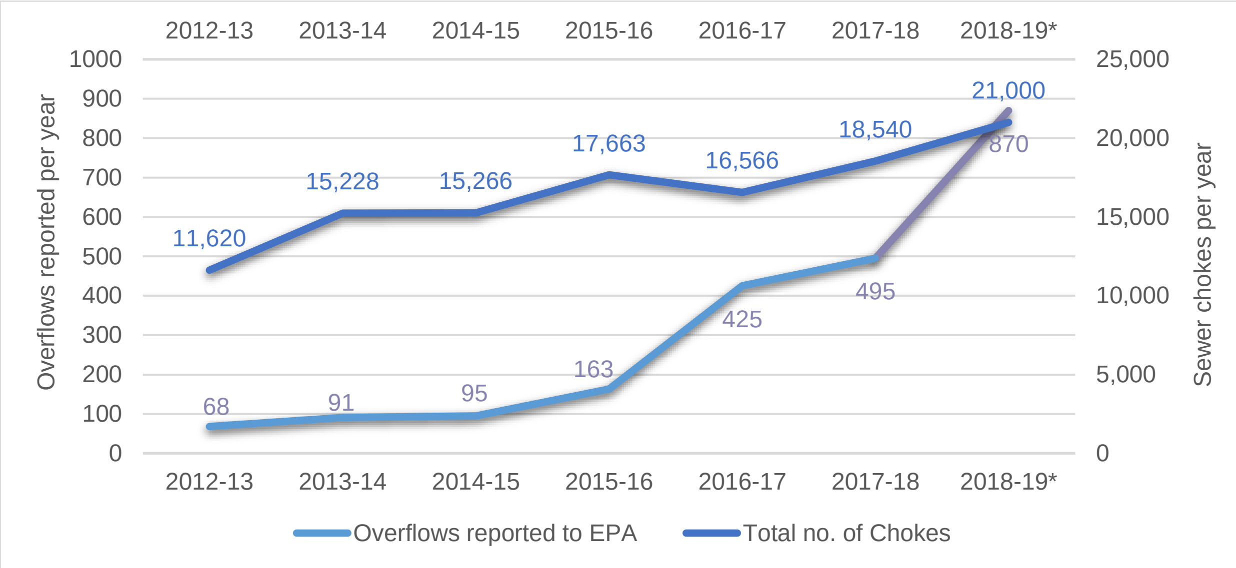


Figure 3-4 Overflows reported to EPA each year and total chokes

Note: *2018-19 is forecast as at June 2019.

The increase in reportable wastewater overflows mostly relates to overflows impacting waterways (see Figure 3-5).

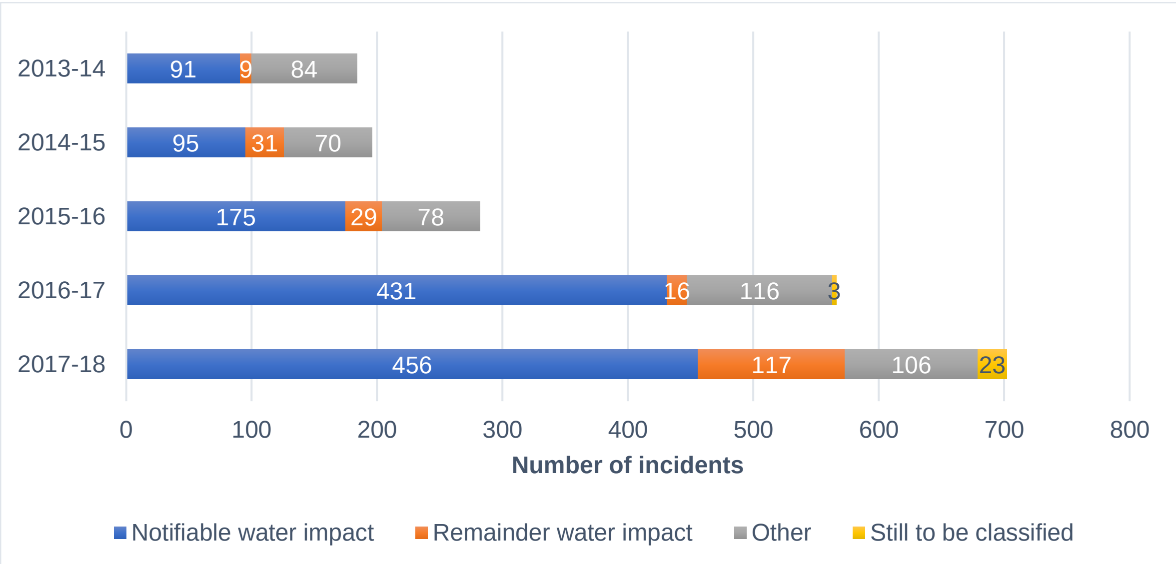


Figure 3-5 Overflows that impact waterways

The increase in reportable overflows between 2014–15 and 2015–16 can be explained by a change in reporting criteria; however, the marked increase since 2015–16 is the result of the interaction of several factors, including weather, resourcing and operational processes.[20]

[20] In 2015 the criteria for reportable incidents were revised to address the EPA's concern that previous reporting was not capturing all incidents that caused or threatened material harm. Prior to the change, less than 1% of all chokes resulted in a notifiable overflow. This rose to around 2.6% after the criteria was changed. In recent years the percentage of overflows reported to the EPA has increased to 3.5%.

The increase in wastewater chokes has placed stress on our ability to respond to incidents. This has contributed to the increased number of incidents that need to be notified to the EPA, as delays in response and repair tend to increase the scale and impact of an overflow.

The EPA has expressed concern over the number of overflows impacting waterways and our level of response to incidents, including the provision of information to the EPA. This has been reflected by an increase in regulatory action by the EPA under the POEO Act. From mid to late 2019, the EPA will be conducting an audit of our incident response processes, which will likely lead to mandatory improvements to be implemented during the next price period.

3.2.4 Pollution concentration and load limits

We have met the EPL pollution concentration and load limits for most plants during the current price path. A few treatment plants struggle or fail to meet their load and/or concentration limits. These include oil and grease concentrations at Bondi WWTP, nutrient loads at Picton WWTP and total nitrogen loads at North Head WWTP. We are continuing to consult the EPA on the nature of the works and supporting studies to resolve these issues.

3.2.5 Wet weather overflow requirements

Most wastewater EPLs contain obligations relating to wet weather wastewater overflows from the system. Wet weather overflows occur when the capacity of the wastewater pipe is exceeded due to the infiltration of rainwater through cracks or breaks in the pipe and illegal stormwater connections to the network. This has been a longstanding issue as Sydney has grown.

We have met wet weather wastewater overflow limits in our EPLs for more than half of our plants. In 2017–18, 14 systems complied with wet weather overflow related conditions (EPL Conditions L7.2 or O4.8(c) and O4.9), seven systems did not comply with all conditions and two systems were not assessed (as they do not have EPL conditions for wet weather overflows).[21]

In December 2015, we submitted to the EPA a proposed new licensing framework for Wet Weather Overflow Abatement. This was based on a risk-based approach that sought to maximise environmental and community benefits and drive more cost-effective solutions to reduce the impacts of both internal wet weather overflows (surcharges) and wet weather overflows in public areas. The EPA did not accept our proposal and changes to EPL conditions are still under consideration. We are continuing to implement wet weather overflow abatement measures in line with existing licence requirements. Further detail on proposed work on wet weather overflow abatement is included in **Attachment 9: Capital expenditure**, section 2.4.1.1.

3.3 Service levels 2020–24

Across 2020–24, we will seek to comply with our EPLs and improve our environmental performance. We are committed to responding to the EPA's concerns about increased overflows,

[21] Systems not complying with wet weather related EPL conditions in 2017–18 were North Richmond, Wallacia, Shellharbour, St Marys, Wollongong, Rouse Hill (EPL Condition L7.2) and Malabar (O4.8(c) and O4.9). Systems not assessed were Picton and Brooklyn-Dangar Island. Source: 2017–18 Annual Report Wet Weather Overflow Performance.

incident management and reporting. While it is unrealistic that we will have nil overflows from our wastewater system, we are committed to improving our performance to meet our environmental obligations and have already begun to implement several initiatives to do this, as outlined in section 3.2.

Key known changes to EPL conditions during 2020–24 include:

- revised concentration limits to reflect current performance, except for total nitrogen and total phosphorus, expected later in 2019
- tighter nutrient load and concentration limits for plants in the Hawkesbury Nepean to be enforced from 2024, requiring plant upgrades or offsets prior to 2024.

Expected and potential changes to EPL conditions during 2020–2024 include:

- further changes to load and concentration limits, following a broader review by the EPA
- changes to wet weather overflow conditions, which are still under consideration.

The EPA is due to revise concentration limits in late 2019 to reflect the current treatment capability of plants, apart from limits for total nitrogen and total phosphorus (for example, limits will be amended for total suspended solids, oil and grease, trace metals, etc). As changes are expected to be based on the current performance of wastewater treatment plants, this should not impact forecast expenditure. The next stage of this project involves a rigorous assessment of load and concentration limits across all plants, including consideration of the discharge environment for each plant. Studies will be needed in 2020–24 to inform this review. This review may lead to tighter EPL load and concentration conditions from 2024, compared to current levels.

The EPA has developed a new regulatory framework for managing nutrients that are discharged from wastewater treatment plants in the Hawkesbury Nepean catchment. Under this framework, the EPA has advised that tighter load and concentration limits proposed for the Hawkesbury Nepean wastewater treatment plant EPLs will be enforced from 2024. Upgrades to treatment plants, including Castle Hill, West Camden, St Marys, and Rouse Hill will need to occur prior to 2024 to service growth and meet the EPA's proposed new licence limits.

We are currently in discussions with the EPA to finalise a new regulatory approach to wet weather overflows. Before 2020, the approach is expected to change from a numerical limit to a risk-based credit approach. This approach will target the impact of wet weather overflows on the environment, and Sydney Water will achieve 'credits' on that basis.

We have agreed with the EPA that the Sewage Treatment System Impact Monitoring Program needs to be revised to better identify impacts of the treatment systems on the environment.

The next statutory review of our EPLs will be in 2020. This five-yearly review typically does not lead to immediate substantive changes in licence conditions but may identify areas for future consideration and assessment.

4 Customer satisfaction and experience

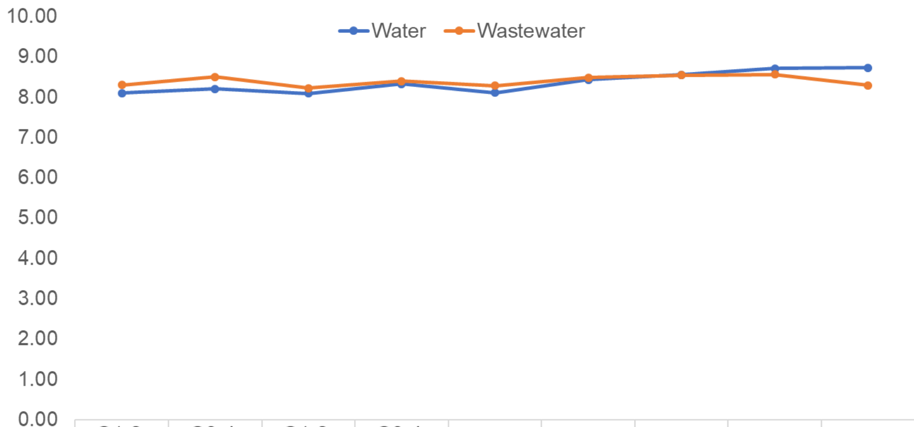
Our customers consistently score us highly in terms of quality of service and quality of drinking water. In our 2015 price proposal, we noted that customer satisfaction with our overall level of service was at an all-time high of 7.7 in 2014. Since 2016, we have improved on these results, with customer satisfaction with our overall level of service increasing to 8.0 in 2018 (see Table 4-1).[22]

Table 4-1 Customer satisfaction indicators, 2014–2018

	2014	2015	2016	2017	2018
Average customer rating of overall service quality	7.7	7.7	7.9	7.96	8.0
Average customer rating of overall quality of drinking water	8.4	8.4	7.7	7.6	7.7
Total number of complaints (including EWON)	6935	5945	5321	5090	5308
Complaints resolved within 10 business days (%)	91.3	90.9	88.9	87.2	86.6

Customers who have experienced a service fault also express high levels of satisfaction with our overall performance (see Figure 4-1). Ratings from our Service Faults Tracker have been more than 8.0 since 2016.

[22] The average rating is calculated from our CX Monitor quarterly online surveys of 400 randomly selected Sydney Water customers and consumers. Prior to 2016, the survey included 600 respondents per quarter.



	Q1-2, 2016	Q3-4, 2016	Q1-2, 2017	Q3-4, 2017	Q1, 2018	Q2, 2018	Q3, 2018	Q4, 2018	Q1, 2019
Water	8.1	8.2	8.1	8.3	8.1	8.4	8.6	8.7	8.7
Wastewater	8.3	8.5	8.2	8.4	8.3	8.5	8.5	8.6	8.3

Figure 4-1 Results from Service Faults Tracker survey, overall performance by Sydney Water

Customers generally expressed positive levels of satisfaction with our reliability of services during our 2018 customer engagement program, with over three quarters stating they felt their service was ‘very’ or ‘quite’ reliable.[23] However, there were also perceptions that we could do more to repair leaks quickly and ensure water supply security, particularly in light of a growing population.[24] Few forum participants (16%) rated us as poor in terms of value for money.[25]

New measurement metrics planned for 2020 will improve our ability to measure customer experience and advocacy. This will help drive a customer-centric understanding of business performance and priorities.

We are consistently striving to improve experiences for our customers. A common theme raised during our 2018 customer engagement was the importance of communication, especially around service faults. Customers understand that service interruptions can happen, especially in a network the size of ours. However, the inconvenience of service faults and planned supply interruptions is greatly reduced by effective communication.[26]

In September 2017, we introduced Customer Hub West – to provide a more proactive and customer-centric experience for customers experiencing water and wastewater faults. We trialed initiatives such as early notification of faults, improved diagnosis and planning for infrastructure repairs, and more channels for customers to interact with us. We have now expanded the Customer Hub to all regions and will keep striving to find ways to improve customer experience.

Further detail on the Customer Hub is provided in **Attachment 10: Operating expenditure**, section 3.9.4.

[23] Appendix 3A *CIPA Phase 1 report, Final Report Customer-informed IPART submission*, prepared for Sydney Water, The Centre for International Economics, Canberra, p 44. This question was asked at the beginning of Phase 1 forums to ascertain incoming customer perceptions.
[24] Appendix 3A *CIPA Phase 1 report*, p 47.
[25] Appendix 3A *CIPA Phase 1 report*, p 45.
[26] Appendix 3A *CIPA Phase 1 report*, p 60.

We are also implementing a Voice of the Customer program to capture what customers are saying about our products, services and brand, to enhance our understanding of customer experience and identify opportunities for improvement. Voice of the Customer enables us to capture feedback directly from customers at key interaction points, providing an improved understanding of what's important to customers, from their perspective. Ultimately a better understanding of customers helps us to keep our customer promises by providing products and services that are aligned to customers' expectations.

4.1 Customer complaints

The 2015–2020 Operating Licence requires:

> *Sydney Water must maintain a procedure for revising, responding to and resolving complaints; which is consistent with the Australian Standard AS/NZS 10002:2014 – Guidelines for complaint handling in organisations (AS/NZS 10002:2014).*

We must also be a member of the Energy and Water Ombudsman NSW, for dispute resolution.

We reports complaints to IPART each year (see Table 4-2).[27] Our typical top three areas of complaints are billing, drinking water quality and wastewater overflows. We have a very low number of complaints each year, considering we provide services to around five million people.

Table 4-2 Complaints reported to IPART, 2013–14 to 2017–18

Ref.	Indicator	2013–14	2014–15	2015–16	2016–17	2017–18
NWI IC9	Number of water quality complaints: water supply	638	649	798	686	697
NWI C9 *Derived*	Number of water quality complaints per 1,000 properties: water supply (per 1000 properties)	0.4	0.4	0.4	0.4	0.4
NWI IC10	Number of water service complaints	427	419	342	330	467
NWI C10 *Derived*	Number of water service complaints per 1,000 properties (per 1000 properties)	0.2	0.2	0.2	0.2	0.2
NWI IC11	Number of sewerage service complaints	901	1054	911	830	948
NWI C11 *Derived*	Number of sewerage service complaints per 1,000 properties (per 1000 properties)	0.5	0.6	0.5	0.4	0.5
NWI IC12	Number of billing and account complaints: water supply and sewerage	3,467	2,431	2,288	1,719	1,767
NWI C12 *Derived*	Number of billing and account complaints per 1,000 properties: water supply and sewerage (per 1000 properties)	1.9	1.3	1.2	0.89	0.9
NWI IC13	Number of water and sewerage complaints	5,887	5,046	4,858	4,147	4,359
NWI C13 *Derived*	Number of water and sewerage complaints per 1,000 properties (per 1000 properties)	3.2	2.7	2.6	2.1	2.2

[27] Based on the Australian standard definition of a complaint, as an expression of dissatisfaction made to or about Sydney Water related to its products, services, staff or the handling of a complaint, where a response or resolution is explicitly or implicitly expected or legally required.

5 Implementation of the 2016 determination

We are required to implement prices in accordance with IPART's Determination No. 5, 2016 – *Maximum prices for Sydney Water Corporation's water, sewerage, stormwater drainage and other services*. Exceptions to this are explained in Table 5-1.

Table 5-1 Exceptions to implementing IPART's 2016 determination

Exceptions	Requirement	Reasons for departure from determination
Rouse Hill stormwater drainage charge	The determined charge for non-residential properties within the Rouse Hill Stormwater Catchment Area is the Rouse Hill stormwater drainage charge	We charge one non-residential property within the Rouse Hill Stormwater Catchment Area a low-impact stormwater drainage charge instead of the Rouse Hill stormwater drainage charge. The NSW Treasurer approved this in 2014 as the property would be eligible for a low-impact charge if located within a declared stormwater catchment area.
Asset construction details	The determined charge for Request for Asset Construction Details is $44.69 ($2016–17)	Between 7 July and 1 September 2016, we accidentally overcharged 43 customers due to an administrative error. We charged them $45.29 per plan instead of $44.69 (the total amount overcharged was $261.60 for all plans provided). We notified IPART of our mistake and offered refunds to all affected customers.
Substance charges for commercial customers	As per IPART's 2012 and 2016 determinations, from 1 July 2012 substance charges for commercial customers are a value with three decimal places	From 1 July 2012 to 30 October 2017, we billed substance charges for commercial customers to two decimal places instead of three, due to a limitation in our billing system. As a result, the charges levied were lower than the maximum determined price, without approval from the Treasurer. We have now updated our billing system to apply substance charges for commercial customers to three decimal places.

6 Further information

Each year, we report on our achievements, performance against statutory and regulatory requirements and our progress towards meeting our corporate goals in our Annual Report. Our Annual Report is tabled in the NSW Parliament and published on our website.

We also report on our performance through:

- annual reports to IPART regarding performance against our Operating Licence and IPART performance indicators
- annual reports to IPART on National Performance Report (NPR) indicators. This information is then provided to the Bureau of Meteorology, for inclusion in the NPR. The NPR provides comparative data on water and wastewater utilities across Australia and is made publicly available on the Bureau of Meteorology website
- annual returns to the EPA regarding performance against our EPLs. Performance data is made publicly available on the EPA website
- monthly, quarterly, annual and intermittent reports to NSW Health on the performance of our water quality management systems, including water quality monitoring results. We also publish a quarterly water quality report and easy to access information for customers about water quality in their area on our website.

SW231 06/19

Attachment 3
Customer engagement

Price proposal 2020–24

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Figures

Tables

Customer Engagement

Key messages

- Customer engagement is important as it allows us to deliver our essential services in a way that best reflects what customers value.
- We have listened to our customers and adapted our plans to align with what they want and are willing to pay for. Information from customer engagement has been a key input to decisions on regulated service standards, proposed pricing structures and specific projects.
- Our proposed price structures for water and wastewater price are in line with our customers' preferences, including:
  - a water use price of $2.13/kL, which keeps usage charges at the higher end of the range of long-run marginal costs
  - having the same fixed wastewater charge for all residential customers, rather than different charges for houses and apartments or introducing a residential wastewater use charge based on an assumed discharge factor.
- We are proposing to deliver several projects that are strongly supported by customers, including:
  - upgrading our wastewater system at Vaucluse-Diamond Bay, to stop the release of untreated wastewater from three cliff-face outfalls during dry weather
  - reducing rainwater entering our wastewater system by working on private plumbing ('source control')
  - the Waterway Health Improvement Program (a stormwater project).
- Customer engagement has also informed our 2019–2023 Operating Licence service standards on water interruptions, wastewater overflows on private properties, and a new requirement to fix chronic low-pressure areas in line with customer willingness to pay.
- We are deferring a decision on a broad roll-out of digital meters, as customers felt the costs outweighed the benefits to them. We will continue to investigate digital metering options, including the potential for using digital meters to reduce network costs.
- Through our 2018 program, we engaged with a representative sample of customers, including residential customers, businesses, government, community groups, customers with different cultural backgrounds, and customers in hardship. In total, our program included more than 10,000 interactions with customers.
- We will continue to engage and collaborate with our customers to inform our future business decisions and regulatory proposals.

1 Program overview

1.1 Objectives and scope

Many of the decisions impacting the prices and service levels experienced by customers are made in the context of our Operating Licence and price reviews by IPART. Sydney Water wants to involve customers in developing the business plans and proposals that we submit to our regulator, and in developing other business strategies.

In 2018, we conducted a year-long, comprehensive engagement program to inform our regulatory proposals and ongoing business decisions, as well as to build our customer engagement capability. An overview of topics covered in each phase is shown in Table 1-1

Table 1-1 Overview of 2018 customer engagement program

<table>
<tr><th>Stream</th><th>Phase 1
What customers want</th><th>Phase 2
What customers pay</th><th>Phase 3
Bringing it all together</th></tr>
<tr><td rowspan="2">Relationship with Sydney Water</td><td colspan="2">Customer priority outcomes</td><td></td></tr>
<tr><td colspan="2">Customer representation</td><td></td></tr>
<tr><td rowspan="2">Reliable services</td><td colspan="3">Water interruptions, wastewater overflows on private properties and chronic water pressure failures</td></tr>
<tr><td colspan="2">Rebates for service interruptions</td><td></td></tr>
<tr><td rowspan="2">Liveable city</td><td></td><td colspan="2">Untreated wastewater cliff-face outfalls</td></tr>
<tr><td></td><td colspan="2">Waterway health (stormwater)</td></tr>
<tr><td rowspan="6">Fair and affordable pricing</td><td>Discounts and fees for bill and payment methods</td><td></td><td></td></tr>
<tr><td></td><td colspan="2">Water price structure</td></tr>
<tr><td></td><td colspan="2">Wastewater price structure</td></tr>
<tr><td></td><td colspan="2">Rainwater in the wastewater system</td></tr>
<tr><td></td><td colspan="2">Digital meters</td></tr>
<tr><td></td><td></td><td>Impact on overall bill</td></tr>
</table>

Phase 1 covered:

- customers’ priority outcomes from an ideal water and wastewater utility
- types of service fault events that cause high inconvenience to customers
- rebates for service interruptions
- discounts and fees for bill and payment methods
- preferred ways for Sydney Water to engage with customers.

Outcomes from Phase 1 were used to inform our submissions to the Operating Licence review.

In Phase 2 we:

- confirmed what we had heard on customer priorities and revised rebates
- sought customer preferences on price structures for water and wastewater services
- sought initial views on the concept of working on private pipes to reduce rainwater in the wastewater network
- ascertained willingness to pay for:
  - changes to service levels for water interruptions and wastewater overflows onto private properties
  - addressing areas with chronic low water pressure
  - limiting the release of untreated wastewater from cliff-face outfalls
  - introducing digital meters and
  - a waterway health improvement program.

Willingness to pay values were used in cost-benefit analysis to test potential changes to Operating Licence standards and develop preferred options to test with customers in Phase 3.

In Phase 3 we:

- confirmed what we heard on price structures
- tested options for seven discrete topics that could affect expenditure, in the context of the total bill, and under different bill scenarios.

Customers were asked to choose between several service and price scenarios for each topic, and then to confirm their choices after seeing the cumulative impact of their choices in the context of an annual bill. Options presented to customers were either ‘no change’ (that is, we would continue our current practice with no change in customer bills) or alternatives that resulted in a change in service with an associated bill reduction or increase. The topic of rainwater in the wastewater system (‘source control’) was the exception, as the level of service stayed the same for each option, but at different costs to the customer vs property owner.

We also tested customer views against a $100 overall bill increase and a $100 overall bill decrease. Varying the base bill did not result in significantly different preferences for any option.

2 What our customers said

2.1 Overview

We have listened to customers and adapted our plans to deliver what customers want. Outcomes from our iterative customer engagement program across 2018 were a key input to decisions on regulated service standards, pricing structures and discretionary projects/programs included in this price proposal.

Our regulated performance standards for service interruptions have been informed by the customer views outlined in our submissions as part of the recent Operating Licence review. Overall, levels of service remain largely the same as in our current licence. Our regulated standards are described in **Attachment 2: Service levels and performance**.

In this proposal, our proposed pricing structures for water and wastewater prices align with the options most strongly preferred by our customers, that is:

- a water usage price at the higher end of the range of long-run marginal costs
- a fixed residential wastewater charge that is the same across houses and apartments.

Our proposal to reduce the non-residential wastewater usage charge, which would increase the fixed charge, was also supported by business customers, after it was explained that a reduction in the wastewater usage charge would lead to lower bills for most non-residential customers. This approach is in line with IPART's 2016 Determination pricing principles for wastewater, to base wastewater usage prices on an estimate of the short run marginal cost.

We are proposing to deliver several projects and programs that were supported by customers including:

- investing to end the daily release of untreated wastewater from cliff-face outfalls (through our proposed project at Vaucluse Diamond Bay)
- our Waterway Health Improvement Program, which will deliver improved waterway health through stormwater management activities
- reducing rainwater entering our wastewater system and causing overflows by working on private plumbing ('source control'), where this is a cost-effective solution
- reducing repeat water pressure failures in chronic problem areas, which has been adopted by IPART as a new Operating Licence requirement.

Based on customer views on the costs and customer benefits of digital meters, we have deferred a decision on a broad roll-out. We will continue to investigate digital metering opportunities and technologies, including their potential for reducing network costs. We have started a staged digital metering trial that will ultimately cover 8,000 properties, which will help inform future decisions.

An overview of the preferred scenarios identified by customers in Phase 3 and our response is outlined in Table 2-1.

Table 2-1 Outcomes of Phase 3 customer engagement on potential areas of expenditure

Topic	Scenario with strongest customer support	% support		What we're doing
		Surveys	Forums	
Water interruptions	Reduce risk of a customer experiencing a long unplanned water interruption (from 20 in 1000 to 16 in 1000)	55	86	**Aim to meet new target level in Operating Licence** Customers willing to pay an extra $0.20 a year
Water pressure	Improve pressure for 130 properties in areas with repeat pressure problems	69	70	**Improve pressure in areas with repeat failures** Customers willing to pay an extra $0.20 a year
Wastewater overflows on private properties	Retain current risk of a customer experiencing a wastewater overflow on their property (5 in 1000)	76	90	**Retain current service level in Operating Licence** No change to bill
Untreated wastewater cliff-face outfalls	Minimise untreated wastewater cliff-face outfalls	65	87	**Upgrade Vaucluse-Diamond Bay wastewater system** Customers willing to pay an extra $2.30 a year
Rainwater in the wastewater system ('source control')	Fund work on private pipes ('source control') to reduce expenditure needed on large storage solutions	72	82	**Test approach in targeted areas, where cost effective** Customers supported based on a bill saving of $3 a year Full savings will be over multiple determinations
Digital meters	Retain current metering approach (that is, no broad roll out of digital meters)	61	72	**Defer decision on roll out of digital meters** No change to bill Sydney Water will continue to research and pilot options
Waterway health	Improve waterway health through additional stormwater management activities	67	n/a	**Deliver Waterway Health Improvement Program** Stormwater customers willing to pay an extra $2.90 per year

More detail on what we heard from customers on each topic area and how it has informed this price proposal is provided in the sections below. Further detail on engagement program results is provided in Appendix 3A, Appendix 3B, Appendix 3C and Appendix 3D. Our methodologies and how our program aligned with IPART's principles for customer engagement are outlined in Appendix 3E.

2.2 Customer priorities

To begin our engagement program, we asked customers what their priorities for an ideal water and wastewater utility would be. Under all engagement methods, the provision of safe, clean, fresh drinking water was the stand-out number one priority for customers. The next most highly rated priorities were fair and affordable pricing and reliable services, followed by ensuring a secure water supply for the future, responsive customer service and protecting the environment.

In Phase 2, we reported back on the most common priorities identified by customers. Residents in forums and discussion groups agreed that quality drinking water, fair and affordable pricing and reliable services were the most important priorities. Indeed, these three outcomes were viewed as a 'given' for water and wastewater utility and should continue to be foundational for Sydney Water. Water security and environmental protection were the most commonly discussed outcomes in Phase 2, and it was suggested these should be focussed on above responsive customer service, particularly at the current time of drought. Education/increasing awareness about water use and efficiency was identified as a potential gap, although it was noted that this could be incorporated into some of the other priorities (for example, increasing awareness about what we are doing in relation to water security and environmental protection).[1]

Overall, when asked about the extent to which the six priorities in Figure 2-1 reflected the most important outcomes they wanted from us, 55 per cent of forum participants stated that the priorities fully reflected their views and a further 39 per cent that they partially reflected their views. The priorities are ranked in order of importance to customers, with the top line showing their top three priorities, and the second line the next three (in order of importance from left to right).

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[1] Appendix 3A CIPA Phase 1 report. The Centre for International Economics 2018, Final Report, *Customer-informed IPART submission (CIPA) Phase 1*, The CIE, Canberra, prepared for Sydney Water, page 47.

Figure 2-1 Customer identified priorities

These priorities are broadly in line with our legislative objectives and corporate goals. They also align with the core objectives of this proposal: to continue delivering high-quality drinking water and reliable water and wastewater services, while keeping prices fair and affordable, responding to growth and drought, protecting the environment and providing great customer service.

Our engagement program sought more detailed customer views on three of these priority areas: fair and affordable pricing, reliable services and environmental protection. We did not engage with customers on quality drinking water, water security or responsive customer service, as we did not have alternative options under consideration for these areas.

We will use these priorities to inform and shape future engagement programs and corporate strategies. For example, following our engagement program, we refreshed our Customer Promises to reflect what our customers told us (see Figure 2-2). The Customer Promises are now at the core of our Customer Experience & Advocacy Strategy that provides Sydney Water with the direction for the next phase of our customer-centric journey.

Figure 2-2 Sydney Water's customer promises

2.3 Price structures

2.3.1 General issues

Pricing principles

To introduce the topic of pricing structures, we first asked participants in forums and discussion groups about what they thought were important principles for pricing water and wastewater services. Commonly raised points by customers included:

- incentivising water saving behaviour through pricing, education or water efficiency rebate programs
- allowing greater control over bills by increasing the variable component
- ensuring future supply, even if this means charging customers a bit more
- providing support for low income earners and disadvantaged customers
- offering more transparency and clear information on pricing and costs.[2]

When asked specifically about price structure options, customers' preferences sometimes reflected these principles, but not always. For example, encouraging water efficiency and greater bill control were commonly stated reasons for customers' choices regarding water price structure. However, stated reasons for choices regarding wastewater charges were typically simplicity and fairness.

Implementing changes to pricing structures

We also sought customer views on whether potential changes to pricing structures should be implemented at the start of a price path or over time. There was no strong consensus view on this issue. There was a slightly stronger preference for a gradual change in prices over several years, to avoid bill shock and allow time for customers to change their behaviour. However, almost as many customers favoured an upfront change.[3] Participants in languages other than English (LOTE) groups noted that transition timing was not as important for them as clear communication of price changes.[4] After considering customer preferences and other factors, we are proposing to retain current price structures (see section 2.3.2 and section 2.3.3 for more detail)

2.3.2 Water pricing structure

Key findings: Most residential and small to medium business customers supported a water usage price at current or higher levels, in both forums and online surveys. Reasons ranged from keeping bills predictable (more typically stated in surveys) to providing greater bill control and incentivising efficient water use (more typically stated in forums). Large business customers interviewed supported a lower usage price, as this would lead to a reduction in costs; however, they also noted

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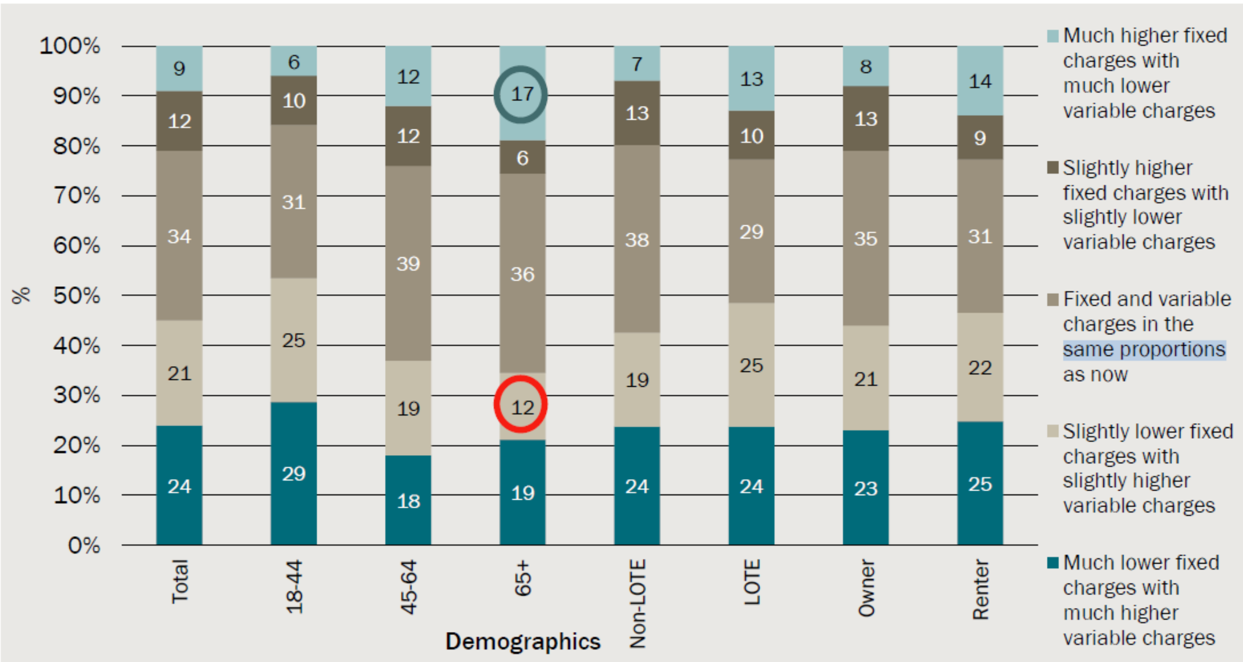
[2] Appendix 3C CIPA Phase 2 forums and surveys report. The Centre for International Economics 2018, Final Report, *Deliberative forums, discussion groups, interviews and tariff surveys*, *Customer-informed IPART submission (CIPA) Phase 2,* The CIE, Canberra, prepared for Sydney Water, page 49.
[3] Appendix 3C CIPA Phase 2 forums and surveys report, page 61.
[4] Appendix 3C CIPA Phase 2 forums and surveys report, page 63.

this was not an issue of high concern to them, as water usage charges were not typically a high cost.

Sydney Water proposal: Retain a usage charge at the higher end of the range of estimated long-run marginal costs, in line with customer preferences. Our proposed usage charge of $2.13/kL ($2019–20) is consistent with our current usage price, plus CPI, which is at the higher end of long-run marginal cost estimates.

Water prices include both a fixed service charge and a usage charge which is applied for every kilolitre of water used. Traditionally, we have set our water usage price with close reference to the long run marginal cost (LRMC) of water. The service charge is then calculated as the difference between the revenue required to cover the costs of providing water services and projected revenue from usage charges. However, since our last price proposal, we have also considered customer preferences when proposing a water usage charge.

In Phase 2 forums, water price structures were explained to participants, who were then asked to discuss the ideal proportion of fixed versus variable prices for the water bill. Overall, there was a general preference by residential participants for a higher variable charge and lower fixed charge (45%), rather than a higher fixed charge and lower variable charge (21%) (see Figure 2-3). Just over a third stated a preference to retain the current balance of fixed and variable charges (34%). There were some differences in preferences across age groups.



Source: Appendix 3C CIPA Phase 2 forums and surveys report

Figure 2-3 Preferences for fixed vs variable mix of water charges (Phase 2 forums)

Participants were then presented with three hypothetical water pricing scenarios (A, B and C) for residential customers, in addition to the current price structure, as shown in Figure 2-4.

	Current	Scenario A	Scenario B	Scenario C
Water usage charge	$2.08 per kilolitre	$1.40 per kilolitre	$1.80 per kilolitre	$2.20 per kilolitre
Water fixed charge	$80.67 per dwelling per year	$240.32 per dwelling per year	$145.53 per dwelling per year	$50.73 per dwelling per year

Figure 2-4 Residential water price structure options ($2018–19) (Phase 2 forums)

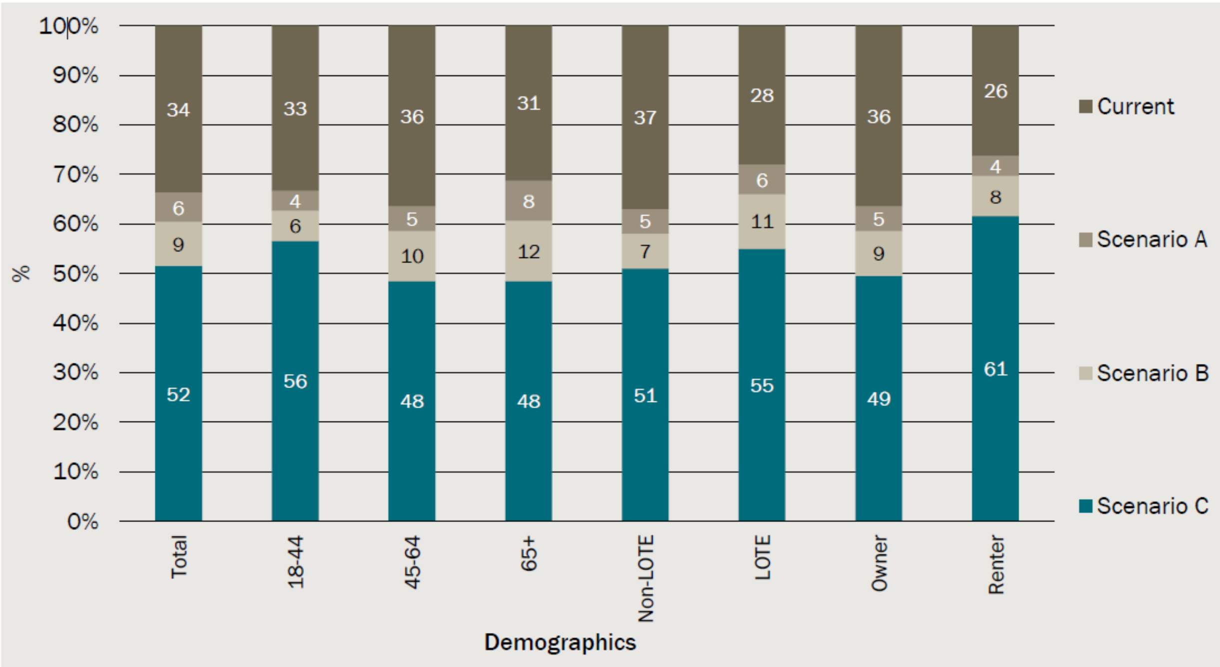
Scenarios were developed based on our analysis of long run marginal costs at that time. The maximum usage charge depicted was $2.20/kL ($2018–19), as, under non-drought conditions, a higher usage charge would result in a minimal to nil fixed charge. As a largely fixed cost business, this would create too much risk for us. The impact of each scenario was explained using four hypothetical customers, to demonstrate the impacts of different price structures on different types of water users.

Annual water bill (Excluding wastewater and stormwater)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Low water user – 100kL a year	$289	$380	$326	$271
Typical apartment – 160kL a year	$413	$464	$434	$403
Typical house – 220kL a year	$538	$548	$542	$535
Large water user – 350kL a year	$809	$730	$776	$821

Figure 2-5 Impacts of water price structure scenarios on different types of water users

When asked to choose a preferred scenario, 86% of forum participants chose a water usage price at or above the current level (52% supported Scenario C and 34% supported the current level) (see Figure 2-6). This largely aligned with customers' views when asked about their general preferences regarding the mix of fixed and variable water charges. There were some locational differences in results. For example, Campbelltown participants were significantly more likely to prefer the current scenario (51%), while the Hornsby forum indicated a significantly higher preference for Scenario C.



Source: Appendix 3D, CIPA Phase 3 report

Figure 2-6 Preferred water pricing scenario (Phase 3 forums)

Forum participants stated a range of considerations when voting, including expected impacts on personal bills, providing the right incentives for water use, and bill certainty or the ability to influence personal bills.[5] Participants who stated concern about the impact on low income households as an important consideration tended to choose the current scenario, since this would not lead to any customers being worse off than they are now.[6]

Most participants in discussion groups also preferred either Scenario C or the current scenario, for similar reasons to those raised in forums.[7] Most small and medium business participants in discussion groups did not have a strong preference for water price structure as the bill impacts were seen to be negligible. Those who did choose a scenario tended to select a higher usage charge, as this could provide more possibility of reducing bills by reducing water use.[8] A greater proportion of financial hardship customers preferred the current scenario, because they generally

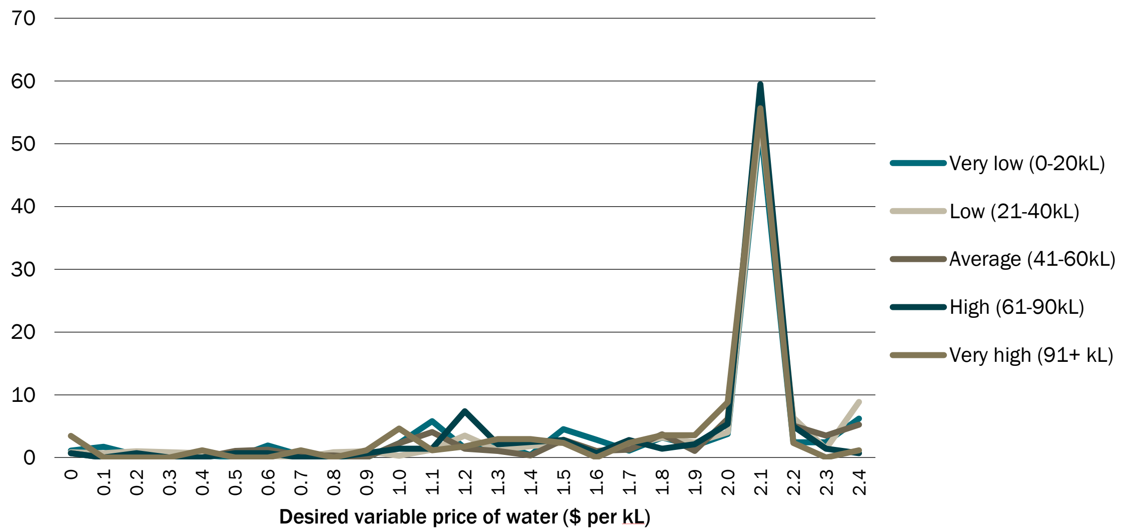
[5] Appendix 3C CIPA Phase 2 forums and surveys report, page 60.
[6] Appendix 3C CIPA Phase 2 forums and surveys report, page 58. Many forum participants noted concern about the potential impacts of various price structures on low-income households; however, they often found it difficult to act on this concern, as both low and high water consumption households could potentially be low-income.
[7] Appendix 3C CIPA Phase 2 forums and surveys report, pages 63, 64 and 66.
[8] Appendix 3C CIPA Phase 2 forums and surveys report, page 66.

just paid the usage charge and it was feared any increase would be passed on to them. Similarly, there was some concern raised by Customer Council members interviewed that Scenario C might disproportionately affect those on lower incomes and from Aboriginal backgrounds.[9]

Significant business customers generally reported that the water charges were a small component of their overall bill, and so the fixed vs usage weighting was not a high priority for them. Most tended to prefer weighting the structure towards the fixed charge, generally preferring Scenario A as this provided more predictability and substantial cost savings. However, a couple of participants mentioned a higher usage component may incentivise consideration of water saving processes, which could then lead to lower bills.[10] Due to the difficulty of engaging with these types of customers, significant business customers were engaged through a small number of interviews, and not covered by online surveys.

There was a very strong preference in online surveys to retain the current water usage price. The online survey included a slider question whereby respondents could choose their preferred balance between fixed and variable charges for water services, within a usage price range of $0 to $2.20/kL ($2018–19). They were shown the impact of this on their own bill (based on actual usage, if known) and the effect of their selection on varying usage levels and meter sizes (for non-residential participants).

More than half of the participants in the residential online survey preferred a usage price at the current level ($2.08/kL ($2018–19), with no other price gaining more than 9% support (Figure 2-7). The most common reasons stated for this choice were the expected impact on personal bills, bill certainty and the ability to influence bills.



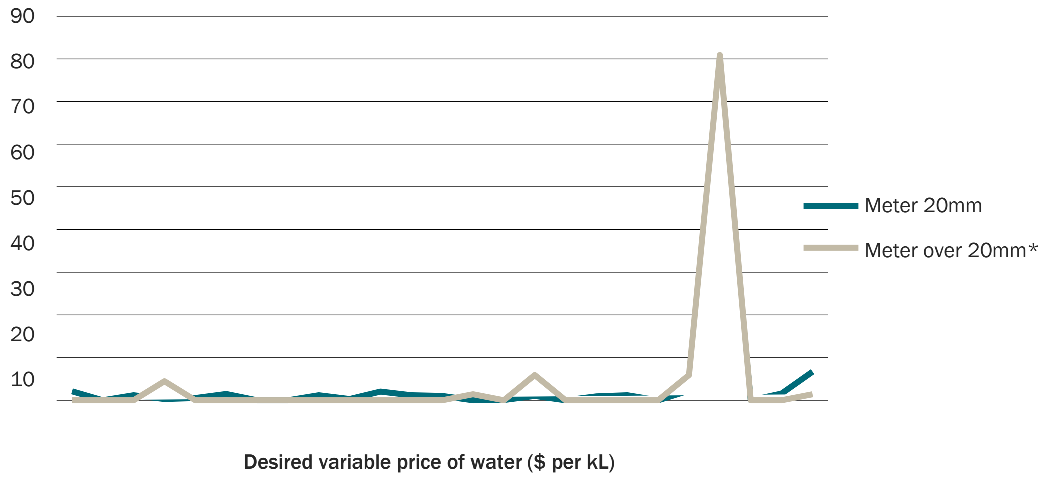
Source: Appendix 3C CIPA Phase 2 forums and surveys report

Figure 2-7 Preferences for water usage charge (Phase 2 residential survey)

[9] Appendix 3C CIPA Phase 2 forums and surveys report, page 55.
[10] Appendix 3C CIPA Phase 2 forums and surveys report, page 68.

It was noted in our consultants' report that this response could be due to the complexity of the question within a survey format, resulting in many respondents simply selecting the status quo. However, the status quo was also the second most preferred scenario chosen in forums (and the most preferred at Campbelltown).

Small and medium businesses surveyed also showed a very strong preference for the current usage price, with the distribution of preferences almost identical to the residential customer survey (see Figure 2-8). Impact on their bill and bill certainty were cited as the main reasons for their choice.[11]



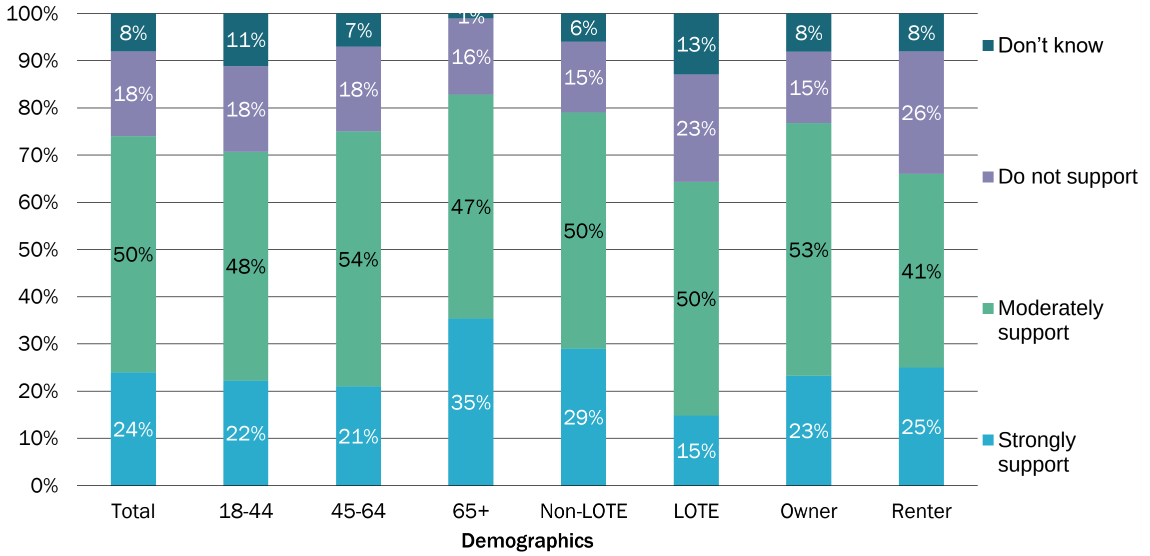
Source: Appendix 3C CIPA Phase 2 forums and surveys report

Figure 2-8 Preferences for water usage charge (Phase 2 business survey)

After considering the range of customer feedback from Phase 2 and our updated long run marginal cost estimates for water, we took our proposed water usage charge of $2.13/kL ($2019–20) back to customers in Phase 3. $2.13/kL ($2019–20) is consistent with our current usage price, plus CPI, but remains at the higher end of the range of potential water use prices.

Our proposed usage charge was supported by 74% of Phase 3 forum participants either moderately (50%) or strongly (24%) (see Figure 2-9).[12]

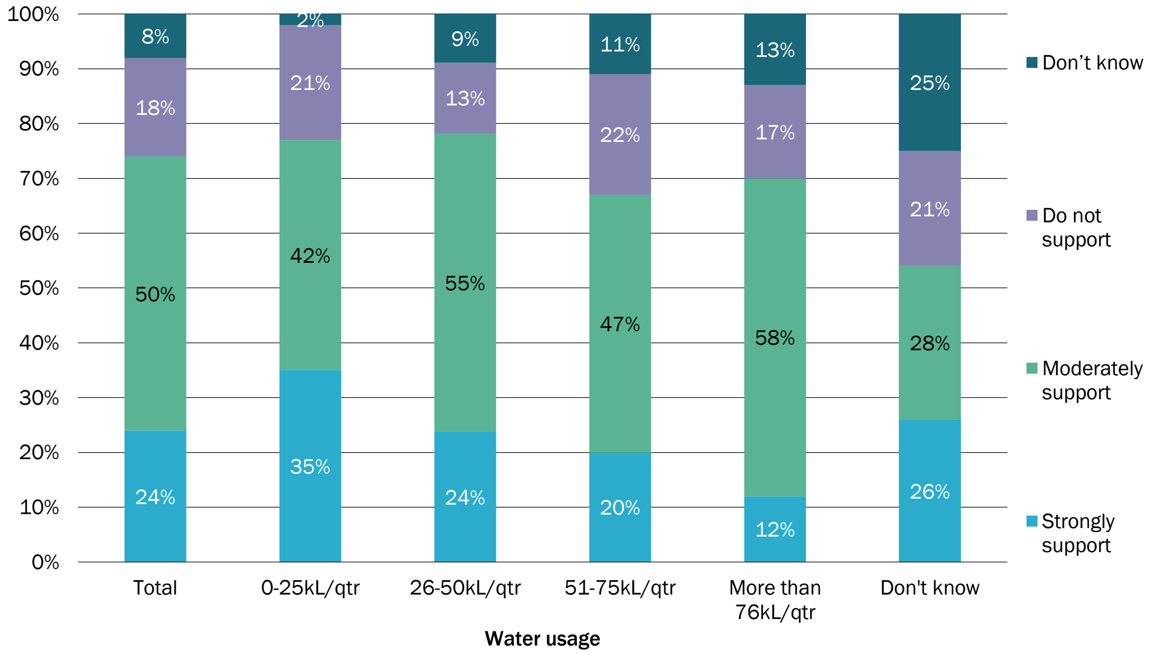
[11] Appendix 3C CIPA Phase 2 forums and surveys report, page 75.
[12] Appendix 3D CIPA Phase 3 report The Centre for International Economics 2019, Final Report, *Bringing it all together, Customer-informed IPART submission (CIPA) Phase 3*, The CIE, Canberra, prepared for Sydney Water, page 28.



Source: Appendix 3D CIPA Phase 3 report

Figure 2-9 Customer support for proposed water use price by demographic (Phase 3 forums)

Support was also seen across different types of water users (see Figure 2-10).



Source: Appendix 3D CIPA Phase 3 report

Figure 2-10 Customer support for proposed water use price by usage amount (Phase 3 forums)

General support for our proposed usage charge was also seen in Phase 3 discussion groups, including with speakers of languages other than English, financially vulnerable customers and small-medium businesses.[13]

Based on customer feedback and our analysis of the long run marginal cost of water we are proposing a water usage price of $2.13/kL. See **Attachment 4: Proposed prices**, section 4.3 for further detail on water prices.

2.3.3 Wastewater pricing structure

Key findings: While there was interest in and support for the concept of a residential wastewater usage charge, in the end, a majority of customers supported retaining the existing pricing structure – a fixed charge only – rather than introducing a usage charge based on a set discharge factor. Moving to different charges for houses and apartments was also seen as potentially unfair, as volumes could be driven by number of occupants and apartments use much less water outdoors. In Phase 2, large businesses preferred a lower wastewater usage charge, while small to medium business customers indicated a preference to retain the current non-residential wastewater usage charge of $1.16/KL ($2018–19). However, in Phase 3, small to medium business were happy to accept a lower wastewater usage charge of $0.60/kL ($2018–19), when it was explained that this would likely result in lower bills for most non-residential customers.

Sydney Water proposal: Retain existing price structure for residential wastewater charges, in line with customer preference and considering the costs and benefits of alternative approaches. For non-residential wastewater charges, we are proposing to shift to a lower wastewater usage charge, considering feedback from business customers and our proposal to reference wastewater usage charges based on short run marginal cost estimates.

Residential wastewater pricing

In Phase 2 participants in forums and online surveys were asked if they would prefer a single fixed charge for all residential customers, having different fixed charges for houses and apartments, or the introduction of a residential wastewater usage charge (as well as a fixed charge), as shown in Figure 2-11.

[13] Appendix 3D CIPA Phase 3 report, page 28.

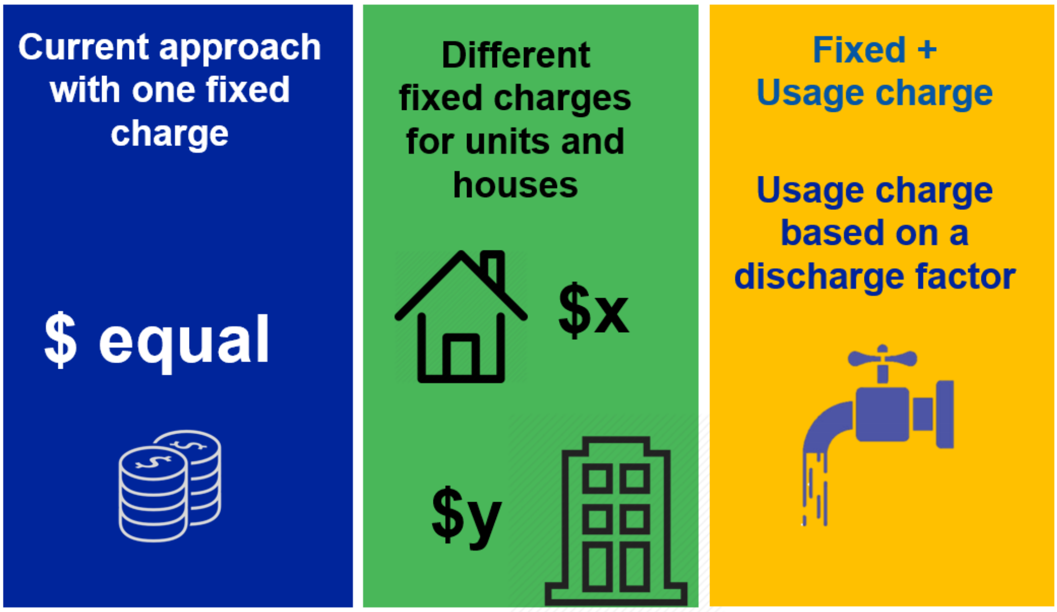
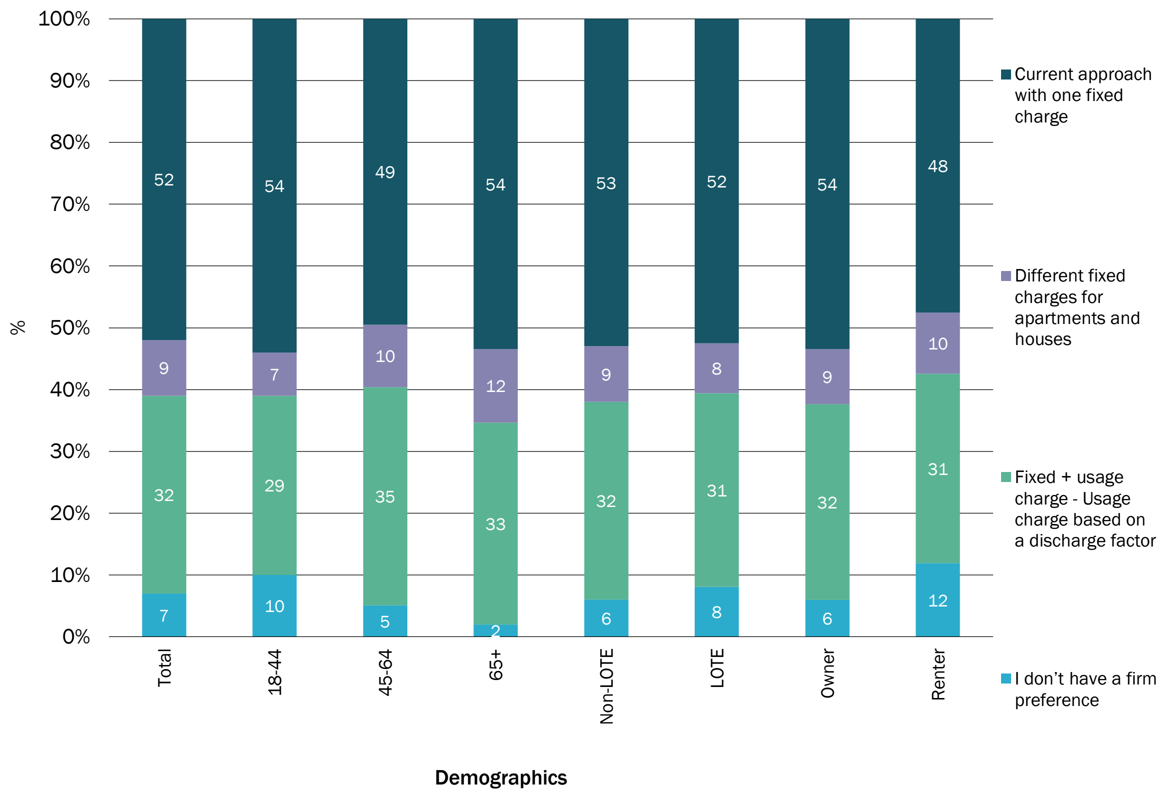


Figure 2-11 Residential wastewater pricing structure options

It was explained that residential wastewater usage charges would be calculated using an assumed discharge factor, which would be applied uniformly across all residential customers. This is because the difficulty and cost of metering wastewater makes this option impractical for residential customers. A discharge factor is a percentage applied to the amount of (drinking) water used to estimate the amount of wastewater discharged into our wastewater system. This means that customers with lower water use also have lower wastewater usage charges applied to their bill.

While there was interest and some support for the concept of wastewater usage charges during forum discussions, when asked to choose their preferred pricing structure, the majority of forum participants (61%) supported staying with the current structure of a single fixed charge only. Just over half preferred keeping the same fixed charge for all residential customers (52%), and only 9% supported introducing different fixed charges for houses and apartments, as seen in Figure 2-12



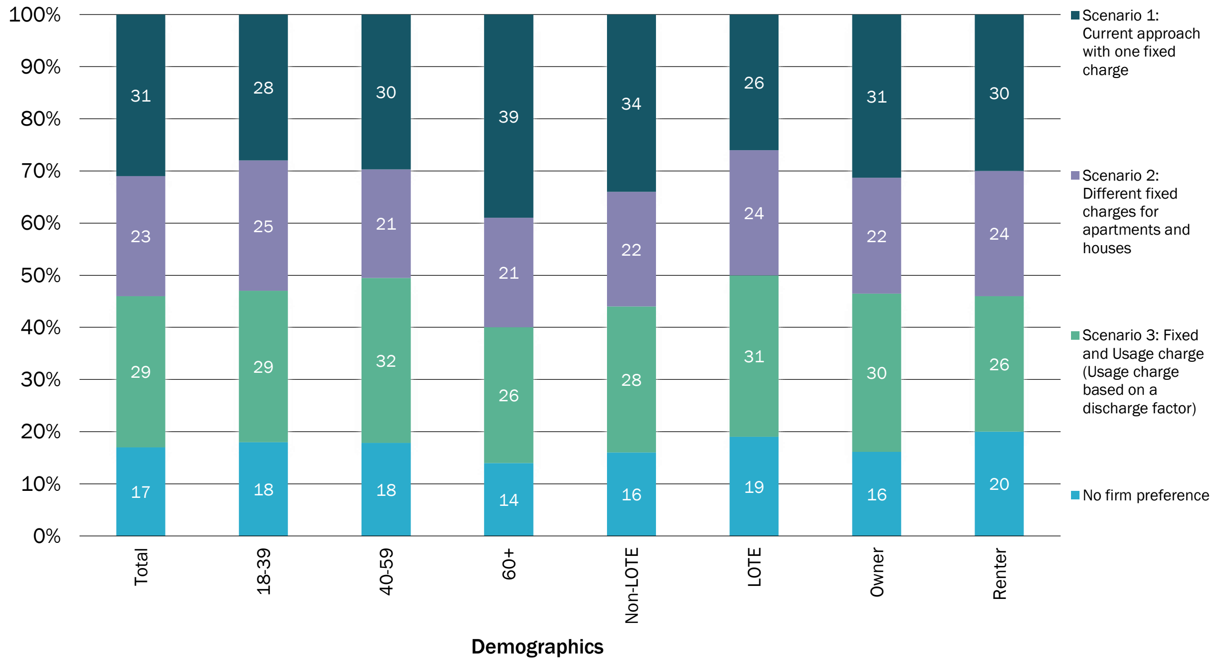
Source: Appendix 3C Phase 2 forums and surveys report

Figure 2-12 Customer preferences for wastewater pricing structures (Phase 2 forums)

With regard to different fixed charges for apartments and houses, this was seen as potentially unfair. Some felt that apartments should be paying less because they were generally smaller; while others felt apartments potentially created more wastewater as they usually had no garden. Overall, there was a general agreement that wastewater usage would depend on the number of people in a household, so a single fixed price was probably the fairest option in the absence of information about household size.[14]

In the Phase 2 online survey, results were more mixed, but over half of participants still supported having a fixed charge only (54%). Compared to forums, preferences were more closely split between keeping the same charge for all residential customers (31%) and having different fixed charges for houses and apartments (23%), as shown in Figure 2-13. A larger percentage of online survey participants indicated they had no firm preference, compared to forum participants.

[14] Appendix 3C CIPA Phase 2 forums and surveys report, page 82.



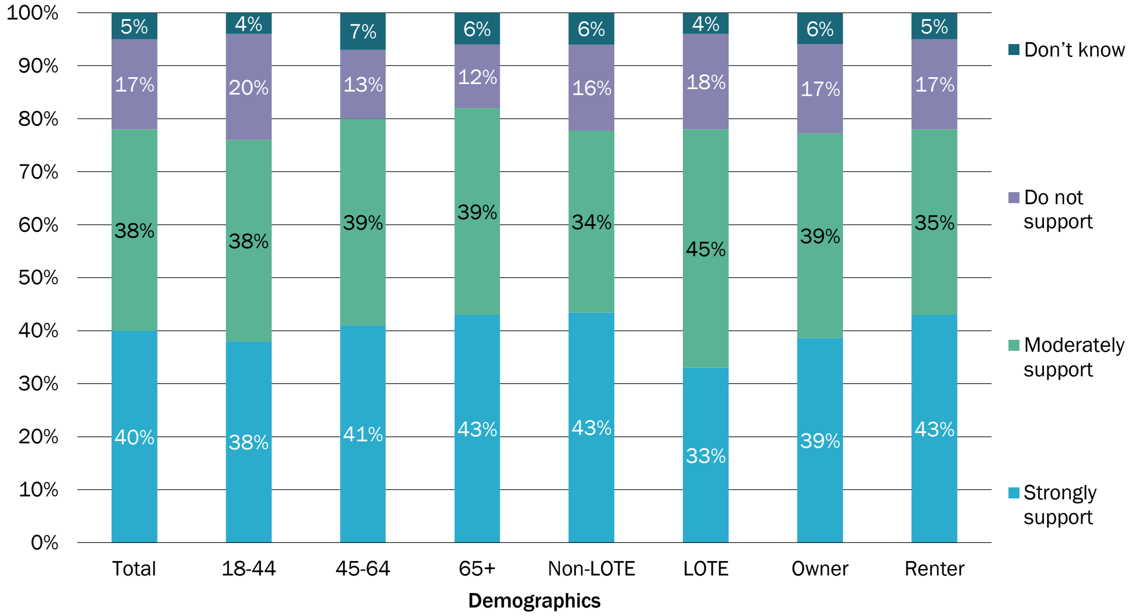
Source: Appendix 3C Phase 2 forums and surveys report

Figure 2-13 Customer preferences for wastewater pricing structure (Phase 2 residential online survey)

Introducing a usage charge based on a discharge factor was preferred by about a third of residential customers in both forums and surveys. Some customers raised concerns about the accuracy and fairness of a discharge factor, particularly as it would be the same discharge factor applied for all residential customers. For example, catching shower water to use on the garden or using a higher proportion of water outdoors than the proportioned assumed in calculating the discharge factor would not be captured.

Based on our customers' feedback, and our own broad analysis indicating that there was unlikely to be a significant difference in average wastewater discharge volumes between houses and apartments, we are proposing to retain a single fixed charge for all residential properties. Further, as residential customers are not metered, it is difficult to calculate an appropriate discharge factor that applies to different customer segments.

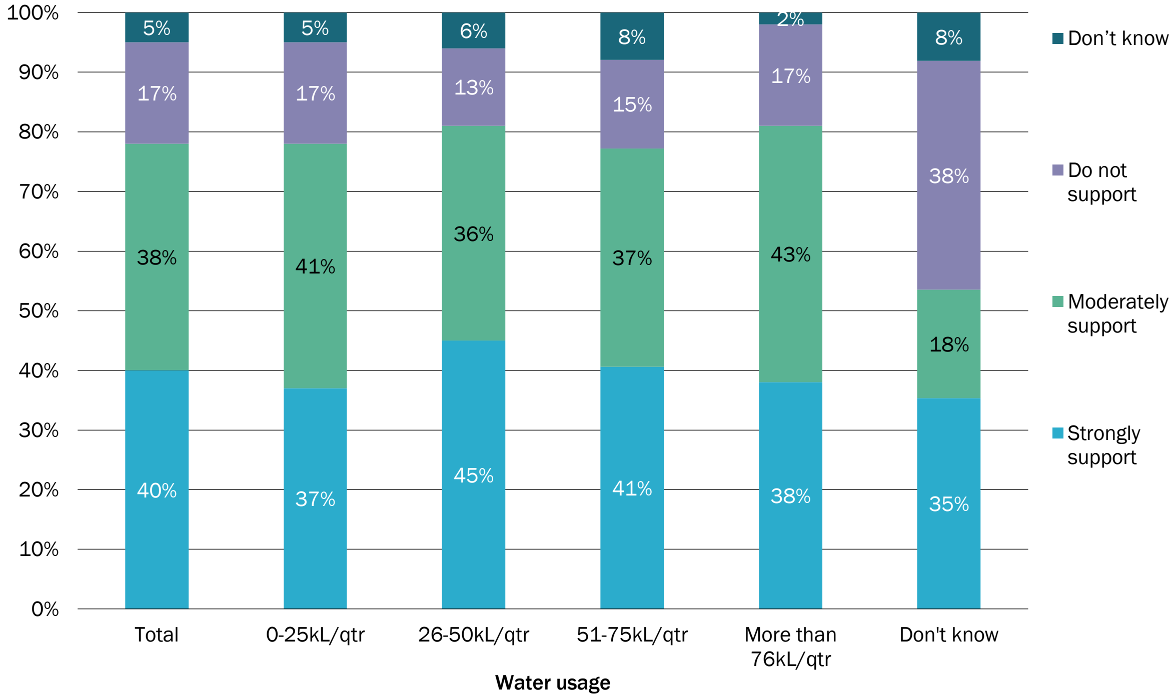
In Phase 3, we tested our proposal with customers in forums and discussion groups. Keeping a single fixed charge was generally supported by forum participants (78%), with total support evenly split between strong (40%) and moderate (38%) support (see Figure 2-14). Support was consistent across demographics.



Source: Appendix 3D CIPA Phase 3 report

Figure 2-14 Support for wastewater price structure proposal by demographic (Phase 3 forums)

Support was also consistent across different types of water users (see Figure 2-15).



Source: Appendix 3D CIPA Phase 3 report

Figure 2-15 Support for wastewater price proposal by usage amount (Phase 3 forums)

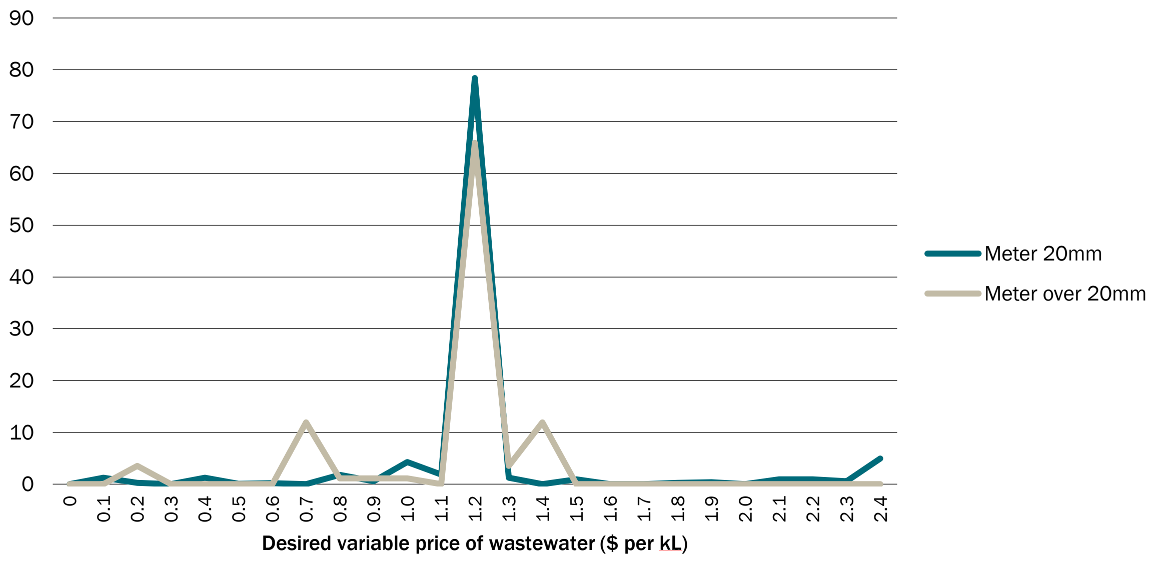
Support was more mixed in Phase 3 residential customer discussion groups. The financially-vulnerable group supported keeping a single fixed charge, while some participants in the speakers of languages other than English (LOTE) groups preferred the introduction of a wastewater usage charge.[15] However, on balance, we are proposing to retain a single fixed wastewater charge for all residential customers.

Non-residential wastewater pricing

Non-residential wastewater price structures already include a usage charge. The wastewater usage charge applies to non-residential customers who are deemed to have discharged more than the allowed discharge allowance (currently set at 150 kL per year) to the wastewater network.[16]

In Phase 2, we asked small and medium business customers about their preferred wastewater usage and corresponding fixed charges through discussion groups. They preferred to keep the structure that same as it is now, with around 70% preferring that current wastewater usage price of $1.16 ($2018–19), and not more than 12% supporting any other usage price (Figure 2-16). Most participants cited impact on their bill and ability to influence their bill as the main reasons for their selection.

Small and medium business customers' preferred wastewater usage price (Phase 2 online survey)



Source: Appendix 3C Phase 2 forums and surveys report

Figure 2-16 Small and medium business customers' preferred wastewater usage price (Phase 2 online survey)

In contrast, large businesses interviewed preferred a lower wastewater usage charge and a higher fixed charge, since this would most likely lead to cost savings.[17]

After considering the mixed feedback from different types of businesses in Phase 2 and other factors, including our proposed position of using short run marginal cost for wastewater pricing, we went back to small to medium business customers in Phase 3 with a proposal to shift towards a

[15] Appendix 3D CIPA Phase 3 report, page 31.
[16] Sydney Water applies discharge factors to estimate each non-residential customer's discharge volume, with reference to the customer's metered water consumption.
[17] Appendix 3C CIPA Phase 2 forums and surveys report, page 88.

lower non-residential wastewater usage charge of $0.60 ($2018–19). It was explained that Sydney Water had done further analysis to better match wastewater pricing with the marginal costs of transporting and treating wastewater. It was also outlined that this would decrease wastewater bills overall for most businesses and is in line with other wastewater utilities. The proposal was then supported by Phase 3 small to medium business discussion groups.[18]

After considering customer feedback and other factors, we are proposing a non-residential wastewater usage charge of $0.61/kL ($2019–20), down from $1.18/kL ($2019–20) in 2019–20.

See **Attachment 4: Proposed prices**, section 4 for further detail on wastewater prices.

2.4 Reliable services

Our Operating Licence contains performance standards relating to service interruptions. These currently cover water interruptions, wastewater overflows onto private properties and water pressure failures. We engaged with customers to understand their willingness to pay for different levels of service for these types of events.

2.4.1 Water interruptions

Key findings: In general, customers indicated they would need to be compensated twice as much for a loss of service relating to water interruptions compared to an improvement of service of the same magnitude. When asked about specific options, customers supported paying a small amount more on bills to slightly improve their risk of experiencing a long unplanned water interruption each year (which is already quite low).

Sydney Water proposal: Our proposed 2019–2023 Operating Licence contains a new target level of performance for unplanned water interruptions over five hours that is in line with customer feedback, as well as a maximum limit similar to our current licence limit. We will aim to meet the new target level over the next price path. We estimate this will cost an extra $0.20 a year, based on average conditions. Our recent experience shows that performance can also be significantly affected by weather and the availability of crews, or extreme events.

In Phase 2, we conducted a choice modelling study to estimate amounts that households and businesses would be willing to pay (or accept) for reductions (or increases) in different types of water supply interruptions. Customers indicated they would need to be compensated about twice as much for a reduction in service compared to an improvement in service of the same magnitude.

Avoiding longer and more frequent interruptions to service were valued higher than shorter or single interruption events.[19]

We used willingness to pay values to inform a cost-benefit analysis of potential changes to performance standards in our Operating Licence. Options in the cost-benefit analysis focused on

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[18] Appendix 3D CIPA Phase 3 report, page 31.

[19] For full results and analysis from Phase 2 willingness to pay studies on water interruptions see Appendix 3B CIPA Phase 2 willingness to pay report, The Centre for International Economics 2018, The CIE, Canberra, prepared for Sydney Water, pages 29-37.

different technical solutions that would affect long, unplanned interruptions. The impact of each option on repeat interruptions was also considered, but it was relatively small and did not differ much between options. Repeat interruptions are naturally limited by our asset management strategy, which targets pipes for renewal after multiple breaks.

Based on our cost-benefit analysis of technical options, we developed three options for managing our water pipes and the impact this would have on customers, to test with customers in Phase 3, as outlined in Figure 2-17.

Option A No change	**Option B** Improve	**Option C** Worsen
Continue what we are doing	**New technology and more notice**	**Repair pipes more before replacing them**
No change in your water bill	You pay an extra **$0.20** each year	You save **$1.50** each year
16 in 1000 properties	**12 in 1000 properties**	**20 in 1000 properties**

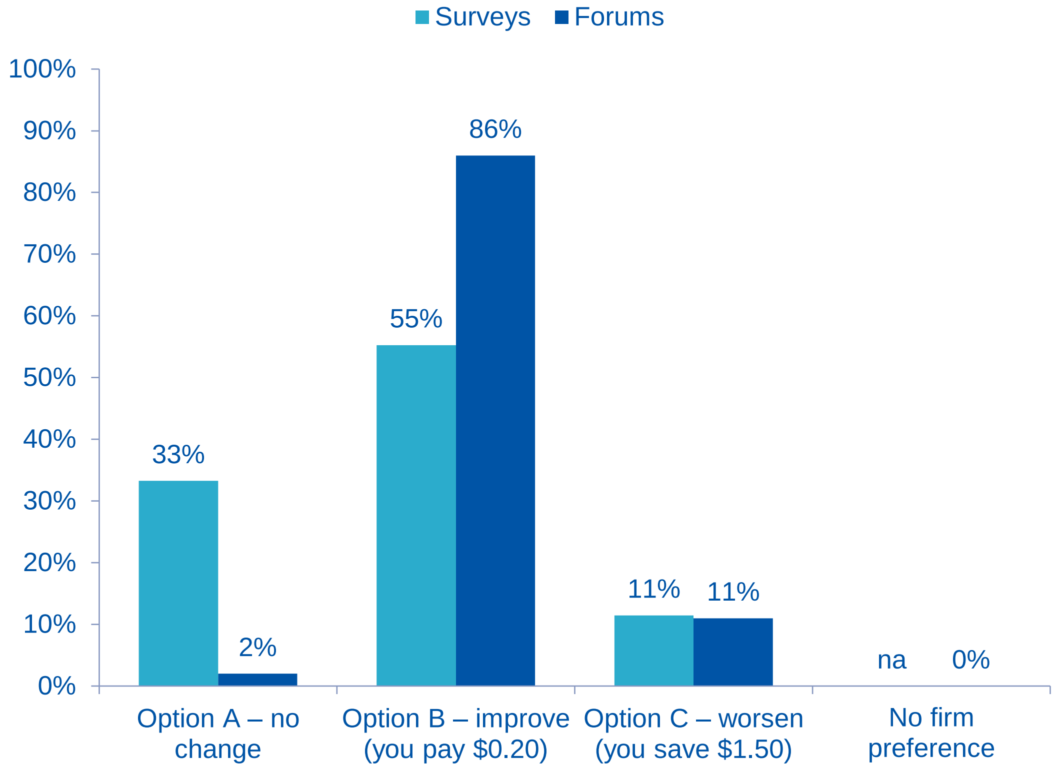
Figure 2-17 Options for unplanned water interruptions (Phase 3)

Online survey participants were also given more information about risk changes for other events under each option, including planned interruptions and repeat unplanned interruptions.

In both forums and online surveys, customers indicated their preferred option at the end of each topic, then again after seeing the cumulative impact of all potential changes being discussed.

Option A retained current levels of risk of a long unplanned interruption, with no change to the bill. Option B reduced the risk of long unplanned interruptions from around 16 in 1000 properties each year (around 2.4 per cent of our customer base) to 12 in 1000 properties (around 2 per cent), at an estimated cost of $0.20 a year. This was based on introducing relatively low-cost measures of purchasing new equipment that would allow us to repair pipes without shutting off supply and planning work to give notice to customers more often. Option C presented a ‘worsen’ service scenario, increasing a customer’s risk of a long unplanned interruption to 20 in 1000 each year, with an estimated bill saving of $1.50 a year.

Option B was the most strongly preferred final water interruption preference by both forum (86%) and online survey (55%) participants, see Figure 2-18



Source: Sydney Water analysis

Figure 2-18 Customer preferences for unplanned water interruptions options (Phase 3)

Option B was preferred across demographics and in discussion groups with speakers of languages other than English, financially vulnerable customers and small-medium businesses.[20]

Support for Option B is consistent with the results of our Phase 2 research and subsequent detailed cost-benefit analysis, which identified Option B as the preferred option.

In our recent Operating Licence review, we supported retaining a similar maximum limit in our Operating Licence to our current standard as a minimum standard, as recent experience has demonstrated how much our performance is affected by external factors. In addition to a maximum limit, IPART proposed a new target level of performance for this standard that aligns with customer preferences, to encourage us to aim for an improved level of service for long unplanned interruptions. A similar maximum limit to that in our current licence has been retained for compliance purposes. We will aim to meet our targeted level of performance in the next price path, noting that performance can also be significantly affected by weather and the availability of crews, or extreme events.

2.4.2 Wastewater overflows onto private properties

Key findings: Customers are willing to pay more to avoid a wastewater overflow on their property than a water interruption. However, the cost of changing the risk of a customer experiencing a wastewater overflow on their property is significantly higher than the willingness to pay. When

[20] Appendix 3D CIPA Phase 3 report, page 32.

asked about specific options, customers did not support paying more to reduce their current risk of experiencing a wastewater overflow on their property (which is already very low).

Sydney Water proposal: Our proposed 2019–2023 Operating Licence contains standards relating to wastewater overflows on customers' properties. Maximum limits are relatively unchanged from our current licence, which is in line with customer feedback. We will aim to meet our Operating Licence standards over the next price path. This will have no impact on bills. We are also improving how we manage wastewater overflows to the environment, which are separately regulated by Environment Protection Licences.

We asked customers about wastewater overflows on private properties. It was explained that these types of overflows usually occur outside but occasionally occur inside a property.

Our Phase 2 choice modelling study estimated the amounts that households and businesses would be willing to pay (or accept) for reductions (or increases) in the number of; wastewater overflows on customer properties, properties experiencing three overflows in a year and the time taken to stop an overflow and clean the affected area. As for water, customers indicated they would need to be compensated substantially more for a reduction in service compared to the amount they would be willing to pay for an improvement in service of the same magnitude.[21]

We used willingness to pay values to inform a cost-benefit analysis of potential changes to performance standards in our Operating Licence. The cost-benefit analysis looked at two scenarios: a 50% increase in properties experiencing at least one overflow and a 50% decrease. Technical options that would result in this estimated level of service included changing the amount of proactive inspection to find blockages and changing response triggers for pipe replacement. We did not consider options to change response times or clean up times in our cost-benefit analysis.

Based on our cost-benefit analysis of technical options, we developed options for different ways of managing our wastewater pipes to test with customers in Phase 3, as outlined in Figure 2-19.

[21] For full results and analysis from Phase 2 willingness to pay studies on wastewater overflows onto private properties, see Appendix 3B CIPA Phase 2 willingness to pay report, pages 38-47.

Option A No change	**Option B** Improve	**Option C** Worsen
Continue what we are doing	**Spend MORE time inspecting wastewater pipes**	**Spend LESS time inspecting wastewater pipes**
No change in your wastewater bill	You pay an extra **$65** each year	You pay an extra **$2.40** each year
5 in 1000 properties experience an overflow on their property each year	**3 in 1000 properties** experience an overflow on their property each year	**8 in 1000 properties** experience an overflow on their property each year

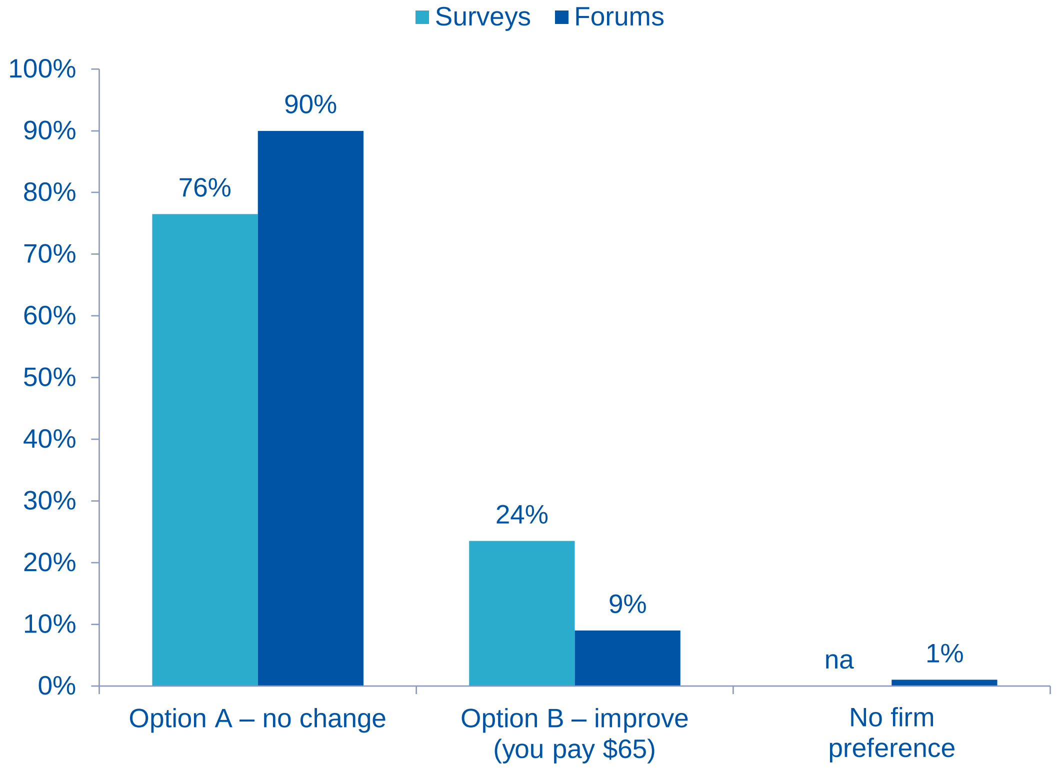
Figure 2-19 Options for wastewater overflows onto private properties (Phase 3)

Option A retained current levels of risk for a customer to experience an overflow on their property, of 5 in 1000 properties (or 0.5%) each year. Option B reduced the risk to 3 in 1000 properties (or 0.2%), with a bill increase of $65 a year.

Option B was based on an estimated improvement in service by increasing proactive inspection rates. It was explained that the high cost of this option was due to the amount of inspection that was estimated to affect a change in overflows onto customer properties (it was assumed inspection would need to cover the network every ten years to affect property related overflows). A third option, Option C, was presented but then immediately ruled out, as it resulted in both a decrease in level of service (8 in 1000 chance) and a cost increase ($2.40 a year). This is because the cost of letting more overflows occur and responding to them is more than the savings from less inspection and replacement.

As we were surveying a representative sample of customers, only a small number of people at forums noted that they had experienced an overflow on their property.

Option A was preferred by both forum (90%) and online survey (76%) participants (see Figure 2-20).



Source: Sydney Water analysis

Figure 2-20 Customer preferences for wastewater overflows onto private properties options (Phase 3)

Option A was also preferred across demographics and our discussion groups with speakers of languages other than English, financially-vulnerable, and small-medium businesses.

Overall, customers overwhelmingly supported Option A, to retain current service levels for wastewater overflows on private properties. This finding is consistent with the results of our Phase 2 research and subsequent detailed cost-benefit analysis.

Aligned with this customer feedback, we supported retaining current service levels in our Operating Licence for dry weather wastewater overflows onto private properties, which will have no bill impact. However, while performance against our Operating Licence standards has been relatively stable, the recent increase in chokes in our wastewater network has led to increasing wastewater overflows to the environment. We are committed to improving our environmental performance, as outlined in **Attachment 2: Service levels and performance**, section 3. This will include increasing proactive inspection and repair/replacement of pipes in targeted, high risk areas. Protecting the environment was identified in Phase 1 as a key customer priority. In Phase 2, it was generally agreed that Sydney Water needs to be managing environmental impacts, particularly during drought.[22]

[22] Appendix 3C CIPA Phase 2 forums and surveys report, page 54.

2.4.3 Water pressure

Key findings: Customers indicated that repeat water pressure failures were of much higher inconvenience than one-off, random failures. Customers supported paying for Sydney Water to improve water pressure for 130 customers who experience repeat water pressure failures.

Sydney Water proposal: Our proposed 2019–2023 Operating Licence contains a new obligation to address identified areas experiencing repeat water pressure failures in line with customer willingness to pay by 2022. Customers were willing to pay $0.20 a year to improve pressure for these customers. We will address this issue during the next price path.

In Phase 1, customers told us water pressure failures tend to be significantly less inconvenient than water interruption and wastewater overflow events. However, forum participants identified that repeat problems would be aggravating.[23]

In Phase 2, we conducted a contingent valuation survey which found that customers would be willing to make a one-off payment of $5 and businesses a one-off payment of 1.3% of a quarterly bill, on average, to improve water pressure for around 130 customers who experience persistent low water pressure. We calculated this value to equate to around $0.30 a year.

The estimated cost to fix repeat low water pressure problems for these 130 customers would equate to an extra $0.20 each year per customer. We used this cost and the value from our Phase 2 contingent study to develop options to present to customers in Phase 3.

Options presented to customers in Phase 3 are outlined in Figure 2-21.

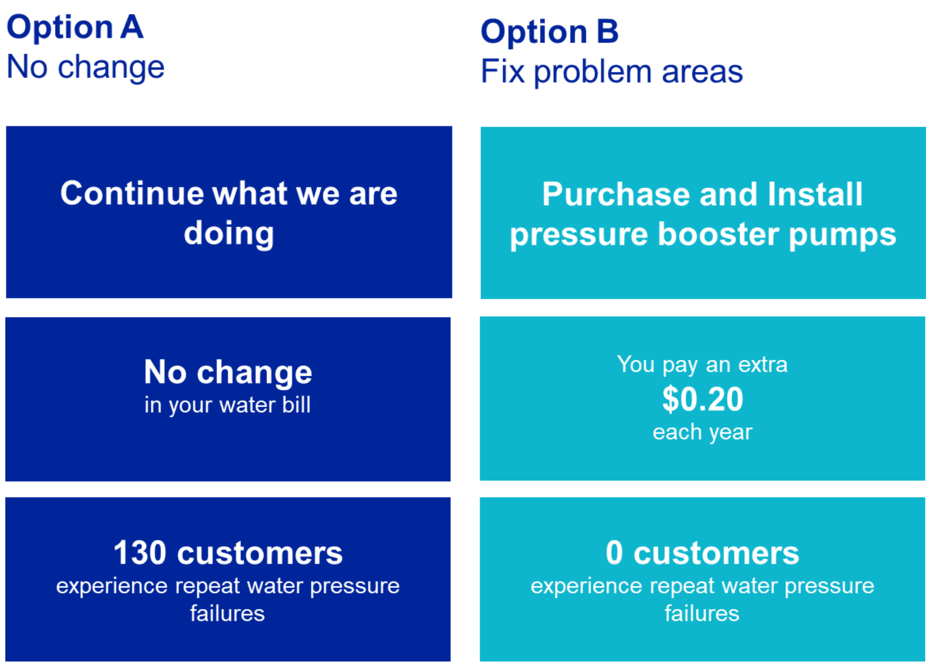
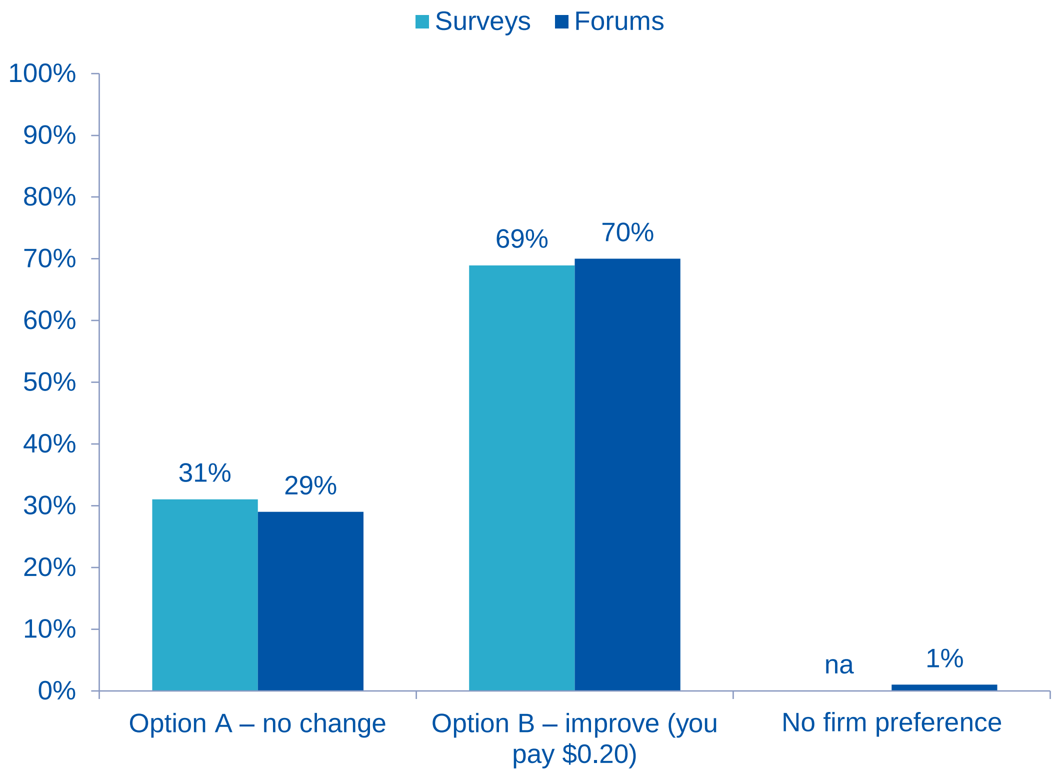


Figure 2-21 Options for water pressure (Phase 3)

Option A would see a small number of customers continue to experience repeat water pressure failures. Option B assumed an improvement in service level, for the affected customers in these

[23] Appendix 3A CIPA Phase 1 report, page 62.

areas only, at a bill increase of $0.20 a year for all customers. Option B was preferred by both forum (70%) and online survey (69%) participants, as shown in Figure 2-22



Source: Sydney Water analysis

Figure 2-22 Customer preferences for water pressure options (Phase 3)

Option B was preferred across demographics and in our discussion groups for speakers of languages other than English, financially vulnerable customers and small-medium businesses.

Overall, customers strongly supported improving service for the 130 customers in areas experiencing frequent water pressure failures. In line with customer support, we supported the proposed new Operating Licence requirement to address these areas by October 2022, in line with customer willingness to pay.

2.5 Untreated wastewater outfalls at Vaucluse-Diamond Bay

Key findings: Customers support Sydney Water stopping the release of untreated wastewater from cliff-face outfalls in the Vaucluse-Diamond Bay area during dry weather.

Sydney Water proposal: We are proposing to upgrade our wastewater system at Vaucluse-Diamond Bay and have begun concept planning. Customers were willing to pay $2.30 a year to do this, which is more than the current cost estimates. This project will stop the release of untreated wastewater from the three cliff-face outfalls during dry weather.

The vast majority (more than 99%) of Sydney's wastewater is treated before it is released to the environment. However, Sydney Water currently releases untreated wastewater collected from five suburbs via three cliff-face outfalls at Vaucluse and Diamond Bay. The outfalls were built between

1916 and 1936 and are the only outfalls in NSW where untreated wastewater flows directly into the ocean. However, the releases are allowed under our Environment Protection Licence.

Up until recently there was no indication that the untreated wastewater outfalls were having adverse impacts on people or the environment. In 2018, as required by our Environment Protection Licence, we completed a risk assessment of the outfalls. This showed the outfalls were having localised impacts to human health and the marine environment. Impacts included:

- degraded ocean floor habitat
- a visible pollution plume on top of the water about 75% of the time
- potential human health impacts to around 2,000 people a year who use the area for recreation (for example, spearfishing or participate in swim events).

The assessment indicated that there were no adverse impacts to water quality at nearby beaches.

In Phase 2, we conducted a contingent valuation survey which found households would be willing to make a one-off payment of $18 and businesses a one-off payment of 9.6 per cent of a quarterly bill, on average, to limit the release of untreated wastewater at the three cliff-face outfalls.[24] Survey respondents were provided with information about the types of benefits this would produce, including environmental and human health impacts. However, the customers surveyed in Phase 2 were not told actual cost estimates for the project. Given the support for the project in Phase 2, we wanted to confirm whether customers would be willing to pay the full cost to fund this new infrastructure, and so we retained the topic in Phase 3 forums and surveys.

Based on project cost estimates available at the time, we calculated that the cost to stop untreated wastewater being discharged from these outfalls in dry weather would be an extra $2.30 per year for each customer. As for all other topics in Phase 3, as the costs would not be recovered via a one-off payment but through customer bills, we presented the actual costs to customers in Phase 3 as an ongoing yearly bill increase.

Options presented to customers in Phase 3 are outlined in Figure 2-23.

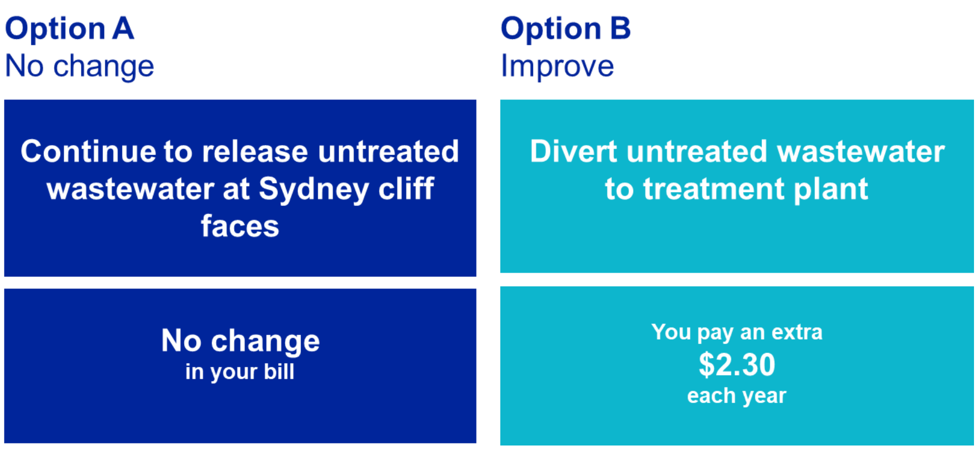


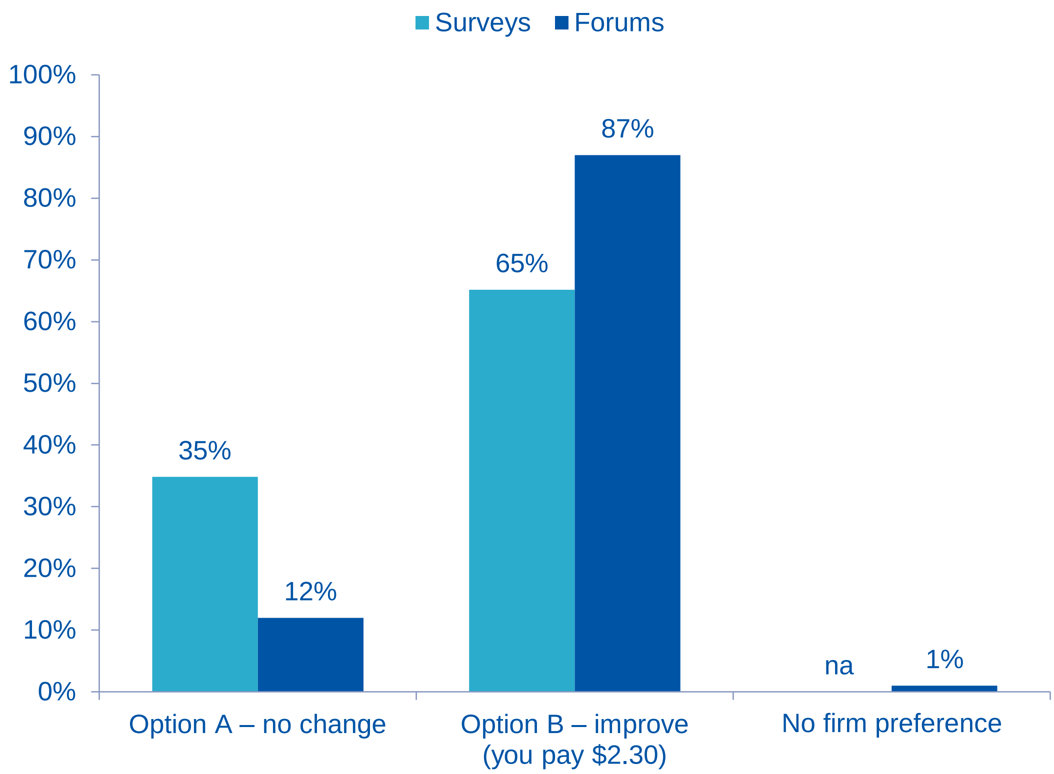
Figure 2-23 Options for untreated wastewater cliff-face outfall options (Phase 3)

[24] Release of untreated wastewater would be limited to during wet weather events, rather than continuing to occur on a daily basis.

Option A was a ‘no change’ scenario, which would see the continued release of untreated wastewater from the three cliff-face outfalls. Under Option B, we would build new infrastructure to divert the wastewater to a treatment plant, so it would be treated before being released. After this investment, no wastewater would be released from the cliff-face outfalls during dry weather. It was explained that some diluted wastewater would still be released from the three outfalls when it rains heavily (as an emergency release).[25]

The results from Phase 3 indicated customers were willing to pay an additional $2.30 a year to fund the project. There was particularly strong support at Phase 3 forums for this issue to be rectified, and many were surprised it still existed in 2018.[26]

Option B was preferred by both forum (87%) and online survey (65%) participants (see Figure 2-24)



Source: Sydney Water analysis

Figure 2-24 Customer preferences for untreated wastewater cliff-face outfalls options (Phase 3)

Option B was preferred across demographics and in our discussion groups for speakers of languages other than English, financially vulnerable customers and small-medium businesses.

There was a stronger preference for Option B observed at the deliberative forums compared to online surveys. This can be explained in part due to:

[25] Wet weather overflows of untreated wastewater occur at various designed points in our system, to avoid wastewater overflowing into homes, business or areas of high environmental sensitivity when volumes in the wastewater system exceed capacity.

[26] Appendix 3D CIPA Phase 3 report, page 50.

- the more community-minded thinking that tends to occur at forums. A stronger preference for Option B (77%) was observed among survey respondents who indicated they thought about the community a lot when making their choices; and
- the additional time and information made available at the forums. A weaker preference for Option B (59% and 60%) was observed among respondents who completed the questionnaire more quickly or who indicated they were uncertain in their response because they needed more time or information or would have liked to discuss options with other people.[27]

The results of Phase 3 indicate broad customer support for this project. We engaged extensively with the local community on a potential technical solution. A Community Reference Group was also established to represent the local community in our decision-making processes.

In line with customer feedback, we have proposed to deliver the Vaucluse Diamond Bay wastewater scheme as part of our capex program. This will bring this area in line with our other wastewater systems and cease the discharge of untreated wastewater from the Vaucluse and Diamond Bay cliff-face outfalls during dry weather. This project is discussed further in **Attachment 9: Capital expenditure**, section 2.5.

2.6 Rainwater in the wastewater system ('source control')

Key findings: Most customers support Sydney Water fixing the problem of rainwater and groundwater in the wastewater system by repairing faulty private plumbing where this is a lower cost solution than augmenting Sydney Water's network. Customers also supported spreading the cost of this work across all Sydney Water customers, rather than costs being paid for by individual property owners with faulty infrastructure.

Sydney Water proposal: Subject to IPART approval, we are proposing to start a 'source control' program in targeted areas. We will fund work on private plumbing where this is a lower cost solution compared to amplifying Sydney Water assets to achieve the same outcomes. This will be part of our broader program to reduce wet weather overflows from our wastewater system. Customers supported this option based on a bill saving of $3 a year. Based on our current program scope and cost estimates, it is likely this bill saving will be seen over multiple price paths. However, bills will still be lower in 2020–24 than under a no change option.

During wet weather, volumes of wastewater in our system can exceed its capacity, as groundwater and rainwater enters through broken or cracked pipes and illegal stormwater connections. To address this problem, we have typically built bigger pipes and storages or installed more overflow points. An alternative way to address this problem would be to fix privately owned plumbing in areas where there is a high level of inflow and infiltration to our system. The EPA has expressed its support for Sydney Water to address rainwater entering wastewater pipes at its source.[28]

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[27] Appendix 3D CIPA Phase 3 report, page 54.
[28] Sydney Water has Pollution Reduction Programs in several of our Environment Protection Licences to investigate and report on the benefits and feasibility of source control on both Sydney Water and privately-owned wastewater assets.

We introduced the problem of rainwater in the wastewater system in Phase 2 of our engagement, to test the concept of Sydney Water working on private plumbing with customers. In Phase 2 forums, customers were asked to choose their preferred method of reducing rainwater and groundwater entering our wastewater system in problematic areas, and how they thought this work should be funded. Options presented to customers in Phase 2 are outlined in Figure 2-25.

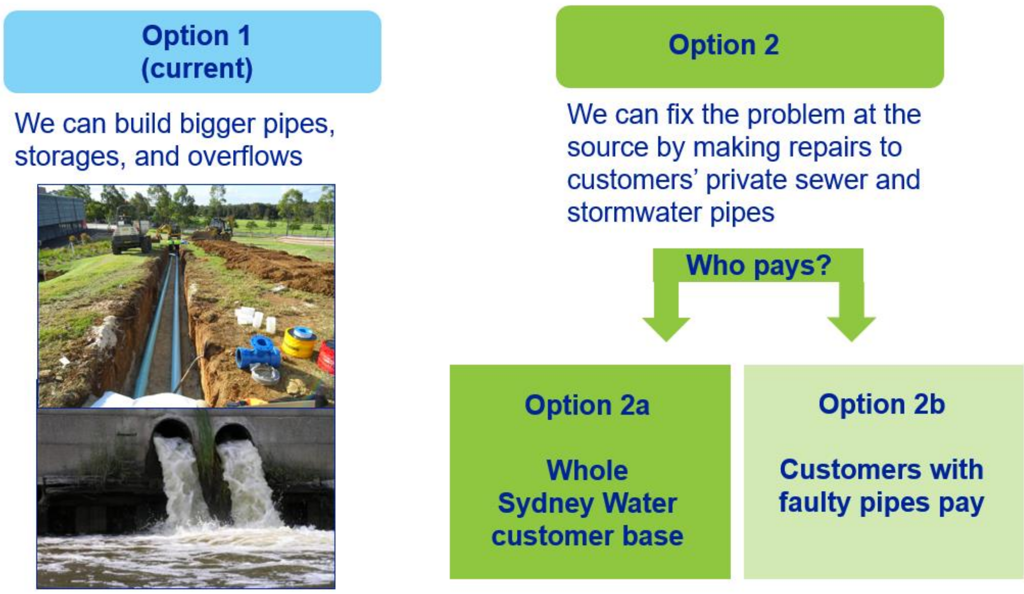


Figure 2-25 Options to reduce overflows due to rainwater in wastewater system (Phase 2)

77% of Phase 2 forums participants supported the concept of fixing the problem at the source (that is, working on private plumbing), and spreading the cost across the whole customer base. Participants who choose this option cited that continuing to build bigger pipes and storages was a 'band aid solution' and it was too big a financial impact to require individual customers to pay for it (especially considering many would not be aware of the issue).

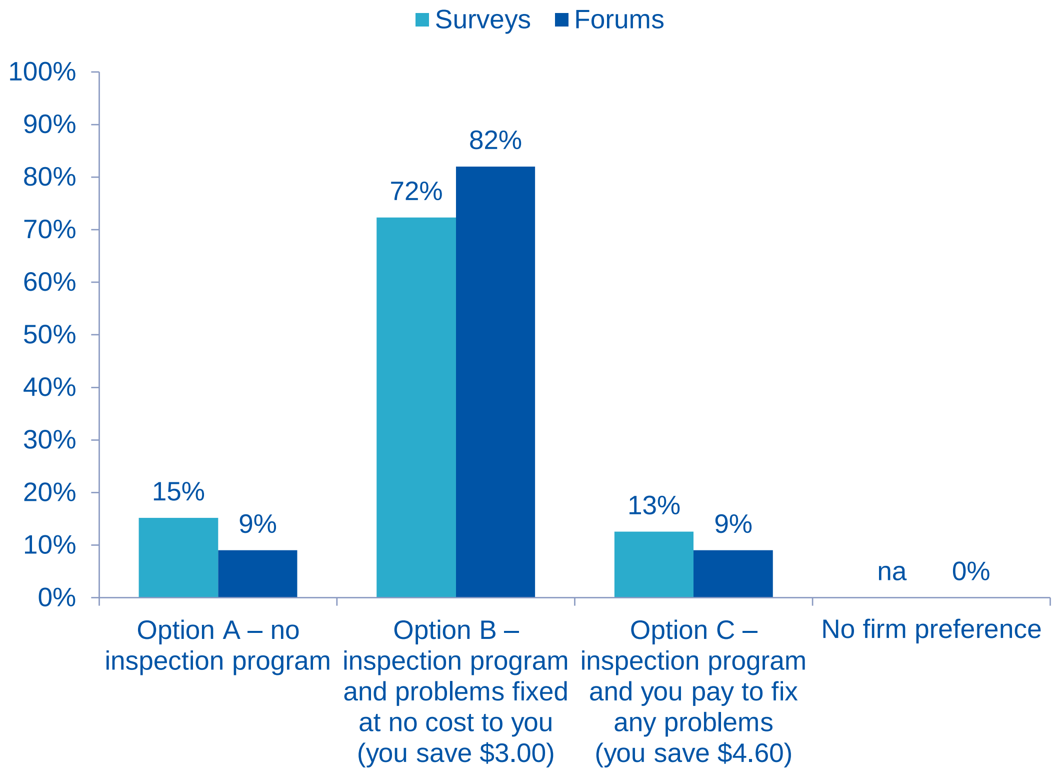
We then developed three options for managing rainwater in the wastewater system which we took back to customers in Phase 3. Options presented to customers in Phase 3 are in Figure 2-26.

Option A No change	**Option B** Improve	**Option C** Improve
Continue what we are doing	**Inspect private pipes and SW fixes the problem in targeted areas**	**Inspect private pipes and individual customers pay**
No change in your bill	You SAVE **$3.00** each year	You SAVE **$4.60** each year

Figure 2-26 Options to reduce overflows due to rainwater in wastewater system (Phase 3)

Different to the other topics surveyed in Phase 3, Option A ('no change') was the most expensive option presented to customers. It was explained that both Options B and C were cheaper solutions, as they would involve less infrastructure to be built. Both Option B and C involved fixing the problem at the source, by repairing issues in pipes owned by customers. It was explained that this would only be done in targeted areas where there is a high rate of inflow and infiltration of rainwater and groundwater to our system, not for all customers. Under Option B, we would include this cost in all customer bills; while Option C assumed that the costs would be paid for by individual property owners. This was estimated to be around $8,500 per property.[29]

82% of forum participants and 72% of online survey participants preferred Option B, as shown in Figure 2-27.



Source: Sydney Water analysis

Figure 2-27 Customer preferences for reducing overflows due to rainwater in wastewater system (Phase 3)

In discussion groups, about half of the 'speakers of languages other than English' group supported Option B, with 40% supporting Option A. However, some who supported Option A cited that they were concerned that supporting Option B would mean that we would not continue to build bigger pipes more generally, presumably to cater for growth. This is not the case. The 'source control' project will be targeted in areas of high infiltration only. We will continue to size our network to allow for growth and some extra flows from ground and rain water getting in. We will also continue

[29] In the hypothetical scenario presented to customers in Phase 2, the cost to individual property owners was based on a high-level estimate of $13,000 per property. The cost to individual property owners presented in Phase 3 was $8,500, after further consideration of average costs.

work focused on reducing infiltration in Sydney Water owned pipes. The financially-vulnerable and small-medium business discussion groups both supported Option B.

Overall, there was strong customer support for us to address the problem of rainwater and groundwater in the wastewater system at the source, which was presented to provide a bill saving of $3 a year. Generally, there was strong support from customers to pursue this solution where it would be a lower cost solution compared to augmenting our wastewater network. In terms of funding this work, customers preferred to share the costs across all Sydney Water customers, rather than costs being borne by individual property owners.

Since undertaking Phase 3, we have developed a proposed source control on private properties program for targeted areas. This work is significantly cheaper than the capital expenditure that would be required to amplify our assets to achieve the same environmental outcomes. Subject to IPART allowing the costs of this work to be recovered from customers, this will be part of our broader work program to reduce wet weather overflows from our wastewater system. For more detail see **Attachment 9: Capital expenditure**, section 2.4.1.1.

2.7 Waterway Health Improvement Program

Key findings: Customers support Sydney Water investing in improving the quality of our waterways through stormwater management activities. Customers in declared stormwater catchment areas supported funding the continuation of the Waterway Health Improvement Program.

Sydney Water proposal: We will continue to deliver the Waterway Health Improvement Program in 2020–24. Customers were willing to pay an extra $2.90 a year for this program. Current project estimates are less than this.

We are generally responsible for managing large stormwater pipes in declared stormwater catchment areas. Stormwater pollution affects the health of creeks and rivers in Sydney. In 2016, we began a program to improve waterway health across Sydney, in the catchments of the Georges, Cooks and Parramatta Rivers. Over time, this program will increase the amount of river length in good waterway health, and that supports healthy populations of fish and birds.

We engaged with customers to understand their willingness to pay for improved waterway health outcomes. We conducted a choice modelling study to estimate amounts that households would be willing to pay for increases in the:

- length of waterways in good health
- area of planted native vegetation
- sets of recreation facilities
- amount of rubbish and litter removed from Sydney waterways each year.

The willingness to pay survey indicated customers are willing to pay some amount towards each of the benefits identified from the investment in waterway health, as outlined in Table 2-2.[30]

[30] The willingness to pay survey on waterway health was done separately to the Phase 2 customer engagement program. For full results and analysis, see Appendix 3B CIPA.

Table 2-2 Willingness to pay values for waterway health outcomes

Waterway health outcome	Willingness to pay
Per kilometre of waterway in good health	$0.93 per year for 10 years
Per hectare of native vegetation of planting	$0.18 per year for 10 years
Per set of recreational facilities	$0.10 per year for 10 years
Per garbage truck load of rubbish and litter removal	$0.18 per year for 10 years

The survey included Sydney Water stormwater customers and non-Sydney Water stormwater customers and found no statistical difference between the preferences for both groups.

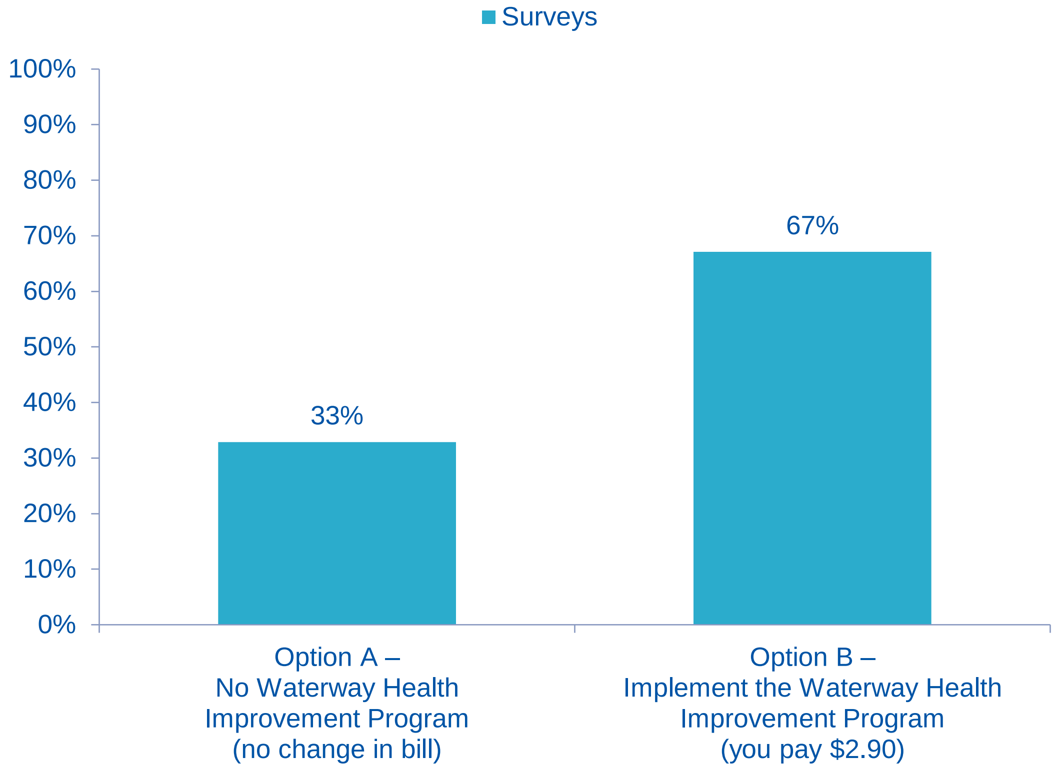
Using the survey results, we developed a five-year waterway health improvement program that would deliver waterway health outcomes that customers were willing to pay for.

In Phase 3, two options were presented to customers:

- Option A – no Waterway Health Improvement Program, with no impact on customer bills.
- Option B – implement the Waterway Health Improvement Program, involving specified improvements in the length of rivers in good health in 30 years' time, the amount of native vegetation planting, the number of recreational facilities and the amount of rubbish and litter removed, at an ongoing cost to customers of $2.90 per year.

As stormwater expenditure is currently only recovered from stormwater customers, we only included this topic in Phase 3 online surveys completed by stormwater customers. Stormwater customers were asked about this topic in addition to the other six topics surveyed, in the context of their overall Sydney Water bill for water, wastewater and stormwater services.

Option B was preferred by 67% of survey participants, as shown in Figure 2-28.



Source: Sydney Water analysis

Figure 2-28 Stormwater customer preferences for waterway health options (Phase 3, survey only)

Overall, stormwater customers strongly supported the continuation of the Waterway Health Improvement Program. For more information on the program, see **Attachment 9: Capital expenditure**, section 2.2.5.

2.8 Digital meters

Key findings: While customers saw value in the benefits of digital metering and indicated strong willingness to pay in Phase 2, when asked about actual costs in the context of other changes and the total bill, customers did not support a broad roll-out to all customers. The main reason given was that the cost of digital meters did not outweigh the benefits to customers, such as leak alerts, more frequent and detailed water use data and notifications about water use patterns.

Sydney Water proposal: We will not do a broad roll-out of digital meters at this time. We will continue to investigate and assess digital metering options, including a pilot in 2020–24. This will give us more information on technologies, customer benefits, and potential cost efficiencies.

Sydney Water is considering the benefits of introducing digital meters. Digital meters would provide benefits to customers such as the ability to receive notifications about water use or potential leaks, make bill predictions, receive check in alerts (for example, for elderly relatives) and to obtain more detailed information about water use through an online portal. Digital meters would also provide potential benefits to Sydney Water in terms of network management and cost efficiencies.

In Phase 2, we conducted a contingent valuation survey on the customer benefits of digital meters. The results suggested the features would be highly used and valued, with households willing to pay an average of $3 per quarter and businesses 1.1% of each bill on an ongoing basis for the customer benefits enabled by a digital meter, such as notifications and web-based information.[31] This indicated that customers may be willing to fund a broad rollout of digital meters, based on the willingness to pay for customer related benefits.

We then developed options to present to customers in Phase 3, based on current cost estimates, as outlined in Figure 2-29, to test willingness to pay in the context of other potential changes and the total bill.

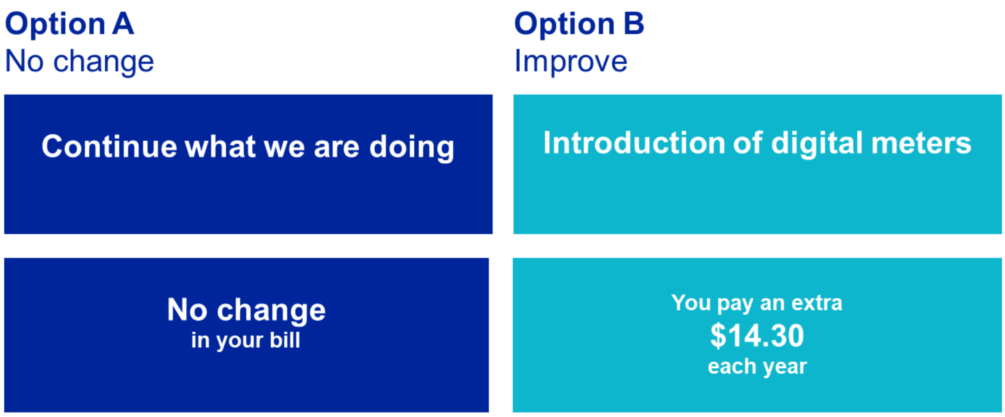
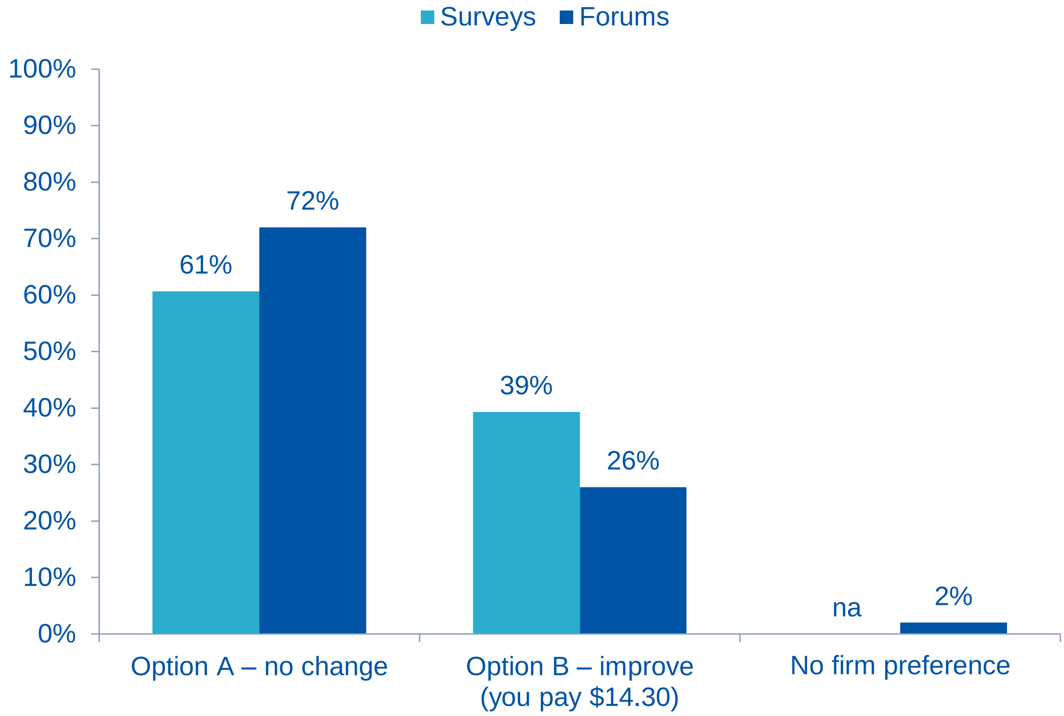


Figure 2-29 Options for digital metering (Phase 3)

Under Option A, we would continue to use non-digital meters, that do not have additional information benefits for customers. Under Option B, we would implement a program to install digital meters in all new properties and retro-fit digital meters into existing properties over a 10 to 15-year period. As for non-digital meters, digital meters would then need to be replaced on an ongoing basis, at the end of their asset life. The same types of customer benefits surveyed in Phase 2 were described to customers, namely, the ability to access more frequent water usage data and receive notifications about water use patterns.

Option A (‘no change’) was preferred by both forum (72%) and online survey (61%) participants, see Figure 2-30. The main reasons stated was that customers thought the cost was too high for the benefits customers would receive.[32]

[31] Appendix 3C CIPA Phase 2 forums and surveys report, page 48.
[32] Appendix 3B CIPA Phase 3 willingness to pay report, page 61.



Source: Sydney Water analysis

Figure 2-30 Customer preferences for digital metering options (Phase 3)

Option A was preferred across demographics in forums and the residential survey.

There was stronger support noted among business survey respondents for Option B, of around 50%. There was also stronger support for Option B in some discussion groups, compared to forum results. Speakers of languages other than English were split between option A (51%) and Option B (49%), with the majority of Cantonese, Mandarin, and Vietnamese speaking participants supporting Option A, and the majority of Greek, Hindi and Arabic speaking participants supporting option B. Financially vulnerable customers and small-medium businesses also supported Option B, with 12 from 14 and 11 from 15 respectively, supporting the introduction of digital meters, though for different reasons. Many of the financially vulnerable participants only paid water usage charges. They assumed the additional cost of $14.30 a year would be on the fixed charge and would not be borne by them. Small-medium businesses thought that digital meters would provide benefits to their business in terms of cost savings.

As most customers in Phase 3 did not support funding a rollout of digital meters at current costs, we are not proposing expenditure for a broad-scale program in this proposal. It was acknowledged by customers that in time the cost for digital meters may come down and/or more benefits may be identified.

We are continuing to investigate digital metering options and have begun a trial in the Liverpool area. The trial is part of our Internet of Things (IoT) program and will be delivered in three phases over a number of years. This will help provide additional information to prove the technologies, further test customer benefits and identify network benefits, which will inform future decisions in this area.

2.9 Bringing it all together

One of the key objectives of Phase 3 was to obtain customer preferences on specific topics in the context of their overall bill, rather than rely on results from Phase 2 surveys that looked at each topic in isolation (or in some cases a small number of topics at a time).

The results noted in the above sections are based on the final selection by participants in forums or surveys, after seeing all topics and the cumulative impact their previous choices had on their annual bill.

As there was some uncertainty over the average bill that would be in place for 2020–24 prior to any new options, we also tested customers' preferences for each topic under a lower or higher business-as-usual bill scenario ($100 more or less than current average annual bills).

Overall, there was not a significant level of change between customer preferences on specific topics viewed in isolation and their final choices at the end of the forum or survey. There was also little change resulting from a $100 lower or higher business-as-usual bill scenario.

Full results are included in Appendix 3D CIPA Phase 3 report.

2.10 Other areas we talked to customers about

2.10.1 Discounts and fees

In Phase 1, we sought customer views on offering discounts or charging fees for various bill receipt and payment methods. Overall, customers surveyed largely favoured introducing a discount for e-billing, regardless of their current payment method. Around half of customers who currently receive a paper bill indicated that they would switch to email bills if a fee or discount was introduced. In terms of payment methods, customers have a range of reasons for paying the way they do, and there was not strong support for financial incentives or penalties for switching payment channels.[33]

In our August 2018 submission to the Operating Licence review, we noted that we would continue to consider this issue as part of our price proposal. However, we have decided not to propose a discount for any bill receipt or payment method as part of this price proposal. We are not able to quantify a cost-saving reflective discount for bill receipt or payment methods, as the extent of savings will need to be considered in light of potential efficiencies from our new billing system. We are also aware of the recent ban in the energy sector on fees for paper bills or paying through Australia Post, and the concerns raised by some stakeholders during our Operating Licence review about the impact of discounts on customers experiencing financial hardship. We will continue to consider cost-reflective discounts and other ways to encourage customers to use lower cost bill receipt and payment methods.

2.10.2 Measuring service performance

In Phase 1 customers told us about events which were of high inconvenience to them. Customers told us that the most inconvenient types of events are:

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[33] Appendix 3A CIPA Phase 1 report, page 98.

- lengthy water interruptions with no notice, particularly those that occur at peak times
- wastewater overflows onto private properties
- repeat service faults.[34]

Customers also indicated that the inconvenience of a water interruption can be reduced dramatically by giving notice and undertaking the work at customers' preferred time of day. The most convenient time for a water interruption is generally between 9am and 3pm for residential customers, or late at night for business customers. Inconvenience can also be significantly reduced by effective communication during a water outage.

We used outcomes from Phase 1 to inform our August 2018 Operating Licence submission. We are also continuing to use outcomes in ongoing projects. For example, we are looking at how to improve communications during service faults through our Faults Customer Journey Council. We will use insights from our 2018 engagement program, with other customer feedback mechanisms, as an input to this work.

2.10.3 Rebates

In Phase 1, we engaged with customers on the principles for paying rebates for service fault events, in line with our Customer Contract which is a part of our Operating Licence. We also sought customer views on relative values for each rebate.[35]

We proposed a revised rebates package as part of our Operating Licence review based on feedback from customers in Phase 1. We then tested our proposed revised rebates with customers in Phase 2 forums. Our proposed changes to rebates were well received by customers, with 94% of forum participants supporting the changes either strongly or slightly.[36]

These types of rebates are funded by Sydney Water, not included in the costs that make up customer bills. As rebates are not funded through prices, this topic did not have a material impact on the price proposal.

2.10.4 Customer representation

We asked customers in Phase 1 about ways they would like us to engage with them, and our current Customer Council. Customers favoured the use of forums for obtaining community feedback, supplemented by group discussions and online surveys. There some concerns raised about the representativeness of advisory panels, phone surveys and social media.[37]

There was no awareness of the current Customer Council among participants. After it was explained to them, customers supported the idea of the Customer Council as a representative group for special and minority interests, with mass customer views obtained by other methods.[38]

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[34] Based on Sydney Water analysis of feedback on service performance through various methods, Appendix 3A CIPA Phase 1 report, pages 60-90.
[35] Appendix 3A CIPA Phase 1 report, page 91.
[36] Appendix 3C CIPA Phase 2 forums and surveys report, page 3.
[37] Appendix 3A CIPA Phase 1 report, page 113.
[38] Appendix 3A CIPA Phase 1 report, page 117.

We used this feedback to inform our submissions to the recent Operating Licence review. We will be reviewing our Customer Council over the next twelve months in line with our proposed Operating Licence requirement and as we develop our future customer engagement program.

3 Our future aspirations

We will continue with our journey towards becoming a customer centric organisation. We want to keep engaging with our customers, so they can help shape the way we respond to the liveability, productivity and sustainability challenges of our city. Our Customer Experience and Advocacy Strategy sets the intent for this work and we are developing component work programs.

IPART's proposed 2019–2023 Operating Licence includes a new requirement for us to engage with customers to understand their preferences and willingness to pay for service levels. It is likely that this engagement will strongly influence our proposed service levels for our price proposal in 2024.

More broadly, a transition to an outcomes-based regulatory approach would support our aspiration to be a customer advocated business. We discuss moving towards a more outcomes-focused regulatory framework for pricing in **Attachment 7: Regulatory framework**. This change would need to be based on robust customer engagement and insights to ensure we are focussed on delivering outcomes our customers value.

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Attachment 4

Proposed prices

Price proposal 2020–24

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Proposed prices

Key messages

- We have proposed prices for water, wastewater and stormwater services to fully recover our annual revenue requirement over 2020–24.
- Our proposed prices reflect our customers' preferences and are based on the efficient costs of supplying our services.
- We propose to maintain the water usage price at $2.13/kL ($2019–20), and lower service charges for residential customers to around $73 ($2019–20) a year in 2020–21.
- We propose a 48% drop in the wastewater usage charge to $0.61/kL ($2019–20), so that it is more cost reflective. Wastewater service charges for residential customers (including deemed usage charges) will drop by about 6% to around $585 a year.
- Stormwater prices in declared stormwater catchments will increase by around 8% (in real terms) in 2020–21. The price rise is due to higher costs need to manage flood risk. This equals an increase of about $7 for a house and $2 ($2019–20) for an apartment in 2020–21.
- From 2021–22, we propose prices only rise with inflation until 2023–24.
- Except for the SDP uplift to the water usage charge, our proposed prices do not include extra costs that occur when the Sydney Desalination Plant (SDP) and Shoalhaven transfers are operating. We propose to maintain current pass through mechanisms for these costs.
- We propose to keep the SDP water usage uplift charge at $0.13/kL ($2019–20) when the plant is operating.
- Funding for any further drought costs that are needed in 2020–24 is not included in proposed prices.
- We are proposing no major changes to current price structures for water, wastewater and stormwater services. Our price structure proposals reflect our customers' preferences.
- For wastewater pricing, we acknowledge the potential value in a price structure based on the long run marginal cost. However, we propose to maintain the current approach (that is, using the short-run marginal cost) due to data limitations, uncertainty about efficiency benefits and our customers' preferences for price simplicity. We are happy to work with IPART during 2020–24 to progress potential reforms to wastewater pricing.
- Bill impacts of our proposed prices are outlined in **Attachment 5: Affordability and bill impacts**.

1 Overview: proposed prices for 2020–24

Under IPART's propose-respond approach, Sydney Water proposes the price structures for its water, wastewater and stormwater drainage services. The term 'price structure' refer to the relationship between the fixed (service) charges and the variable (usage) charges, and the basis for each individual charge.

Our prices are based on a four-year determination period. We are proposing prices for our water and wastewater services that will result in lower customer bills relative to 2019–20.

Under our proposal, in 2020–21:

- residential customers will benefit from a 11.5% drop in their water service charge and a 5.8% drop in their wastewater (including deemed usage) service charge[1]
- water usage prices will be unchanged, in line with customers' preference and our estimates of the long-run marginal cost
- non-residential customers will benefit from a 48.3% drop in the wastewater usage price, to align the usage charge more closely with the relevant underlying short-run marginal cost
- stormwater customers in declared stormwater catchment areas will see a price increase of 8.3%, which represents a $6.57 ($2019–20) increase for a household, and $2.05 increase for a residential customer living within an apartment.

From 2021–22, we propose prices for water, wastewater and stormwater only rise with inflation (that is, be held constant in real terms) over the rest of the determination period.

Our proposed prices for 2020–24 assume 'business as usual' operating conditions. We propose to continue to pass through costs relating to operating the Sydney Desalination Plant and Shoalhaven transfers using the existing arrangements set by IPART. If further drought response costs are needed in 2020–24 we will make these investments. These potential additional costs have not been included in proposed prices.

Our proposed prices are informed by:

- our customers' preferences
- our forecast efficient costs and revenues over the coming price period

[1] We are proposing to retain current price structures. Therefore, maximum prices for residential wastewater services follows the formula (20mm meter charges x 0.75) + the deemed wastewater usage charges. With the proposed prices, residential customer will pay wastewater service charge $585.11 (that is $658.13×0.75+91.51) per year from 2020–21 to 2023–24 (without inflation). The proposed prices of 20mm meter charges and the deemed wastewater usage charges can be found in Table 2-2.

- the estimated cost of supplying services sustainably over the long term (known as the long run marginal cost or LRMC) or the immediate cost of supplying services in the short-term (known as the short run marginal cost or SRMC)
- more appropriate reallocation of corporate common costs to each of our services, based on the recent 'Cost Allocation Methodology' that was developed jointly with IPART (see section 5.4).[2]

Recognising the substantial tariff reforms that have occurred over the last two determinations, we are proposing no major changes in the setting of water, wastewater or stormwater prices.

We have continued to engage with customers to ensure their preferences are reflected in our proposal and consider the various customer impacts of potential changes to price structures.

We have also considered the potential impact of significant swings in water and wastewater usage prices resulting from LRMC or SRMC pricing. Customers do respond to price signals, for example by investing in new equipment and behavioural change, but as part of a measured response. As noted by the Australian Energy Market Commission (AEMC), consumers are more likely to be able to respond to price signals if those signals are consistent and apply for a reasonable time period.[3] Sudden price changes, major tariff restructures, or significant year-to-year price volatility, make it difficult for consumers to make informed consumption decisions. This also applies to volatility between different regulatory periods. Our proposals avoid such volatility by broadly maintaining tariff structures or adopting a transitional approach where change is proposed.

Prices will fall in 2020–24 primarily because of higher actual and forecast demand and growth in dwellings and the forecast lower rate of return (or weighted average cost of capital, WACC). With growth, despite higher investments required in 2020–24 (for long-lived assets), both our water and wastewater revenue requirements are forecast to only marginally increase in real terms ($2019–20).

1.1 Proposed revenue and prices – by services and price schedules

Our proposed pricing schedule encompasses 115 separate prices across nine product classes (see Table 1-1). We have categorised these services and prices into seven schedules and 20 tables (see Appendix 4A).

Our revenue will be recovered through prices paid by customers for water, wastewater, stormwater, trade waste and other services. All but 3% of our revenue will continue to come from charges for water and wastewater services (see Figure 1-1).

[2] Sydney Water 2018, *Cost Allocation Manual*.
[3] See AEMC, *National Electricity Amendment (Distribution Network Pricing Arrangements) Rule 2014*, 27 November 2014, page iii.

Table 1-1 Regulated services and proposed revenues (average 2020–24)

Product	Number of quoted prices	Revenue (million, $2019–20) (average per year)
Water usage	3	$1,116
Water service	10	$171
Wastewater usage	2	$49
Wastewater service[1]	10	$1,260
Stormwater drainage	10	$33
Rouse Hill / Kellyville Village drainage[2]	13	$11
Rouse Hill recycled water supply[3]	1	$9
Trade waste services	31	$25
Ancillary services	35	$13
Total	**115**	**$2,685**

Note: Totals may not add due to rounding.

[1] Wastewater service charges include deemed usage charges.

[2] Rouse Hill drainage charges include land charges for new properties.

[3] This charge and revenue is shown in the table because Rouse Hill recycled water price is a part of determined price schedules. However, Rouse Hill recycled water costs are ring-fenced, and not included in our regulatory cost base.

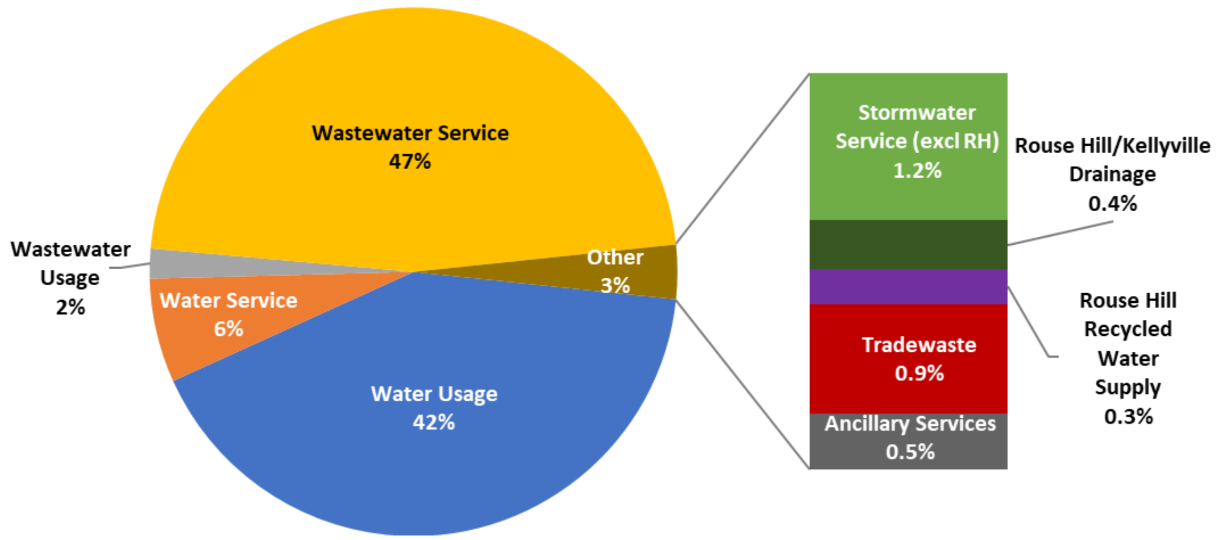

Figure 1-1 Revenue composition of regulated services (proposed revenue 2020–24)

2 Proposed prices for key services

2.1 Water, wastewater and stormwater

All water, wastewater and stormwater prices have been estimated on a present value revenue neutral basis. This means that although the price increase for a service may not match the annual increase in the revenue requirement for that service, overall, we are no better off or worse off over the four-year determination period. Our target revenues and proposed prices accompanying these revenues are outlined in Table 2-1 and Table 2-2.

Further discussion on the revenue requirement for our services and each element of the building block approach is included in **Attachment 11: Proposed revenue requirement**.

Table 2-1 Target revenues by services (million, $2019–20)

	2020–21	2021–22	2022–23	2023–24
Water	1,267.8	1,284.3	1,300.8	1,321.3
Wastewater	1,307.1	1,329.0	1,350.6	1,375.3
Stormwater	40.8	40.9	41.1	41.3
Total	**2,615.7**	**2,654.2**	**2,692.4**	**2,737.9**

Table 2-2 Prices for major services ($2019–20)[4]

	2019–20	2020–21	2021–22	2022–23	2023–24
Water					
Water usage ($/kL)	2.13	2.13	2.13	2.13	2.13
Water service – 20mm ($/year)	83.02	73.46	73.46	73.46	73.46
Wastewater					
Wastewater usage ($/kL)	1.18	0.61	0.61	0.61	0.61
Wastewater service – 20mm ($/year)	590.74	658.13	658.13	658.13	658.13
Deemed usage charge ($/year)	177.83	91.51	91.51	91.51	91.51
Stormwater					
Service charge – residential single ($/year)	79.55	86.12	86.12	86.12	86.12
Service charge – residential multi ($/year)	24.83	26.88	26.88	26.88	26.88

Note: The forecast CPI 2.2% is used to escalate 2019–20 prices to $2019–20. Water service charge is estimated with adjustment of SDP assuming desalination plant and shoalhaven transfer are not in operation.

[4] Sydney Water proposes daily rates for water, wastewater and stormwater service charges for next determination period of 2020–21 to 2023–24. The proposed daily rates can be found in Appendix 4A. The annual charges for the period of 2020–21 to 2023–24 in the table are calculated based on 365 days a year.

2.1.1 Tariff structure for water and wastewater prices

The water usage price has been set with reference to the range of LRMC estimates of providing water services; whereas the wastewater usage charge has been set with reference to the SRMC of providing wastewater services. Our proposed usage charges also consider customer preferences.

Discussions on the rationales for the price setting, customers' preferences, the estimation of the LRMC of water and wastewater and the SRMC of wastewater, are presented in section 3 and section 4. We also discuss other tariff structure issues such as common meter-based charging and wastewater usage charge related issues in section 5.1 and section 5.2.

A full proposed price schedule for water supply services is listed in Appendix 4A, Schedule 1.

A full proposed price schedule for wastewater services is listed in Appendix 4A, Schedule 2.

2.1.2 Tariff structure for stormwater prices

Our annual revenue requirement for stormwater services is projected to increase on average by $4.5 million per annum for over 2020–24 resulting in an 8.3% increase in stormwater charges.

We propose to retain the current stormwater pricing structure which uses a constrained area-based charging basis as determined by IPART in the 2016 price determination. Under this approach, we have applied the recovery of the revenue requirement evenly across residential and non-residential customers to derive charges.

An assessment of an alternative approach using a pure area-based charging basis indicated that this would lead to extremely volatile prices for stormwater customer groups. Methodology issues and limited cost reflectivity under this alternative question the assumed economic benefits from adopting a pure area-based charging approach. Our supporting analysis and customer implication assessments can be found in section 5.3.

A proposed price schedule for stormwater drainage services is listed in Appendix 4A, Schedule 3.

2.1.3 Low impact stormwater charge

The low impact stormwater charge for non-residential customers in declared stormwater catchment areas was introduced by IPART in the 2012 Determination and implemented on 1 July 2013. To date, 32 non-residential properties receive the low impact charge.

In 2016, IPART introduced the low impact stormwater charge for residential customers, which was implemented on 1 July 2017. Eligible residential customers can save $53.54 ($2018–19) on their annual stormwater charge. Properties must retain at least 60% of the average annual stormwater run-off from their property to be eligible for the low impact stormwater charge. To date we have received 27 applications and currently have 3 residential properties who receive the charge.

We are proposing to retain residential and non-residential low impact stormwater charges. Our proposed prices are equivalent to the residential multi premises and non-residential medium property stormwater charges, respectively.

2.1.4 Rouse Hill stormwater charges

We own and manages trunk drainage land in the Rouse Hill stormwater catchment area. This includes over 43 kilometres of five creek systems, about 262 hectares (ha) of riparian lands, wetlands, and naturalised stormwater assets. We manage the trunk drainage land to ensure adequate drainage, protection of fauna habitat, and the reinstatement of remnant native vegetation where feasible, including the protection and enhancement of native bushland and endangered ecological communities.

The provision of stormwater services in the Rouse Hill stormwater catchment area is done for the dual purposes of wastewater management (being a condition of approval for the Rouse Hill wastewater treatment plant) and stormwater management. The stormwater system is designed to reduce flooding and to remove nutrients to offset those discharged by the wastewater treatment plant.

Operating costs associated with these services are recovered through the Rouse Hill stormwater drainage charge.

Rouse Hill stormwater drainage charge

In the 2016 Determination, IPART set the price for the Rouse Hill stormwater drainage charge so that Sydney Water could recover its cumulative operating expenditure from Rouse Hill customers by 2022–23. This recognised that the charge had previously been set at levels that were less than forecast costs. Recent cost and revenue modelling indicate that we are on track to break even by 2022–23. Accordingly, from 2023–24, the charge can be set to recover ongoing operating costs only.

We propose a gradual transition to smooth stormwater prices ($2019–20) from $151 per year in 2019–20 to $114 per year in 2023–24. Under this proposal, we will recover our past operating costs by 2023–24 (see Table 2-3).

Table 2-3 Proposed Rouse Hill stormwater drainage charge

	2019–20	2020–21	2021–22	2022–23	2023–24
Prices with gliding path ($/year, $2019–20)*	150.51	141.38	132.26	123.13	114.00
Projected cash flows from 2020–21 (to evaluate the break–even point) (nominal, $'000)					
Revenue		6,534	6,479	6,388	6,253
Operating costs		4,973	5,086	5,209	5,346
Cumulative operating cost recovery surplus/(shortfall)	(4,856)	(3,295)	(1,901)	(722)	186

Note: The forecast CPI 2.2% is used to escalate 2019–20 price to $2019–20.

* For non-residential properties with land size > 1,000m^2, the Rouse Hill Stormwater Drainage Charge = price x ((land area in m^2)/1,000)

A proposed price schedule for Rouse Hill stormwater drainage services is listed in Appendix 4A, Schedule 4.

Rouse Hill land drainage charge

The Rouse Hill land drainage charge recovers 50% of our capital expenses for the stormwater drainage system in Rouse Hill. The current charge was set consistent with the impactor pays principle and the allocation of shared costs between wastewater and stormwater in the 2016 Determination.[5] The land drainage charge is applicable to new properties that connect (or have connected) to our water system in the Rouse Hill stormwater catchment area between 1 July 2012 and 30 June 2026. The current charge was set to recover 50% of our purchase and civil costs for 19 hectares of trunk drainage land. In setting the charge, IPART introduced a glide-path arrangement for the land charge to be transitioned from $277.29 per annum in 2016–17 to $433.37 per annum in the 2020 pricing period.

We have remodeled the charge to reflect changes in growth and costs and are proposing a lower fixed land charge of $335.75 per year ($2019–20), from 2020–21 (see Table 2-4). Our proposal represents a 14% reduction compared to the current charge of $392.43 ($2019–20). The decrease results from higher than expected growth in properties in the Rouse Hill area (see Figure 2-1), driven by an increase in density in greenfield areas such as Box Hill.

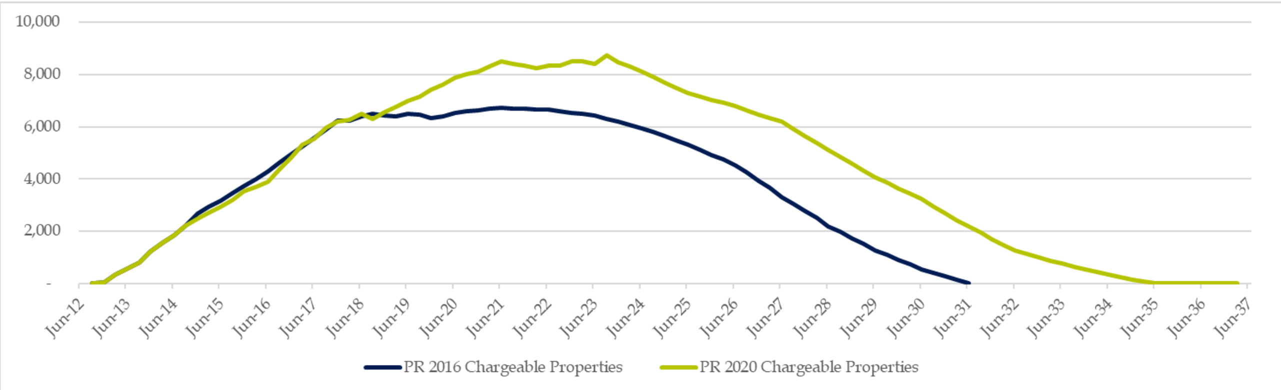

Figure 2-1 Number of chargeable properties for Rouse Hill land drainage charge

Our proposed prices reflect revised total actual and forecast efficient capital expenses for the Rouse Hill stormwater drainage system of $53 million ($2019–20), in net present value terms. This is $4 million less than the $57 million approved by IPART in the 2016 Determination. This saving reflects a deferral of capital expenditure due to delays in acquiring land from multiple landowners around the Rouse Hill service area. The area of trunk drainage land we own is forecast to remain at 19 hectares, despite the increase in property numbers.

Our proposed prices are consistent with the principles set by IPART in the 2016 Determination, in particular, that we recover half of the Rouse Hill stormwater capital expenses through the land charge and the other half through general wastewater prices.

[5] IPART has allowed for the remaining 50% of efficient capital cost for Rouse Hill to be added to Sydney Water's wastewater RAB to be recovered from all of Sydney Water's customer through wastewater prices, see IPART 2016, *Review of prices for Sydney Water Corporation – Final Report*, page 202.

Table 2-4 Rouse Hill land drainage charge ($2019–20)

Charge	2019–20 $/year	2020–21 $/year	2021–22 $/year	2022–23 $ per year	2023–24 $/year
Rouse Hill land drainage charge	392.43	335.75	335.75	335.75	335.75

Note: The forecast CPI 2.2% is used to escalate 2019–20 price to $2019–20.

A proposed price schedule for Rouse Hill land drainage charges is listed in Appendix 4A, Schedule 4.

Rouse Hill – Kellyville Village

There are 974 Kellyville Village properties that were originally excluded from Rouse Hill charges as they existed prior to the Rouse Hill development and were treated by the (now defunct) Kellyville Sewage Treatment Plant. These Kellyville Village properties are now connected to the Rouse Hill integrated water system, but they do not receive recycled water.

We propose to maintain the standard stormwater charge for Kellyville Village properties until they are redeveloped throughout 2020–24. Our proposal is consistent with IPART's 2016 Determination. We propose to reconsider shifting the remaining Kellyville Village properties to the Rouse Hill stormwater drainage charge in the 2024 Determination.

A proposed price schedule for Kellyville Village stormwater drainage charge is listed in Appendix 4A, Schedule 4.

2.2 Trade waste, ancillary and miscellaneous services

2.2.1 Trade waste prices

There are two main categories of trade waste prices:

- trade waste pollutant quality charges – these cover the cost of transport and treatment of trade wastewater and associated impacts on our wastewater system (for example, corrosion)
- trade waste management charges – these include:
  - agreement fees that cover the cost of establishing and processing new applications, managing commercial permits and industrial consents, inspections, monitoring (sampling and analysis) and administration
  - Wastesafe charges that cover the costs of the Wastesafe electronic tracking system and administrative support.

We propose to maintain current trade waste charge structures. We have reviewed and updated cost and volume inputs that are used in our trade waste pricing model. Our review found significant savings for most treatment and management activities. Our proposed lower prices reflect identified cost efficiencies and changes in cost modelling assumptions associated with pollutant management.

We are proposing a change to the way we manage customers when a scheduled service of their liquid waste trap is missed. Further explanations of the changes, and a proposed price schedule for the trade waste and related services are detailed in Appendix 4A, Schedule 6.

Forecast average revenue from trade waste charges is $24.6 million ($2019–20) per year from 2020–21 to 2023–24. This is 25% lower than forecast revenue from trade waste charges in 2019–20 (see Table 2-5).

Table 2-5 Trade waste and Wastesafe revenue (million, $2019–20)

	2019–20	2020–21	2021–22	2022–23	2023–24
Industrial pollutant	11.8	9.2	9.3	9.4	9.6
Commercial pollutant	15.2	11.0	11.1	11.2	11.3
Industrial agreement	1.3	1.4	1.4	1.5	1.5
Commercial agreement	3.1	2.0	2.1	2.1	2.2
Trade waste ancillary	0.03	0.03	0.03	0.03	0.03
Wastesafe	1.6	0.5	0.6	0.6	0.6
Total	**33.0**	**24.1**	**24.5**	**24.8**	**25.2**

2.2.2 Ancillary and miscellaneous customer services

We currently offer 41 ancillary and miscellaneous services. 24 of these services attract a charge, accounting for 0.5% of our total revenue.

Annual revenue for ancillary and miscellaneous services is $11.4 million in 2019–20. This is forecast to increase to $12-13 million ($2019–20) per year from 2020–21 to 2023–24 (see Table 2-6), due to the proposed changes outlined below.

Table 2-6 Ancillary services revenue and volume ($2019–20)

	2019–20	2020–21	2021–22	2022–23	2023–24
Ancillary services revenue (million)	11.4	12.4	12.5	12.7	12.9
Volume	371,984	374,484	374,484	374,484	374,484

We have reviewed fifteen of our ancillary and miscellaneous services that attracted a charge. These services include 21 prices and accounted for around 92% of all ancillary and miscellaneous customer service transactions. The review considered labour costs, management costs, IT system costs and contractor costs (where applicable).

Based on our review, we are proposing some changes to prices:

- 13 ancillary service prices have reduced, ranging from $0.09 to $891.40 per transaction
- 8 ancillary service prices have increased, ranging from $0.54 to $71.29 per transaction.

Lower charges are due to changes in contractor costs and fees, and the realisation of efficiencies from our Tap In™ online portal. Increases reflect an increase in meter contract costs and other cost changes resulting from changes in our business and operating requirements.

Consistent with IPART's 2016 determination, we have allocated 1.4% to prices each year in 2020–24 to account for common costs. More detail on allocating common costs is provided in section 5.4.2.

New ancillary charge – annual test of backflow prevention containment device

We are proposing to introduce a new ancillary charge to recover our costs for carrying out an annual test of backflow prevention containment devices, if the customer fails to do so.

We provide assurance for our drinking water quality through the administration and management of backflow containment on a customer's property. Backflow can occur when there is a cross connection between services on a customer's property and/or a reduction in mains pressure which creates a syphoning effect. Annual testing of a backflow device is mandatory under AS/NZS 3500 Plumbing and Drainage to ensure the device is functional. Testing backflow devices reduces the risk of contaminating the drinking water supply and protects public health.

Under our Customer Contract, customers are responsible for maintaining and ensuring annual testing of backflow prevention containment devices on their property, except where the device is integrated into a meter supplied by Sydney Water. Sometimes customers fail to carry out the annual test of their device. In the recent review of our Operating Licence, we proposed changes to the Customer Contract to allow us to carry out the annual test of a backflow prevention containment device if the customer failed to do so and charge the customer for the costs incurred by us. IPART accepted our proposed changes, which we expect to be in the final contract approved by the Governor later in 2019. We are proposing a fee of $229.44 ($2019–20) in 2020–21 which increases in real terms to $239.22 in 2023–24 (due to the incremental addition of corporate costs) for us to arrange an annual test of a backflow prevention containment device. Our proposed price reflects the costs of managing non-compliant customers and having a backflow accredited plumber test the device.

Hot water metering service – multi level individually metered properties (an unregulated service)

In our 2016 price proposal, we proposed to introduce a hot water meter reading service, conditional on this service being unregulated by IPART.

Under this service, developers and Owner's Corporations could install individual hot water meters for each apartment in a multi-level individually metered building. For a monthly fee, we would maintain, operate and renew each meter, and provide the apartment owner with a quarterly bill based on their actual water use, that is, as measured by the hot water meter and drinking water meter.

IPART decided not to set a fee for our proposed hot water metering service in the 2016 Determination. However, it noted that there was scope for hot water metering to be contestable service. Since 2016, we have not progressed with this service proposal; however, we may reconsider this type of service offering again in the future.

A proposed price schedule for ancillary and miscellaneous services with further explanation of our proposed changes is included in Appendix 4A, Schedule 7.

2.3 Other services

2.3.1 Unfiltered water charges

Unfiltered water charges apply to water that has been chemically treated, but not treated at a water filtration plant. We currently sell a small amount of unfiltered water to BlueScope Steel in Wollongong.

In the 2016 Determination, IPART approved an unfiltered water usage charge based on applying a discount of $0.30/kL ($2016–17) to the usage charge for potable water. This discount reflects the reduced water treatment costs that we incur in providing unfiltered water.

The average forecast filtration cost for 2020–24 is $0.30/kL ($2019–20), only marginally lower than the projected discount price of $0.33/kL for 2019–20 ($2019–20). In line with IPART's current pricing approach and cost reflective principle, we are proposing:

- a fixed service charge for unfiltered water to be set at the same level as the fixed service charge for drinking water, based on meter size
- a usage charge set at $0.30 per kL less than the usage charge for drinking water.

The proposed water usage price for unfiltered water service is listed in Appendix 4A, Schedule 1.

2.3.2 Uplift in water usage charges for activation of SDP

In the 2016 Determination, IPART approved a cost pass-through mechanism that is triggered when the Sydney Desalination Plant (SDP) is activated. The mechanism has two parts:

- water usage charge – an uplift of $0.12/kL (in real $2016–17) is added to water usage charges when SDP is required to operate. This reflects the per kL cost of desalinated water, and allows us to recoup the cost of desalinated water purchases as these costs are incurred
- water service charge – the difference between actual and forecast SDP-related bulk water costs is passed through to water service charges at a one-year lag.

The mechanism both sends a price signal to customers that incentivises water savings when water becomes scarce and enables us to recover additional associated costs on revenue neutral base.

We propose to retain the SDP cost pass-through mechanism in 2020–24. Our proposed uplift charge is estimated as:

$$SDP\ uplift\ charge = \frac{SDP\ capacity \times (SDP\ usage\ charge + variable\ network\ charge)}{Total\ volume\ of\ potable\ water\ sold}$$

Where capacity is defined as 250ML per day and, total volume of potable water sold is Sydney Water's total demand forecast.

We calculated the uplift charge for 2019–20 to 2021–22, when the current SDP determination ends. On average, the uplift charge is still $0.12/kL ($2019–20).

We are proposing to maintain the SDP uplift charge in line with current prices, at $0.13/kL ($2019–20). This would avoid a potentially confusing change for customers and is very close to forecast costs. The proposed SDP uplift to the water usage price when SDP is operating is listed in Appendix 4A, Schedule 1.

2.3.3 Recycled water charges

We are proposing to maintain our current approach to recycled water charges for mandatory recycled water schemes. That is, no service charges and to maintain recycled water usage charges at 90% of potable water usage charges (see Table 2-7).

Table 2-7 Recycled water usage charge ($2019–20)

Charge	2019–20 $/kL	2020–21 $/kL	2021–22 $/kL	2022–23 $/kL	2023–24 $/kL
Recycled water usage charge	1.92	1.92	1.92	1.92	1.92

Note: The forecast CPI 2.2% is used to escalate 2019–20 price to $2019–20.

Setting usage charges at 90% of potable water usage charges is in line with IPART's 2006 recycled water pricing principles. On average, our Rouse Hill recycled water scheme uses approximately 15% potable top-up. We consider this will be consistent across our other mandatory recycled water schemes when they are fully operational. It is important that recycled water usage charges remain at 90% of the drinking water rate to ensure continued alignment of operating costs with ongoing revenues for our mandatory schemes.

We note IPART recently released updated draft recycled water pricing principles for public water utilities.[6] Principles relevant to the setting of charges for recycled water customers include:

- recycled water usage charges must be used, and should have regard to the price of substitutes (such as potable water and raw water)
- recycled water service charges may be used, but, if so, should have regard to customer impacts, willingness-to-pay and not materially incentivise customers to disconnect.

We consider our proposed recycled water usage price is in line with these draft principles. IPART's final report on recycled water pricing is expected to be finalised in late June 2019. Our proposed charges may need to be updated to reflect any changes in IPART's final position.

The proposed recycled water usage price for Rouse Hill recycled water services is listed in Appendix 4A, Schedule 5. For further detail on recycled water, see **Attachment 14: Recycled water**.

[6] IPART 2019, *Review of recycled water prices for public water utilities, Draft Report*, April 2019, page 63.

2.4 Other charges and pricing issues

2.4.1 Unmetered water charge

We propose to maintain the same 180 kL per year volume assumption for the unmetered water charge. Approximately 14,000 customers currently pay this charge.

The proposed water supply service charge for unmetered properties is listed in Appendix 4A, Schedule 1.

2.4.2 Dishonoured or declined payment fee and late payment fee

We propose to increase the late payment fee and the dishonoured or declined payment fee by the allocation of the shared corporate costs determined by IPART in 2016 (see Table 2-8). This results in an upwards real adjustment of 1.4% each year for the term of this price review.

Table 2-8 Section 12A charges ($2019–20)

	2019–20	2020–21	2021–22	2022–23	2023–24
Late payment fee	4.74	4.81	4.88	4.95	5.02
Dishonoured/declined payment fee	14.26	14.46	14.66	14.87	15.08

Note: The forecast CPI 2.2% is used to escalate 2019–20 price to $2019–20.

For more information on our proposed late payment fee and dishonoured or declined payment fee, see Appendix 4B.

2.4.3 Determining service charges on a daily rate basis

Service or fixed charges for water, wastewater (including trade waste) and stormwater are currently determined by IPART as an annual charge. These annual charges are billed to customers on a quarterly basis. In cases where the charge is not easily divisible to two decimal places, an adjustment is made to the first quarter charge to ensure that the total equates to the annual charge.

As part of our new SAP billing system, we are proposing to determine service charges on a daily rather than annual basis. The annual charge is calculated by multiplying the proposed daily rate with the number of days in that year. Service charges will continue to be billed quarterly; however, the daily fixed charge will allow bills to reflect the number of days in that quarter.

The schedules of charges in Appendix 4A show charges on a daily rate basis and an annual basis, for ease of reference.

3 Water tariffs

3.1 Water price structure – finding the right balance

We propose to maintain the water usage charge at its current level. This leads to a water usage price of $2.13/kL ($2019–20) and a service charge for residential customers of $73.46 a year ($2019–20). We consider this strikes the right balance between setting the water usage charge with reference to the LRMC and our customers' preferences.

Maintaining tariffs at levels broadly similar to the current structure provides continuity for customers, avoids significant swings in prices and financially rewards customers for water efficient behavior. We consider it is particularly important to retain a usage price at the higher end of the range of LRMC estimates given we are currently in drought, which may continue during 2020–24.

We are concerned that a usage charge that reflects a much lower LRMC estimate would introduce price volatility and is not in line with our customers' preferences. Putting a strong weighting on customers' preferences for tariff structures reflects our goal of being a customer-focused organisation. Our customer engagement clearly identified a preference for usage prices at or above current levels.[7]

3.2 Customer preferences

We engaged with customers on water price structures and our proposed water usage charge using a range of engagement methods and across different types of customer groups. Usage charges were presented for a 'business as usual' scenario. We did not engage with customers on current or potential changes to price structures or usage charges to support water security during drought.[8] However, an important principle proactively raised by customers was ensuring future water supply, even if this means charging customers a bit more.

On the whole, customers preferred a water usage charge at or above current levels. There were some differences in preferences depending on the engagement method used and between different customer groups. For example:

- forum participants (residential customers) tended to support a usage charge higher than current levels, with the second most supported scenario being to retain the current level
- low water users in forums were particularly likely to favour a usage charge higher than current levels. Although high water consumers were thought to be disadvantaged under this scenario ($2.20/kL, $2018–19), many participants argued that this was only a small increase compared to the current approach

[7] Noting that our engagement focused on our baseline water usage charge. We did not engage with customers on current or potential changes to water price structures to support water security.
[8] For example, the current pass through mechanisms used to recover costs relating to operating the Sydney Desalination Plant or Shoalhaven transfers.

- small to medium business discussion groups did not have strong views, but those who chose a scenario tended to select a usage charge higher than current levels, as this was seen to provide an opportunity to reduce bills by reducing water use
- large businesses did not have strong views but tended to prefer a usage charge lower than current levels, as this would lead to lower costs for them. However, some noted a higher usage charge also provided greater incentives for reducing water use, which would then lead to reduced costs
- a greater proportion of financial hardship customers in discussion groups and renters preferred the current scenario rather than a higher usage charge, because they generally just paid the usage charge[9]
- survey participants (both residential and small to medium business customers) showed a very strong preference for the usage charge to remain at the current level, with no other level receiving more than 9% support.

There were some concerns raised about the impact of a higher usage charge scenario by members of our Customer Council, who preferred to retain the current scenario. Similar results were seen in forums, with participants concerned about the impact on low income households tending to vote for the current scenario.

Overall, there was very little appetite for a lower usage charge and higher fixed charge. Exceptions to this general view were among large businesses and forum participants aged over 65 (who were likely to receive a pensioner discount on their fixed service charge).

Reasons stated for customer preferences on the split of fixed and variable charges varied. The most commonly stated reasons for customers' preferred pricing scenarios included:

- expected impacts on personal bills
- keeping bills predictable, which appeared to be generally interpreted as retaining the current price structure, rather than choosing to lower the variable charge and increase the fixed charge
- providing customers with greater ability to influence their bill, by having a higher usage charge
- providing the right incentives for water use, especially seen in forums.

The value customers place on having a degree of control over their bills is consistent with the existing two-part water tariff structure (a fixed service charge and variable usage charge), and the 'user pays' pricing principle.

Taking the range of customer views into consideration, we proposed to retain usage charges at the higher end of the spectrum of potential charges. Our proposed usage charge of $2.13/kL was strongly supported when we tested it with customers during our engagement program.

[9] Financial hardship was defined more broadly for the purposes of customer engagement than the definition used by Sydney Water for payment assistance programs.

Further detail on customer views on water pricing principles and water tariff structures is included in **Attachment 3: Customer engagement**, section 2.3.2.

3.3 Long run marginal cost estimates

Water tariffs are made up of a fixed component and a usage-based component. Usage charges can influence customers' water use behavior; higher water usage charges can provide customers with a greater ability to influence their bill, as changes in water use are reflected in a larger change to their bill.

Our usage price references our estimate of the long-run marginal cost (LRMC). The LRMC is a forward-looking concept that estimates the cost impact of additional water supply over the long run. The accompanying fixed service charge is set to recover the difference between the value of the forward revenue stream associated with usage prices and our revenue requirement.

Historically, IPART has used the LRMC of water resources as the main basis for its decisions in determining water usage prices. Prices based on LRMC have been considered to signal the incremental costs of consumption and encourage efficient water use.

For this price proposal, we have updated and improved the model we used to estimate the LRMC of water. In our 2015 price proposal, we based our model on the Average Incremental Cost (AIC) method only, but in our latest iteration we use both the AIC and the Turvey/Marginal Incremental Cost (MIC) methods.

For our modelling, we have used the latest available demand forecasts produced by Sydney Water and figures publicly available to us for the total yield of the water supply network.[10] We have also incorporated scenarios to estimate the impact on the LRMC of different assumptions about water availability and other factors. Some of the details of our approach and results are in Appendix 4C.

A summary comparing the approach used for the 2016 Determination and our updated approach is shown in Table 3-1.

[10] WaterNSW 2018, *Greater Sydney's water supply system yield*.

Table 3-1 Main differences between Sydney Water's models and IPART's model

Assumption	Sydney Water 2015	IPART[11] 2016	Sydney Water 2019
Method	AIC	AIC and perturbation (5% positive shock)	AIC and perturbation (5% positive shock)
System operation	WaterNSW and SDP (SDP is treated as a supply source, not as a drought measure only)	Simulated data with Shoalhaven transfer/SDP operating rules	WaterNSW and SDP (SDP is treated as a supply source, not as a drought measure only)
Components	Bulk water costs and augmentations	Bulk water costs and augmentations Supplementary demand and supply simulations under metropolitan water restriction rules	Bulk water costs and augmentation (annuitised capital costs) Non-bulk water costs and augmentations.
Augmentations	Desalination – module expansion of current plant	Tunnel, a generic augmentation and desalination plant expansion.	Augmentations updated from WaterNSW. See Appendix 4C.
Discount rate	5.3%	4.9%	5%
Demand	Sydney Water demand forecast	Sydney Water demand forecast	Sydney Water demand forecast
Modelling period	50 years	20, 30, 40 and 50 years	50 years + lead time

One of the key changes we made to our LRMC estimates was to incorporate non-bulk water costs. Their inclusion reflects the degree to which non-bulk costs vary with changes in average levels of water consumption, that is, only the non-bulk costs that would change with changes in water consumption should be included. To this end, we have separately modelled distribution network costs and water filtration costs. The inclusion of these costs has increased our total non-bulk LRMC estimate by between $0.15/kL to $0.30/kL. Further details of this approach and results are shown in Appendix 4C.

Our AIC model estimates a total LRMC (based on a "no drought" assumption) of $2.33/kL. Sensitivity analysis indicates that the plausible range of LRMC estimates is between $0.72/kL to $3.08/kL. The lower bound on this range reflects sensitivity analysis using our MIC model. The range of LRMC estimates for different assumptions is set out in Appendix 4C.

The wide range of plausible estimates highlights the sensitivity of LRMC calculations to modelling assumptions. This points to the need to take a considered approach when weighting the importance of LRMC in pricing decisions. We are conscious that LRMC calculations are a point in time estimate of the forward-looking cost of supplying water sustainably and, as such, can vary considerably over time.

[11] IPART 2016, *Review of prices for Sydney Water Corporation, Final report*, page 289.

4 Wastewater tariffs

4.1 Wastewater price structure

We propose retaining the current approach for wastewater charges, including retaining a fixed service charge for all residential customers, continuing to apply explicit usage charges to non-residential customers only and setting usage charges with reference to the short run marginal cost (SRMC).

Our proposal to retain a fixed residential wastewater service charge with no explicit usage charge is in line with our customers' preferences. It also considers a number of technical factors including:

- the demand for domestic wastewater services is not influenced by price to the same degree as demand for water
- there is less difference between volumes of wastewater discharged between houses and apartment compared to volumes of water used
- a volumetric wastewater charge is complex, more costly to administer and not easily understood by customers.

The use of the SRMC to set wastewater usage charges is based on sound principles, given the nature of our wastewater system and pricing framework, and there is insufficient evidence to justify a move away from it at this time.

We are open to further exploring the long run marginal cost (LRMC) as a potential approach for future price determinations. This would require careful consideration of the benefits and practicalities of calculating locational LRMC estimates. The development of component costing could potentially facilitate further development of LRMC estimates for our discrete wastewater systems; however, there would still be methodology and data challenges. We would also not support a shift to LRMC pricing without a clearer understanding of customer preferences and impacts.

We recognise that our current wastewater usage price exceeds the SRMC. We propose to transition our wastewater usage price to our mid-range SRMC estimate of $0.61/kL ($2019–20). This would make our usage price consistent with Hunter Water and Central Coast Water. Our proposed usage price was supported by business customers in our engagement program.

4.2 Customer preferences

We engaged with customers on two key areas regarding wastewater pricing:

- various options for pricing residential wastewater services, including the concepts of a usage charge based on a discharge factor and using different fixed service charges for houses and apartments
- the level of the wastewater usage charge (business customers only).

Regarding residential pricing, while there was interest in and support for the concept of a residential wastewater usage charge, in the end, most customers supported retaining a fixed charge only – particularly in forums, where there was opportunity for discussion among participants. This was preferred to both introducing a usage charge based on an assumed discharge factor or moving to different charges for apartments and houses.

61% of forum participants supported staying with a fixed charge, with just over half (52%) preferring to keep the same fixed charge for all residential customers. The use of a set discharge factor caused concern about accuracy, complexity and the potential impact on bills. Different fixed charges for apartments and houses were also seen as potentially unfair, as wastewater volumes were seen to depend more on the number of occupants and apartments used much less water outdoors. Survey results were more mixed, with roughly a third (31%) supporting a single fixed charge, a third (29%) supporting a usage charge based on a discharge factor and 23% supporting different fixed charges for houses and apartments. We then tested our proposal to retain a single fixed charge with customers in Phase 3 forums, and it was generally supported (78%).

Regarding non-residential pricing, large businesses preferred a lower usage charge, as this would lead to lower costs for them. Initially, small to medium business customers indicated a strong preference to retain the current non-residential wastewater usage charge of $1.16/kL ($2018–19). However, when we tested our proposed price of $0.60/kL ($2018–19) with small to medium business customers in Phase 3, they were happy to accept a lower wastewater usage charge, when explained that this would likely result in lower bills for most non-residential customers.

Further detail on customer views on wastewater tariff structures is included in **Attachment 3: Customer engagement**, section 2.3.3.

4.3 Consideration of using long run marginal cost estimates

Wastewater prices are currently set with reference to the SRMC. IPART has asked us to consider the potential of using LRMC estimates for pricing wastewater discharges, as it considers this could provide an important price signal to consumers and the market through the identification of wastewater system constraints (that is, catchments with the highest potential avoided costs). In developing our position, we established a set of criteria to assess whether a LRMC methodology for wastewater pricing would provide reliable and appropriate outcomes. In our view, the use of LRMC in wastewater pricing would require:

- a robust and credible methodology for calculating the LRMC for wastewater
- availability of data that allowed for an accurate and verifiable calculation of future costs
- estimates that closely reflect the true costs of increasing wastewater system capacity
- promotion of efficient customer behaviour
- the ability to support price stability, consistent with customer expectations.

We believe that a number of these criteria will not be achieved at this stage. Our reasons are set out below.

4.3.1 Lack of metering data

Robust LRMC based pricing for wastewater usage requires credible and verifiable estimates of customers' wastewater volumes. Wastewater flows are more difficult to meter than water volumes. The current state of wastewater metering technology and the significant cost impost associated with installing separate meters make individual metering for households and small commercial customers unrealistic. An alternative to metering used in some jurisdictions is to estimate the volume of wastewater discharged by an assumed relationship between water supplied and wastewater discharged.[12] However, approaches based on derived discharge volumes are often subject to modelling errors and administrative complexity, and lead to inequitable outcomes for customers.[13]

For example, water used outdoors usually does not enter the wastewater system and would need to be excluded from discharge estimates. Yet outdoor consumption varies significantly between customer types and individuals. Customers can also install onsite systems that reuse water rather than discharge it to our system. A further complication is that water from rainwater tanks is not considered consumption (as calculated by the water meter) but it can enter the wastewater system depending on customer use (for example, if rainwater is used for flushing toilets).

As noted above, in our customer engagement program, many customers raised concerns with the use of a set discharge factor based on water use, as it was not thought to be an accurate reflection of the actual volume of wastewater discharged from a premises.[14]

4.3.2 Difficult to identify incremental wastewater network costs

Wastewater system capacity is driven by a number of factors, not only customer wastewater discharges but also additional flows during wet weather that result in peak flows. Peak flows are many times greater than the average dry weather flows. The system is also designed to carry, in addition to wastewater discharge, surface water run-off and groundwater that enters the system via illegal connections and defects in the system. This means that estimating the incremental cost of meeting increases in wastewater usage is difficult and could be misleading.

The size (and thus the cost) of pipe infrastructure increases at a lower rate than the capacity required, that is a doubling of the size of the pipe will be much more than double the capacity of a pipe. Given this uneven relationship, wastewater infrastructure is built to handle significantly greater wastewater volume than is generally transported which makes LRMC estimates for wastewater more challenging to determine.[15]

4.3.3 Limited efficiency benefits from LRMC pricing for wastewater

Wastewater systems are typically more localised than water networks. Our water and wastewater systems are shown in Table 4-1. Our wastewater network is made up of numerous independent

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[12] For example, City West Water and Yarra Valley Water customers pay fixed and volumetric wastewater charges.
[13] These reasons are explored further in https://www.escosa.sa.gov.au/ArticleDocuments/436/20150128-Water-InquiryReformConsultantReport-LRMCcons.pdf.aspx?Embed=Y
[14] See Appendix 3C, CIPA Phase 2 Forums and Surveys report, page 78.
[15] Tooth, R., Hefter, E., *LRMC of SA Water's Sewerage Services.* Report for the Essential Services Commission of South Australia, March 2014.

catchments, as demonstrated by the higher number of treatment plants and separate systems compared to our water network.

Table 4-1 Our water and wastewater systems (as at June 2019)

	Separate systems	Pipes (km)	Treatment plants	Pumping stations
Water	13	23,000	9	151
Wastewater	24	26,000	30	686

If a customer in one location discharges one kilolitre less wastewater, it does not mean this provides capacity for a customer in another area to discharge an extra kilolitre of wastewater. There is not a price signal for the entire system, only in the catchment that is facing a capacity constraint. Further, wastewater systems are affected less by changes in volumes than water systems, because wastewater pollutant loads and concentrations also affect the costs of treatment and transport.

A usage charge based on LRMC rises well in advance of infrastructure capacity constraints. Customers can respond to water price signals with lower water use. However, with limited metering options, it is difficult for customers to reduce their indoor use, and hence their wastewater volumes discharged, substantially. Wastewater pricing based on the SRMC sends appropriate price signals within the current policy of postage stamp pricing, as the SRMC is more constant across different wastewater catchments.

4.3.4 Price instability and volatility from LRMC pricing for wastewater

Prices based on LRMC would lead to significant shifts in the wastewater usage prices, which will have an impact on customers' bills. Some customers would financially benefit, and others would be worse off. Such a change would likely have a significant administrative cost, resulting from an anticipated large number of enquiries and complaints. In our experience, marginal cost pricing is a difficult concept for customers to understand given that there is no metering of wastewater. Customers generally prefer prices to be simple and easy to understand.

4.4 Short run marginal cost estimates

We propose basing wastewater usage charges on the SRMC of the transport, treatment and disposal of domestic strength wastewater. As with LRMC, the SRMC is a marginal cost concept. The difference is that SRMC is measured over a shorter time period when certain inputs, such as system capacity, cannot vary and costs are driven by immediate levels of demand.

We estimate that the SRMC for wastewater ranges from $0.20/kL and $1.00/kL (see Table 4-2). The lower bound of this range reflects the recovery of the average variable cost increase for the additional transportation, treatment and disposal of 1 kilolitre of wastewater. The cost increases to $0.50/kL and $1.00/kL if semi-fixed (for example, regular maintenance costs) and fixed costs (for example, labour and contractor costs) are included in the SRMC wastewater estimation.

Table 4-2 Wastewater SRMC estimate ($2019–20)

	2020–21	2021–22	2022–23	2023–24
Average variable cost per kL	0.22	0.20	0.20	0.20
Average variable and semi–fixed* cost per kL	0.53	0.52	0.51	0.51
Average direct fixed and variable cost per kL	0.97	1.00	1.00	1.00

Notes:

^ Billable volume is used for price setting to recover the full wastewater service costs

* Some semi–fixed costs eg asset maintenance costs are recognised for ensuring the asset conditions not impacted by the extra demand overtime.

We propose to set our wastewater usage price to our mid-range SRMC estimate of $0.61/kL ($2019–20).

5 Other price structure issues

This section addresses several price structure issues that IPART has asked us to consider in its price proposal. It also covers some of the transitional price structure issues explored by IPART in its 2016 Determination.

5.1 Residential service charges

IPART has asked us to consider setting residential service charges using pure meter-based prices. Under this approach, residential customers would pay service charges based on the size of their actual meter (or share of a common meter for apartments), rather than being deemed to have a 20mm meter. If there is one common meter used for an apartment block, the service charge would be based on the size of the common meter divided by the number of units. This could result in a material re-distribution of costs between houses and apartments.[16]

IPART has expressed a view that if residential apartments use less water and discharge less wastewater than houses, the costs they impose on the overall water and sewerage system are lower.[17] Based on this assumption, adopting pure meter-based service prices could be more cost-reflective and transparent.

We propose to retain the current pricing structure that aligns residential and non-residential service charges to a common cost driver by rebasing them to a 20mm meter scale. We consider that the current approach best promotes equity and efficiency and the administrative disruption and price volatility of change is not justified. Our reasons are set out below.

5.1.1 Different residential service charges would not promote efficiency

While average water usage may differ between different property types, the costs to serve and provide capacity for drinking water does not vary materially between different residential property types. We provided analysis in our 2012 submission to IPART's Issues Paper to demonstrate this point. Under the current tariff structure, efficient usage signals are provided through a usage charge based on marginal costs. This provides a more effective way to promote consumption decisions and align water bills with the cost to serve.

All residential customers (apartments and houses) receive the same ultimate product, drinking water. A uniform service charge reflects the fixed nature of the underlying costs of providing drinking water services, which do not vary significantly with volume. Variable costs for water services are addressed through the LRMC, with costs captured by the residual revenue requirement recovered through service charges being typically fixed in nature. We do not consider volume to be an appropriate allocator of these costs.

[16] Currently if an apartment with a common water meter has 20 units, each pays a separate service charge. Moving to pure meter-based pricing would result in only one service charge being levied across those 20 units. The under-recovery in tariffs caused by this would be passed through to other household customers.
[17] IPART 2018, *Review of Central Coast Council's prices for water, sewerage and related services from 1 July 2019, Issues Paper*, pages 36-37.

In addition, we agree with Central Coast Council that in today's urban environment the difference between detached houses and other residential dwellings such as, flats, apartment, town or terraced housing is becoming blurred. The size of housing blocks for detached houses is reducing, resulting in smaller gardens and significant reductions in outdoor water use. Conversely, flats and apartments, town or terraced houses are trending towards having larger open spaces, particularly larger open common spaces, and increased occupancy rates. This is increasing average levels of water use for these dwelling types.

Implementing different service charges for houses and apartments would require us to develop a new meter-based methodology for determining different types of service charges for different meters that reflects peak demand and the associated cost. A commonly used proxy for peak usage is to link the fixed charge to the diameter of the pipe or meter serving the property. This technically relates only to the *potential* maximum usage and, in the absence of time-of-use metering, may not accurately reflect actual usage at times of peak demand. Also, where larger meter connections are required for purposes other than expected demand requirements (eg, for fire services purposes), meter size is a poor proxy for the consumer's likely demand and cost imposed on the water assets. In addition, under a common meter pricing approach, a block of flats serviced by a 20mm meter would likely use more water than a single house serviced by a 20mm meter. However, both properties would be charged the same service charge.

5.1.2 Price volatility and increased administrative and billing costs

Approximately 35% of residential customers are subject a common meter arrangement. Changing the basis of residential service charges will lead to a significant re-distribution of costs across customers which would be hard to justify.

In September 2014, we introduced new requirements for individual metering of units for new multi-level buildings. This resulted in two distinct types of metering for multi-level buildings: pre-2014 buildings with common meters and post-2014 buildings with individual meters. Setting different residential service charges for apartments and houses will have the unintended consequence of different apartment buildings receiving different types of charges based on the age of their construction. This leads to inequitable pricing outcomes and introduces complexity, which adversely impacts on transparency of prices.

Feedback from our customers indicates a preference for simple prices that are easy to understand, and prices to be fair and equal across residential customers. The current approach of aligning residential and non-residential service charges to a common cost driver of a 20mm meter size is a simple price structure that is relatively easy for customers to understand and as a result has a relatively low administration costs compared with other options.

The adoption of differential service charges will increase administrative costs and subsequently increase bills. Our new SAP billing system was configured to charge all residential properties the same 20mm meter size charge. Reverting to a common meter charge for flats, unit and apartments will require substantial changes to the billing system, with costs ultimately passed on to customers. Based on our experience, this type of pricing structure change would also result in substantial customer enquiries and complaints. For example, two apartment blocks next to each other could receive different water service charges, if they were constructed pre- or post-2014. This would be difficult to explain to customers and unlikely to be positively received.

The Submission Information Package from IPART notes that under meter-based charging the discrepancy between residential and non-residential service charges would be minimal and that this would help remove the arbitrage opportunities that were identified as part of the 2017 wholesale price review. We acknowledge IPART's concerns but has not found any evidence that the current charging arrangements are driving inefficient behaviour or that provision of services to these properties is imposing differential costs on our customers or systems.

5.1.3 Using the same service charge is equitable and avoids unnecessary complexity

As with water service charges, we consider it equitable that all dwellings pay the same wastewater service charge as the cost of providing wastewater services does not materially differ between residential property types.[18]

It is reasonable to assume that there is less variability in the volumes of wastewater discharged between residential households and multi-premise dwellings, compared to differences in water use. This is because apartments use little to no water outdoors, so they would discharge a much higher proportion of used water to the wastewater system. Our analysis shows that a 75% discharge factor is an appropriate proxy for total residential wastewater use.

Similar to water, applying a common meter approach would likely result in a higher administrative burden, due to substantial anticipated customer enquiries and complaints, as some apartments would pay a much lower service charge while others would pay a much higher charge. There is also the added complexity of applying a discharge factor and the deemed sewerage usage charge to wastewater service charges.

5.2 Wastewater usage charge

IPART has asked us to consider the following issues regarding wastewater usage charges in its price proposal:

- Is there merit in introducing an explicit wastewater usage charge for all customers (residential and non-residential)?
- What discharge volume should be deemed for residential and non-residential wastewater usage charges?
  - Should a standard discharge volume apply to all residential customers, or should different discharge volumes apply to houses and apartments?
  - If changes are proposed, how would they affect the implicit discharge allowance for non-residential customers?
  - What would be the customer impact if we removed the discharge allowance of 150 kL per year from non-residential customers?

[18] IPART 2012, *Review of price structures for metropolitan water utilities, Water – Final report*, page 18.

5.2.1 Consideration of using explicit wastewater usage charges

As noted in section 4, we consider it efficient and equitable for wastewater tariff structures to remain unchanged: that is, not to introduce an explicit usage charge for residential customers.

In response to concerns raised by Sydney Water leading up to the 2016 determination, IPART agreed not to introduce an explicit residential wastewater usage charge. We acknowledged at that time that introducing an explicit wastewater usage charge for residential customers may more closely reflect the user pays principle and give these customers greater control over their bills. However, there are difficulties with implementing this type of approach, largely because discharges are not metered.

As noted in section 4.3, there are a number of issues that need to be considered in relation to introducing an explicit wastewater usage charge for residential services. These include:

- cost drivers for residential and non-residential wastewater services, which include the number of connections, peak wet weather flows (affecting transmission and treatment costs), discharge volumes, chemical and biological load (affecting treatment and disposal), development density and distances/topography
- given the current state of wastewater metering technology, it is unlikely that the benefits of metering residential wastewater would outweigh the costs
- marginal cost pricing for wastewater services is less well understood than for water services and there is less opportunity to constrain demand or increase availability of supply in the short run
- our networks are designed to service peak expected demand, including excess volumes in wet weather, meaning the number of connections is a more significant driver of network costs than the volume of wastewater. Once established, distribution pipes are relatively less likely than transmission pipes to need augmentation. As the capital costs are largely independent of the volume of water and wastewater travelling through the distribution network, a volumetric charge is not appropriate. Costs should instead be priced as a fixed charge on a connection basis.

Most water retailers in Australia adopt a fixed charge and no variable charge for residential wastewater prices (see Table 5-1).

Table 5-1 Residential wastewater charges – other jurisdictions

State	Retailer	Fixed charge	Variable charge
NSW	Hunter Water	Flat charge	No
ACT	Icon Water	Flat charge	No
Victoria	City West Water	Flat charge	Discharge factor, seasonal adjustment
	South East Water	Flat charge	Discharge factor
	Yarra Valley Water	Flat charge	Discharge factor, seasonal adjustment
WA	Water Corporation	Gross rental value	No
SA	SA Water	Property value	No
Tasmania	TasWater	Flat charge	No

There is no accepted level to use for a discharge factor; instead, discharge factors vary between utilities.

The Essential Services Commission (ESC) has recently noted that current pricing structures for wastewater residential customers in Melbourne are difficult for customers to understand and not cost reflective. In its most recent pricing guidelines, the ESC stated that, given the low marginal cost of residential sewage treatment, it would consider proposals for a single fixed charge for residential customers favourably.[19] Both City West Water and South East Water proposed changes to their residential wastewater charges in their most recent price proposals, as a step towards phasing out variable charges. These changes were accepted by the ESC.[20]

Our own customer research indicates most Sydney Water customers support retaining a fixed price only for residential wastewater services (see section 3.2).

5.2.2 Appropriate deemed discharge volume

In the 2016 Determination, instead of implementing an explicit two-part tariff for wastewater services, IPART decided to include a deemed usage charge for residential and non-residential customers in wastewater service charges. IPART noted that this removes the anomaly in usage charging where non-residential customers with large meters pay too much for wastewater discharge, as a result of the multiplication of the wastewater service charge per meter. The deemed wastewater usage component for residential customers was set using an assumed discharge volume of 150 kL per year, based on a discharge factor of 75%.

Our analysis shows that, on average, residential wastewater discharge is 75% of residential water use. On average, across both houses and apartments, residential customers use 200 kL of water

[19] See the ESC's *2018 Water Price Review, Guidance Paper*, November 2016, page 57.
[20] See the ESC's City West Water final decision, *2018 Water Price Review for City West Water, June 2018*, page vi and the ESC's South East Water final decision, *2018 Water Price Review for South East Water*, page 23.

per year. Therefore, a discharge allowance of 150 kL of wastewater per year remains appropriate, in the absence of residential wastewater metering.

Technically, this would equate to an implied discharge factor of 68% for a typical single house using 220 kL of water per year, and an implied discharge factor of 94% for a typical apartment using 160 kL of water per year. This is a reasonable assumption, given the different ways water can be used in these types of dwellings.

A discharge of 150 kL a year for all residential customers remains appropriate. We propose to maintain the current wastewater tariff structure, with all residential customers paying the same wastewater service charge that includes a deemed 150 kL wastewater discharge volume.

5.2.3 Customer impacts of removing discharge allowance from non-residential charges

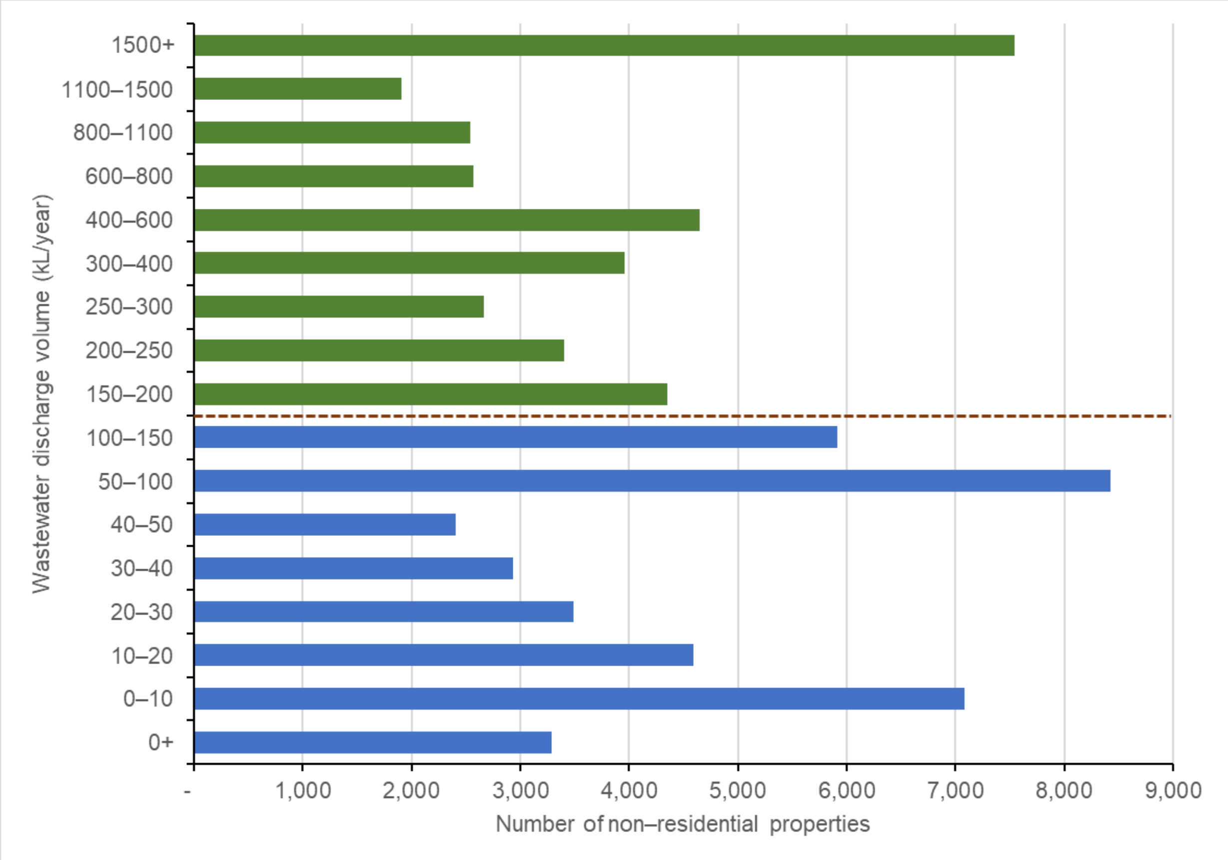
Currently, non-residential wastewater service charges include a discharge allowance of 150 kL a year. All non-residential customers pay the same deemed usage charge, based on 150 kL. Non-residential customers then also pay a usage charge for every kilolitre of wastewater above the discharge allowance.

Our analysis shows that the discharge allowance for non-residential customers continues to reflect average residential discharge volumes. Analysis of non-residential data (2017–18) shows about 72,000 (about 55% of our 130,000 non-residential customers) pay wastewater usage charges.[21]

Removing the discharge allowance from non-residential customers (that is, making the wastewater usage charge applicable to all individually metered non-residential customers) would have significant customer impacts (see Figure 5-1).[22] Under such a change, just over half of non-residential customers liable for wastewater usage charges (38,000) that currently discharge less than the 150kL/year threshold would be subject to an explicit wastewater usage charge on their bills for the first time.

[21] Not all non-residential customers are liable for wastewater usage charges. Non-residential customers such as unmetered properties and non-residential properties within a mixed multi premises are subject to wastewater charges that have the same structure to charges for residential customers.
[22] As per the case proposed by IPART in its *Review of Central Coast Council's water, sewerage and stormwater prices, Draft Report*, April 2019, page 91.

Figure 5-1 Wastewater discharge volume of non-residential customers liable for usage charge



If the discharge allowance was removed, non-residential customers with discharge volumes lower than 150 kL will be paying less for wastewater services. This would result in a revenue shortfall of approximately $4.7 million, which would need to be offset by the broader customer base.

In addition, other issues would include:

- individually metered non-residential customers with discharge volumes lower than 150 kL a year will pay less than an equivalent non-residential customer in a mixed multi premises. This is because non-residential customers within mixed multi premises pay wastewater charges that are in line with residential charges. For 2018–19, the wastewater bill for non-residential customers within a mixed multi premises is $607.52 a year. If we remove the threshold, an individually metered non-residential customer with a 20mm meter, water consumption of 100kL and a 78% discharge factor will pay a lower wastewater bill of $541.34 a year
- individually metered non-residential customers with discharge volumes lower than 150 kL a year would pay less than residential customers. This is because non-residential customers would no longer pay the deemed usage charge but residential customers would.

5.3 Area-based stormwater charging

Stormwater drainage services are largely the responsibility of local councils in our area of operation. We supply trunk stormwater drainage services in declared stormwater catchment areas. Around 520,000 customers living in these catchment areas pay stormwater charges, which is around 25% of our total customer base.[23]

We note that we have not continued engagement with customers on stormwater price structure issues for this price proposal.

In the 2016 determination, IPART set stormwater charges for declared stormwater catchment areas on a constrained area basis. A low impact customer category was also introduced for residential customers from 1 July 2017, with a charge that is equivalent to the stormwater charge for apartments.

Table 5-2 shows stormwater charges using the constrained area-based approach (that is, maintaining the current price relativities between different customer categories and non-residential property bands). For modelling purposes, we have applied the 8.3% proposed stormwater price increase evenly across all property bands.

Table 5-2 Stormwater charges using constrained area-based approach

Property category	Prices (annual rate) 2019–20	Proposal	Change %	Area–based charge $/100m^2
Residential standalone property	$79.55	$86.12	8.3%	$19.0
Residential multi premises	$24.83	$26.88	8.3%	$32.3
Non–residential small	$24.83	$26.88	8.3%	$32.3
Non–residential medium/low impact	$79.55	$86.12	8.3%	$19.0
Non–residential large	$463.55	$501.82	8.3%	$17.5
Non–residential very large	$2,060.27	$2,230.34	8.3%	$11.4
Non–residential largest	$5,150.69	$5,575.87	8.3%	$6.7
Non–residential multi premises	$24.83	$26.88	8.3%	$32.3

Table 5-3 shows stormwater charges using a pure area-based approach (that is, the same area-based charge for all bands).

[23] We also provide stormwater services to customers in the Rouse Hill stormwater catchment area. These services and charges are not the subject of this section.

Table 5-3 Stormwater charges using a pure area-based approach

Property category	Prices (annual rate) 2019–20	Proposal	Change %	Area–based charge $/100m^2
Residential standalone property	$79.55	$90.00	13.1%	$19.8
Residential multi premises	$24.83	$16.44	-33.8%	$19.8
Non–residential small	$24.83	$16.44	-33.8%	$19.8
Non–residential medium/low impact	$79.55	$90.00	13.1%	$19.8
Non–residential large	$463.55	$566.01	22.1%	$19.8
Non–residential very large	$2,060.27	$3,865.50	87.6%	$19.8
Non–residential largest	$5,150.69	$16,507.00	220.5%	$19.8
Non–residential multi premises	$24.83	$16.44	-33.8%	$19.8

Our analysis in Table 5-3 shows that moving to a ‘pure’ area-based charge would result in significant price changes for all customer groups, with some seeing very large increases and others a substantial fall in their stormwater costs. For example, moving to a pure area-based charge would result in the very large and largest non-residential property categories receiving a substantial price increase of about 88% and 221% respectively.

Further, while property size is a factor in demand for stormwater services, it is not the sole determinant. There are many drivers of stormwater drainage costs and some are largely fixed. For example, operating costs such as maintenance and desilting activities do not vary with the amount of run-off in storms. Trunk drainage assets also need to transport volumes of stormwater generated from roads and public spaces within a catchment, not just volumes from properties. For any given property, while the volume of runoff may be a function of property area, other factors such as land use, topography, soil types and proportion of impermeable surfaces or total impermeable land area also have an impact on stormwater volumes and pollutant loads that leave a property. For example, an increased proportion of roofed and paved areas contribute to greater run-off. Accordingly, a stricter application of area-based charging would not necessarily increase the cost reflectivity of these charges.

We note that pricing signals are only beneficial where they can lead to a modified customer response. The options for stormwater customers to respond to pricing signals are usually limited, with measures to reduce their stormwater discharge volumes limited to options such as onsite detention and rainwater tanks. Customers who choose to invest in these types of measures are eligible for the low impact charge, where there is a significant reduction in volumes from their property.

Given the impacts and costs of moving to a pure area-based charging approach, and the fact that this type of approach would not necessarily lead to more equitable or cost-reflective pricing, we propose to maintain the current price relativities between different customer categories and property types.

5.4 Reallocation of common costs

5.4.1 Propose to use all direct costs for allocating common costs to services

For retail pricing purposes, we use a regulatory cost model to break down our operating costs by services. This aligns with IPART's pricing principle of cost reflectivity and the requirement to ring-fence costs associated with unregulated services. Our cost allocation adopts a top-down approach, assigning functional costs available from the general ledger to services.

Our regulatory cost model assigns direct costs to services. Direct costs are costs where a cause and effect relationship with the provision of the service can be demonstrated. These costs can either be directly linked to the service or allocated on a causal basis where a clear verifiable traceable cause and effect relationship exists between the item and the output of the service.

In addition to direct costs, the regulatory cost model allocates common costs to services in proportion to their direct costs. Common costs are costs such as business support or other corporate costs. Up to the 2016 Determination, the direct costs used by the regulatory cost model for common costs allocation excluded bulk water costs (that is, water purchased from Water NSW, BOO water filtration plants and desalination costs).24 However, under our recently developed cost allocation methodology for declared wastewater services, all direct costs, including bulk water costs, are used for allocating common costs to services. We have adopted this approach for allocating forecast common costs in our price proposal.

To demonstrate the effect of this change, we have outlined the common cost allocation by service using the two allocation methods (see Table 5-4). Averaged over four years (2020–21 to 2023–24), the share of common costs allocated to water services will increase by $71 million, while common costs allocated to wastewater services will decrease by $63 million.

Table 5-4 Allocation of common costs (pooled business support and corporate costs) ($2019–20, million)

	Four-year average (2020–21 to 2023–24)		
Product/service	**Includes bulk water in the allocation basis**	**Excludes bulk water from the allocation basis**	**Difference +/(-)**
Water	149.9	78.5	71.4
Wastewater	86.1	149.3	(63.2)
Stormwater	2.7	4.7	(2.0)
S16A recycled water	5.9	10.2	(4.3)
Total regulated common costs	244.6	242.7	1.8
Total unregulated common costs	2.5	4.3	(1.8)
Total common costs	247.1	247.1	0.0

[24] These costs were excluded from the regulatory cost model as it was considered that only negligible administrative support costs were incurred to manage these three large contracts.

The change in the cost allocation approach results in a higher operating cost, and a higher revenue required for water services, and correspondingly lowers operating costs and revenue required for wastewater services.

The impact on the average residential bill is estimated to be largely neutral, with an increase of $32 for water services offset by a reduction of $30 for wastewater services.

5.4.2 Allocating common costs for trade waste and ancillary service charges

In the 2016 determination, IPART applied an upward real adjustment of 1.9% each year over the 2016–2020 determination period to account for corporate common costs, that is, a 7.8% cumulative increase by 2020. This accounted for half of the corporate costs of 15.6%, as determined by IPART. The corporate costs uplift was planned to occur over two consecutive determinations: the 2016 and 2020 Determinations.

For this price review, we have calculated corporate common costs at 14%. Applying the same approach that was included in 2016–20 determination, an upward real adjustment of 1.4% each year was applied to all trade waste and ancillary and miscellaneous service charges. This results in a 14% cumulative increase by 2024.

We propose to use the same approach that IPART used in the 2016 Determination, where corporate overheads were transitioned over the price path to minimise price impacts on customers.

SW231 06/19

Attachment 5

Affordability and bill impact

Price Proposal 2020–24

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Affordability and bill impact

Key messages

- Our proposed prices will lead to a saving of around 4% or $45 for typical residential customers in 2020–21 in real terms, compared to 2019–20.
- Beyond 2020–21 residential water and wastewater bills will remain constant in real terms until 2023–24.
- Under our proposed prices, our residential water and wastewater bills will remain the lowest in the country (compared to current prices).
- Allowing for inflation, the bill saving will be around $18 for a typical household and $21 for a typical apartment in 2020–21. Bills will then rise in line with inflation.
- By the end of 2023–24, bills will increase by around $72 in total for a typical house and $58 for a typical apartment in nominal terms.
- Most non-residential customers will save up to 7% on their water and wastewater bills in 2020–21 in real terms. This is due to lower non-residential wastewater bills, linked to our proposed shift to lower wastewater usage charges that are more cost-reflective.
- Most customers with trade waste will save more, as we have adjusted our trade waste prices to reflect reduced costs and more efficiencies.
- We have extensive customer assistance programs to support customers who experience hardship and payment difficulties.
- Our proposed baseline water prices do not include costs that are passed through to customers when the Sydney Desalination Plant (SDP) or Shoalhaven transfers are operating. These costs are recovered through existing arrangements set by IPART. This add arounds $40 a year to a typical household bill.
- If SDP is still operating in July 2020, customers will still benefit from a bill saving in 2020–21 after inflation. If SDP is turned off, the reduction in real terms will be greater. The exact numbers will depend on SDP’s operation over 2019–20.
- If further drought costs prove essential, we will make these investments. Funding for these additional costs is not included in our proposal.

1 Impact of proposed prices on bills

Changes in prices are reflected in customers' bills, which are a product of prices and consumption. **Attachment 4: Proposed prices** contains details of our proposed prices and rationale for our proposed price structures. Bill impacts to residential and non-residential customers are discussed in this attachment.

On the whole, the bill impacts presented in this attachment are based on our proposed expenditure for normal operating conditions, assuming average weather. They do not include costs we must pass through to customers when the Sydney Desalination Plant (SDP) is operating. They also do not include further costs that may be needed if drought continues. If further costs are required, we will make these investments. However, these potential costs are uncertain, and have not been included in the revenue calculations that our prices are based on. Bill impacts when the SDP and Shoalhaven transfers are operating are described in section 1.1.3.

Actual customer bill impacts in 2020–24 will depend on several external factors, including financial conditions when our prices are set by IPART and the outcomes of IPART's review.

1.1 Bill impacts for residential customers

1.1.1 Bill impacts for residential customers with water and wastewater services

We have assessed the impact of water and wastewater bills based on our proposed prices for:

- a typical residential household using 220 kilolitres (kL) of water each year
- a typical residential apartment using 160 kL of water each year.

Typical households and apartments will receive a bill decrease of $45 in 2020–21 in real terms, compared to bills in 2019–20. A typical household will experience a 3.9% decrease and a typical apartment will experience a 4.3% decrease. Bills will then remain constant in real terms until 2023–24. This is illustrated by the blue line in Figure 1-1.

Accounting for inflation (assuming 2.5% inflation each year), a typical household will see a bill decrease of $18 and a typical apartment will see a bill decrease of $21 in 2020–21. Bills will then increase at the rate of inflation to 2023–24. This is illustrated by the orange line in Figure 1-1.

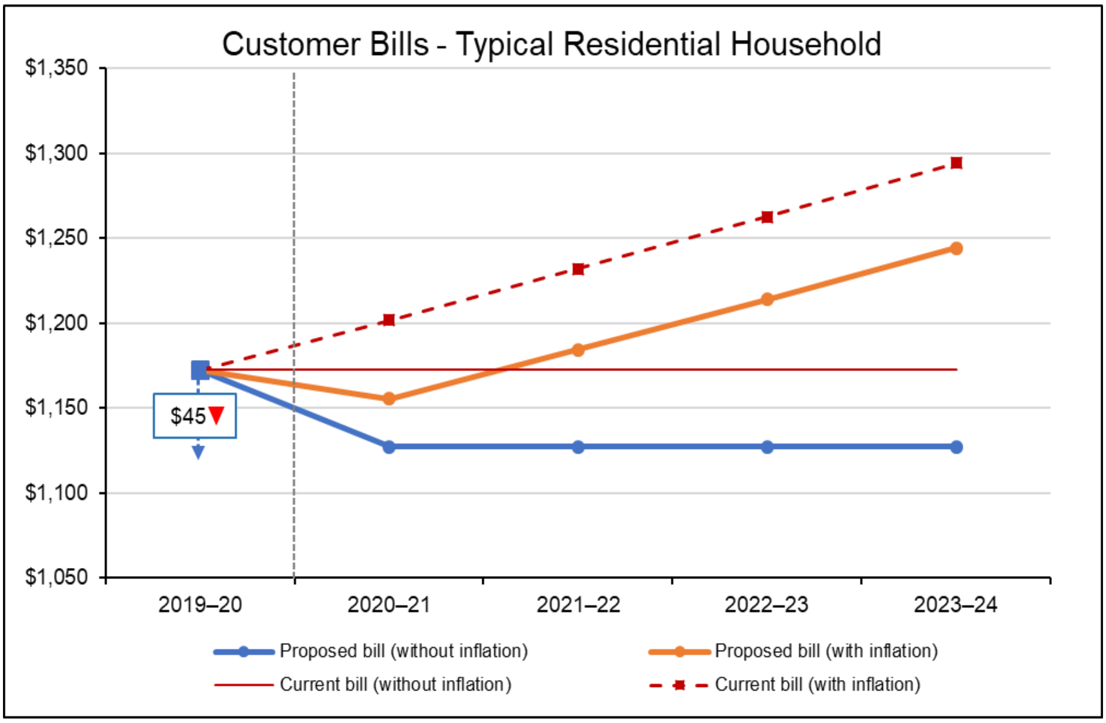


Figure 1-1 Water and wastewater bill for typical residential household (220kL/year)

Table 1-1 illustrates estimated bills for different types of water users, in real terms. Bill impacts are similar for most types of residential customers. Larger household users using 350 kL a year will experience a slightly smaller bill decrease of 3.1% in 2020–21. This is because we are proposing to retain water usage charges at current levels and decrease water service charges in line with the drop in our per unit costs. This pricing structure is in line with our customers' preferences and will help encourage efficient water use.

Table 1-1 Real residential water and wastewater bill impacts ($/year, $2019–20)

	2019–20	2020–21	2021–22	2022–23	2023–24
Water and wastewater					
160 kL/year (typical apartment)	1,045	999	999	999	999
Annual change		-4.3%	0.0%	0.0%	0.0%
200 kL/year	1,130	1,085	1,085	1,085	1,085
Annual change		-4.0%	0.0%	0.0%	0.0%
220 kL/year (typical house)	1,173	1,127	1,127	1,127	1,127
Annual change		-3.9%	0.0%	0.0%	0.0%
350 kL/year	1,449	1,404	1,404	1,404	1,404
Annual change		-3.1%	0.0%	0.0%	0.0%

Note: 2019–20 bill is estimated with adjustment of SDP assuming desalination plant and Shoalhaven transfer are not in operation. Forecast inflation of 2.2% is used to index 2019–20 prices to $2019–20. Bill reductions from 2019–20 to 2020–21 may differ due to rounding.

Table 1-2 illustrates residential customer bills assuming inflation of 2.5%. This results in a nominal increase in their annual water and wastewater bills by the end of the four–year price determination.

Table 1-2 Nominal residential water and wastewater bill impacts ($/year)

	2019–20	2020–21	2021–22	2022–23	2023–24
Water and wastewater					
160 kL/year (typical apartment)	1,045	1,024	1,050	1,076	1,103
Annual change		-1.9%	2.5%	2.5%	2.5%
200 kL/year	1,130	1,112	1,139	1,168	1,197
Annual change		-1.6%	2.5%	2.5%	2.5%
220 kL/year (typical house)	1,173	1,155	1,184	1,214	1,244
Annual change		-1.5%	2.5%	2.5%	2.5%
350 kL/year	1,449	1,439	1,475	1,512	1,550
Annual change		-0.7%	2.5%	2.5%	2.5%

Note: 2019–20 bill is estimated with adjustment of SDP assuming desalination plant and Shoalhaven transfer are not in operation. Forecast inflation of 2.2% is used to index 2019–20 prices to $2019–20. Inflation of 2.5% is assumed for each remaining year of the price determination period. Bill changes from 2019–20 may differ due to rounding.

1.1.2 Contributing factors for savings

Figure 1-2 shows the main factors driving changes in residential bills. Bill savings are partly offset by increases from the higher capital and operating expenditure that we will need to maintain high quality services, protect the environment and build infrastructure to service a growing city.

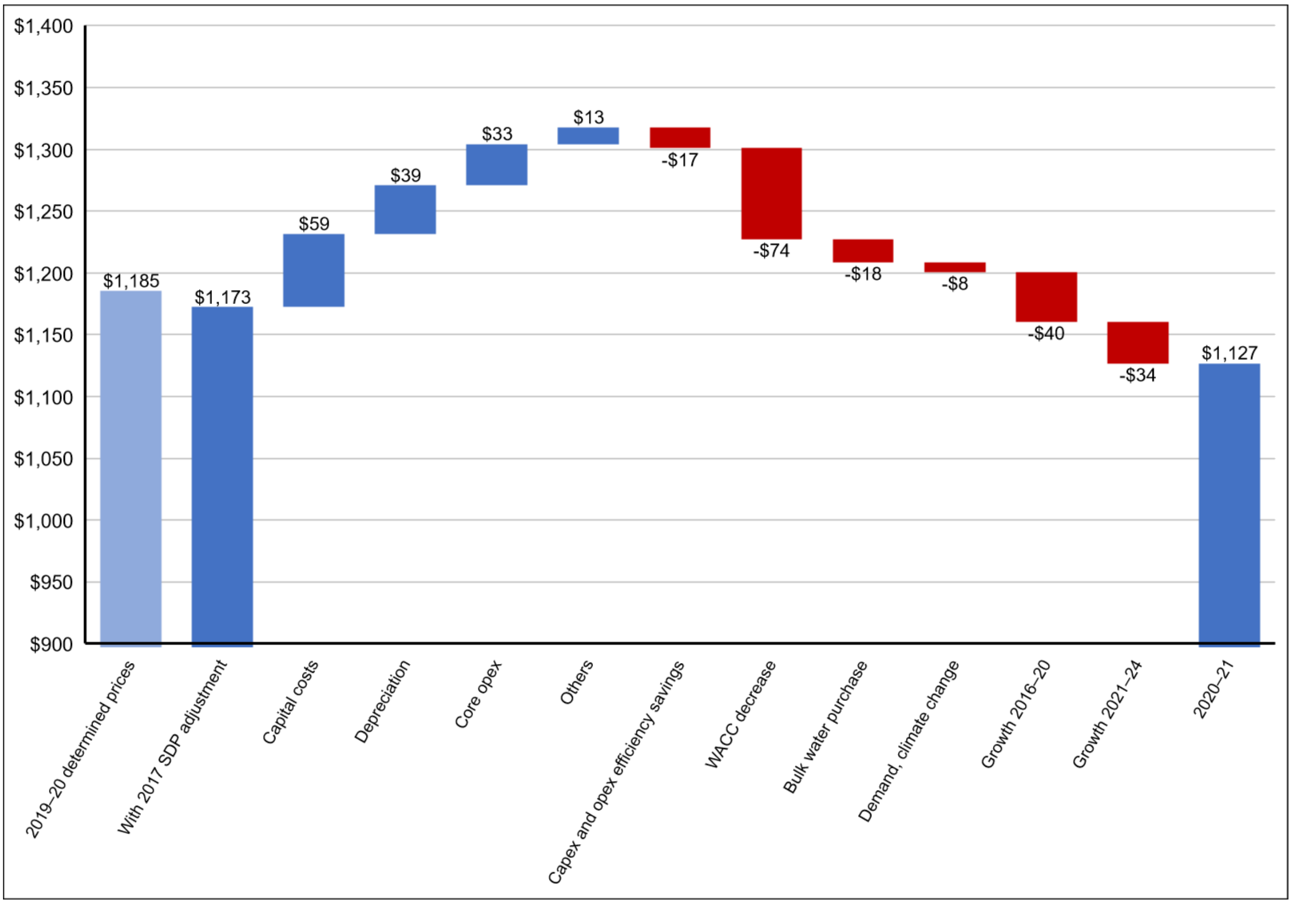


Figure 1-2 Contributing factors to changes in residential customer bills ($2019–20)

Figure 1-3 shows that the key drivers for bill savings are from higher actual and forecast demand from existing and new customers (which contribute to a combined 43% of bill savings), the forecast lower rate of return (or weighted average cost of capital, WACC, 39%) and efficiency savings. Higher demand from new customers (growth) helps drive lower bills, as our costs, which are largely fixed, are recovered from more customers.

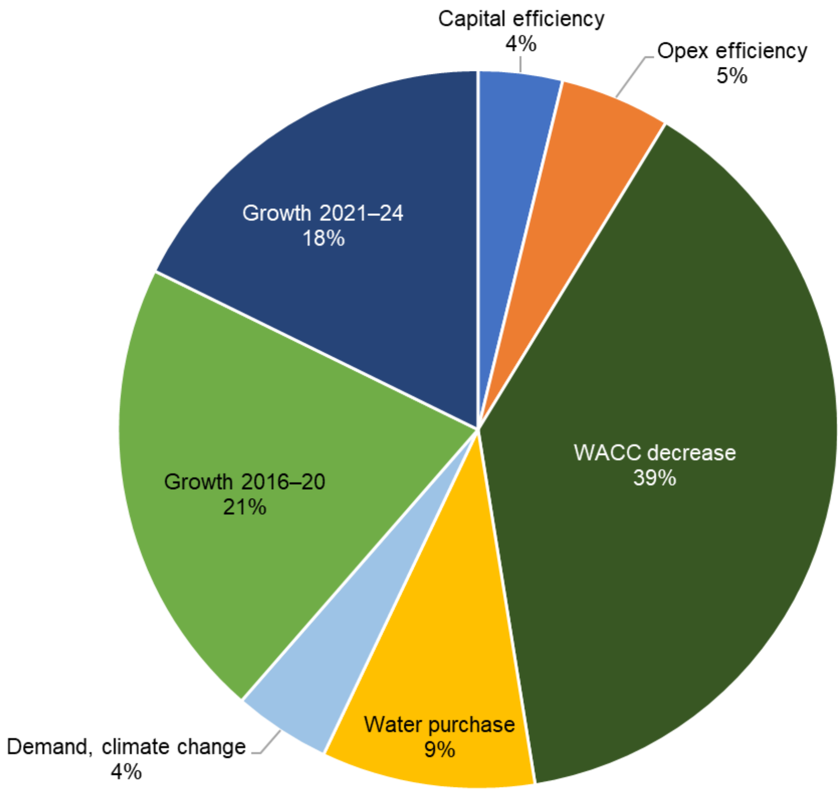


Figure 1-3 Drivers of residential bill reduction

1.1.3 Bill impacts when the desalination plant and Shoalhaven transfers are operating

The extra costs we incur when the SDP or Shoalhaven transfers are operating are recovered through existing arrangements set by IPART. These arrangements are triggered under specific conditions.[1]

Bill impacts for a typical residential customer if SDP and Shoalhaven transfers are in full operation from 2020–24 and including inflation are shown in Figure 1-4. The incremental bill impact when SDP and Shoalhaven transfers are operating is around $40 a year.

[1] The 2017 Metropolitan Water Plan (https://www.planning.nsw.gov.au/-/media/Files/DPE/Other/About-us/Metropolitan-Water/2017-Metropolitan-Water-Plan.pdf) sets the triggers for Shoalhaven transfers and the operation of SDP as 70% and 60% of total dam storages, respectively.

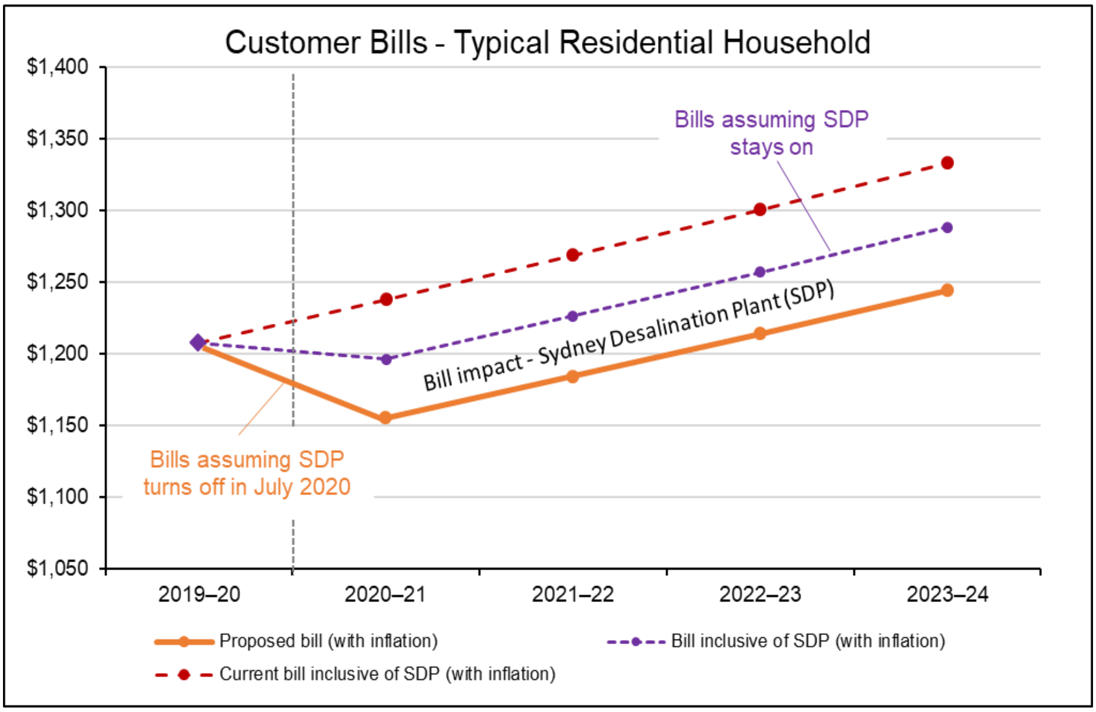


Figure 1-4 Water and wastewater bill for typical residential household (220kL/year) with SDP costs

If further drought costs are needed in 2020–24, we will make these investments. Funding for these additional costs, whether it be capital investment to improve network resilience or operational expenditure to manage water restrictions and implement water conservation, is not included in our proposal.

1.1.4 Bill impacts for residential customers in declared stormwater catchment areas

Customers in declared stormwater catchment areas pay Sydney Water stormwater charges in addition to water and wastewater charges. Our proposed stormwater charges will increase in 2020, largely to address areas with high flood risks. This will see an increase of $2-$7 ($2019–20, not including inflation) in stormwater charges for customers in declared catchment areas in 2020–21.

Bills for a typical household and apartment receiving water, wastewater and stormwater services are shown in Table 1-3. Including inflation, customers in declared stormwater catchment areas will still see a small bill reduction in 2020–21, as stormwater charges make up a small component of overall Sydney Water bills. Bills will then increase at the rate of inflation to 2023–24.

Table 1-3 Nominal residential water, wastewater and stormwater in declared catchment areas bill impacts ($/year)

	2019–20	2020–21	2021–22	2022–23	2023–24
Water and wastewater					
160 kL/year (typical apartment)	1,045	1,024	1,050	1,076	1,103
Annual change		-1.9%	2.5%	2.5%	2.5%
220 kL/year (typical house)	1,173	1,155	1,184	1,214	1,244
Annual change		-1.5%	2.5%	2.5%	2.5%
Water, wastewater and stormwater					
160 kL/year (typical apartment)	1,070	1,052	1,078	1,105	1,133
Annual change		-1.6%	2.5%	2.5%	2.5%
220 kL/year (typical house)	1,252	1,244	1,275	1,307	1,339
Annual change		-0.7%	2.5%	2.5%	2.5%

Notes: 2019–20 bill is estimated with adjustment of SDP assuming desalination plant and Shoalhaven transfer are not in operation. Forecast inflation of 2.2% is used to index 2019–20 prices to $2019–20. Bill reductions from 2019–20 to 2020–21 may differ due to rounding. Inflation of 2.5% is assumed for each remaining year of the price determination period.

1.1.5 Bill impacts for residential customers in the Rouse Hill stormwater catchment area

Customers in the Rouse Hill stormwater catchment area pay different stormwater charges to customers in declared stormwater catchment areas.[2] For new developments, customers also pay the Rouse Hill land drainage charge for a period of five years. Both these charges will decrease over 2020–24 in real terms, largely due to forecast growth in the Rouse Hill area.

Bills for a typical household and apartment receiving water, wastewater and stormwater services are shown in Table 1-4. Including inflation, Rouse Hill customers will see a decrease in bills in 2020–21 (up to $71 for a single house subject to the Rouse Hill land drainage charge). Bills will then increase by less than inflation to 2023–24.

Further details on Rouse Hill charges are in **Attachment 4: Proposed prices**, section 2.1.4.

[2] Except for customers in the Kellyville Village area, who pay the same stormwater charges as customers in declared stormwater catchment areas until the property is redeveloped.

Table 1-4 Nominal residential water, wastewater and Rouse Hill stormwater bill impacts ($/year)

	2019–20	2020–21	2021–22	2022–23	2023–24
Without land drainage charge					
160 kL/year (typical apartment)	1,195	1,169	1,189	1,209	1,229
Annual change		-2.2%	1.7%	1.7%	1.7%
220 kL/year (typical house)	1,323	1,300	1,323	1,346	1,370
Annual change		-1.7%	1.8%	1.8%	1.8%
With land drainage charge					
160 kL/year (typical apartment)	1,588	1,513	1,542	1,570	1,600
Annual change		-4.7%	1.9%	1.9%	1.9%
220 kL/year (typical house)	1,715	1,644	1,676	1,708	1,741
Annual change		-4.1%	1.9%	1.9%	1.9%

Notes: 2019–20 bill is estimated with adjustment of SDP assuming desalination plant and Shoalhaven transfer are not in operation. The forecast inflation of 2.2% is used to index 2019–20 prices to $2019–20. It is assumed 2.5% of inflation each year over the 2020 determination period.

1.2 Bill impacts for non-residential customers

1.2.1 Bill impacts for non-residential customers with water and wastewater services

Not including inflation, non-residential customers will experience a bill decrease in 2020–21. Bill impacts for non-residential customers depend on their meter size, discharge factors and water use.

There is no typical non-residential customer. Non-residential customers range from large industrial manufacturers to commercial offices, small food outlets, schools and hospitals. Water use and wastewater discharge vary greatly across and within these groups.

We have modelled the impact of our proposed prices on six significant non-residential customer segments in Table 1-5.[3]

[3] We used the same six customer segments for illustrative purposes in our 2015 price proposal.

Table 1-5 Significant non-residential customer segments

Customer type	Type	Meter size mm	Average usage kL/year	Discharge Factor %
Industrial strata unit	Low	20	75	80
	Medium	25	90	80
	High	50	32,000	69
Commercial strata unit	Low	20	130	80
	Medium	25	180	81
	High	40	2,100	88
Industrial	Low	20	200	82
	Medium	40	5,800	77
	High	80	26,000	69
Commercial	Low	20	310	83
	Medium	50	6,700	82
	High	80	21,000	82
Private school	Low	50	7,700	84
	Medium	80	24,000	85
	High	100	35,000	83
Public hospital	Medium	80	20,000	89
	High	100	33,000	89

These groups of non-residential customers cover the main types of customers that contribute to non-residential revenue. We have modelled the impact of proposed prices for low, medium and high-water users in each of these segments.

Table 1-6 illustrates bill impacts on non-residential customers in real terms. Table 1-7 illustrates bill impacts on non-residential customers assuming inflation.

Around 70% of non-residential customers will receive a bill saving up to 7% and about 30% will receive a bill saving up to 13% (in real terms).

Most small businesses will experience the same bill reduction as a residential customer. This is because these customers have the same water use and wastewater discharge as residential customers: average 200 kL water use and 150 kL wastewater discharge.

Types of non-residential customers who will experience a larger bill saving include:

- low water using customers in significant non-residential customer segments (as defined in Table 1-6) with a 20mm meter and discharge factor above 75%
- higher water using customers with a discharge factor above 75%.

This is because we propose a significant decrease in the wastewater usage charge to $0.61/kL ($2019–20), to make this charge more cost reflective. Further details on our proposed wastewater tariff structure are in **Attachment 4: Proposed prices**, section 4.

Table 1-6 Real non-residential water and wastewater bills ($/year, $2019–20)

Customer type	Water consumption	2019–20	2020–21	2021–22	2022–23	2023–24
Industrial strata unit	Low	$893	$851	$851	$851	$851
	Annual change		-4.7%	0.0%	0.0%	0.0%
	Medium	$1,238	$1,221	$1,221	$1,221	$1,221
	Annual change		-1.4%	0.0%	0.0%	0.0%
	High	$97,282	$84,926	$84,926	$84,926	$84,926
	Annual change		-12.7%	0.0%	0.0%	0.0%
Commercial strata unit	Low	$1,010	$968	$968	$968	$968
	Annual change		-4.2%	0.0%	0.0%	0.0%
	Medium	$1,439	$1,423	$1,423	$1,423	$1,423
	Annual change		-1.1%	0.0%	0.0%	0.0%
	High	$9,066	$8,211	$8,211	$8,211	$8,211
	Annual change		-9.4%	0.0%	0.0%	0.0%
Industrial	Low	$1,188	$1,139	$1,139	$1,139	$1,139
	Annual change		-4.1%	0.0%	0.0%	0.0%
	Medium	$19,776	$17,308	$17,308	$17,308	$17,308
	Annual change		-12.5%	0.0%	0.0%	0.0%
	High	$84,400	$74,673	$74,673	$74,673	$74,673
	Annual change		-11.5%	0.0%	0.0%	0.0%
Commercial	Low	$1,538	$1,437	$1,437	$1,437	$1,437
	Annual change		-6.6%	0.0%	0.0%	0.0%
	Medium	$24,301	$21,454	$21,454	$21,454	$21,454
	Annual change		-11.7%	0.0%	0.0%	0.0%
	High	$74,129	$65,044	$65,044	$65,044	$65,044
	Annual change		-12.3%	0.0%	0.0%	0.0%
Private school	Low	$27,654	$24,261	$24,261	$24,261	$24,261
	Annual change		-12.3%	0.0%	0.0%	0.0%
	Medium	$84,555	$73,690	$73,690	$73,690	$73,690
	Annual change		-12.8%	0.0%	0.0%	0.0%
	High	$123,163	$107,763	$107,763	$107,763	$107,763
	Annual change		-12.5%	0.0%	0.0%	0.0%
Public hospital	Medium	$73,345	$64,005	$64,005	$64,005	$64,005
	Annual change		-12.7%	0.0%	0.0%	0.0%
	High	$120,167	$104,686	$104,686	$104,686	$104,686
	Annual change		-12.9%	0.0%	0.0%	0.0%

Note: 2019–20 bill is estimated with adjustment of SDP assuming desalination plant and Shoalhaven transfers are not in operation. The forecast inflation of 2.2% is used to index 2019–20 prices to $2019–20.

Table 1-7 Nominal non-residential water and wastewater bills ($/year)

Customer type	Water consumption	2019–20	2020–21	2021–22	2022–23	2023–24
Industrial strata unit	Low	$893	$873	$894	$917	$940
	Change from 2019–20					5.2%
	Medium	$1,238	$1,251	$1,282	$1,315	$1,347
	Change from 2019–20					8.9%
	High	$97,282	$87,049	$89,226	$91,456	$93,743
	Change from 2019–20					-3.6%
Commercial strata unit	Low	$1,010	$993	$1,017	$1,043	$1,069
	Change from 2019–20					5.8%
	Medium	$1,439	$1,458	$1,495	$1,532	$1,570
	Change from 2019–20					9.2%
	High	$9,066	$8,416	$8,626	$8,842	$9,063
	Change from 2019–20					0.0%
Industrial	Low	$1,188	$1,168	$1,197	$1,227	$1,257
	Change from 2019–20					5.9%
	Medium	$19,776	$17,740	$18,184	$18,638	$19,104
	Change from 2019–20					-3.4%
	High	$84,400	$76,540	$78,453	$80,415	$82,425
	Change from 2019–20					-2.3%
Commercial	Low	$1,538	$1,473	$1,510	$1,547	$1,586
	Change from 2019–20					3.1%
	Medium	$24,301	$21,991	$22,541	$23,104	$23,682
	Change from 2019–20					-2.5%
	High	$74,129	$66,670	$68,337	$70,046	$71,797
	Change from 2019–20					-3.1%
Private school	Low	$27,654	$24,867	$25,489	$26,126	$26,779
	Change from 2019–20					-3.2%
	Medium	$84,555	$75,532	$77,421	$79,356	$81,340
	Change from 2019–20					-3.8%
	High	$123,163	$110,457	$113,219	$116,049	$118,951
	Change from 2019–20					-3.4%
Public hospital	Medium	$73,345	$65,605	$67,245	$68,927	$70,650
	Change from 2019–20					-3.7%
	High	$120,167	$107,303	$109,985	$112,735	$115,553
	Change from 2019–20					-3.8%

Note: 2019–20 bill is estimated with adjustment of SDP assuming desalination plant and Shoalhaven transfer are not in operation. The forecast inflation of 2.2% is used to index 2019–20 prices to $2019–20. It is assumed 2.5% of inflation each year over the 2020 determination period.

1.2.2 Bill impacts for non-residential customers with trade wastewater

Non-residential customers who hold a commercial permit or an industrial consent for trade waste discharge pay trade waste charges. The impact of our proposed trade waste charges varies widely, depending on the type of customer (such as commercial or industrial) and type of business (such as automotive, food or photographic, etc).

We have modelled the bill impact of our proposed trade waste prices for commercial and industrial customers for selected types of businesses.

Table 1-8 shows the impact of trade waste on commercial customers in the food business with low strength BOD. These customers consist of over 70% of commercial customers with a commercial permit. Including inflation, the majority of these customers will see a bill saving ranging from 5.2% (for medium water consumption customers) to 9.6% (for high water consumption customers) in 2023–24, compared to 2019–20.

Table 1-8 Nominal commercial customer bills with trade waste service ($/year)

	2019–20	2020–21	2021–22	2022–23	2023–24
Water and wastewater with trade waste service					
Low water consumption	$2,457	$2,068	$2,129	$2,191	$2,255
Annual change		-15.8%	2.9%	2.9%	2.9%
Change from 2019–20					-8.2%
Medium water consumption	$27,893	$24,461	$25,108	$25,773	$26,455
Annual change		-12.3%	2.6%	2.6%	2.6%
Change from 2019–20					-5.2%
High water consumption	$114,435	$94,894	$97,671	$100,534	$103,484
Annual Change		-17.1%	2.9%	2.9%	2.9%
Change from 2019–20					-9.6%

Note: 2019–20 bill is estimated with adjustment of SDP assuming desalination plant and Shoalhaven transfer are not in operation. The forecast inflation of 2.2% is used to index 2019–20 prices to $2019–20. It is assumed 2.5% of inflation each year over the 2020 determination period.

Pollutant charges for industrial customers depend on the type of pollutants, concentration, discharge volume, the masses of pollutants discharged and the type of wastewater system the trade waste is discharged to. We assessed two examples of industrial customers with certain pollutant assumptions (BOD mass of 1500kg, suspended solid of 200 kg, grease of 50 kg, nitrogen of 100 kg and phosphorus of 30 kg per year): one discharging to a primary wastewater treatment plant and one discharging to a secondary/tertiary wastewater treatment plant.

Table 1-9 shows bill impacts for our two example industrial customers. Including inflation, bill savings for these types of customers will range from 1.7% to 2.9% in 2023–24, compared to 2019–20.

Table 1-9 Nominal industrial customer bills with high water consumption ($/year)

	2019–20	2020–21	2021–22	2022–23	2023–24
Water and wastewater without trade waste	$84,400	$76,540	$78,453	$80,415	$82,425
Annual change		-9.3%	2.5%	2.5%	2.5%
Change from 2019–20					-2.3%
With discharging to a primary WWTP	$86,633	$78,991	$81,002	$83,063	$85,176
Annual change		-8.8%	2.5%	2.5%	2.5%
Change from 2019–20					-1.7%
With discharging to a secondary/tertiary WWTP	$89,945	$80,894	$82,980	$85,118	$87,314
Annual change		-10.1%	2.6%	2.6%	2.6%
Change from 2019–20					-2.9%

Notes: 2019–20 bill is estimated with adjustment of SDP assuming desalination plant not in operation and no adjustment for Shoalhaven transfer. The forecast inflation of 2.2% is used to index 2019–20 prices to $2019–20. It is assumed 2.5% of inflation each year over the 2020 determination period.

2 Affordability of bills

We are aware of the social impact of bills on our customers. In this section, we compare Sydney Water's bills with other Australian utilities and consider affordability issues.

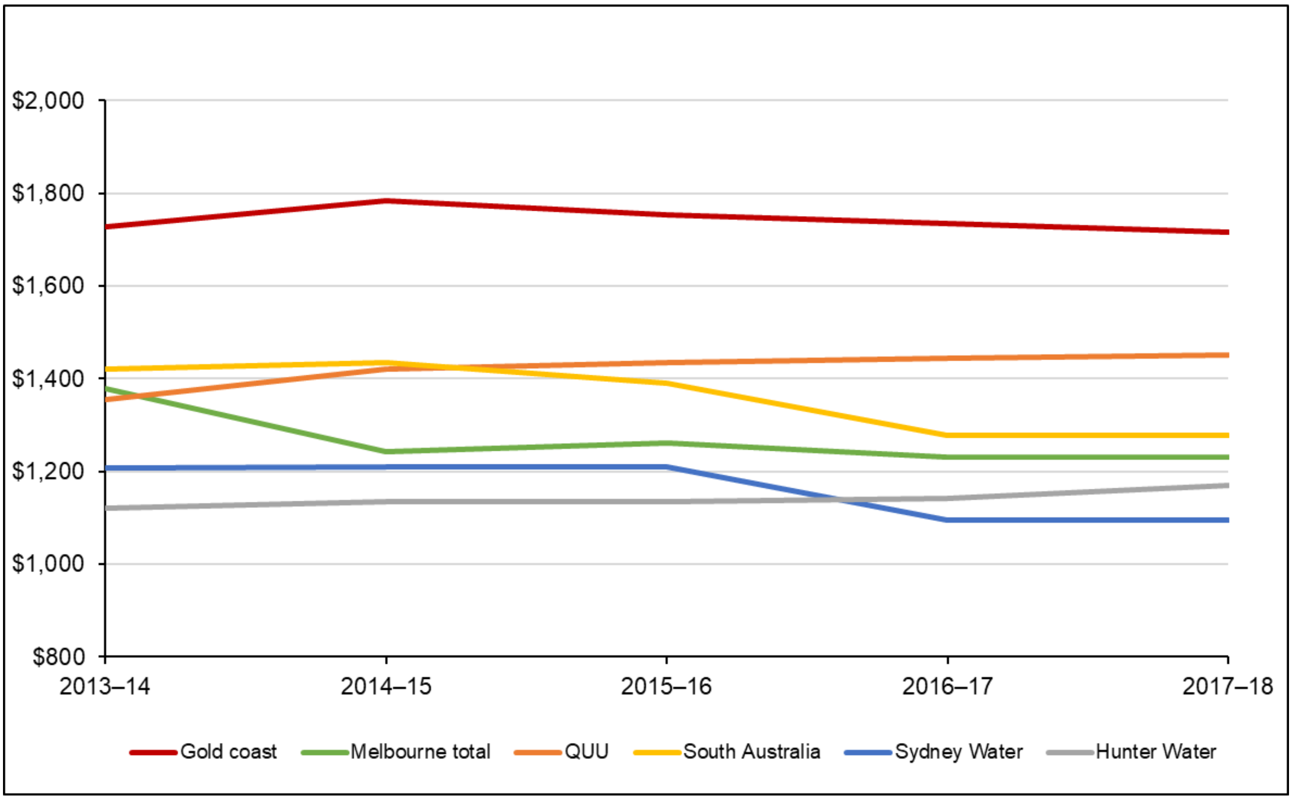
2.1 Customer bill comparison

Our residential customers have experienced relatively stable bills for water and wastewater services over the last 20 years. The last significant increase in prices and bills occurred during the 2008–12. This was largely driven by costs to secure Sydney's water supply through constructing the desalination plant and water recycling plants and improving our wastewater networks by building the Northside Storage Tunnel.

Based on water use of 200 kL a year, our residential annual bills continue to be amongst the lowest in the country (see Figure 2-1). Our annual residential bills have either remained stable or fallen since 2013–14.

Adopting 200 kL a year as the basis for comparing bills corrects for differences in the average volumes of water supplied between utilities. This allows for more meaningful comparisons between water utility bills.[4] 200 kL a year is also aligned to the average use of our residential customers, when considering both houses and apartments together. Based on this comparison, our residential bill was the lowest of major Australian water utilities in 2017–18. The $100 bill reduction that we provided in 2016 helped to achieve this.

[4] The National Performance Report uses 200kL/year as a basis for comparing water bills.



Source: National Performance Report 2017–18, Sydney Water analysis.

Figure 2-1 Comparison of annual bills based on 200kL/year – major Australian utility group

2.2 Affordability of water and wastewater services in Australia

Cost of living pressures are a concern for a number of households in Australia. The latest household expenditure data released by the Australian Bureau of Statistics noted that more than half the money Australian households spend on goods and services each week goes towards basics, including housing, food, energy, health care and transport.[5]

We are conscious of cost of living pressures on households. We are committed to providing high quality services at the lowest possible cost. Our prices are based on the efficient costs of providing services to customers and meeting our environmental requirements. Lower bills achieved in the 2016 Determination (around 8%) and the proposed saving of 4% in this price proposal will help customers manage cost of living pressures.

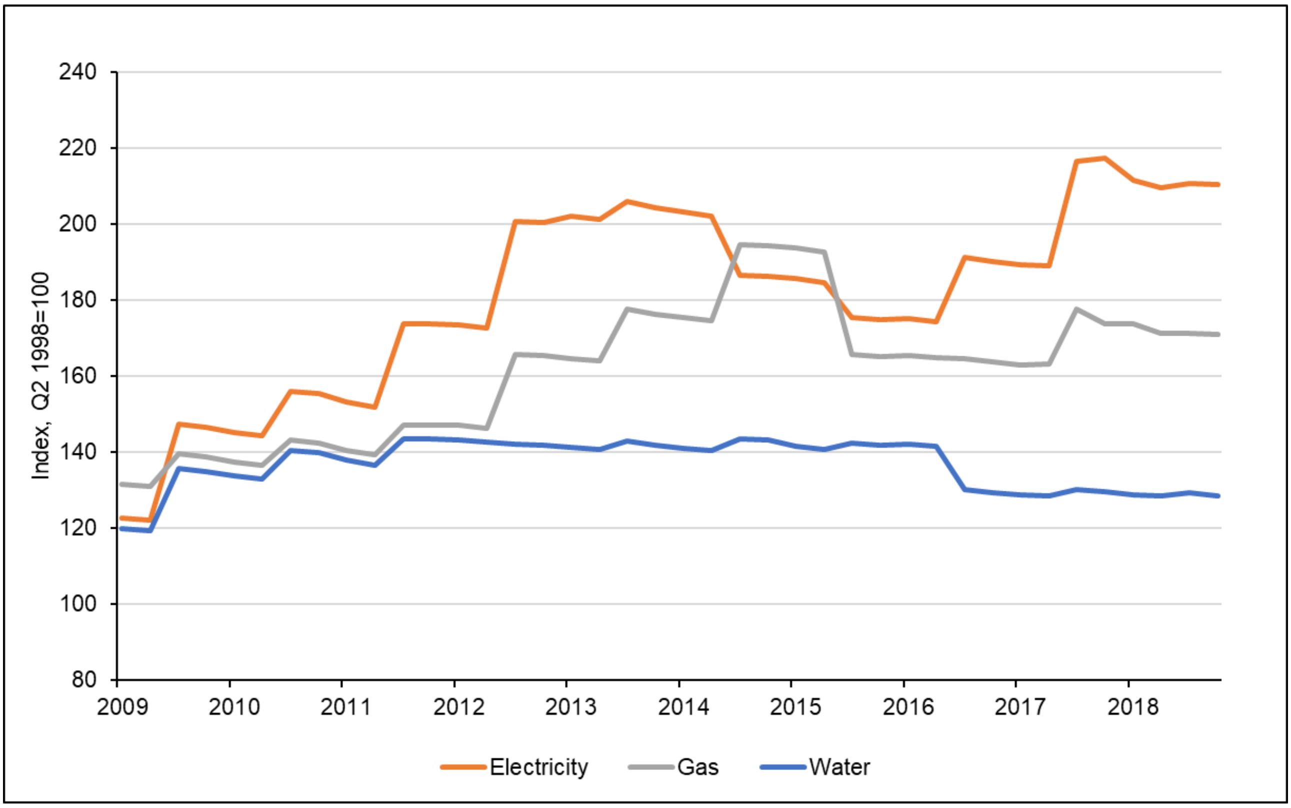
As noted by Infrastructure Australia in 2017, the urban water sector is facing many challenges from external factors, such as climate variability, or from the need to renew ageing assets.[6] These factors could put upward pressure on the costs of delivering urban water services in Australia in the future. We are also mindful of the challenges for affordability that may be posed due to future investment needs for growth or water security, as well as potential increases in the cost of capital. We note that we are the only jurisdiction in Australia that does not have some form of developer

[5] See the ABS website at: http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/6530.0Media%20Release12015-16?opendocument&tabname=Summary&prodno=6530.0&issue=2015-16&num=&view=

[6] Productivity Commission, National Water Reform, Productivity Commission Inquiry Report, No 87, 19 December 2017.

charges in place to help fund infrastructure needed to cater for growth. We consider there is merit in maintaining discussions about the potential role of developer charges, as part of the overall water funding framework.

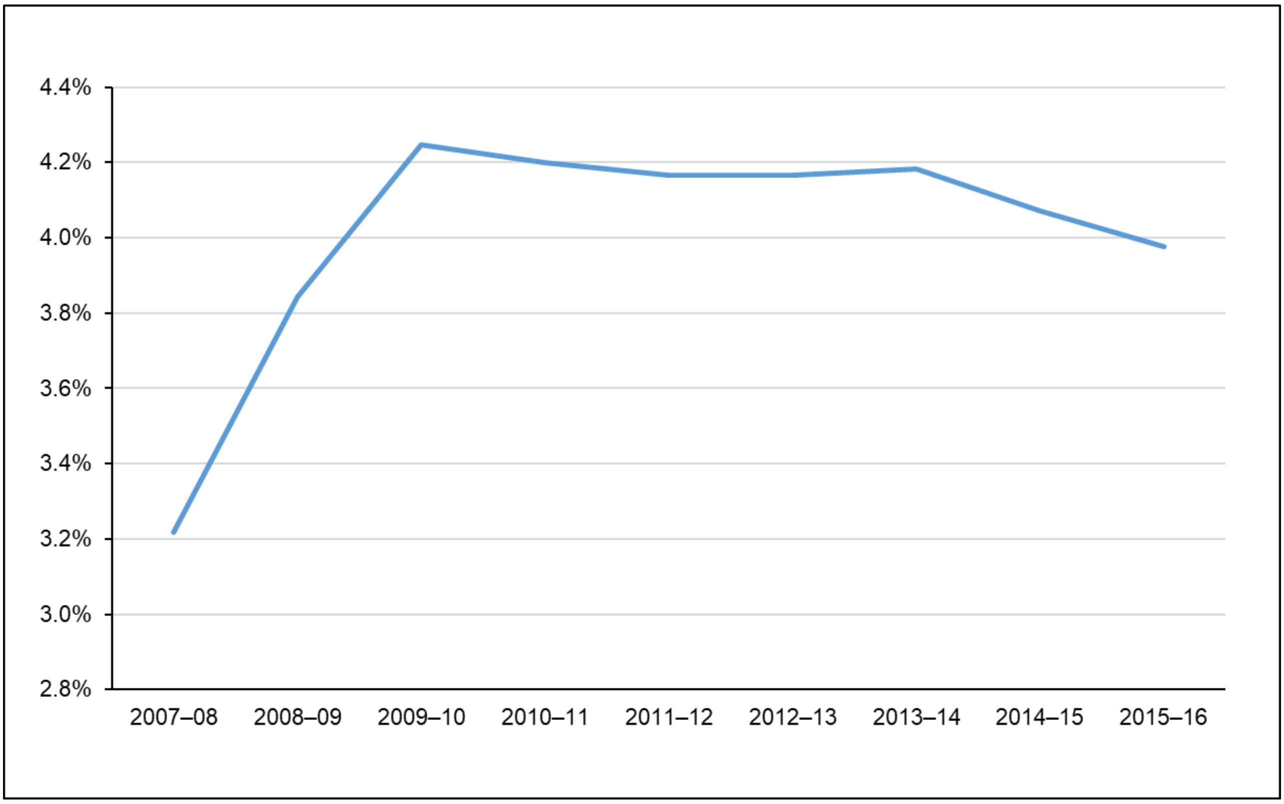
Figure 2-2 compares water, electricity and gas prices for Sydney households from 2009 to 2018, as used by the Australian Bureau of Statistics (ABS) as an input to the consumer price index. Electricity prices rose significantly from 2009 onwards before easing in 2014 and rising again recently. Retail gas prices also rose from 2009 onwards before stablising over the past couple of years. After the increase in 2008–12, water prices have remained stable for most of the last decade, with only marginal increases.



Source: ABS data, Sydney Water analysis

Figure 2-2 CPI data on utilities prices

Our analysis shows that annual bills as a percentage of low-income households' disposable income has been steady, and lately has fallen just below 4% (Figure 2-3).



Source: ABS data, Sydney Water analysis

Figure 2-3 Sydney Water annual bill as percentage of low-income household disposable income[7]

Table 2-1 compares the number of customers on hardship programs and payment plans in 2017–18 for electricity, gas and water in NSW, and bills as a percentage of disposable income. This indicates our prices have a smaller impact on customers' budgets than energy prices, given the number of customers on payment plans.

Table 2-1 Residential customers bills as a % of disposable income in 2017–18

	Payment plans	Hardship	Bills as % of disposable income
Electricity	82,288	30,425	7.4%
Gas	19,792	6,334	3.2%
Water	29,099	2,166	4.8%[8]

Source: AER, Sydney Water analysis[9]

[7] We note that the ABS data on household income is only available up to 2015–16. The disposable income used in the Table 2-1 is based on the Australian Energy Regulator's forecast of disposable income.
[8] Based on AER's assumption of what the 2017–18 disposable income for NSW is for low-income households.
[9] AER, Annual report on compliance and performance of the retail energy market 2017–18, December 2018 (See AER website at: https://www.aer.gov.au/retail-markets/performance-reporting/annual-report-on-compliance-and-performance-of-the-retail-energy-market-2017-18).

3 Customer assistance

We engaged with customers on various pricing options in 2018 (see **Attachment 3: Customer engagement**, section 2.3 for more detail). A common theme raised by participants was the need to support low-income and disadvantaged customers. We support customers experiencing payment difficulty with a range of programs and assistance options. This includes providing payment assistance credits, flexible payment plans and tailored assistance for customers experiencing financial hardship.

We define a customer experiencing hardship as someone who is willing but unable to pay all or some of their bill by the due date. In the short or medium term, hardship can be due to sudden changes in customer circumstances such as employment status, ill health, changes in personal relationships or temporary financial difficulties. Customers experiencing longer-term hardship are generally those on low, fixed incomes such as pensions, or who have a disability or chronic illness. We have a dedicated Customer Care team to assist customers holistically. The team aims to build rapport and re-engage with customers.

We also partner with community welfare agencies to increase awareness of our payment assistance options and concession entitlements. In the past year we've attended community events, inter-agency meetings and held information sessions with culturally and linguistically diverse customers, seniors and mental health community groups.

3.1 Customer assistance programs

Table 3 1 shows customers who have participated in a Sydney Water hardship or assistance program and costs related to these programs.

Table 3-1 Customers assisted by Sydney Water and associated costs (nominal costs)

	2016–17 (actual)		2017–18 (actual)		2018–19 (actual, YTD)		2019–20 (budget)	
Program	**Customer**	**Cost** $million	**Customer**	**Cost** $million	**Customer**	**Cost** $million	**Customer**	**Cost** $million
Community Service Obligations (CSOs)								
Pensioner concessions	231,000	125.1	224,000	124.6	223,000*	94.0*	218,600	126.3
Payment Assistance Scheme	1,900	0.7	2,166	0.8	2,197*	0.8*	2,600	1.0
PlumbAssist	See Social programs		See Social programs		See Social programs		300	0.4[+]
Flexible payment options								
Payment extension	79,907	N/A	113,715	N/A	79.750[#]	N/A	N/A	
Payment Plans	21,701	N/A	29,099	N/A	23,485[#]	N/A	N/A	
Centrepay	2,551	1.93	2,784	2.11	2,713*	1.95*	N/A	
Social programs								
PlumbAssist (see CSOs also)	331	0.34	396	0.34	316*	0.32*	See CSOs	
Home visits	n/a		353	N/A	N/A		N/A	
Concealed leaks	3,140	2.17	3,259	2.25	2,822*	2.26*	N/A	

Notes: A customer equates to a property. *Data is for year to date to May 2019. #Data is for year to date to March 2019. +From 2019–20, PlumbAssist will be funded by the NSW Government as a Community Service Obligation

Further detail on our customer assistance programs is provided below. Information on Community Service Obligations is provided in section 5.

3.2 Payment Assistance Scheme

The Payment Assistance Scheme (PAS) is a long-standing initiative that aims to assist customers suffering acute financial hardship and provide emergency relief to customers struggling to pay their bill. Eligible customers receive a credit directly applied to their bill. This ensures they maintain access to water and wastewater services.

We partner with community agencies to connect with vulnerable groups such as low-income earners, seniors, people from culturally and linguistically diverse (CALD) backgrounds, people with a disability, people experiencing mental illness or other health issues, separate families and people identify customers in need of this type of assistance. administer the PAS.

Owner-occupiers who only own one home can receive credits of up to $300 a quarter (up to $1,200/year) towards service and usage charges on their bills. Private residential tenants can receive up to $150 each quarter to help pay for water usage charges.

In 2017–18, we provided 2,166 properties with $784,278 in payment assistance, an average of $362 per household that was assisted. We anticipate the demand for payment assistance will continue to increase over the coming years. For 2018–19, we have budgeted $0.9 million for PAS. For 2019–20, our PAS budget increases to around $1 million.

The PAS is funded by the NSW Government as a Community Service Obligation. For more information on NSW Government funded social programs, see section 5.

3.3 Pensioner concessions

We provide concessions on water, wastewater and stormwater drainage service charges to recipients of the Centrelink Pensioner Concession Card and certain Department of Veterans' Affairs cards. Through this scheme eligible pensioners (that is, home owner-occupiers) currently receive a rebate of 100% on water, 80% on wastewater and 50% on stormwater service charges. Our approach is to keep pensioner bills in line with non-pensioner bills. That is, at each price determination, pensioner bills will increase or decrease by a similar percentage to non-pensioner bills. This means the wastewater service charge rebate percentage for pensioners would change, because of our proposed price reduction. Subject to the final prices determined by IPART, we adjust pensioner concessions so pensioner bills are kept in parity with non-pensioner bills.

In 2017–18, around 224,000 pensioners received concessions at a value of $124.6 million ($2017–18). Concessions are incorporated into our billing system so that recipients are only required to pay the net amount.

Pensioner concessions are funded by the NSW Government as a Community Service Obligation. For more information on NSW Government funded social programs, see section 5.

3.4 Payment options

Sydney Water offers a range of payment options to assist customers. These include:

- payment extensions – increasing the time that eligible customers have to pay accounts
- payment plans – providing customers with the option of entering an instalment plan
- Centrepay – making regular deductions directly from customers' Centrelink benefits
- financial counselling – referral to qualified financial counsellors for individual financial assessments and help with budgeting.
- BillAssist – case management of customers in debt and referrals to support services within the customer's local area.

Centrepay allows customers to arrange regular deductions from their Centrelink benefits. This helps customers to budget for their water bill.

We may also remove interest charges and other fees for customers experiencing payment difficulties, so that they will not incur increasing debt.

Setting up payment plans allows customers to smooth payments for bills and outstanding debt. Outstanding debt and estimated future bills are considered to determine the instalment amount. This provides customers with a regular bill and assists those who are trying to manage a budget.

3.5 PlumbAssist Program

Since 2011, our PlumbAssist program has provided vulnerable customers with emergency and essential plumbing repairs and maintenance. With a focus on water efficiency and sustainable consumption, PlumbAssist also aims to ensure that vulnerable customers have access to basic services such as water, hot water and drainage.

PlumbAssist includes:

- repair of minor, major and concealed leaks
- installing water efficient devices
- replacing faulty hot water systems
- clearing blocked wastewater pipes.

PlumbAssist helps over 300 customers a year, at a cost of around $340,000. The program aims to empower customers to manage their water consumption and expenses.

This program was previously funded by Sydney Water; however, from 2019–20, PlumbAssist will be funded by the NSW Government as a Community Service Obligation. For more information on NSW Government funded social programs, see section 5.

3.6 Home visits

Our Home Visits program commenced as a pilot in 2017. The program aims to help our most vulnerable customers who have stopped engaging with us and are not making payments on their account. To be eligible customers need to hold a pension card and have a debt over $400.

An initial letter is sent to the customer with a suggested payment arrangement that meets their use. If no contact is made, we follow up and offer to meet with the customer. Customer Care team members visit customers' properties and assess for hardship. These visits provide an opportunity to build rapport and provide options for support available to vulnerable customers.

To date, we have visited 353 customers. The outcome for customers has been very positive with those engaging with us reducing or paying off their debt.

3.7 Identifying concealed leaks

We notify customers of a potential concealed leak on their property, where we detect a change in water use patters. In 2017–18, we sent over 5,600 letters to customers informing them of a potential leak on their property.

We also reviewed our concealed leak allowance policy. The policy previously allowed for 50% of water usage charges resulting from a concealed leak to be paid by Sydney Water, up to a limit of 1,000 kL. In some cases, this still left customers with a very large, unexpected water bill. From 2016, we removed the 1,000 kL limit and have paid 50% of any consumption above average use where we have verified a concealed leak claim.

3.8 Programs to support business customers

We have a range of programs to support its business customers. We have specialist teams that work with businesses to assist them to reduce water use, achieve compliance in wastewater and reduce business costs. We offer businesses appropriate tools, products and services to suit their needs.

For our major customers, we provide access to a relationship manager who acts as a single point of contact with Sydney Water. For our smaller business customers, we provide case-managers to process approvals for trade waste connections, respond to technical, compliance-related or complex account enquiries.

Our Customer Services team facilitates non-standard services for business customers and works with them to prevent backflow, improve wastewater quality, become more water efficient and to review water contingency options. Our teams also work closely with people such as property developers, hydraulic consultants, and plumbers who assist end-use customers to apply for and manage non-standard services.

We offer the following online tools and information to help businesses:

- water efficiency tips, practical steps businesses can take to minimise their water use

- best practice guidelines for water management relevant to specific business sectors. These are currently available for clubs, aquatic leisure centres, playing fields, commercial office buildings and shopping centres.
- business rainwater tank calculator. This tool is designed to help businesses calculate how much water they could save with a rainwater tank and the most suitable sized tank for their needs.

3.8.1 Payment difficulty and assistance options for non-residential customers

We will provide all reasonable effort to assist non-residential customers who may be experiencing payment difficulty. We will treat each situation sensitively on a case by case basis and deal with customers in a fair and reasonable manner.

The following assistance options are available to non-residential customers:

- payment deferral for a short period of time
- alternative payment arrangements, such as a payment plan
- access to a language interpreter, at no cost.

Payment arrangements for business customers will be based on reasonable commercial considerations and market conditions.

4 Communication and engagement

We are aware of the impacts of water prices on disadvantaged groups and those who are in hardship. We have developed a culturally and linguistically diverse (CALD) Communications and Engagement Strategy targeting those most in need. This can relate to factors including age, cultural and linguistic background, illness and other social factors.

We engage with the community and welfare sector by developing relationships with relevant peak bodies. Peak organisations are an important conduit in promoting our assistance options, building awareness and encouraging acceptance.

We currently work with a network of 127 community, welfare and charitable organisations. These organisations help to:

- identify customers at risk of medium to long-term hardship, and refer them to Sydney Water for more specialist support
- provide information to customers on water efficiency in the home.

We have an ongoing evaluation process to identify opportunities for improvement and achieve better outcomes for customers.

4.1 Thriving Communities Partnerships

The Thriving Communities Partnership (TCP) is a cross-sector initiative to address complex and growing social inequality and the impact it has on our community. We participated in the TCP Vulnerability Roundtable in 2016 and the TCP Charter Workshop in Melbourne in 2017.

We are now a founding member of the TCP Sydney chapter. This will allow us to continue to build our long-term commitment in providing essential water and wastewater services to customers experiencing financial difficulty.

4.2 Sponsorship

In June 2018 we partnered with Orange Sky Laundry, to bring the first laundry and shower van in NSW to service Western Sydney communities. With an aim of restoring dignity and normality to those in need, the van offers a free mobile laundry and shower service to the homeless. It can also be used in instances of natural disasters.

The partnership has included an initial capital investment of $140,000 and annual operating costs of $60,000 for a five-year term. Within the van's first four months of operation, 38 Sydney Water volunteers facilitated:

- 515 loads of laundry
- 135 showers
- 807 hours of positive and genuine conversations
- 107 shifts across Parramatta, Campbelltown, Liverpool and Penrith.

We have also donated to other programs assisting people in financial hardship, including:

- Mission Australia – towards running the Creditworthy Program for 12 months
- Financial Counsellors Association – towards training additional financial counsellors
- Metro Migrant Resource Centre (Western Sydney) – towards the Emergency Relief Program for financial stress.

5 Government funded social programs

Social programs are non-commercial in nature and would not be provided by a commercial entity in the normal course of business. The NSW Government funds these programs as a Community Service Obligation (CSO). NSW Government funded social programs include:

- pensioner concessions
- financial assistance to customers, including the Payment Assistance Scheme (PAS) and, from 2019–20, PlumbAssist
- exempt properties.

Social programs are explained in section 3. Exempt properties are explained in section 5.1.

Table 5-1 shows an estimate of NSW Government funding for social programs.

Table 5-1 Estimated Community Service Obligations reimbursement (nominal costs, $million)

Program	2019–20	2020–21	2021–22	2022–23
Pensioner concessions	126.7	124.5	128.9	133.5
Financial assistance to customers	1.7	1.9	2.0	2.1
Exempt properties	18.6	18.9	19.8	20.6
Total	**147**	**145.3**	**150.7**	**156.2**

Note: Data only available up to 2022–23

5.1 Exempt properties

Certain properties are exempt from the payment of Sydney Water's service charges. The exceptions are specified in schedule 2 of the *Sydney Water Act 1994.*

Around 17,000 properties benefit from exemptions. The largest recipients are religious bodies, charities and some local government properties. Other recipients of this exemption include cemeteries, not-for-profit childcare centres, the NSW Aboriginal Land Council and non-government schools. Exemptions are granted by Sydney Water following consideration of a formal application and on-site inspection. If an exemption is granted, this is reflected through our charging and billing system. In addition, approximately 300 exempt properties (eg charitable nursing homes built prior 1987) are allowed certain quantities of water free of charge.

This program is expected to cost around $18 million in 2018–19 rising to $18.6 million in 2019–20.

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Attachment 6
Weighted average cost of capital

Price proposal 2020–24

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Weighted average cost of capital

Key messages

- Our price proposal adopts IPART's February 2019 post-tax real weighted average cost of capital (WACC) of 4.1% and excludes the effect of the trailing average for the cost of debt.
- This is 80 basis points lower than the WACC in our current (2016–20) price period. A lower WACC for the 2020–24 price period contributes to a reduced annual revenue requirement, allowing us to pass price reductions to our customers. Compared to the 2016–20 price period, our lower proposed WACC reduces a typical bill by about $70 each year (all else equal).
- We request that IPART ensures that the WACC point estimate reflects the efficient funding costs of the benchmark water utility over the price path.

1 Context

One of our building blocks, the return on capital, is calculated by multiplying the value of our regulated asset base by the WACC. It is the sum of the weighted average returns expected from the two types of capital – equity and debt. For regulated utilities, the WACC is set by the regulator to balance the interests of the utility, its shareholders and customers.

The WACC is the minimum financial return an investor requires from an investment given its non-diversifiable risk. It is an important signal to both our customers and our shareholder of the opportunity cost of the capital employed in providing the regulated services. The WACC should be set to ensure that an efficient business can generate a sufficient return to service its ongoing debt requirements and provide returns to shareholders. This allows it to remain viable over the longer term. An appropriate regulated WACC for Sydney Water is therefore in the long-term interests of our customers.

Judgment should be used to ensure that the WACC model produces a return that reflects the expected funding costs of the benchmark water utility over the price path.

IPART recently reviewed its method to calculate the regulatory WACC.[1] While this resulted in several improvements, market conditions have since changed dramatically. We have forecast that IPART's WACC method could produce a WACC output that does not give us the opportunity to deliver the appropriate rate of return to our shareholder, or maintain our financeability.

Judgment should be used to ensure that the WACC model produces a return that reflects the funding costs of the benchmark water utility over the price period, regardless of whether IPART's uncertainty index breaches the one standard deviation threshold.

[1] IPART 2018, *Review of our WACC method – Final Report*.

2 We propose a WACC of 4.1%

Our proposed prices have been calculated using a WACC estimate of 4.1%, as shown in Table 2-1. We understand that IPART will update the market data underpinning the WACC before it releases a draft and a final decision. As a result, our WACC and prices may be higher or lower than our proposal.

Table 2-1 WACC parameters and calculation

	Current (40 days)	Long-term (10 years)	Low	Mid	High
Nominal risk-free rate	2.4%	3.6%			
Inflation	2.4%	2.4%			
Debt margin	2.5%	2.7%			
Market risk premium	8.6%	6.0%			
Gearing ratio	60%	60%			
Equity beta	0.7	0.7			
Post-tax real WACC	3.8%	4.4%	3.8%	**4.1%**	4.4%
Pre-tax nominal WACC	7.3%	7.8%	7.3%	7.5%	7.8%
Pre-tax real WACC	4.8%	5.3%	4.8%	5.0%	5.3%

Source: IPART 2019, *Biannual update addendum*, page 2.

2.1 The basis of our proposed WACC

We calculated our proposed WACC using IPART's standard method and parameter valuations for the water industry. The estimate is based on the addendum to IPART's February 2019 market update.[2] We excluded the effects of the cost of debt true-up because it is a transitional measure – it will not apply to our WACC at the beginning of the 2020–24 price period.[3]

[2] IPART 2019, *Biannual update addendum*, page 2.
[3] IPART 2018, *Review of our WACC method – Final Report*, page 33.

3 Potential issues with IPART's WACC method

Our analysis indicates that the IPART WACC method may produce a WACC as low as 3.4% when IPART determines our prices in 2020. This level may have implications for our financeability and our ability to provide a reasonable return to our shareholders.

We request that IPART ensures prices are set at a level that gives us a reasonable opportunity to remain financeable and deliver to our shareholders an appropriate rate of return on their assets. This would include applying measured discretion to ensure that the WACC point estimate reflects the efficient funding costs of the benchmark water utility over the price path. We would be concerned if IPART relied on a mechanical application of its WACC method. Specifically, we request that IPART selects a WACC point estimate that meets at least our minimum requirement to remain financeable.

3.1 IPART's method allows discretion

We note that IPART has sought to reduce regulatory risk through codifying its method to a large extent. This increases certainty and transparency in IPART's approach. While we support this in principle, certainty and transparency need to be balanced with other objectives such as accuracy, stability and efficiency. Carefully balanced and considered discretion will:

- result in a more accurate and efficient WACC outcome
- set the WACC at a level that signals both efficient usage to customers and efficient investment from the utility.

We propose that IPART accounts for this by exercising discretion and departing from the midpoint of IPART's WACC range. IPART has two mechanisms for selecting a point estimate other than the midpoint of the current and long-term WACC estimates:

- The first mechanism is the uncertainty index (UI). IPART is open to considering the WACC point estimate if the UI exceeds one. But the issue we have identified is not addressed with reference to the UI.
- The second is when financial market information suggests that the midpoint WACC underestimates or overestimates market expectations for the cost of capital. IPART's WACC method is durable and adaptive to changing market conditions as it has pre-empted this situation in 2013. It set out a process to introduce judgment when markets are abnormal, regardless of whether the UI has been breached. In 2013, IPART noted that:

> In an unlikely event that the index of economic uncertainty is neutral but other financial market information suggests that the midpoint WACC underestimates or overestimates market expectations for the cost of capital, we will choose a point estimate above or below the midpoint WACC.[4]

IPART confirmed this approach in its 2018 review of the WACC. It stated that it would:

> …continue to use our discretion to determine the appropriate weighting of current and historic average market data when the market is in an abnormal state, and to consult with stakeholders before we make our decisions.[5]

We propose that IPART exercises discretion when selecting a WACC point estimate.

3.2 Why regulatory discretion is necessary

Market conditions have changed since IPART's WACC review

The risk-free rate is the foundation of both the cost of equity and the cost of debt calculation. The market data that underpins the risk-free rate is the yield on 10-year Australian Government bonds. As illustrated in Figure 3-1, these yields are currently extraordinarily low and are at never-before-seen levels.

While IPART refined its WACC approach early last year, due to market conditions unfolding, IPART's model may produce unintended WACC values in 2020 when IPART makes its final decision. To demonstrate the extent of this, when IPART completed its review of the WACC in early 2018, the yield on these bonds was around 2.8%. In June 2019, the yield is 1.7%.[6] IPART's WACC method was developed before the effects of these conditions came to light and we query whether the model is working as intended.

[4] IPART 2013, *WACC methodology – Draft Report*, page 35.
[5] IPART 2018, *Review of our WACC method – Final report*, page 70.
[6] Month average. Source: RBA.

Source: RBA

Figure 3-1 Yield on 10-year Australian Government bonds

The WACC method could produce a very low WACC value

We have sought advice from finance expert Dr Jason Hall that indicates that IPART's WACC method could produce a WACC as low as 3.4% in April 2020. Dr Hall has also updated the WACC using actual data to the end of April 2019, indicating an approach similar to IPART's method currently produces a WACC of 3.7%[7] as shown in Table 3-1.

Both these WACC values could present challenges for Sydney Water. We request IPART consider the implications on our ability to service debt, provide a return to our shareholders and remain financeable.

We may not recover sufficient revenue to fund our regulated business

While our analysis suggests we remain credit worthy at a WACC of 4.1%, if current market conditions continue at the same or similar levels, the WACC produced by IPART's method could be much lower than 4.1%. This is because in early 2020, yields on long dated government bonds would be removed from the sample that underpins IPART's WACC calculation. We expect them to be replaced by newer, abnormally low observations (assuming current market conditions continue).

[7] Analysis from Dr Jason Hall, 16 May 2019.

Our analysis is presented in Table 3-1. We have obtained an estimate of the WACC using IPART's method and data available to 30 April 2019 from Dr Jason Hall.[8] With four months of additional data since IPART's February 2019 market update, the midpoint post-tax real WACC measured to the end of April 2019 falls from 4.1% to 3.7%.

Table 3-1 also presents a forecast of the WACC for end April 2020, when IPART is due to make its final decision for our prices. The WACC could be as low as 3.4%. At this level, our analysis indicates there could be implications for our financeability as the Moody's metrics suggest our credit rating could fall below a Baa2 rating.

Table 3-1 WACC estimate (30 April 2019) and forecast (30 April 2020)

	30 April 2019			30 April 2020		
Parameter	Current (40 days)	Long-term (10 years)	Mid	Current (40 days)	Long-term (10 years)	Mid
Nominal risk-free rate	1.92%	3.50%		1.71%	3.10%	
Inflation	2.40%	2.40%		2.40%	2.40%	
Debt margin	2.20%	2.60%		2.10%	2.60%	
Market risk premium	8.60%	6.00%		8.60%	6.00%	
Debt funding	60%	60%		60%	60%	
Equity funding	40%	40%		40%	40%	
Gamma	0.25	0.25		0.25	0.25	
Corporate tax rate	30%	30%		30%	30%	
Equity beta	0.7	0.7		0.7	0.7	
Nominal vanilla WACC	5.65%	6.74%	6.20%	5.38%	6.34%	5.90%
Post-tax real WACC	3.17%	4.24%	**3.70%**	2.91%	3.85%	**3.40%**
Pre-tax nominal WACC	6.57%	7.63%	7.10%	6.27%	7.19%	6.70%
Pre-tax real WACC	4.08%	5.11%	4.60%	3.78%	4.68%	4.20%

Source: Dr Jason Hall.

Changes to the WACC are substantial

Our prices and our ability to fund our regulated business are highly sensitive to the WACC selected by IPART. Between 2016 and the February 2019 biannual market update, the WACC has reduced by 80 basis points. This results in (all else equal):

- a reduction in our revenue requirement of around $160 million each year
- a reduction of around $70 to a typical household bill each year.

[8] We note that this analysis is indicative only as the MRP has not been updated. This is because the MRP model is not available publicly and uses proprietary data.

Since the market update, market conditions have deteriorated further, as shown in Table 3-1. The effect of changes of this magnitude requires careful consideration, especially when the WACC determined by IPART could be far lower than indicated by this analysis.

There are well-established downward biases and inaccuracies in the Sharpe-Lintner model

IPART's WACC method uses one of the earliest iterations of the capital asset pricing model (CAPM), the Sharpe-Lintner (SL) CAPM. This model was developed in the mid-sixties and there have been many important refinements and improvements to the CAPM over the last half-century. In the 2017 review of the WACC, IPART acknowledged that the SL CAPM has downward biases when it is applied to 'low-equity beta stocks (such as regulated natural monopoly firms)'.[9] It decided to monitor the impact of moving to a Fama-French CAPM over the next five years.[10]

The SL CAPM is a relatively simple model of expected returns, so it is widely used. However, there is extensive literature showing that the SL model is biased and incomplete. As a simple model, its use should be limited to a heuristic. It is not a perfect representation of the complex and dynamic relationship of risk and expected market returns:

- it is downward biased. As noted by IPART, this effect is especially relevant for low beta stocks such as water utilities.[11]
- it is incomplete because the model ignores risks that are incorporated into asset prices, including exposure to financial distress, the inability to disinvest in a downturn, and exposure to variation in economic conditions.

More sophisticated CAPMs, such as the Black CAPM and the Fama-French five-factor model, overcome some of these biases and include additional risk factors.

The SL CAPM does not need to be a perfect model if it is used as one input to inform a regulatory decision. We consider it appropriate to use the SL CAPM if IPART considers evidence from this model alongside other sources of evidence, and explicity recognises and adjusts for the biases and inaccuracies of the model.

We support IPART's commitment to investigate using alternative CAPMs as a cross-check. We have previously requested that IPART explores alternative CAPMs to consider or account for the inaccuracies and biases in the SL CAPM.[12] Although it made a five year commitment, we ask that IPART endeavours to apply and consider evidence from other capital asset pricing models in the current review and recognise and account for the limitations of the SL CAPM. We consider that this is necessary now due to the dramatic market conditions at play. It is important that the WACC estimated by IPART is in line with the efficient cost of funding the benchmark water utility.

[9] IPART 2018, *Review of our WACC method – Final Report*, page 49.
[10] IPART 2018, *Review of our WACC method – Final Report*, page 47.
[11] IPART 2018, *Review of our WACC method – Final Report*, page 96.
[12] Sydney Water 2017, *Sydney Water submission to IPART Issues Paper on 'Review of our WACC method'*, page 6.

4 We propose an equity beta of 0.7

Any estimation of the equity beta from market data is uncertain and requires a high degree of judgment. Our proposed WACC contains an equity beta estimate of 0.7. This valuation is consistent with IPART's standard industry valuation for this parameter and supported by the preliminary analysis conducted by IPART to demonstrate its proposed process for calculating the equity beta.[13]

4.1 IPART's past practice

IPART has provided stakeholders with a degree of certainty in the regulatory approach through stable and consistent equity beta valuations for the water industry. Table 4-1 below shows that IPART has consistently adopted an equity beta of 0.7 (either as the midpoint of a range or a point estimate) in recent decisions.

Table 4-1 IPART's past decisions on the equity beta

Decision	Sydney Water, Hunter Water, WaterNSW	WaterNSW – coastal valleys[a]	Sydney Desalination Plant	Central Coast Council	Essential Energy (Broken Hill)	Broken Hill pipeline
Year	2016	2017	2017	2019	2019	2019
βe value	0.6 – 0.8	0.7	0.7	0.7	0.7	0.7

[a] We have omitted Murray Darling Basin prices from the analysis because IPART used the Water Charge (Infrastructure) Rules 2010 to determine the WACC and prices.

We consider that IPART's past decisions are objective and evidence-based as it has, in the past, carefully considered empirical studies of the equity beta for a benchmark water firm and interpreted these results in tandem with other sources of evidence.[14] We consider this appropriate given the difficulty and uncertainty in obtaining certain or reliable equity beta values from market studies. We support IPART doing so in the future.

4.2 IPART's current review of the equity beta

IPART is currently reviewing its approach to calculating a market-based equity beta to use as an input into its decision when valuing the equity beta in future decisions.[15] IPART's proposed approach to estimating the equity beta from market data produces an equity beta of 0.74 for a benchmark water utility.[16] This accords with its standard valuation for the industry of 0.7.

[13] IPART 2019, *Estimating Equity Beta – Fact Sheet*, page 2.
[14] See for example, IPART 2016, *Review of prices for Sydney Water Corporation – Draft Report*, Appendix I.
[15] IPART 2019, *Estimating Equity Beta – Fact Sheet*.
[16] IPART 2019, *Estimating Equity Beta – Fact Sheet*, page 2.

We consider IPART's review will improve the predictability and transparency of IPART's method of estimating this parameter from market data. IPART indicated that it will continue to interpret market-based equity beta values in the context of other evidence.[17] We support this approach as it recognises the need to incorporate an element of judgment into regulatory process to ensure that outputs of a method remain appropriate to circumstances and market conditions. Our separate submission to the equity beta fact sheet contains our detailed response to IPART's review of the equity beta.

[17] IPART 2019, *Estimating Equity Beta – Fact Sheet*, page 1.

5 Our proposed steps to implement the cost of debt true-up

IPART's recent WACC review developed a mechanism to pass through annual changes in the cost of debt.[18] We support this mechanism as it improves the degree to which IPART's WACC decisions reflect the efficient funding costs of the benchmark firm. This leads to more efficient signals for both customers to consume water and the utility to invest. Both customers and our shareholders benefit from this mechanism as it removes any windfall gains and losses caused by annual changes in the cost of debt over the determination period.

We propose that annual changes in the cost of debt are 'stored up' over the 2020–2024 price period, then administered in the following regulatory period, instead of annually. Adjusting our prices annually would be overly complex as we have over 100 individual prices for our regulated products and services. As well as being simpler, a true-up in the next determination period increases the stability of our customers' bills for the regulatory period.

We propose the following steps for the cost of debt true-up (Figure 5-1). This approach is consistent with IPART's WACC method.[19] Additionally, we propose that the value of the true-up is recovered from or passed on to customers in a smooth manner to minimise price shocks.

1. Calculate the difference between the actual cost of debt and the cost of debt set at the beginning of the regulatory period
2. Allocate this difference to a separate regulatory account, similar to an 'unders and overs account'
3. At the end of 2020–2024, the balance of this account (either positive or negative) would be applied to prices for the following period
4. This balance would be smoothed across the regulatory period (not a lump sum at the start) after adjusting for the time value of money

Source: Adapted from Sydney Water, *Submission to IPART's WACC review Issues Paper 2017–18*, August 2017, pages 21–22.

Figure 5-1 Our proposed steps for the cost of debt true-up

[18] IPART 2018, *Review of our WACC method – Final Report*, page 39.
[19] IPART 2018, *Review of our WACC method – Final Report*, page 38.

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Attachment 7
Regulatory framework and application

Price proposal 2020–24

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Regulatory framework and application

Key messages

- Using more customer insight in decision-making will help us move towards a greater focus on the outcomes we deliver and meeting customer expectations. A more customer-focused and outcomes-based regulatory regime would complement current incentive mechanisms.
- We propose a four-year determination at this time, to balance stability for customers with the right incentives to implement and achieve efficiencies.
- We support retaining both the operating expenditure efficiency carryover mechanism, which could benefit customers in future price reviews; and unregulated pricing agreements, with a review of benefits in 2024 as they may need more time to develop sufficiently.
- Our proposed approach for the demand volatility mechanism reconciles three years of figures for the period between 2016–19, as actual information will not be available in 2019–20 for the determination. This would see $30 million returned to customers.
- We propose allowing recovery of $13 million in research and development costs for nutrient discharge offset projects. This supports the EPA's new environmental regulatory framework for the Hawkesbury Nepean that will come into effect from 2024.
- Performance benchmarking is an important ongoing development to the regulatory framework. However, the way forward needs careful consideration by IPART.
- Our proposed framework for unregulated services that use shared assets has been extended to propose treatments for depreciation. We suggest an incremental cost approach to compensating customers for depreciation, or a sharing rule equal to 10% of revenues, if IPART determines that the administrative costs of working out the exact incremental cost outweighs the benefit.
- An assessment of our Sydney Water Developer Direct (SWDD) services shows that our offering is competitively neutral. In our view, the market for minor construction services is contestable and should not be regulated. If minor construction services are regulated, we consider a methodology to be the most efficient form of setting prices.
- We propose a least cost approach to managing overflows from our wastewater network including working on faulty private pipes. Our approach reflects IPART's funding hierarchy and feedback from our customers.
- We propose to upgrade our wastewater system at Vaucluse-Diamond Bay to stop release of untreated wastewater during dry weather. After applying IPART's funding hierarchy, we propose to recover the costs from all customers, as supported by our customers.

1 Overview

Regulatory framework and application refers to the methods and approaches used to regulate our prices. These methods and approaches determine how our costs are evaluated, how we are incentivised to achieve efficiencies, how we can offer prices and new services to customers, and how we can manage our cost and forecasting risks.

Incentives frameworks are fundamental to promoting and delivering better outcomes for customers.

Our proposal is based on:

- the long-term interests of customers
- the promotion of outcomes that are consistent with those that would be expected from an efficient, competitive market, even though Sydney Water is a monopoly supplier
- a reduction of the burden and costs of regulation for all stakeholders
- greater certainty and value for our customers, Sydney Water and other industry participants by delivering lower prices in the long run and improved quality of service.

In this attachment we also outline the key steps in achieving these principles, including:

- applying greater weight to customer preferences and outcomes and allowing the necessary flexibility in pricing to do this
- in the long run, strengthening incentives to improve efficiency
- providing greater flexibility for innovation in regulated and unregulated services and prices.

2 Regulatory framework

2.1 Moving towards an outcomes-based regulatory approach

Continuing from our 2015 price proposal, we are proposing further modernisation of the regulatory regime, to make it consistent with regulatory best practice.

We support a transition to an outcomes-based regulatory approach that supports our long-term strategy to be a customer led business. This transition affects how our prices are set and how customers' interests are reflected in our business plans and is essential to us delivering the outcomes customers want in the long-term.

2.1.1 Integrating more customer insight into our decision making

Our regulatory framework is underpinned by our State Owned Corporation model, with three equal principal objectives:

- to protect public health
- to protect the environment
- to be a successful business, including to exhibit a sense of social responsibility.

Our price determination process is an appropriate way to ensure the services we deliver, as a monopoly provider, are value for money and cost effective for our customers. This model has worked well for a long time.

We are committed to building on and extending this model by developing the way in which we determine the outcomes that we deliver and the prices that we charge, working with our regulators, our customers and our stakeholders. As IPART have recognised, there is significant scope to expand the role of our customers in shaping our plans. Our customer engagement for this review is a step towards using more customer insight in our decision-making in the future.

More customer insight will help us move towards a greater focus on the outcomes that we deliver, and our performance in terms of meeting customer expectations. Strengthening our incentives to deliver the performance our customers wants, through mechanisms like the operating expenditure and capital expenditure Efficiency Carryover Mechanism (ECM) (see section 2.2), is likely to be part of this evolution.

2.1.2 What is an outcomes-based regulatory approach?

Traditionally, IPART's pricing regime has focused largely on assessing our expenditure against the delivery of outputs (that is, kilometres of new mains, treatment plant renewals etc) given the standards in our Operating Licence and Environment Protection Licences (EPLs), without considering the wider picture of what outcomes are valued by our customers. In other words, outcomes expressed by customers have traditionally had a limited role in IPART's price determination process, relative to an assessment of the overall cost efficiencies of the plan. We appreciate that IPART has recently helped bridge this gap as part of our Operating Licence review, by recommending performance standards that aligned with customer preferences and willingness to pay. We acknowledge that the primary responsibility rests with us to engage with our customers and represent their needs in everything that we do.

An outcomes-based framework shifts the focus of the pricing objective from being primarily cost-based, concentrating on the different building block allowances and the delivery of outputs, to ensuring that prices deliver outcomes that customers value. An outcomes-based approach resets the focus of regulation to establishing the link between prices and outcomes.

Key stages in the development of a customer led price proposal under an outcomes-based approach are outlined in Figure 2-1.

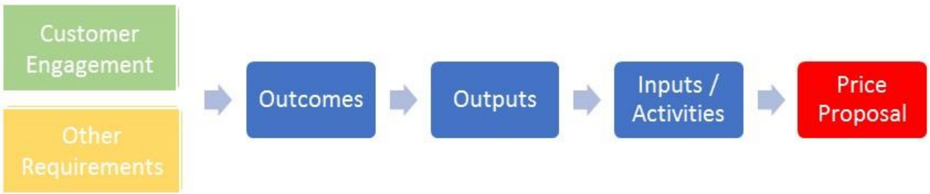

Figure 2-1 Stages of an outcomes-based framework

Under an outcomes-based framework, the development of our price proposal commences with customer engagement and broader stakeholders. Comprehensive engagement of our customer base allows us to identify what our customers (and broader stakeholders) need of us, their priorities and their preferences. Engagement provides the understanding essential to determine the trade-offs between price and service quality that our customers most value.

An outcomes-based regime builds on, rather than replaces, IPART's existing approach to setting prices. It would still encompass an assessment of our cost base for prudency and efficiency. However, the focus would shift to whether planned outputs deliver customers' desired outcomes.

The Office of Gas and Electricity Markets (Ofgem) and Water Services Regulatory Authority (Ofwat) in the UK and the Essential Services Commission (ESC) in Victoria have restructured their regulatory regimes to adopt outcomes-based approaches while retaining regulatory oversight of the prudency and efficiency of expenditure. Both Ofgem and Ofwat have also restructured their approach to expenditure reviews by shifting to a total expenditure assessment.

We look forward to working with IPART to help reform the regulatory framework in this direction.

2.2 Efficiency carryover mechanisms

2.2.1 Operating expenditure ECM

As outlined in **Attachment 10: Operating expenditure**, section 1.2, we will not be claiming an efficiency carry-over as part of the operating expenditure ECM.

Despite this, we see continued merit in retaining the stronger operating expenditure incentive the ECM provides for controllable costs relative to the traditional CPI-X framework. Retaining the ECM will continue to drive high quality information for future expenditure reviews, and allows customers in future price periods receive lower prices sooner.

We retain our view presented in our 2016 response to IPART's Draft Report, that the incentives of an operating expenditure ECM would be balanced with a complementary capital expenditure ECM.[1]

2.2.2 A capital expenditure ECM would complement an outcomes-based regulatory approach

In 2016, IPART decided to introduce a carry-over mechanism for controllable operating expenditure, but not for capital expenditure.[2] IPART's reasons for deciding not to include a capital expenditure carry-over mechanism included:

- limited scope for efficient substitution between capital expenditure and operating expenditure, as only 9.5% of capital expenditure would have been covered by the capital expenditure ECM proposed by Sydney Water
- risks of unintended consequences associated with strengthening capital expenditure incentives (that is, incentives for over-forecasting and inefficient deferral of capital expenditure)
- additional complexity, including for the ex post assessment of capital expenditure with an ECM in place, and the nuances of achieving equalised incentives across operating expenditure and capital expenditure.

We are not proposing a capital expenditure ECM as part of this proposal.

The introduction of a capital expenditure ECM would create more balanced and time independent incentives between and for operating expenditure and capital expenditure. This would provide us with a stronger incentive to choose the most efficient solution, whether this is operating expenditure or capital expenditure. Yet, even if a capital expenditure ECM is eventually introduced, it would not address any possible capital expenditure bias that may exist for institutional reasons.[3] A total expenditure (known as 'totex') incentive mechanism could alleviate this problem.[4]

As with any financial capital expenditure incentive, there is a risk that it leads to inappropriate reductions in expenditure or inefficient deferrals. Financial service quality and reputational incentives could help mitigate this risk. However, given the state and territory-based nature of water regulation in Australia, reputational incentives and competition by comparison may be

[1] Sydney Water 2016, *Submission to Draft Report*, *April 2016*, pages 116-117.
[2] IPART 2016, *Review of prices for Sydney Water Corporation: From 1 July 2016 to 30 June 2020,* page 58. IPART's decision was based partly on the advice of their consultant Cambridge Economic Policy Associates (CEPA). See CEPA, *Advice on efficiency carry-over mechanisms,* a report prepared for IPART, February 2016.
[3] See Ofwat, *Capex bias in the water and sewerage sectors in England and Wales – substance, perception or myth? A discussion paper*, 2011.
[4] This approach treats all expenditure jointly and uses a set capitalisation rate to allocate expenditure to the regulatory asset base (RAB) ('slow money') or to expenditure remunerated within year ('fast money'). An *ex ante* sharing factor, as with a capital expenditure ECM, is applied to the totex under/overspend before it is capitalised.

difficult to implement effectively, if at all. This would require service quality incentives to be addressed with robust reporting requirements and good output and outcome measures.

We outline below what we consider to be good features of a capital expenditure ECM, which, as noted above, would need to be complemented with strong reporting requirements (outputs and outcomes).

Features and reporting requirements of a capital expenditure ECM

The features of the capital expenditure incentive mechanism design we proposed at our 2016 determination remain broadly appropriate.[5] We note that IPART did not raise any issues with the functionality of our proposed capital expenditure incentive mechanism.[6]

We consider the following features are appropriate:

- a carry-over period that matches the determination period, other than for the first determination period (as outturns for the last year of the determination will not be available)
- a 25:75 sharing factor between Sydney Water and customers respectively. We note that a four-year determination requires only a 19% sharing incentive for capital expenditure to balance operating expenditure and capital expenditure incentives
- symmetry (that is, we bear the risk of any over-spend)
- a cap and collar, either $50 million for a four-year determination length or a percentage, say 10%, of the capital expenditure subjected to the ECM
- renewal and replacement capital expenditure to be captured by the scheme (approximately 20-30% of total capital expenditure)
- retention of discretion by IPART to assess the permanency of any saving and to reset the capital expenditure allowance at the next price control period
- reporting requirements for output and outcomes tied to capital expenditure, which forms part of our Special Information Request (SIR).

2.3 Proposed determination length

We are proposing to retain a four-year determination length. In our view, this represents the best balance between the costs and benefits associated with a short or long period in the context of the current price review. In our submission to IPART's Issues Paper for the Operating Licence review, we indicated that we would be seeking to move to a five-year price determination from 1 July 2020.[7] However, we now consider it is more appropriate to retain a four-year determination for 2020–24.

[5] Sydney Water 2015, *Our plan for the future: Sydney Water's prices for 2016-20*, pages 256-258.
[6] The capital expenditure ECM mechanics replicates the mechanism used by the AER. The AER's design was heavily consulted on.
[7] Sydney Water 2018, *Review of Sydney Water's Operating Licence, Submission to IPART's Issues Paper*, page 31.

Determining the length of the price determination is a matter of judgement. Short determination periods do not give us the opportunity to fully implement initiatives and respond to the incentives underlying our regulatory framework. Long determination periods potentially provide greater certainty for the utility to focus on delivering for customers but require both the utility and the regulator to have confidence and clarity in the future outlook.

Traditionally, IPART has assessed our proposed determination length based on five criteria which we address below:

1. **Confidence in our forecasts —** Our forecasting capabilities have progressively improved since the beginning of our RAB based regime. This is evident with the continued development of our demand forecasting and long-term capital forecasts. However, as experienced in 2016–20, there has recently been a significant deviation between actual and forecast growth. We have also deliberately adopted a downward revised growth forecast for our capital expenditure program, to reduce risk for customers.
2. **Risk of structural change in the industry —** The structure of the urban water industry is expected to remain stable for 2020–24. IPART's WICA Licence Register8 shows that no new licences have been granted since 2017; we do not know of any significant new WICA schemes expected to begin operation in 2020-24.
3. **The need for price flexibility and incentives to increase efficiency —** The 2020–24 determination period will be the third determination that our customers have had four-year price resets. Maintaining a four-year determination delivers consistency for customers and preserves the current incentive structure for capital expenditure. Absent a capital expenditure ECM, the incentive strength for efficient capital declines the longer the period is, however this must be balanced with the need for customer consistency.
4. **The need for regulatory certainty and financial stability —** We continue to support the modernisation of the regulatory framework. However, changes in the regime, even when positive in the long term, introduce regulatory uncertainty for us and our customers. A four-year determination is consistent with our historical approach, avoids unnecessary uncertainty and allows time to develop regulatory framework changes that will allow us to reduce financial risk and improve outcomes for customers.
5. **The benefits of aligning the price determination with the Operating Licence** — In the long term, staggering the review of prices and our Operating Licence, ideally by two years, is our preferred approach from a business implementation and resourcing perspective. Staggering reviews improves the ability to incorporate licence changes that have expenditure impacts into the price proposal. A second-best option is to have the reviews staggered by one year, although this may be sufficient to include unanticipated or major changes in our initial proposal. At this point, we consider a two-year gap between reviews

[8] See https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/licensing-wica-administrative-ipart-website-private-sector-licensing-website-documents/wica-licence-register-october-2018.pdf

does not outweigh other factors suggesting a four-year determination would be more appropriate for 2020–24.

2.4 Demand volatility mechanism

The current demand volatility and adjustment mechanism was approved in 2016 by IPART to address variation in water sales from the demand forecasts that were reflected in the final determination.[9] The mechanism allows for variations in revenue ±5% over the determination period to be returned to customers or Sydney Water.

IPART has not specified how the demand volatility adjustment mechanism would be applied in the 2020 Determination, but deferred consultation on this issue in the event the threshold was met.[10]

Based on actuals for 2016–17 and 2017–18 and forecasts for 2018–19 and 2019–20, we expect revenue for 2016–20 will be more than +5% compared to the demand forecasts in the 2016 Determination, triggering the possibility of a return of revenue to our customers. We have excluded this adjustment from our proposed 2020–24 revenue requirement (see **Attachment 11: Proposed revenue requirement**, section 1.1.1).

Our actual and forecast water sales for the current determination period are set out in Table 2-1.

Table 2-1 Comparison of forecast and actual water sales

	2016-17	2017-18	2018-19	2019-20	Total
IPART decision – potable metered (ML)	470,600	477,499	481,681	487,387	1,917,167
Sydney Water actual and forecast sales	490,101	526,210	499,180[a]	506,714[b]	2,022,205
Variance	4.1%	10.2%	3.6%	4.0%	5.5%

a Forecast value replaced with outturn in September 2019.
b Forecast value remains, outturn will not be available until IPART final decision for prices to commences in July 2020.

2.4.1 Proposed regulatory treatment

As actuals for 2019–20 will not be available in time for the 2020 Determination, we propose that IPART true up three (or four) years of sales through to 2019–20, to the respective forecasts referenced in the relevant Determinations. Three years has the benefit of establishing settlement against actual sales only for the period in which the 5% was applied. Four years aligns with the 2016 Determination and our proposed 2020 Determination length.

We propose a staggered four-year approach be applied to the application of the demand volatility mechanism true up. Assuming three years are trued up, for 2019–20 through to 2022–23, any revenues returned to customers or Sydney Water should be returned in NPV neutral terms. This is illustrated in Figure 2-2. A true up covering three years of actual sales would generate a return to

[9] IPART 2016, *Review of prices for Sydney Water Corporation – Final Report*, page 151.
[10] IPART 2016, *Review of prices for Sydney Water Corporation – Final Report*, page 151.

customers in 2020 of approximately $30 million. This would also be consistent with IPART's proposed treatment of other new incentive mechanisms introduced in the 2016 Determination that rely on forecasts and actuals, such as the operating expenditure ECM.

Figure 2-2 Proposed adjustment for water demand variances

	True up period 1			True up period 2				True up period 3			
Year	1	2	3	4	1	2	3	4	1	2	3
Determination Period	2016-20				2020-24[a]				2024-2028[a]		

[a] Indicative determination periods

2.5 Pricing flexibility – unregulated pricing agreements

Unregulated pricing agreements were introduced by IPART in 2016 to provide flexibility for large water using customers and Sydney Water to agree to differential price and service offerings where agreed by both parties. The instrument was proposed as an alternative to our proposed Weighted Average Price Cap.

Since 2016, only a small number of customers have expressed interest in unregulated pricing agreements, but none have sought to take up the agreement. The primary reason for no take up is our inability to offer secure long-term prices, given the potential for these agreements to be overturned at future price determinations. Longer-term commitments to pricing are needed where the customer is making a capital outlay in return for a price discount. For example, in a specific location we may be able to defer or avoid capital expenditure if a customer built a water storage tank. In return for making that investment a customer is likely to request a price discount for a period sufficient to allow them to recoup the costs associated with their investment. This period would typically extend beyond the next four-year price determination.

2.5.1 Proposed regulatory treatment

This approach to pricing is still relatively new and it may take time for customers and Sydney Water to identify opportunities for successful pricing agreements. We propose retaining the ability to make these unregulated agreements in 2020–24, to allow continued exploration of potential opportunities that could incentivise economic efficiencies from mutually beneficial agreements.

Unregulated pricing agreements could be reassessed at the 2024 Determination. At that point the policy will have been in place for approximately eight years, and the potential benefit and take-up of agreements will be better understood.

2.6 Performance benchmarking

In its 2016 final report, IPART stated that it will work with the industry and other regulators to develop an improved performance benchmarking framework.[11] We strongly support the use of performance-based benchmarking as a feature of a robust, best practice, incentive-based and customer led regulatory framework, but see this as a long-term objective.

IPART's desire to adopt such an approach is encouraging, and its discussion of alternative techniques and potential cross-checks in undertaking performance-based benchmarking aligns closely with an accepted best practice approach.

Since 2016, we have been engaging with industry via the Water Services Association of Australia, and with the Essential Service Commission and IPART to assess the potential ways of progressing performance benchmarking. This engagement has led to a better understanding of the strengths and weakness of the current single source of industry wide data, the National Performance Report (NPR), which is collected by the Australia Bureau of Meteorology (BOM).

Based on our review of the NPR, we consider that it is not data that is fit for use in benchmarking generally, nor for specific use in setting or informing regulated allowances and prices. A review of the NPR by the BOM in late 2018 highlighted problems and a consensus by industry that there were significant issues with the reliability of the NPR.[12] The BOM and industry are currently working to improve the NPR and make it fit for a broad number of uses, including performance benchmarking.

Improvements to the NPR will take time, as will the collection of data necessary to undertaking robust and reliable performance benchmarking. Meanwhile, we would like to continue working with IPART and industry over 2020–24 to develop an agreed approach to performance-based benchmarking.

2.6.1 Proposed regulatory approach

It is important that IPART provide clear guidance about its intended use of benchmarking analysis within our regulatory framework. This guidance needs to identify a best practice approach to benchmarking that, at a minimum, incorporates the following attributes:

- an appropriately broad set of cost and cost driver variables
- the collection and collation of robust and reliable data
- the use of a range of estimation methodologies
- the adoption of a cautious approach that is consistent with prudency and efficiency and is free of unintended or undesirable consequences.

The approach adopted by IPART should be been informed by adequate consultation. Benchmarking processes that are not developed and undertaken in a transparent, consultative manner, and that are used in a way that does not adequately take into account the limitations of

[11] IPART 2016, *Review of prices for Sydney Water Corporation – Final Report*, page 64.
[12] See http://www.bom.gov.au/water/npr/framework-review/NPR_Framework_Review_Discussion_Paper.pdf

the data and models, lack credibility, create considerable regulatory risk and are generally not widely accepted.

We recommend IPART engages Sydney Water and stakeholders on the following matters:

- the benchmarking techniques that IPART intends to consider
- the data that will be used for benchmarking, and whether IPART intends to rely on publicly-available data
- whether and how IPART intends to initiate a new data collection process to obtain data directly from us
- how costs and cost drivers will be measures and accounted for
- whether and how business-specific and operating environment factors would be accounted for
- the way in which benchmarking will be used to set cost allowances.

2.7 Hawkesbury Nepean Offset Scheme

The Hawkesbury Nepean River provides drinking water, recreational opportunities, agricultural and fisheries produce, as well as support for tourism and mining resources. Activities along the river contribute to the level of nutrients present, which have a significant effect on river health and its ultimate uses.

Many of our wastewater treatment plants (WWTPs) discharge treated wastewater to the river. We contribute approximately 25% of total river nutrients and are the only licensed nutrient sources with discharge/load limits.[13] Discharges from other sources come from point sources, such as local council operated facilities, non-point (also known as diffuse) sources and run-off from farm land.[14]

Our current load limits were set in the 1990s. Over time as technology in WWTPs has improved and growth has occurred, the relevance of current (higher) load limits has diminished. In light of the expected impact on the water quality of the Hawkesbury Nepean River from development and population growth in Western Sydney, the Environment Protection Authority (EPA) has proposed a new approach to managing the Hawkesbury Nepean River, known as the Hawkesbury Nepean Nutrient Management Framework. A part of this framework is the Hawkesbury Nepean Offset Scheme (HNOS), a nutrient trading scheme for licenced nutrient discharges.

[13] Expressed in terms of total phosphorus and total nitrogen.
[14] Of note, we own all the WWTPs of a reasonable scale, with the exception of two in Zone 6 (South Windsor and McGraths Hill) that are owned by Hawkesbury City Council (HCC). There are also two small facilities (with discharge volumes <20ML per annum). These are Kenthurst in Zone 2, which is a sewage treatment plant attached to a retirement village owned by the Uniting Church and Bingara Gorge in Zone 5, which is a private recycled water facility associated with a residential development in South-West Sydney.

The HNOS will come into effect from 2024.[15] The key elements of the scheme include:

(i) modifying (reducing) nutrient load limits which includes (to ensure adequate cost-recovery):

- alignment of changes with our price determination
- determination of changes six years prior to the beginning of each price period
- review every four years based on updated research.

(ii) an off-set trading scheme (the HNOS) based on the assignment of property rights to levels of nutrient discharge, which includes:

- trading between licensed sources and other sources
- adoption of 'direct' offsets relating to regulated nutrients[16]
- offset credits subject to 'trading ratios' and spatial limits that affect trading between zones[17]
- performance monitoring of licensed sources.[18]

We see that the key elements of the HNOS are consistent with regulatory best practice and establish property rights.[19]

In preparation for the new framework, we are upgrading several WWTPs in order to meet lower limits. We also propose operating expenditure of $13 million for 2020–24 for research and development (R&D) projects. Our rationale and proposed treatment is explored below.

2.7.1 Consideration of risks, project types and credits

The HNOS is a pragmatic solution to nutrient management. However, the EPA is using discharge limits on WWTPs to manage nutrient discharges into the entire Hawkesbury Nepean River, rather than directly managing all sources of nutrient discharge. This places the entire responsibility for Hawkesbury Nepean on Sydney Water. This has implications for the risks and types of offset projects incentivised and the HNOS itself.

Diffuse point source polluters may not be incentivised to trade, given we have responsibility for the entire river. There is evidence internationally that this is a risk; however, there are successful example of offsetting within Australia, primarily due to utilities taking lead roles in educating impactors of the long-term benefits of trading.[20] An outcome in which there are little to no trades is

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[15] For current interim load limits see EPA 2019, *Regulating nutrients from sewage treatment plants in the Lower Hawkesbury River Catchment*, Final Draft.
[16] For example, a reduction in phosphorus cannot offset a requirement to reduce nitrogen
[17] Trading ratios are applied multiplicatively, that is, aggregate offset trading ratio = delivery ratio x equivalence ratio x uncertainty ratio. An aggregate ratio of 6 would mean that a reduction in 6 units at the non-point source would be required to offset 1 unit at the WWTP.
[18] That is, when a WWTP acquires offsets from an unlicensed source, the WWTP owner has the responsibility for measuring/monitoring nutrient reductions from the unlicensed source and bears the risk of non-performance.
[19] See Coase, R., (1960), *"The Problem of Social Cost"* , Journal of Law and Economics, The University of Chicago Press, Vol. 3, page 1.
[20] International experience is discussed in Ribaudo, M., and Gottlieb, J., 2011, "*Point-Nonpoint Trading – Can It Work?"* Journal of the American Water Resources Association, page 47.

also a risk to our business, in that little to no trades may not achieve the goals of regulators, bringing about tighter, less efficient future regulatory intervention.

To manage the risk of scheme failure and further regulatory burdens, it is appropriate that we proactively invest in activities to improve the management of water quality in the Hawkesbury Nepean River, including activities relating to governance, water quality monitoring and river health.

Being responsible for the entire Hawkesbury Nepean River, we are incentivised to engage in projects that manage nutrients, but result in few or no offsets credits, such as educational programs. Such projects will improve the overall health of the river, lowering costs in the long term by reducing the likelihood of stricter future discharge limits. Such projects may include:

- encouraging greater compliance with existing guidelines and policies that affect nutrient discharges
- providing support to farmer and other land-owners to improve practices
- establishing systems to facilitate trading of offsets
- improve the monitoring of river-health.

This means that the scope and nature of effective projects may be wide and will require investment in research and development (R&D) and innovation, particularly in the early stages of the HNOS. This means we will face, in the early years of the scheme, relatively high levels of risk for projects. Table 2-2 summarises the risks and issues.

Table 2-2 Sources of project risk

Risk	Significance	Potential management
Cost risk	Potentially higher than traditional projects due to bespoke nature of projects and low R&D/information and experience base	Allow for risk using contingency budgets or cost pass throughs
Delivery risk that benefits not realised because: • project fails to achieve nutrient reductions • nutrient reductions cannot be demonstrated	Very high – greater than traditional projects	• Target a greater level of reductions than required • Establish contingency projects that can proceed in the event some projects fail • Work with EPA on consequences of non-delivery
Regulatory risk that EPA: • does not approve offset • applies higher ratios • modifies rules diminishing project value	High – but difficult to assess	Work closely with EPA and IPART

Given the R&D nature of HNOS projects, unless there is an appropriate risk sharing with customers we are disincentive to engage in projects which may in the long run be more cost effective.[21]

A way of reducing this risk is for us to undertake (and recover the costs of) projects that target a higher-than-required level of offset reductions.[22] This approach reduces the risk of under-delivery but is likely to result in higher than needed short-term nutrient reduction. However, these types of projects will, in the long run, be more cost efficient by avoiding more expensive investment in amplification of traditional wastewater solutions. Further, additional short-term nutrient reduction should result in improved long-term river health, which will benefit customers.

We understand this approach has been adopted by water utilities in Queensland and Victoria, where water utilities bear the costs associated with any shortfall in delivery. [23]

2.7.2 Proposed pricing principles

Given the above, we propose IPART consider the following principles in the cost recovery of offset activities.

Principle 1: Sydney Water should recover the efficient cost of water quality management activities for the Hawkesbury Nepean River that have the support (explicit or tacit) of the EPA

We should be incentivised to take an interest in all cost-effective activities that manage the health of the river that also has the support of the EPA. This includes:

- activities that would enable Sydney Water to obtain offsets under the proposed HNOS
- other activities that assist with the long-term management, governance and monitoring.

Principle 2: Sydney Water should be incentivised to seek financial contributions from other beneficiaries of nutrient management activities

Some nutrient management activities benefit other parties.[24] It is efficient to seek contributions from these beneficiaries.[25] Some projects may not be cost-effective without these contributions.[26]

Principle 3: Sydney Water should not be unfairly penalised for efficient risk taking (including R&D pilot programs that are necessary to efficiently discharge our obligations)

[21] The appropriate sharing of risk between Sydney Water and customers is essential to efficient pricing in the long run and is consistent with Section 15 of the IPART Act.
[22] Another similar approach is to plan for contingency projects, that can be introduced at relatively short notice should some offset projects appear likely to fail to deliver.
[23] See QDEHP (Queensland Department of Environment and Heritage Protection) (2014), *Flexible options for managing point source water emissions: A voluntary market-based mechanism for nutrient management*, April 2014 and EPA Victoria (Environmental Protection Authority Victoria) (2018). *Water quality offsets: Goulburn Valley Water Kilmore case study.* Publication 1690. March 2018.
[24] For example, nutrient reduction strategies in Zone 6 reduce (over the long-term) zonal caps that impact the discharge limits of the WWTPs owned by Hawkesbury City Council.
[25] Possibly equal to at least any avoided costs: we see this principle as being in line with IPART's funding hierarchy
[26] The costs to be recovered from regulatory charges would be net of any financial contribution.

While we should appropriately justify each of the activities we undertake, we should be encouraged to take on riskier activities if they are expected to reduce long-term costs for our customers.[27]

Principle 4: Hawkesbury Nepean nutrient management costs should be recovered via regulated wastewater charges

Consistent with IPART's current principles, costs of obtaining offsets should be recovered from the service that benefits from the offset.

Principle 5: Hawkesbury Nepean costs should be recovered from customers based on contributions to discharge

It is appropriate that the marginal cost of complying with our WWTP limits is estimated and included in the calculation of wastewater usage charges. Where wastewater usage charges do not apply (eg for residential customers), the service charge should reflect the expected level of wastewater usage.

2.7.3 Proposed regulatory treatment

Given the above principles, the building block model (BBM) treatment of offset programs should be one in which expenditure on offsets (net of financial contributions from other sources) would contribute to the wastewater building block and be recovered via wastewater charges. However, there are complexities that relate to whether the expenditure should be categorised as capital or operating expenditure, and, if categorised as capital expenditure, how depreciation is determined.

While WWTP investment is mostly capital expenditure, it is less clear how investments on land that we do not own should be treated. Accounting standards provide some guidance in that they suggest expenditures are capital if they are either 'controlled' and from which 'economic benefits' are expected.[28] Most offset investments will generate economic benefits; however, some may not be 'controlled'. For example, we may not have control over a river-bank investment made on private land.[29] Potentially (some) control may be obtained via contracting, in which case the contract may be considered an asset under our control. However, we note WaterNSW expenditure on catchment management programs on other parties' land is currently treated as operating expenditure.[30]

In Table 2-3 we propose how expenditures should be treated in principle.

[27] This principle is consistent with principles articulated by Ofwat. See Ofwat (2011) *From catchment to customer. Can upstream catchment management deliver a better deal for water customers and the environment?* page 21.
[28] AASB (Australian Accounting Standards Board) (2016), *Framework for the Preparation and Presentation of Financial Statements (AASB, Melbourne, Victoria)*, para 49(a).
[29] Note control does not necessarily equate to legal rights. AASB (2016, para. 57) states 'Although the capacity of an entity to control benefits is usually the result of legal rights, an item may nonetheless satisfy the definition of an asset even when there is no legal control.'
[30] WaterNSW (2015). *Submission to the Independent Pricing and Regulatory Tribunal. Prices for the Greater Sydney Area from 1 July 2016 to June 2020*, section 6.2, page 52.

Table 2-3 Project cost categorisation

Investment	Capital or operating expenditure	Rationale
Riverbank stabilisation on private land	Operating expenditure	SWC has no control over the resource created
Educational campaign	Operating expenditure	Increase is level of education is not an asset over which that SWC has control
Riverbank stabilisation on private land where SWC is granted contractual rights to maintain the investment	Capital expenditure	SWC has control over the resource created that will deliver future economic benefit
Upgrade of WWTP owned by SWC	Capital expenditure	A temporary benefit
Investment in system (IT and hardware) to enable in water quality monitoring	Capital expenditure	SWC has control over the resource created that will deliver future economic benefit

The EPA has proposed that credits from offset projects will initially be limited to eight years.[31] After that, each project will be reassessed for ongoing value. As discussed, there may be projects that do not generate credits but still contribute to better river outcomes. As a result, selecting the appropriate economic life for depreciation is unclear. Given the uncertainty, there is an argument to limit the economic life to eight years. However, a long life might also be used based on the argument that, on average, the economic value will be longer. As there is already an incentive for projects that do not generate credits to occur, we propose depreciation should be based on the useful asset life. This will also reduce risk to customers from accelerating depreciation.

In summary, for projects (excluding R&D for the period 2020–24) we propose:

- all expenditures (net of contributions) are recovered from wastewater services in relevant proportions
- capital expenditure is depreciated over the useful life of the asset via straight-line depreciation regardless of if the project generates tradeable credits
- expenditure which appears to be capital in nature, but we do not have contracted control rights over (that is, on non-Sydney Water land), is treated as operating expenditure.

[31] Specifically, it states "Due to a range of uncertainties with some offsetting activities, the duration of credits is usually limited. To this end, a maximum period of 8 years is recommended, and alignment with allocation periods would seem attractive. Over time, as experience and confidence with diffuse source offsets increases, longer duration credits may be approved. The use of a shorter period in the meantime will not exclude benefits from long-lived abatement measures, but rather require re-approval after 8 years if the offset benefits will demonstrably continue beyond this time."

For R&D projects between 2020–24 we propose:

- all expenditures are recovered from wastewater services in relevant proportions
- all expenditures are treated as operating costs.

3 Regulatory application

3.1 Unregulated services using shared assets

Shared assets are regulated assets that are used to provide both regulated and unregulated services. We use these assets in the provision of unregulated services, while ensuring that customers of regulated monopoly services are at least no worse off.[32]

3.1.1 Proposed regulatory principles

IPART recently conducted a review of their regulatory asset disposal policy and a review of our proposal for the treatment of the Biodiversity Offset Scheme (Biobanking) for water businesses.[33] Our proposals to both reviews set out principles which we consider should apply when dealing with shared assets.

These principles include:

- **promote efficient use of assets —** regulatory treatments ought to incentivise the use of shared assets to their highest value use, provided customers are no worse-off
- **appropriate allocation of risks, costs and/or benefits between Sydney Water and customers —** customers should not pay more than the efficient costs of providing services to them
- **minimise regulatory burden —** consistent, clear, simple and unambiguous policy minimises regulatory burden
- **provide certainty and stability over time —** predictable and easily forecast regulatory outcomes.

3.1.2 Proposed regulatory treatment

Drawing on the principles for efficient asset use agreed with IPART and the precedents established under the asset disposal policy and biobanking scheme, we propose the following regulatory approach to the treatment of unregulated services using shared assets and assess the treatment again the relevant criteria:

- **depreciation:**
    - ***is immaterial or offset by increased maintenance —*** depreciation costs should continue to be allocated to regulated services. The additional maintenance costs would be allocated to the unregulated service

[32] IPART letter to Sydney Water, *Proposed regulatory treatment of participation in the Biodiversity Offset Scheme*, 16 May 2018, p 1.
[33] IPART *Asset Disposals, Policy Paper (for application to water businesses), Final Report*, February 2018.

- *is material* — depreciation should be allocated between regulated and unregulated services based on straight-line depreciation and relative share of throughput in each year of a determination period. The regulatory asset life would be adjusted in line with the accelerated depreciation

- **incremental cost —** incremental costs generated by the unregulated service should be allocated to unregulated services, where these can be readily identified
- **compensating customers for underwriting assets —** appropriate customers should be paid 10% of post-tax profits as a return for underwriting shared assets used for providing unregulated services
- **incremental costs and depreciation that cannot be easily identified —** customers should benefit from a 10% share of the unregulated revenues associated with providing unregulated services, which is consistent with the treatment of the biodiversity scheme.

Table 3-1 Assessment of our shared asset proposal against criteria

Principle / objective	Our assessment	
Promotion of efficient use of assets	Using regulated assets to provide unregulated services may increase asset utilisation, use spare capacity productively and thus promote the efficient use of assets.	✓
An appropriate risk allocation and sharing of costs/benefits with customers	Incremental costs, including depreciation, will be allocated to the unregulated service and ringfenced from the regulatory accounts where identification is simple and would not introduce undue burden. Regulated customers will be shielded from the risk associated with the unregulated activity - no losses from providing unregulated services will be transferred to regulated customers. Customers may benefit from a 10% share of post-tax profit as compensation for underwriting risk.	✓
Minimisation of regulatory burden/costs	The proposed approach to sharing depreciation costs strikes a reasonable balance between simplicity and accuracy.	✓
Stability and certainty	The proposed approach is consistent with other, related decisions. The proposed approach recognizes that unregulated services should not impact the monopoly service provided Any risks regarding profitability of the unregulated services would be borne by Sydney Water.	✓

3.2 Sydney Water Developer Direct

Sydney Water provides developers a choice between engaging a Water Service Coordinator (WSC) to manage the application for a Section 73 compliance certificate and engaging directly with Sydney Water Developer Direct (SWDD).[34] All other development types and developments requiring more complex or 'major works' are managed by WSCs. Through SWDD, we provide our customers:

- application services
- construction services that relate to connecting a property to the water and sewerage network.

We have ensured equivalence in our processes whether a developer chooses a WSC or SWDD. We have also made sure that a developer has the choice of being able to switch to a WSC to build connections to our network.

There are over 30 WSCs, and developers can choose any WSC for their development. Regardless of the choice of using a WSC or SWDD, we remain solely responsible for providing certification services.

3.2.1 Regulatory issues identified by IPART

In its 2018 review of developer charges, IPART indicated its intention to review the regulatory arrangements for SWDD as part of the 2020 price review.[35] Regulatory issues identified by IPART are discussed below, including:

- identifying whether SWDD services are government monopoly services
- ensuring competitive neutrality
- ring-fencing of SWDD expenses
- assessing whether SWDD has an unfair advantage in the market
- options for price regulation of SWDD construction services.

Are SWDD services (government) monopoly services?

We agree with IPART that we are the regulated monopoly service provider of section 73 certification.

IPART has indicated it also considers construction services to be a government monopoly service.[36] Our interpretation differs. We consider minor construction services offered in conjunction with SWDD to be an ancillary and miscellaneous customer service.[37] Our view is based on the

[34] Section 73 compliance certificates are issued under the *Sydney Water Act 1994*.
[35] IPART 2018, *Maximum prices to connect, extend or upgrade a service for metropolitan water agencies, final report*.
[36] IPART 2018, *Maximum prices to connect, extend or upgrade a service for metropolitan water agencies, final report*. Monopoly services are defined in paragraph 3(e) of the *Independent Pricing and Regulatory Tribunal (Water, Sewerage and Drainage Services) Order 1997*.
[37] Paragraph 3(f) of the Order, and not government monopoly services as defined under paragraph 3(e) of the Order.

facts of the service being offered, which is indicative of a contestable market and does not justify regulation by IPART, including:

- there are 30 WSCs and more than 150 constructors in the market
- we facilitate competition by facilitating consumer information on our website
- constructors are selected from a competitively tendered panel
- common statistical measures of a contestable market show a well-functioning level of contestability.

We list WSCs and minor constructors on the SWDD portion of our website, to facilitate information as part of a well-functioning competitive market for the benefit of our customers.[38]

We outsource SWDD minor construction needs to constructors from a competitively tendered panel of over 150 construction firms, passing quotes directly onto customers. We also provide information to customers that they are free to choose any constructor (or WSC).[39]

This process and the contestable nature it has facilitated is reflected in statistical measures – the Herfindahl–Hirschman Index (HHI) and Concentration Ratios (CR) – of the contestable level of the SWDD market. Table 3-2 provides the measures since the introduction of SWDD in 2017.

Table 3-2 SWDD measures of market dynamics – WSC-s73

Interval	HHI	CR4	CR8
1 Jul to 31 Dec 17	1107	0.57	0.75
1 Jan to 30 Jun 18	1360	0.60	0.76
1 Jul to 31 Dec 18	1289	0.61	0.76
1 Jul 17 to 31 Dec 18	1235	0.59	0.75

Source: SWDD, based on total s73 applications

An HHI of less than 1,500 is accepted to be an unconcentrated market and indicative of a contestable market.[40] This is the case for every period reviewed since 2017. The CR4 and CR8 measures are also indicative of a contestable market in that there is little difference between the market shares of the top 4 firms (not reported for confidentiality purposes); they are also indicative of a quality/service difference between the top 4 firms given low barriers to entry. Further, the market share of the top 5th to 8th firms' differences by approximately 1 percentage point of market

[38] See heading of *"Who can construct your works?"*, found here: https://www.sydneywater.com.au/SW/plumbing-building-developing/developing/Sydney-Water-Developer-Direct/index.htm.
[39] Limited only by the type of work needed for their development and the services the constructor is willing to provide.
[40] US Department of Justice Horizontal Merger Guidelines, 19 August 2010, available at https://www.justice.gov/atr/horizontal-merger-guidelines-08192010#5c.

share. The rank order of the 4th to 8th firms changes between each period, as well as the makeup of the firms changing, which are all indicative of a dynamic contestable market.[41]

Finally, contestable markets have low barriers to entry and exit, so that firms can, all else equal, enter the market and compete away any excess profits over time if they arise. In the market for minor construction services, there are low barriers to entry, for example, software / IT seat licence fees, general administrative cost, with the largest barrier to entry possibly being the cost of formal education and training, such as plumbing. Firms who are licensed as WSCs, and already offer to coordinate major construction services, can offer minor construction services at low additional cost.

The above is evidence of a market that is continuing to develop and is contestable. However, should IPART maintain that construction services are monopoly services, we recommend IPART adopts a position of regulatory forbearance and monitors market development. If IPART is to price regulate the minor construction market, we consider that the market should be provided sufficient time to transition to any new arrangements.

Ensuring competitive neutrality and ring-fencing

Competitive neutrality in relation to SWDD requires that we do not have an unfair advantage over WSCs in the provision of section 73 and minor construction services by virtue of being a monopoly provider of another service. These advantages include both price and non-price factors, as discussed below.

Price factors

We establish our market offer based on the build-up of regulated and unregulated costs, plus ex ante consideration of the competitive nature of the market. We ring-fence all of our relevant costs as required by IPART. We explore each below.

Application fee

We charge a regulated price for application services which fall within regulated services for:

- building plan approvals
- development requirements application – complying development.

In relation to other application services, we annual review this price, ensuring it reflects the underlying cost.

Construction fee

Construction costs vary on a case-by-case basis. We provide our developer customers with a project specific quote (as discussed earlier), passed through directly from our panel.

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[41] See for a discussion on relating the HHI to the CR4, Leo E. Sleuwaegen, Raymond R. De Bondt and Wim V. Dehandschutte, *"The Herfindal index and concentration ratios revisited",* Investigation Report Number 8601, industry and Company Analysis Program, Katholieke University Leuven, May 1986.

We obtain up to three quotes and select the quote that meets the technical requirements of the project and timelines required by the developer at the least cost.

SWDD customers are free to test the market, choosing to obtain further quotes from the provider list we share publicly and engage a WSC to manage the works.[42]

Other costs

Other costs recovered from final SWDD charges to ensure competitive neutrality and standalone costs, include the addition of (when appropriate):

- overheads (following IPART's precedent)
- a project coordination fee for 2 hours of labour
- recovery CAD cost software licence
- a fee to convert the work-as-constructed data into an electronic format and upload them to our system.

Using determined margins

In the case of SWDD, we could be considered to be vertically integrated in that we own and operate the upstream platforms used to provide section 73 and application services and charge WSC's an IPART determined regulated fee for use of these platforms. We also compete with WSCs in the downstream market for the supply to customers for the management of the process, which includes minor construction services. The WSCs differ from us in that they add services, such as different payment options, end-to-end 'one-stop-shop' services, to transform the core services.

By charging a downstream price that is too low relative to the regulated input price, we may have the effect of constraining competition from WSCs, or at least significantly weakening their competitive positions.[43] This is known as a margin squeeze or predatory pricing.

An (ex ante) margin squeeze test seeks to measure the margin that a hypothetically efficient competitor to SWDD would need to earn to efficiently remain in competition with SWDD in the WSC-s73 market. A margin squeeze test can be used ex ante as a first step in detecting and avoiding any inadvertent anti-competitive or non-competitive neutrality behavior by identifying, a price that allows efficient competitors to fairly compete. It is important to note that although the principles on which margin squeeze tests are based are sound, they should generally not be solely relied upon as in practice most markets are very complex and dynamic (at a point in time and even

[42] One in five SWDD customers carry out their construction with an alternate minor constructor and/or a WSC.
[43] The term 'effect' is used to describe the Effects Test that will replace the previously lower evidentiary standard of the 'likelihood' of substantially lessening competition of section 46 of the CCA. Technically, market power is determined as being present if, in all likelihood, a firm is shown to be able to sustain a small but significant, non-transitory increase in price (SNIPP), known as a SSNIP test. Although the SSNIP test is technically outlined as part of merger guidelines in Australia (See ACCC Merger Guidelines November 2008), it has been used in unilateral market power assessments, see Queensland Wire Industries Pty Ltd v Broken Hill Proprietary Co Ltd (1989) 167 CLR 177., noting that the SSNIP test incorporates supply-side as well as demand-side responses to a price increase by the relevant firm.

across time) and require a degree of experience and nuance in interpreting competitive market dynamics.[44]

We have applied an ex ante margin squeeze test based on three costs standards[45] (Equally Efficient Operator, Reasonably Efficient Operator, and adjusted Reasonably Efficient Operator) over a three-year forecast period. We use the results of these tests to determine a relevant yearly declining margin to apply to our costs over a time to maintain the efficiently competitive market, while passing onto consumers margins over time as competition intensifies.

Non-price issues

IPART noted that stakeholders have indicated that there is a lack of equivalence between SWDD and WSC's in that:

- WSCs are required to provide 'Work As Constructed' (WAC) drawings to us in AutoCAD, which requires an expensive software licence, but SWDD is not required to do so
- we subject WSC's to a different (higher) inspection regime.[46]

We consider that above issues raised by WSCs present a barrier for the market for the reasons explored below.

In relation to WAC information, the rationale for requiring Computer Aided Design (CAD) WAC information, is to ensure the integrity and resilience of our records system when information is loaded into the system, ensuring an improved quality and cost of service for all users. Internally for automatic uploads, we have also made use of WAC CAD based information. We also do not strictly require WSC's to use the AutoCAD LT product, any compatible Computer Aided Design (CAD) product is feasible.

In relation to costs of CAD software and licences, we have consulted with Autodesk Australia[47], the provider of AutoCAD, and confirmed the yearly seat licence cost for AutoCAD LT (version suitable for this type of work) is $590.

Regarding our inspections we note that that regime is identical for works conducted by a WSC and SWDD. We are responsible for ensuring that all construction complies with the standards set for our network, as a result:

[44] For example, adverse effects in the WSC market may be as a result of: temporarily bad market conditions; competitors already operating below cost; market in decline; or misjudgement of competitors, eg, entering the market on too large a scale. Alternatively, a low price by SWDD or any other competitor could be justified as: a temporary marketing initiative; a need to achieve scale for a new product with low volumes; or, inefficient firm or competitors believes it may be able to improve performance or products. The strength of these justifications must be taken in context of the Effects Test.
[45] See, for example: Areeda and Turner (1975) Predatory Pricing and Related Practices under Section 2 of the Sherman Act; Baumal (1996) Predation and the Logic of the Average Variable Cost Test; and Ofcom (2015) Fixed Access Market Reviews: Approach to the VULA margin.
[46] IPART 2018, *Transcript of Public Hearing for Review of Developer charges and Backlog Sewerage Charges for the Metropolitan Water Agencies*, page 59.
[47] https://www.autodesk.com.au/

- WSCs Minor Works are subject to random site audits by our internal Asset Inspection Services (AIS). SWDD works are subject to random site audits by independent third party civil contract services
- we have AIS attend all SWDD and WSC pier inspection and concrete encasement work
- WSCs are not required to be on site for any other standard minor works sewer, but are required (as are we) to ensure accredited construction personnel and site-specific documentation is kept on site.

Assessing whether SWDD has an unfair advantage

We have recognise the broad concerns raised that we have an unfair advantage in this market.[48]

Based on our assessment of the evidence above, we consider that we are providing the market with a degree of fair and efficient competitive tension on both price and non-price terms which were, in our estimation, was missing prior to our entry.

The SWDD business is fully ring-fenced from our regulated business and is not subsidised by our regulated revenue stream.

3.2.2 Proposed regulatory treatment

Our view is that regulation of the construction market is not required. Rather we prefer a light-handed approach to regulation that focuses on information disclosure for customers to continue facilitating a contestable market.

If IPART decides to regulate prices for construction services as a government monopoly service, section 13A of the IPART Act sets out the options available to IPART, including:

- application of price caps by setting a maximum price for the service, and/or
- adopting pricing principles that define a methodology that can be used to calculate a maximum price for a service.

Once IPART has decided on the best approach we must charge the relevant price unless we have written approval from the NSW Treasurer to charge a lower price.

Should IPART set a maximum price, we consider that this will likely lead to inefficient pricing and an uneven playing field in our favour. This is due to the cross-subsidies that would be forced into pricing from postage stamp pricing, given the large heterogeneous nature of construction service costs.[49]

If a formula-based approach is adopted, significant difficulties are likely to be involved in administering the formula, which will likely make many of our SWDD offerings not worthwhile. This would stifle a competitive offering and disadvantage customers. In either instance, we would be the

[48] IPART 2018, Developer Direct public hearing.
[49] See Sydney Water 2017, *IPART review of developer charges and backlog sewerage charges for metropolitan water agencies* 2017, *Sydney Water response to IPART's Issues Paper*, page 45.

only provider in the market subject to a pricing restriction for construction services (presuming WSCs remain unregulated).

Our preference, should IPART seek to set a price for minor construction services, would be to use a price methodology based on the appropriate unit costs for minor construction services.

3.3 Rainwater in the wastewater system (source control)

Excessive rainwater and groundwater entering our wastewater system through faults in private plumbing or illegal stormwater connections can lead to or exacerbate wastewater overflows to the environment or onto other customers' properties. Managing overflows by limiting the amount of excess volumes entering the wastewater system is known as source control.

Traditionally, we have managed wastewater overflows by upgrading our wastewater system by amplifying pipes and constructing storage tanks (see **Attachment 9: Capital expenditure expenditure**, section 2.4.1.1). However, we have proposed incorporating source control on private properties as part of our 2020–24 wet weather overflow abatement program, where it can achieve the same outcomes as traditional solutions at a lower cost (that is, in targeted areas where there is a high amount of excessive rainwater and groundwater entering our system).

Our customers support Sydney Water undertaking source control measures where cost effective (see **Attachment 3: Customer engagement**, section 2.6). Customers also supported funding this work from all customers (indirect beneficiaries), rather than attempting to recover costs only form properties with faulty plumbing (impactors). [50]

We recognise that a 'first best' funding approach in this case is an impactor pays outcome. However, there are significant hurdles when requiring private landowners to conduct repairs of a sufficient quality on their property. It is less costly and provides more certain environmental outcomes (benefits) to conduct the repairs ourselves. A one-time resolution to fix the problem tends to be less expensive than outsourcing fixes to impactors. For example, outsourcing fixes to impactors requires: inspecting, serving the homeowner with a notice, responding to queries about the notice, following up, attempting to verify the quality of work they have done, and possibly, further action. Alternatively, we are well-placed to conduct a one-time resolution quickly and cost-effectively.

It is also often difficult or impossible for us to compel impactors to remedy faults at their expense. We have powers to restrict water supply for non-compliance (for example, if there is an illegal stormwater connection), or can request the property owner to remedy the problem, but our powers to direct property owners to fix faulty assets are limited, given we no longer regulate plumbing. These provisions do not adequately solve overflows quickly or effectively. Some customers also expressed a view that forcing homeowners to fix problems is 'unfair' if they have recently bought a property with illegal plumbing connections and were unaware of the fault.

[50] Customers supported the Sydney Water funded source control option which was presented based on a bill saving of $3 a year, compared to a bill saving of $4.60 a year if property owners funded the work, or no bill saving if Sydney Water continued to implement a traditional approach. See **Attachment 3: Customer engagement**, section 2.6 for more detail.

3.3.1 Proposed regulatory treatment

We propose that expenditure on source control for private properties be treated as capital costs for the purposes of the 2020 Determination, as it is offsetting capital expenditure that would otherwise be required to build new storages and amplify our assets. This avoids Sydney Water being disincentivised from implementing the lowest cost solution in the long term to meet our environmental obligations.

This regulatory treatment would also allow IPART to consider any expenditure on source control on private properties in its prudency and efficiency review in 2024 (as, from a regulatory treatment perspective, it would be considered capital expenditure).

We propose progressing down IPART's funding hierarchy to allocate and recover costs from the wider customer base (indirect beneficiaries).[51] This position is based on:

- a least cost solution for source control fixes on private property
- support by our customers in our customer consultation[52]
- the difficulty in enforcing fixes and recovering costs from impactors.

3.4 Untreated wastewater outfalls at Vaucluse-Diamond Bay

Our wastewater system on Sydney's Vaucluse Peninsula has been discharging untreated wastewater from three cliff-based ocean outfalls since it was built. These three outfalls are the only remaining untreated wastewater discharge sites in Sydney.

As outlined in **Attachment 3: Customer engagement**, section 2.5 and **Attachment 9: Capital expenditure**, section 2.5, customers support us discontinuing the daily discharge of untreated wastewater into the ocean from these outfalls and diverting it to our Bondi treatment plant. Customers were willing to pay more per year than the per customer cost of the project, based on current estimates. Aligned with customer feedback, we are proposing $63.5 million in capital expenditure in 2020–24 to build assets to divert this wastewater to our Bondi treatment plant. As is common throughout our wastewater system, untreated discharges would then only occur during wet weather events.

3.4.1 Proposed regulatory treatment

As the discharges are allowed under our current EPL, we have proposed this capital expenditure to be discretionary. Impactors and direct beneficiaries could be seen as being (primarily) customers in the local area. However, given customer support and willingness to pay, we propose all customers (that is, indirect beneficiaries) should fund this work. That is, the proposed capital expenditure for 2020–24 should be added to the wastewater RAB.

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[51] IPART 2019, *Rural Water Cost Shares – Final Report*, page 23.
[52] The forums revealed that customers view this approach as a form of 'insurance' against purchasing a home with the faults requiring costly source control. There was also a sense that the cost to remedy the overflow may be too much to bear for a low-income customer.

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Attachment 8

Water Demand and Customer Numbers

Price proposal 2020–24

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Water demand and customer numbers

Key messages

Water demand

- We continue to use the demand forecasting approach endorsed by IPART and industry experts in past price reviews. We employ sophisticated panel data econometric techniques. Our model is constantly enhanced with the latest information relating to demand, weather conditions and property growth; and undergoes a rigorous peer review.
- We expect total water demand for 2016–20 to be 2,294 GL, 6% higher than IPART's forecast in the 2016 determination. This is mainly driven by higher than expected customer growth and much hotter and drier weather than normal in the first two years.
- For 2020–24 we forecast total water demand to be 2,346 GL, 8.4% above IPART's forecast for the 2016–20 period. This is due to higher than expected dwelling growth in 2016–20 and 2020–24, and refinements to the model such as higher price elasticity and adjustments for climate change.
- We forecast average residential demand over 2020–24 to be about 200 kL per household per year. It will slowly decrease over the four years due to an increasing proportion of units and BASIX-certified dwellings.

Customer numbers

- Customer numbers are a key determinant of our costs, revenues and water demand. We serve 2,036,000 properties with drinking water, 1,996,000 million with wastewater and 585,331 with stormwater services.[1] Around 93% of our customer base is residential.
- Our forecasting approach, which IPART acknowledged as reasonable in the 2016 review, is primarily based on housing forecasts by the Department of Planning and Environment (DPE)[2].
- Our growth during 2016–20 has been about 2%, which is slightly above the long-term average of 1.3% per year, and above DPE's residential growth forecasts.
- Our number of new water, wastewater and stormwater customers for 2016–20 is slightly higher than IPART's decision in the 2016 determination. This is largely driven by dwelling completions, which have reached a 45-year high and caught up to dwelling approvals. Strong market conditions and increases in housing supply also contributed.
- For 2020–24, we expect growth to remain high, but slightly below the peak of the last three years. There are signs that construction activity, building approvals and housing investor rates are easing.

1 Forecast for June 2019.
2 The Department of Planning and Environment is expected to be known as the Department of Planning, Industry and Environment in future.

1 Introduction

The level of demand for water, wastewater and stormwater services is a key consideration in our price proposal. Estimates of total water demand affect our costs, because they underpin how much water we buy from WaterNSW, extract from the Hawkesbury Nepean River, and our consequent treatment costs. Further, the expected billed metered demand, described as the volume of water used by our customers – determines our expected revenue.

1.1 Key terminology

1.1.1 How we count customers

Customer numbers can be counted in various ways. In the *Customer Numbers* section, we generally refer to customers in the way they are charged for water and wastewater services.

Residential customer numbers refers to the number of dwellings (not meters), as each residential dwelling pays a full meter charge, or equivalent if they do not have an individual meter. For example, a unit block with one meter and 10 units would be counted as 10 residential customers.

Non-residential customer numbers refers to the number and size of meters, as non-residential customers only pay a proportion of the meter charge, depending on how many non-residential customers are being served by that meter. Using the example above, a non-residential unit block with one meter and 10 units would be counted as one non-residential customer (each of those non-residential customers would only pay one tenth of the meter or service charge).

When we forecast *water demand* we do not use the number of meters as a proxy for the number of customers, as we are less concerned with how they are charged and more concerned with how much water is being used. Using the unit block example above, when forecasting water demand we count each dwelling, so a residential block of 10 units with one meter would be counted as 10 residential dwellings and a non-residential block of 10 units with one meter would be counted as 10 non-residential units.

1.1.2 Overview of key water demand concepts

Figure 1-1 shows the key water demand concepts, and how we recover our costs through revenue from water sales to our customers.

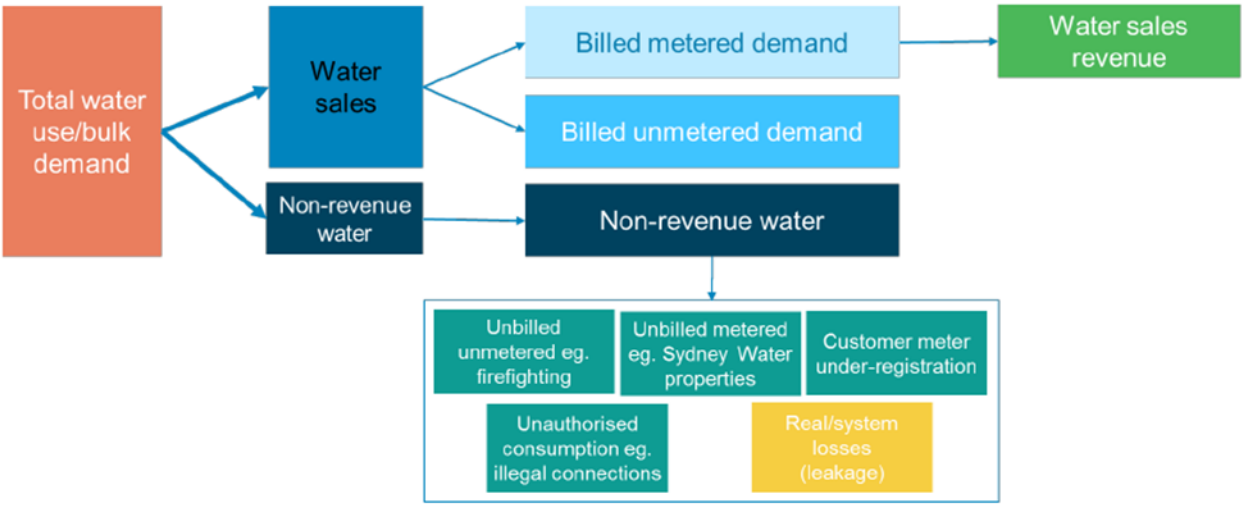


Figure 1-1 Overview of demand and revenues from water sales

Total water use equals the total amount of water produced by the water filtration plants plus the unfiltered water supplied to a large industrial user. The forecast of total water use determines the forecast of raw water purchases from WaterNSW and the Sydney Desalination Plant (if any), water extracted from the Hawkesbury Nepean River, and forecast water treatment costs.

Billed metered demand (including unfiltered water) is the volume of water used by customers who have a water meter. It excludes water we use at our own metered sites which is included in unbilled metered consumption. Billed metered demand determines the forecast of water sales revenue, which is why it is presented separately to the forecast of total demand.

The difference between total demand and billed metered demand is made up of billed unmetered demand and non-revenue water. Billed unmetered demand is the (estimated) water use by customers who do not have a water meter. These customers do not pay for water use based on their actual demand (which is unknown), but through a higher service charge based on a deemed consumption. Therefore, the forecast of actual demand by these properties is not relevant to forecasting water sales revenue and is not presented explicitly in this attachment.

Billed metered demand typically accounts for about 89% of total water demand, and billed unmetered is estimated to account for about 1%. The remaining 10% is non-revenue water, the main component of which is real losses (system leakage) at about 7% to 8%.

Throughout this attachment we use the terms water demand and water use interchangeably.

2 Water demand

This section is structured as follows:

- In Section 2.1 we compare forecast and actual demand in 2016–17 and 2017–18. We discuss the causes of the variation, and quantify their contribution to the total variation. We also present an updated forecast for 2016–20, based on actuals for the first two years and an updated forecast for the remaining two years.
- Section 2.2 details the demand volatility mechanism.
- Section 2.3 presents our forecast for 2020–24, including major assumptions.

For a description of the updated model used to prepare the new forecast for 2016–20 and the forecast for 2020–24, see Appendix 8A.

2.1 Water demand 2016–20

We expect total water demand for 2016–20 to be 2,294 GL, 129 GL (+6%) higher than IPART's decision in 2016 of 2,165 GL. This is based on actuals for the first two years and an updated forecast for the remaining two years.

Water demand during the first two years of 2016–20 was 8.2% higher than forecast. The main reasons for this variation are:

1. significantly higher than forecast growth in the number of residential dwellings served
2. record high temperatures in combination with prolonged periods of below normal rainfall
3. faster than forecast growth in demand by non-residential properties
4. higher than forecast real losses (system leakage)
5. significantly higher supply of unfiltered water, in lieu of recycled water, due to a recycled water main break.

In 2018 we updated our water demand forecast model (detailed in Appendix 8A). Our new forecast for 2018–19 and 2019–20 is about 4.9% higher than the original forecast for these two years as included in our 2015 price proposal, and about 3.7% higher than what IPART decided in the 2016 determination. See actual and forecast water demand over 2016–20 in Table 2-1.

This is mainly due to higher dwelling numbers than used for the original forecast, and higher non-residential demand. The updated forecast assumes a return to average weather conditions. However, these average conditions have been adjusted to include the effect of climate change, which has also increased the forecast compared to the original.

The updated water demand forecast model also uses a slightly higher estimate for the price elasticity of demand, which results in greater increase in demand due to the water usage price drop which came into effect in July 2016. For further detail on the revised forecast for 2018–19 and 2019–20 see Section 2.1.2.

Table 2-1 Water demand over 2016–20 (GL)

Demand component	2016–17	2017–18	2018–19	2019–20	Total
IPART decision					
Billed metered demand					
Residential	355	361	365	370	
Non-residential	116	117	117	117	
Unfiltered	1	1	1	1	
Total billed metered[a]	**471**	**478**	**482**	**488**	
Billed unmetered, non-revenue and recycled top-up	**61**	**61**	**62**	**62**	
Total[a]	**532**	**539**	**544**	**550**	**2,165**
Actual and updated Sydney Water forecast[b]	(actual)	(actual)	(updated forecast)	(updated forecast)	
Billed metered demand					
Residential	362	390	374	382	
Non-residential	128	136	125	125	
Unfiltered	7	7	2	2	
Total billed metered[a]	497	533	**501**	**509**	
Billed unmetered, non-revenue and recycled top-up	**61**	**68**	**64**	**62**	
Total[a]	**558**	**601**	**565**	**570**	**2,294**
Variation to IPART total (Actual/forecast – IPART total)	26 (+4.9%)	62 (+11.5%)	21 (+3.9%)	20 (+3.6%)	129 (+6.0%)

[a] Totals may differ from sum of components due to rounding
[b] Updated forecasts based on the updated (PR2020) water demand model

2.1.1 Factors contributing to higher than forecast demand

This section focuses on billed metered water demand as this is most relevant to variations in revenue.[3]

Variations in unfiltered demand are not discussed here because, unlike filtered water consumption, there is no simple one-to-one relationship between variations in the volume of unfiltered water consumption and variations in revenue from unfiltered water.[4]

Figure 2-1 shows IPART's forecast of water demand for 2016–20, as decided in the 2016 determination, and actuals where available. It is slightly higher than the initial forecast we submitted.[5] Billed metered demand (excluding unfiltered water) was 19.5 GL or 4.1% higher than forecast in 2016–17 and 48.7 GL or 10.2% higher than forecast in 2017–18.

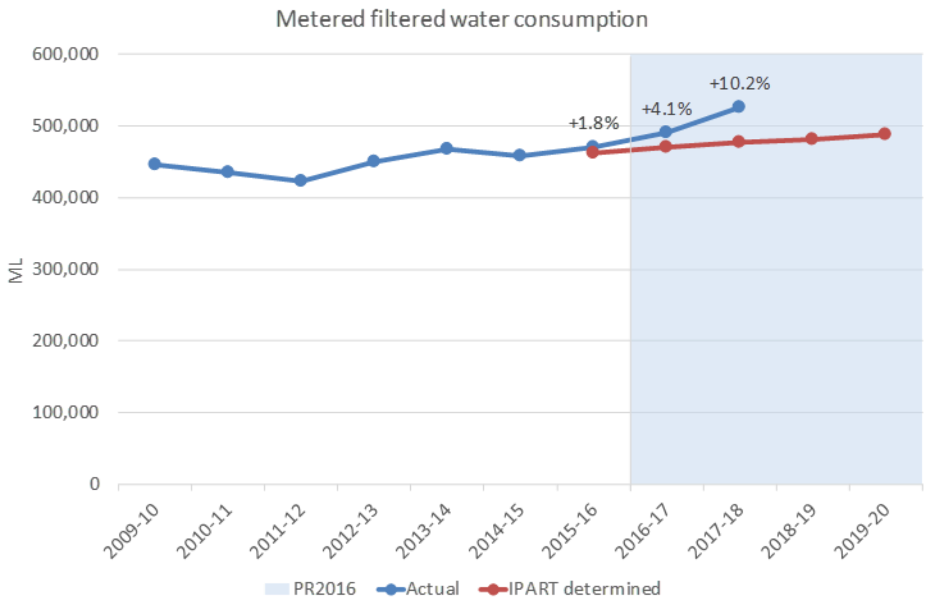


Figure 2-1 Actual and forecast demand for PR2016 (billed metered demand excluding unfiltered)

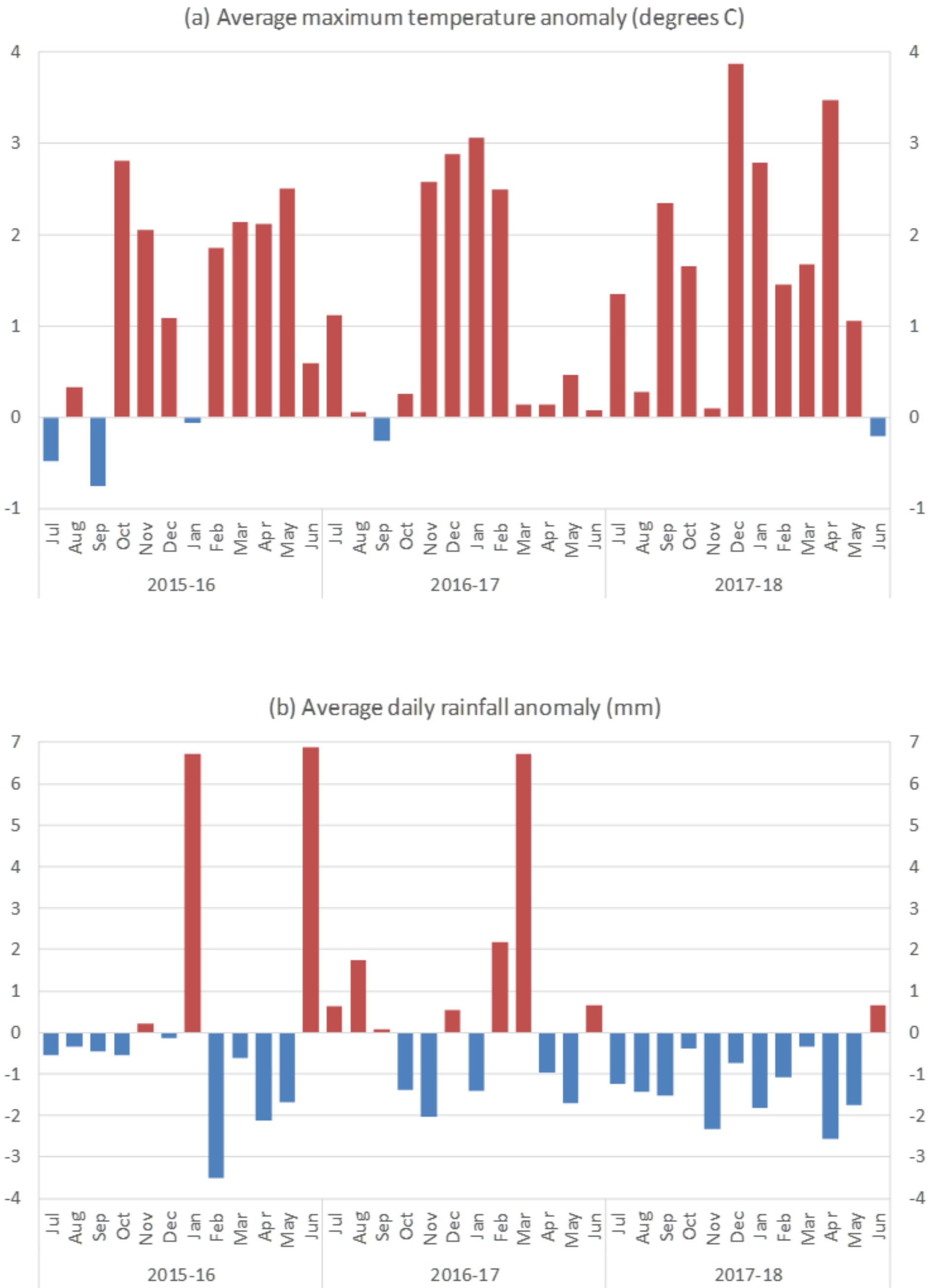
Weather patterns

Water demand depends on weather conditions such as temperatures and rainfall. All else equal, demand is higher in a relatively hot, dry year than in a relatively cool, wet year. It is not possible to forecast weather conditions five to six years in advance. Therefore, when we produced our 2015 forecast for 2016–20, we used average weather conditions in the forecasting model.

Figure 2-2 shows the anomalies for average maximum temperature (panel a) and average rainfall (panel b) for each month from July 2015 to June 2018. Actual maximum temperatures and rainfall conditions deviated from their long-term average values. A positive temperature anomaly indicates

[3] Variations in non-revenue water by definition do not lead to variations in revenue (but can lead to variations in costs, eg. raw water purchase and treatment costs).
[4] Appendix 8B – Confidential.
[5] *Our plan for the future: Sydney Water's prices for 2016–20. Sydney Water, June 2015.* The difference between our forecast and IPART's is due to two factors. The model used for the initial forecast did not include a price elasticity for the non-residential sector. An estimate of this elasticity was added following our proposal. Also, IPART decided to use a forecast based on a price elasticity asymmetry factor of 0.75 instead of 0.5 as used in the initial forecast included in our proposal.

a relatively hot month for the time of the year. A negative rainfall anomaly indicates a relatively dry month for the time of the year.



Note: Based on data from the Bureau of Meteorology weather stations at Sydney Airport and Prospect Reservoir (weighted 27% and 73%, respectively). The long-term average against which anomalies are calculated is based on the 30 years to June 2014.

Figure 2-2 Temperature and rainfall anomalies

2016–17 and, to an even greater extent, 2017–18 were characterised by relatively hot and dry weather resulting in higher demand than the forecast based on average conditions. Average maximum temperatures during these two years were consistently above average except for two months (September 2016 and June 2018). In 2016–17 the deviations were most pronounced during late spring and summer (November to February) but in 2017–18 almost every season exhibited well above average maximum temperatures. In addition, whereas 2016–17 saw a few months with above average rainfall, 2017–18 saw consistently below average rainfall (except for June). As a result, the variation in demand due to weather conditions was considerably higher in 2017–18 than in 2016–17 (see Figure 2-4).

Dwelling growth

Figure 2-3 shows the forecast of the number of residential dwellings served with water at June of each year as was used for our 2015 price proposal forecast. It also shows actuals and updated forecasts for June 2019 and 2020. The number of dwellings served with water in June 2017 and 2018 was, respectively, 1.6% and 2.6% higher than forecast. By June 2020, the number of dwellings served is now forecast to be about 4% higher than the original forecast.[6]

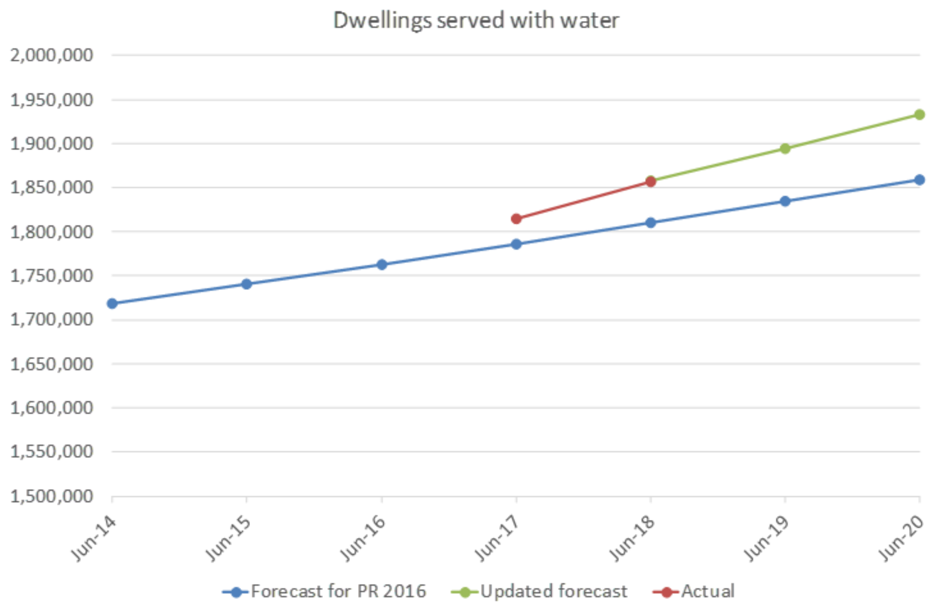


Figure 2-3 Forecast and actual number of dwellings served with water at June of each year

Price effects

Analysis carried out to update the demand forecasting model for the 2020 price review suggests that the water usage price decrease that came into effect in July 2016 had slightly more impact than was originally forecast (see Appendix 8A). For example, for single dwellings the analysis suggests a (weighted average) price elasticity of -0.218 for price decreases. The forecast for 2016–20 was based on a value of -0.25 combined with an asymmetry factor of 0.75. This is equivalent to a price elasticity of -0.188, somewhat less (in absolute terms) than the updated estimate.

[6] The variations presented here may be slightly different from those presented in Section 3. For the demand forecasting model, the dwelling numbers are adjusted for the reclassification in June 2016 of about 9,100 dual occupancies (which each count as two dwellings) to single dwellings (which each count as one dwelling). This adjustment is made to ensure consistent treatment of these reclassified properties for demand forecasting purposes.

Other Properties

The model includes a segment, Other Properties which refers to a group of property type codes which do not readily fit into the residential or non-residential sector, eg. “occupied land”. The consumption of this segment is relatively small at about 4 GL/year, less than 1% of total demand. The review of the model for the current proposal revealed that during a previous update the consumption of these properties had been set to 1 GL/year instead of 1 GL/quarter, resulting in an under forecast. This has been corrected in the updated model.

Quantification

Our demand forecasting model as used for the 2015 proposal was used to quantify the impact of the factors discussed above. The dwelling forecast was replaced with actual dwelling numbers to June 2018. The difference between the resulting forecast and the original forecast provides an estimate of how much of the additional demand is due to the higher dwelling growth.

To estimate the effect of the hotter and drier than average weather conditions we replaced the average weather conditions that were inputted for the 2015 forecast with the actual weather conditions to June 2018. The increase in the forecast provides an estimate of how much of the additional demand is due to weather conditions deviating from normal conditions.

We also adjusted the price elasticity asymmetry factor such that the effective price elasticities are consistent with the results obtained by the regression analysis carried out for the updated model. The increase in the forecast is an estimate of the additional price effect, ie the effect over and above the effect included in the original forecast.

Figure 2-4 summarises the results. Higher dwelling growth is estimated to have resulted in an additional demand of 3.6 GL in 2016–17 and 6.3 GL in 2017–18. The hot and dry weather conditions in 2016–17 and, in particular, 2017–18 are estimated to have increased demand by 7.4 GL and 26.6 GL, respectively, compared to what would have occurred under average weather conditions. The higher than assumed price elasticity is estimated to explain 1.5 GL (2016–17) and 2 GL (2017–18) of the higher demand. The mistake in the forecast for Other Properties explains 3.3 GL of the higher than forecast demand in each year. [7]

[7] The underestimate is 3.3 rather than 3 GL/year due to an interaction with unbilled metered demand.

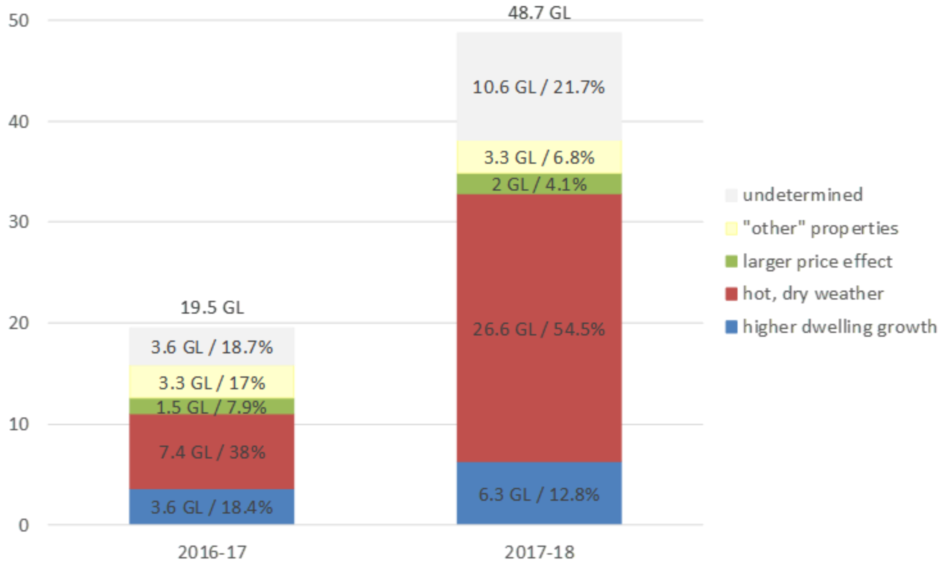


Figure 2-4 Impact of key factors contributing to higher than forecast demand (billed metered demand excluding unfiltered water only)

There remains 3.6 GL in 2016–17 and 10.6 GL in 2017–18 which cannot be attributed to these factors. Categorising this analysis into residential and non-residential demand reveals that this unattributed variation is almost entirely due to the non-residential sector.

As shown in Figure 2-5, the model is able to reproduce observed residential demand almost exactly when we make the adjustments as described above. The average hindcast error between 2014–15 and 2017–18 is only 1.1 GL/year or 0.3% higher than observed, ie a slight *over*prediction. In other words, the factors described above fully explain the observed underestimation in the residential segment. However, in the non-residential and Other segment there remains an underestimate of 5.8 GL in 2016–17 and 10.0 GL in 2017–18.

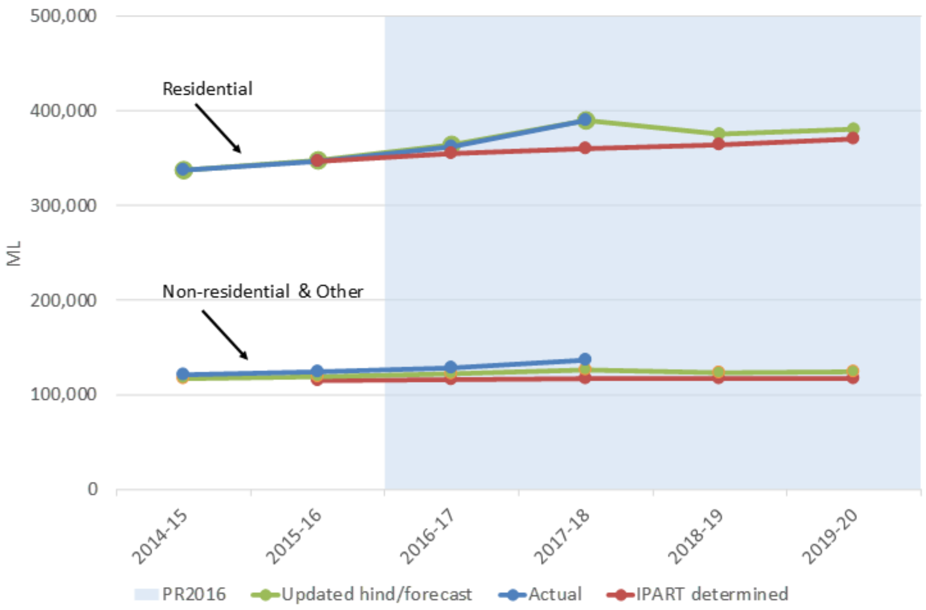


Figure 2-5 Forecast, hindcast and actual demand by sector (billed metered demand excluding unfiltered water)

This remainder cannot be explained by higher than forecast property growth in the non-residential sector. Non-residential property growth has, in fact, been slightly lower than forecast. At the same time, population has grown much faster than forecast, which implies strong growth in the size of the workforce. Taken together, low non-residential property growth and strong growth in the workforce suggest non-residential properties are densifying, ie the average workforce and output per property is increasing.

This could be through a combination of lower vacancy rates in existing non-residential properties and the consolidation of existing, smaller properties into much larger properties. Both mechanisms result in relatively low *net* property growth, as has been observed, but would increase the average size of non-residential properties in terms of workforce accommodated and output. This in turn would result in a gradual increase in average consumption. This effect is not accommodated in the current model as it based on a period of relatively low non-residential property *and* population growth.

To allow for this mechanism a new “densification” factor has been introduced in the non-residential model (explained more fully in Appendix 8A).

In summary, of the under forecast of 48.7 GL in 2017–18, the majority (26.6 GL) is estimated to be due to temporary factors, ie weather varying from the long-term average conditions used as the basis for the forecast. About 11.5 GL is due to permanent factors, ie higher than forecast property growth, slightly larger than expected impact of the 2016 price decrease and assumptions relating to Other Properties. There remains about 10 GL which is almost entirely due to the non-residential sector. It is likely related to an increase in the average consumption of non-residential properties due to accelerated “densification”. A surge in large infrastructure projects may have also played a role.

2.1.2 Updated forecast for 2016–20

Figure 2-6 shows the updated forecast of billed metered demand for 2018–19 and 2019–20, the remaining two years of the 2016–2020 price period. This has been prepared using the updated model which corrects for the factors discussed above as well as other factors such as the effect of climate change on average weather conditions.

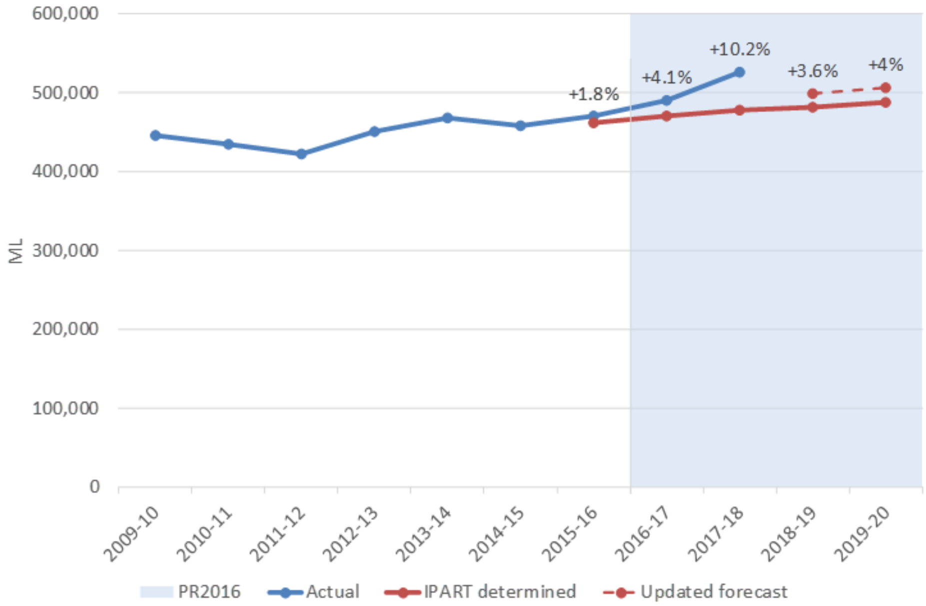


Figure 2-6 Actual demand to 2017–18 and updated demand forecast to 2019–20 (billed metered demand excluding unfiltered)

Demand in 2018–19 and 2019–20 is forecast to be, respectively, 17.5 GL (3.6%) and 19.3 GL (4%) higher than the volumes IPART decided in 2016. With regards to the forecast decrease in demand between 2017–18 and 2018–19, a large part of the higher than forecast demand in 2017–18 was due to drier and hotter than average weather conditions. The forecast for 2018–19 assumes a return to average conditions. This would result in a decrease in demand. This is counteracted by factors that result in higher demand, eg. an increase in customer numbers between the two years. Because the effect of the latter is less than the effect of the former, the net result is that the forecast for 2018–19 is less than the actual for 2017–18 but still 3.6% higher than the original forecast.[8]

2.2 Demand volatility adjustment mechanism

In the 2016 determination, IPART introduced the current demand volatility adjustment to the revenue requirement and prices to address any over- or under-recovery of revenue over 2016–20 due to material variation between the level of forecast and actual water sales over 2016–20.

[8] Figures for total demand (ie billed metered demand including unfiltered, billed unmetered demand and non-revenue water) available at the time of writing indicate that demand has indeed decreased between 2017–18 and 2018–19. During the first 10 months of 2018–19 (July to April) total demand was 6% lower than demand during the same period in 2017–18.

Attachment 7: Regulatory framework and application provides details on the mechanism and our proposal to trigger a return of revenue to our customers as we expect to exceed the +5% deadband in this regulatory period.

2.3 Water demand forecast 2020–24

We are forecasting our total demand for 2020–24 to be 2,346 GL, increasing from 576GL in 2020–21 to 598GL by 2023–24, an average increase of 7 GL or 1.2% per year, see Table 2-2.[9]

Table 2-2 Forecast demand (GL)

Demand component	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Billed metered demand						
Residential	374	382	387	394	400	407
Non-residential[a] and other	126	127	127	127	127	128
Total billed metered[b]	501	509	514	521	527	535
Billed unmetered, non-revenue and recycled top-up	64	62	62	62	63	63
Total[b]	565	570	576	583	590	598

[a] Includes unfiltered water
[b] Totals may differ from sum of components due to rounding

Our forecast for 2020–24 is about 181 GL or 8.4% higher than IPART's forecast for 2016–20. The main factors contributing to the difference are:

- higher than forecast property growth during 2016–20, and forecast property growth for the 2020–24 period (6.2%)
- adjustments to the model including re-estimation of residential models, higher price elasticity, modifications to the non-residential model, a new basis for weather data (gridded weather data instead of weighted station data), and adjustments to average weather conditions for the effect of climate change (2.2%).

The effect of the changes to the models and adjustments to weather conditions between the two forecasts cannot be easily disentangled, as they interact and the base for certain variables has changed between the two models. Therefore, only the net effect of these changes is presented.

[9] This is slightly different from the total of the figures in Table 2-2 (2,347 GL). This is a rounding issue. The figure of 2,346 is based on summing the forecast for each year in megalitres and then rounding to gigalitres.

The key assumptions and inputs underlying the forecast for 2020–24 and other points of note include:

1. Updated, higher dwelling growth projections of about 36,000 dwellings per year as discussed in more detail in Section 3. All (net) new dwellings are assumed to be subject to the BASIX regulation.
2. The forecast is based on average weather conditions, derived from regional climate change projections produced by the NARCLiM project to include the effect of climate change on averages. See Appendix 8A for more details.
3. Real system losses (included in non-revenue water) reduce to 123 megalitres/day in 2018–19 and 116.7 megalitres/day in 2019–20 as a result of increased investment in leak repair and detection. Losses gradually increase thereafter to 119 ML/day by 2023–24 due to system growth.
4. It excludes the effect of water restrictions implemented in response to the current drought.
5. It excludes savings from any water conservation programs in response to the current drought (in addition to water restrictions). These were still in the development stage when the forecast was completed, and no savings estimates were available.
6. Excludes Western Sydney Airport, as its supply arrangements were still under negotiation at the time the forecast was completed.

Other, minor assumptions are discussed in Appendix 8A.

The main source of demand growth is residential demand which is projected to increase by an average of 6.4GL or 1.6% per year. This is driven by a forecast dwelling growth of about 36,000 dwellings per year over 2020–24 (Section 3).

Average residential consumption, ie consumption per dwelling, is forecast to decrease from 200.3 kl in 2020–21 to 199.5 kl in 2023–24 – see Figure 2-7. The downward trend is actually somewhat stronger than these figures suggest because 2023–24 is a leap year and has an extra day compared to 2020–21. Correcting for this effect would result in a comparable average of about 199 kl in 2023–24.

The forecast decrease in average demand per property is driven by two factors:

1. The majority of the new dwellings are units which have lower average consumption than existing dwellings, the majority of which are single dwellings.
2. In addition, new dwellings are covered by the BASIX regulation and have lower average consumption than existing dwellings of the same type, the majority of which were build prior to the BASIX regulation.

These two factors result in a gradual decrease in overall average residential consumption. However, as the number of dwellings increases at a faster rate than average consumption decreases, total residential consumption will still increase.

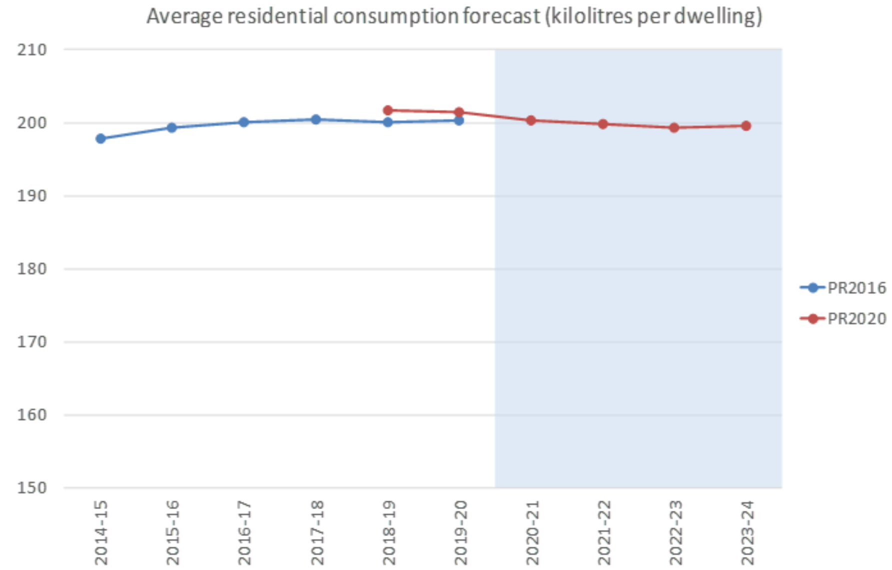


Figure 2-7 Average residential demand forecast[10]

The updated forecast of average residential demand for 2018–19 and 2019–20 is about 0.7% higher than the 2016 forecast. This is due to the inclusion of climate change in average weather conditions and the slightly higher price elasticity estimate which result in a higher average. The effect of these factors is somewhat mitigated by other factors. For example, the higher than forecast dwelling growth means that the downward impact on average demand from the shift to units and BASIX dwellings is larger than forecast in 2016.

Non-residential demand including Other Properties is forecast to grow by an average of 0.1% per year. While the forecast year-on-year growth is modest, the starting point is substantially higher than the forecast for 2016: the forecast for 2019–20 is about 11GL or 9% higher than the forecast in our 2015 price proposal.

Billed unmetered consumption, non-revenue water and potable top up of recycled water systems is forecast to increase slightly over 2020–24. This is mainly due to the assumptions relating to real system losses described above.

2.3.1 Sensitivity to unpredictable weather conditions

Water consumption is sensitive to weather conditions. All else equal, demand in a relatively hot and dry year will be higher than demand in a relatively cool and wet year.

The forecasting model includes weather variables and can predict demand for a specific set of weather conditions. Hindcasts prepared using the model show that it reproduces observed demand closely when actual weather conditions during those periods are inputted to the model.

However, it is impossible to forecast the weather for the next five to six years. Therefore, we input average weather conditions in the model when preparing this 2019 forecast.

[10] To make average demand figures for PR2016 and PR2020 comparable the dwelling numbers underlying average consumption forecast for the latter have been adjusted for the reclassification of about 9,100 dual occupancies to single dwellings due to IPART's 2016 determination.

This means that most years' demand is likely to be at least somewhat higher or lower than forecast, as no year is exactly average. Preliminary analysis suggests that in any one year, demand could be up to 5% lower or 6% higher than the forecast for that year based on average weather conditions.

These are maximum variations, reflecting an extremely wet, cool year and an extremely dry, hot year. In most years, we would expect a smaller variation. Furthermore, while weather variations could result in significant variations in a particular year, over a number of years such variations will start to average out. The probability of a run of four years of extremely dry and hot weather conditions resulting in a variation of 6% over a four-year price period is extremely low.

As noted before, for this price review we have taken a new approach to defining average weather conditions which includes the effect of climate change to date. See Appendix 8A for more details.

2.4 Water demand forecast model

The demand forecasting model is a bottom-up model. That is, separate models are used to forecast the different components of total demand. These forecasts are then combined into a forecast of total demand. The components of total demand are based on the water balance.

Detail about the water balance and the forecast model are in Appendix 8A.

3 Customer numbers

3.1.1 Customer forecast model

The model uses the end of financial year actual dwellings served and unserved as the base year and then adds on annual growth. The dwelling growth is sourced from DPIE, the Illawarra Urban Development Program and informed by trends in our billing system.

The forecast is split into single dwellings and multis and is attributed to each water system and wastewater system. Stormwater forecasts are not catchment based except for Rouse Hill. Dwelling forecasts drive the short to medium term (first 10-15 years). In the medium to long-term population projections are converted back to dwellings using occupancy ratios. The population projections are sourced from DPIE – the most recent published were from 2016.

The total dwellings including *Water Industry Competition Act 2006* (WICA) served are passed to the demand models for calculating future short and medium-term water consumption.

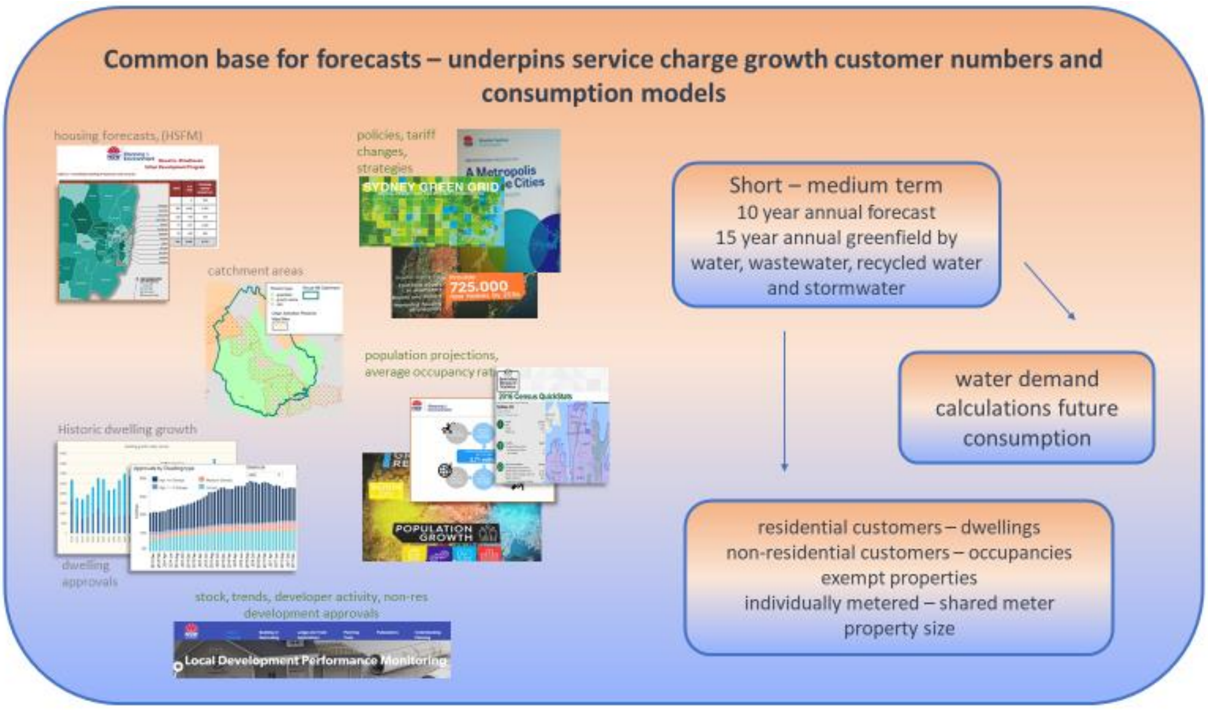


Figure 3-1 Dwelling forecast method, inputs and outputs

3.2 Customer numbers 2016–20

Over 2016–20, we expect our residential customer base with drinking water to have increased by 148,261, and our non-residential customer base (by meter) to have increased by 5,718. This is an extra 63,176 customers in total above IPART's decision in 2016. See

Table 3-1 and 3-2.

Our projections for the first two years are actuals, whereas 2018–19 and 2019–20 are forecasts.

Table 3-1 Number of residential water customers 2016–20

Residential customer numbers	2015–16	2016–17	2017–18	2018–19	2019–20	Total
IPART decision						
Total residential customers*	1,774,025	1,787,931	1,811,843	1,836,328	1,861,219	
Expected growth		13,906	23,912	24,485	24,891	87,194
Expected growth (%)		0.78%	1.34%	1.35%	1.36%	4.83%
Sydney Water actual / forecast						
Total residential customers*	1,779,007	1,805,149	1,848,094	1,888,840	1,927,267	
Actual and forecast growth		26,142[11]	42,945	40,747	38,427	148,261
Actual and forecast growth (%)		1.47%	2.38%	2.20%	2.03%	8.09%

* Excludes unmetered

[11] Growth dipped slightly in 2016–17 when the service charge tariff restructure for dual occupancies with one meter was implemented. Instead of paying per dwelling, these properties now pay one service charge for water, wastewater and stormwater. Without this, water service charge growth would have been closer to 35,000 in 2016–17 instead of 26,000.

Table 3-2 Number of non-residential water customers (by meter) 2016–20

Non-residential customer by meter	2015–16	2016–17	2017–18	2018–19	2019–20	Total
IPART decision						
Total non-residential customers (by meter)	98,085	98,901	99,833	100,779	101,694	
Expected growth		816	932	946	915	3,609
Expected growth (%)		0.83%	0.94%	0.95%	0.91%	3.63%
Sydney Water actual / forecast						
Total non-residential customers (by meter)	98,158	99,836	101,076	102,961	103,876	
Actual and forecast growth		1,678	1,240	1,885	915	5,718
Actual and forecast growth (%)		1.71%	1.24%	1.86%	0.89%	5.71%

Our residential customer base with wastewater is expected to be around 59,100 (or 3.2%) above IPART's 2016 decision over the four years (see Table 3-3).

Table 3-3 Number of wastewater customers 2016–20

Residential customer numbers	2015–16	2016–17	2017–18	2018–19	2019–20	Total
IPART decision						
Total residential customers*	1,737,891	1,751,750	1,775,625	1,800,077	1,824,935	
Expected growth		13,859	23,875	24,452	24,868	87,044
Expected growth (%)		0.80%	1.36%	1.38%	1.38%	4.92%
Sydney Water actual / forecast						
Total residential customers*	1,745,269	1,771,450	1,814,336	1,854,725	1,891,396	
Actual and forecast growth		26,181	42,886	40,389	36,671	146,127
Actual and forecast growth (%)		1.50%	2.42%	2.23%	1.98%	8.12%

* Excludes un-metered

Our residential customer base with stormwater is expected to be 19,400 or 3.7% more than IPART's 2016 decision (see Table 3-4).

Table 3-4 Number of residential stormwater customers 2016–20

Residential customer numbers	2015–16	2016–17	2017–18	2018–19	2019–20	Total
IPART decision						
Total residential customers	495,961	500,131	507,577	515,038	522,625	
Expected growth		4,170	7,446	7,461	7,587	26,664
Expected growth (%)		0.84%	1.49%	1.47%	1.47%	5.27%
Sydney Water actual / forecast						
Total residential customers	498,917	507,526	521,198	533,852	544,959	
Actual and forecast growth		8,609	13,672	12,654	11,107	46,042
Expected growth (%)		1.73%	2.69%	2.43%	2.08%	8.93%

3.2.1 Reasons for the variation – residential growth

The main reason residential growth across all services is higher than expected, is the transition from a trough, to a historic high.

Our forecasts for 2016–20 were prepared during a 30-year low – a natural dip in the housing cycle, as shown in Figure 3-2 below. During 2010–14 average residential growth was about 19,000 dwellings per year.

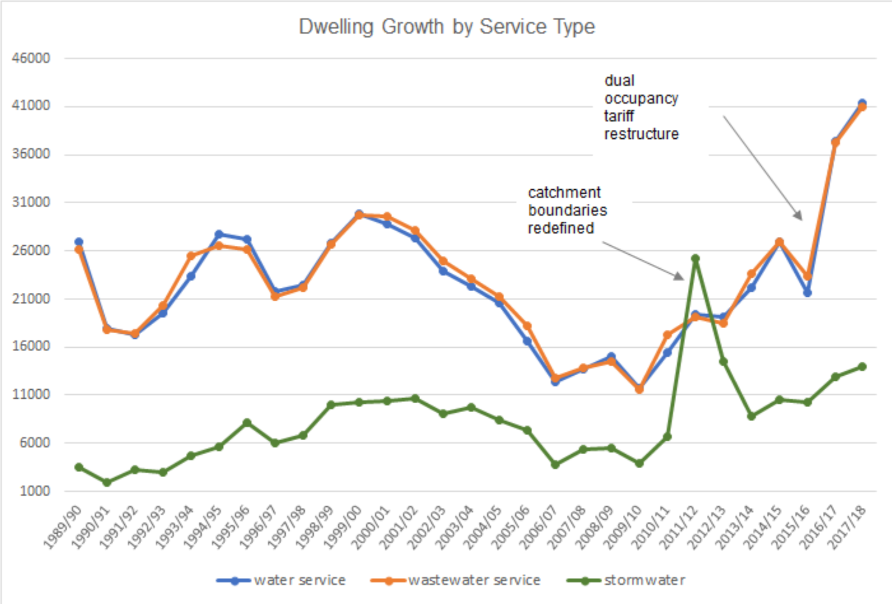


Figure 3-2 Historic trends in dwelling growth by service type

In addition, the traditional data sources had limitations. The main source dataset from the Department of Planning was derived from the Metropolitan Development Program, but this 20-year housing delivery program was drawing to a close; and the data was already two years old, and the medium term was based simply on historic averages.

In this context, we took a conservative approach to preparing our forecast in the leadup to the 2015 price proposal. Advice from other government departments suggested that any housing forecast "over 18,000 dwellings per year was not realistic or achievable"[12]. After detailed analysis of precincts, major sites, vacant land stocks, dwelling approvals, proposed developments and historic trends from our billing database, we agreed on a forecast that was consistent with the long-term (30 year) average of 1.3% per year. Then, actual growth unexpectedly surged. We undertook our analysis and modelling in 2014; when we submitted our price proposal to IPART in 2015, we could already see an increase in growth. By the time IPART made its 2016 determination a year later, it was even more obvious the tide had turned. Figure 3-3 shows the cyclical nature of residential growth.

[12] Economics Presentation for Sydney Water 4 July 2014 TCorp.

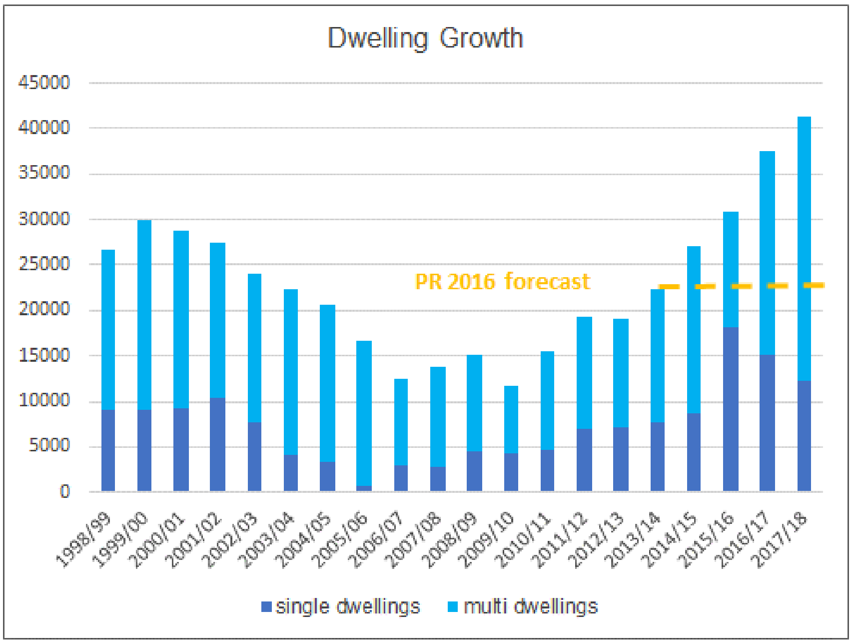


Figure 3-3 Historic dwelling growth with water service, showing low growth in 2010 and a peak in 2018.

IPART's decision predicted residential growth of 1.3% over 2016–20. However, actual growth in the first two years of this period has averaged 0.9% higher. In 2017–18, growth hit a 30 year high of 2.4%, well above the short-term (5-year) average of 1.7%. We expect actual growth for the next two years to also be above the 2016–20 forecast.

Factors driving the higher than expected growth are:

- dwelling *approvals* were increasing monthly, setting new record highs. Dwelling *completions* have also reached a 45-year high, and caught up to dwelling approvals
- 4% more growth in greenfield sites than forecast, particularly in Edmondson Park and North Kellyville
- 3% more growth in urban renewal precincts than forecast, particularly in Greater Parramatta to Olympic Peninsula, Metro Northwest corridor, Pagewood Green, Thornton and Washington Park
- dwelling growth in stormwater catchments is also ahead of forecast. We expected an average of 7,400 per year, the actual for the last three years was 10,700[13] – with a peak of 2.8% in 2017–18
- increasing strata unit growth over time. Over 27,000 strata units were added to the water service customer base in 2017–18, compared to 9,000 in 2008.

3.2.2 Reasons for the variation – non-residential growth

Only about 7.4% of the properties we serve are non-residential.

[13] Excludes mixed multi premise.

In our 2015 price proposal we estimated the same non-residential growth in *properties* and *meters*, for both water and wastewater – an average of 1,040 per year during 2016–20. This forecast was consistent with the average growth trajectory from 2008 onwards. The important assumption of *one meter per property* reflected the general pattern in the past. IPART accepted this estimate but viewed it as 'low, not in line with population growth'.

Since 2015 we have observed that non-residential properties with water service have grown by half as much of what we forecast in 2015, whilst the number of *meters* has grown by twice as many. The average short-term growth (since 2016) in meters is around 1.3% or 1,265 per year. We have observed that:

- non-residential property growth in 2017–18 dropped to 0.8% for both water and wastewater services
- average non-residential property growth during the last 10 years has been around 1,120 per year. Property growth has been gradually slowing, for example, small properties are being amalgamated for more dense or high-rise developments. In addition, businesses are not always run from a new premises – the Small office/Home office are categorised as residential for billing purposes
- there is a decline in the overall number of non-residential properties in stormwater areas – the traditional small standalone commercial or industrial building on a separate land parcel with a water meter/s has dropped by 310 between June 2016 (when there were 29,331) and June 2018. As these properties often amalgamate, the property count is declining
- there is more growth in units than other non-residential property types. Commercial and industrial units grew by 624 in 2017–18, compared to 2,207 in 2007–08 (see Figure 3-4). Old strata schemes are more frequently being terminated since the changes to the Strata Law in 2016. Older buildings are being demolished and replaced with modern stock, producing a small or no net gain in number of units
- meter growth in 2017–18 was 1.2% with water and only 0.7% with wastewater.

We have investigated this anomaly in number of properties to number of meters in detail. While there is no single key driver, there are a number of contributing factors such as:

- significant growth in standpipes with multiple meters – we attribute this to the building boom
- genuine new industrial and commercial buildings developed from vacant land, getting their first meter – this creates one new property, but the meter will be large
- new boarding houses and retirement villages emerging, which we categorise as one non-residential property, but the meter will be large
- small or neighboring properties consolidating to form a larger site and upsizing their meter
- new properties in Barangaroo, which is serviced by a private water utility under the WICA. For our purposes this is one property to whom we supply services at the boundary; it has multiple large meters (it supplies services to its own customers within the property)

- many small businesses have been bulldozed and are currently a construction site for high rise residential, with a large meter (meaning they have a large meter while in transition, relative to their ultimate purpose as residential dwellings).

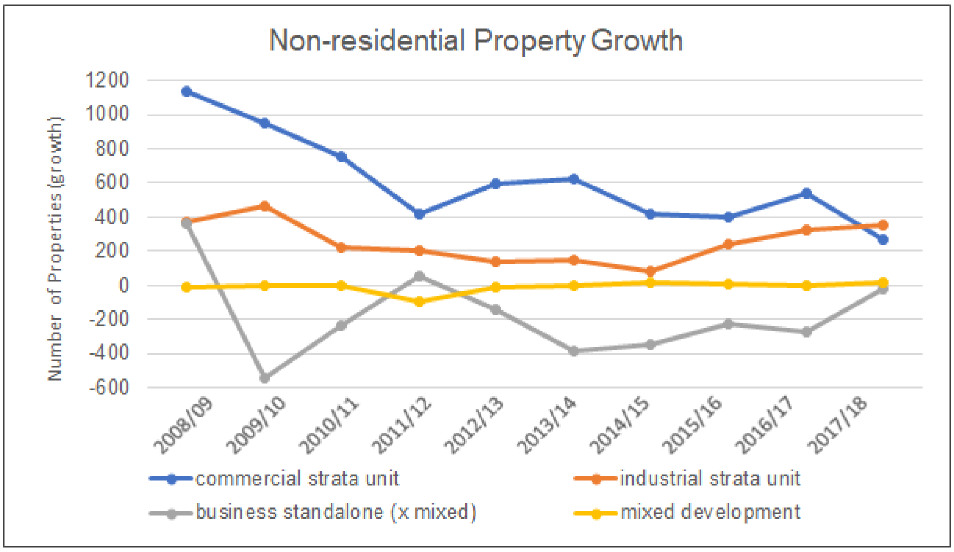


Figure 3-4 Sample of non-residential property growth last 10 years

3.3 Customer numbers 2020–24

We expect residential growth to remain at the current (high) level for the remainder of 2016–20, then drop back to the short-term average, 1.8% per year, during 2020–24.

We are forecasting an average annual dwelling growth[14] of:

- 36,069 with a water service
- 34,877 with a wastewater service
- 11,111 with a stormwater service.

This is detailed in Table 3-5 to Table 3-9 below.

[14] Based on fixed service charges, as explained in 8.1.1.

Table 3-5 Forecast number of Sydney Water water customers 2020–24

Residential customer numbers	2019–20	2020–21	2021–22	2022–23	2023–24	Total
Sydney Water forecast						
Residential customers	1,927,268	1,964,390	2,001,816	2,037,524	2,071,544	
Non-residential customers	135,295	136,300	137,305	138,310	139,315	
Non-residential meters	103,876	105,090	106,304	107,518	108,732	
Total customers*	2,076,055	2,114,182	2,152,613	2,189,326	2,224,351	
Forecast growth (#)		38,127	38,431	36,713	35,025	148,296
Forecast growth (%)		1.84%	1.82%	1.71%	1.60%	6.96%

*includes un-metered properties

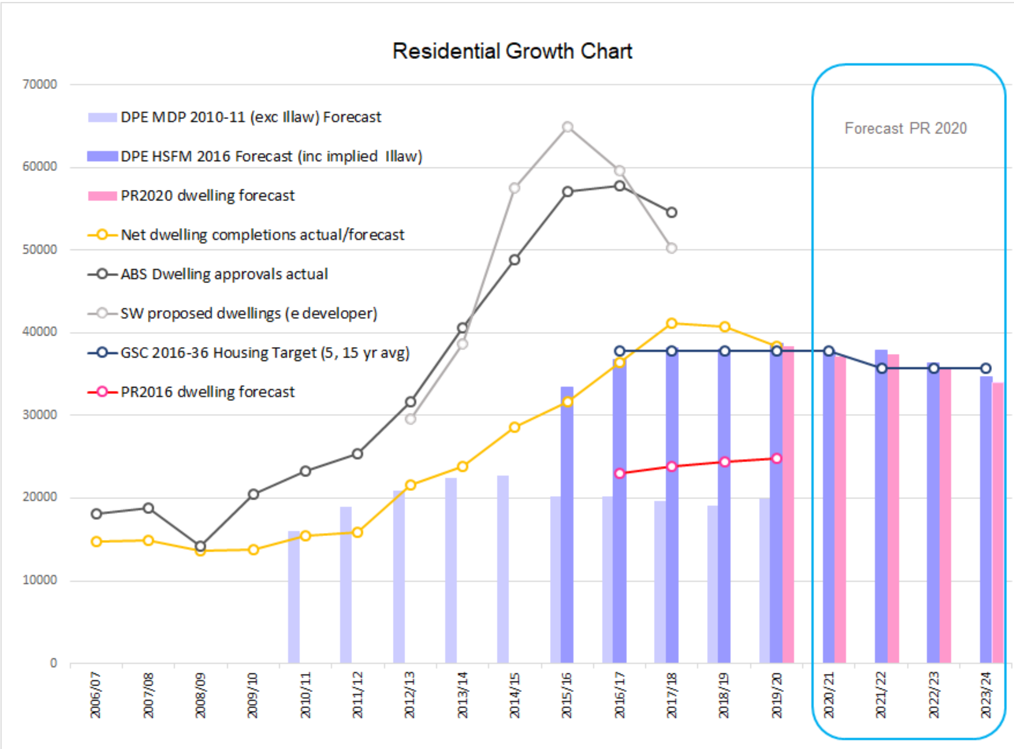


Figure 3-5 Historic residential growth forecasts, actuals and future indicators.

Proposed dwellings and approvals have peaked and are now declining. The residential forecast is based on the DPE housing supply model which has been performing well. During the last three years it achieved a high accuracy level (95% and 98% accuracy, ie over forecast by 5% and 2%, then 91% in 2017–18 or 9% under).

The DPE forecast was approved for use by the common planning assumption group (CPAG). This group has representatives from across government with the undertaking to align relevant data, policies, assumptions, government strategies, investment decisions, projects and funding in a coordinated way. It reports to Cabinet Committee on Infrastructure.

Our forecast assumptions are:

- dwelling growth continues at current levels for the last two years of 2016–20, then declines during 2020–24, then remains constant out to 2029–30
- the majority of future dwellings will be multi-unit (eg apartment buildings)
- all growth will be metered either individually or have a shared meter, no unmetered growth ie no increase in the number of unmetered properties
- greenfields growth will continue to occur as planned
- the integrated forecast across all products holds true (our forecast accounts for whether new dwellings are likely to take water, wastewater and stormwater, depending on their location), and that growth does not occur in unexpected locations or amounts (which could alter the mix of product take-up)
- no growth in flats and mixed developments – these are temporary types until strata titled
- no growth of industrial properties with a stormwater service charge (industrial is declining, replaced by other non-residential property types or residential; only commercial is growing)
- all known WICA sites that are currently developing have been accounted for – ie for development sites likely to be serviced by a private utility, we may only supply certain services
- there are no tariff restructures that will impact the existing base number of customers served.

The forecast number for wastewater customer growth is similar to that for water. The number of wastewater residential customers is forecast to increase from 1.89 to 2.03 million during the price path. The number of non-residential property meters is forecast to increase from 84,705 to 86,713 – see Tables 3-6 and 3-8.

Table 3-6 Forecast number of Sydney Water wastewater customers 2020–24

Residential customer numbers	2019–20	2020–21	2021–22	2022–23	2023–24	Total
Sydney Water forecast						
Residential customers	1,891,396	1,927,361	1,963,332	1,997,860	2,030,903	
Non-residential customers	120,349	121,083	121,817	122,551	123,285	
Non-residential meters	84,705	85,207	85,709	86,211	86,713	
Total customers*	2,014,473	2,051,172	2,087,877	2,123,139	2,156,916	
Forecast growth (#)		36,699	36,705	35,262	33,777	142,443
Forecast growth (%)		1.82%	1.79%	1.69%	1.59%	6.89%

*excludes vacant land

Other indicators to support our forecast for a slower rate of growth includes:

- proposed developments appear to have peaked – dwelling approvals are declining, which indicates dwelling growth will drop down from the current level during 2020–24 – see Figure 3-5
- Australian Bureau of Statistics data shows NSW apartment approvals falling by 33% over the last year (as at February 2019)[15]
- it is consistent with the Greater Sydney Commission housing targets, and the implied dwellings in the most recent DPE household and population projections
- some councils are not supporting any further low-rise medium density housing in the short-term (Ryde, Canterbury-Bankstown)
- experts predict a 23% drop in medium density residential building starts in the next two years[16]
- in boom times approvals are said to be 8% indicative of intentions to build – while this figure is difficult to quantify, we consider dwelling completions is likely to slow
- Australian Bureau of Statistics show the value of housing-related lending dropped by 2.5% in November. The value of loans to investors alone dropped by 4.5%[17]
- Reserve Bank Australia official interest rates are the lowest rates in decades, a measure generally interpreted to be designed to stimulate housing growth

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[15] Urban Taskforce 2019, *Alarming decline in Housing Approvals no longer can be ignored*.
[16] T Razaghi, 'Australian building activity could see the sharpest decline since GFC, BIS Oxford Economics finds', *Domain,* 23 July 2018.
[17] S Wright, 'Falling home loans point to further drop in house prices', *Sydney Morning Herald,* 18 January 2019.

- reports that construction activity, building approvals[18],[19] and housing investor activity are all slowing.

Stormwater

The number of residential customers with stormwater is forecast to grow from around 545,000 to 589,000 during 2020–24, as shown in Table 3-7.

Table 3-7 Forecast number of Sydney Water stormwater customers 2020–24

Residential customer numbers	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Sydney Water forecast						
Residential customers	544,959	556,407	567,776	578,770	589,402	
Forecast growth (#)		11,448	11,369	10,994	10,632	44,443
Forecast growth (%)		2.10%	2.04%	1.94%	1.84%	7.92%

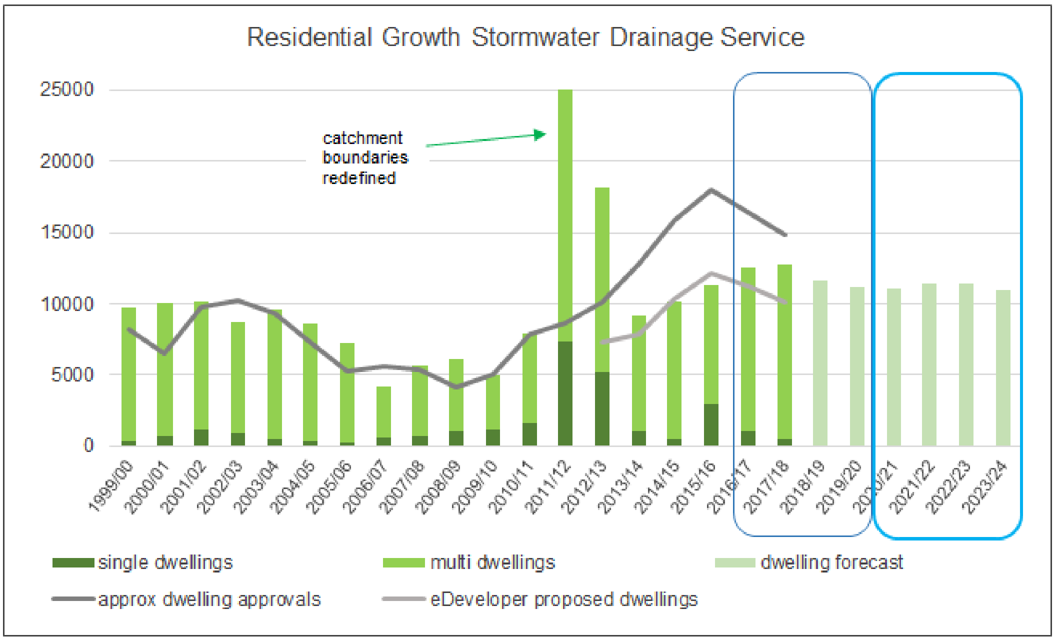

Figure 3-6 Historic dwelling growth with stormwater, leading indicators for future potential and forecasts for next price path

Dwelling growth forecasts show high growth in multi-residential dwellings in areas where we provide stormwater services, such as the inner city and eastern/middle ring suburbs. In 2017–18, 2.7% of the total residential growth (or 13,672 dwellings) was experienced in our stormwater

[18] Urban Taskforce 2018, Non-residential building approvals drop by 31% in NSW.
[19] M Wade, 'Approvals for new homes fall amid property price slump', *Sydney Morning Herald,* 4 February 2019.

catchments (see Figure 3-6). The stormwater forecast is less than the observed short-term growth of 2.2% and equates to the around 2% per annum over the next price path.

Forecast dwelling growth for Rouse Hill drainage is around 1,100 a year, unchanged from previous forecasts. This growth is expected to cease around 2029–30 when the area is fully developed. The North Kellyville area of Rouse Hill is mostly complete. However, if the development potential is increased, or if development slows down, the date of full completion could be extended beyond 2029–30.

3.3.1 Non-residential customer growth forecast

Forecasting non-residential growth is difficult due to the relatively small numbers and that there is no common measure. Factors like floor space, vacancy rates, employment numbers or jobs, hectares of various sectoral types, profit and revenue projections have all been considered. None of these suit our requirement of number of properties or meter forecasts. There is an opportunity for a common metric and projection for non-residential growth to be developed and agreed through the Common Planning Assumptions Group (CPAG)[20].

To forecast future growth in non-residential property numbers, we rely on the trends in the number of property meter connections, development approvals and proposed developments.

Growth forecasts are developed for different meter sizes as they are charged at different rates for water and wastewater services. Land size forecasts are developed to inform stormwater service charges which are dependent on lot size.

We believe that our forecast is reasonable and adequately reflects the actual observed growth trends sourced from the billing system. We are forecasting for non-residential customers growth of:

- around 1,210 meters per year (91% of this growth in small water meters less than 50mm) for water service charges
- around 500 meters growth per year for wastewater service charges
- only around 310 additional properties per year with stormwater service charges.

Table 3-8 Forecast number of non-residential meters 2020–24

Non-residential customers	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Sydney Water forecast						
Water (by meter)	103,876	105,090	106,304	107,518	108,732	
Wastewater (by meter)	84,705	85,207	85,709	86,211	86,713	

[20] Please refer to https://www.transport.nsw.gov.au/data-and-research/common-planning-assumptions.

Table 3-9 Forecast number of stormwater non-residential customers 2020–24

Stormwater customers	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Sydney Water forecast						
Non-residential customers*	52,099	52,405	52,711	53,017	53,323	

*Includes vacant and exempt properties

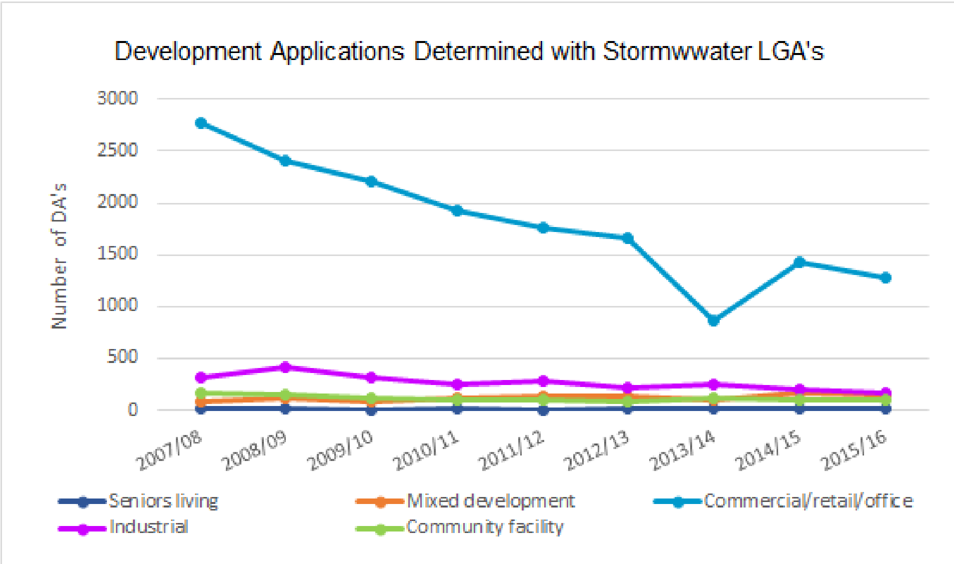

Figure 3-7 Static non-residential type development approvals in stormwater local government area (LGA) catchments indicate recent trends will continue.

In the short term, additional evidence to support the forecast includes:

- non-residential development approvals are static (see Figure 3-7) – we expect recent trends of slow/low growth to continue
- number of proposed developments in our eDeveloper system are static (see Figure 3-8).

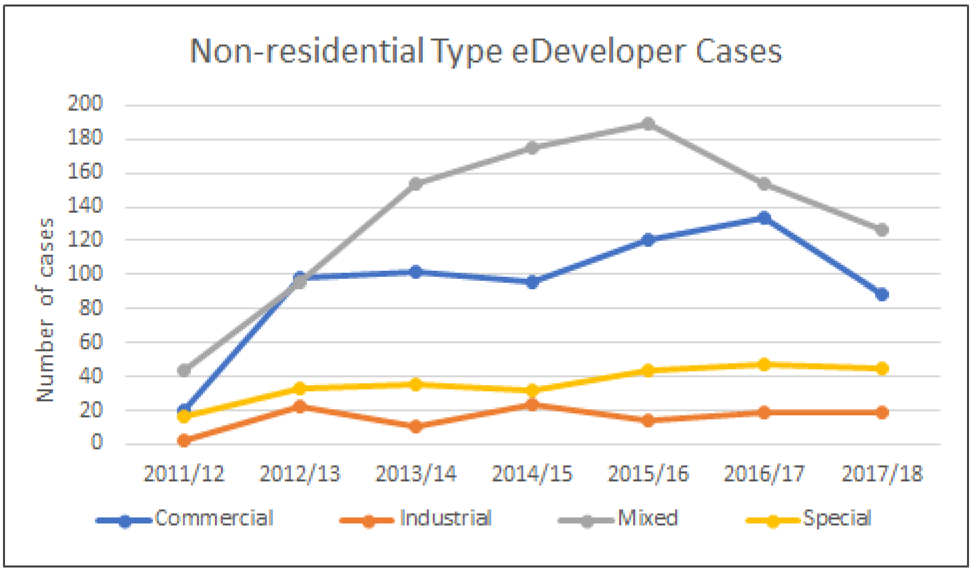

Figure 3-8 Trends in non-residential development applications

Stormwater customers

The stormwater land size forecast is for negative growth in the small, medium and large size ranges. We have observed that many small businesses are being demolished and the land parcels are being amalgamated to form one larger site. The forecast is for a gradual decline of standalone stormwater properties over the price path. It would seem likely that DPE initiatives to re-invigorate town centers, main streets and the review of retail business opportunities and supporting the green grid will see the decline reversed in the medium to longer term.

We expect that no additional properties will apply for or be granted a low impact status –ie zero growth. Commercial units are forecast to grow by 394 per annum – that is the average over the last 10 years. We expect zero growth in industrial units. The total non-residential growth averages at 306 properties per annum out to 2023–24, previously it was an average of 660 per annum.

SW231 06/19

Attachment 9
Capital expenditure

Price Proposal 2020–24

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Key messages

2016–20 capital expenditure – unprecedented growth, extreme climatic impacts

- Our 2016–20 capital expenditure will be around $3.2 billion in total, 18% ($498 million) higher than IPART's allowance. This is largely due to:
  - growth expenditure, which will exceed its allowance by $323 million
  - forecast renewal expenditure, which is $191 million above allowance, mainly in Corporate renewals (which includes digital business expenditure).
- Much of the increase was driven by external factors beyond our control. Where possible, we have sought to manage the overspend by reviewing priorities and spending less in other areas.

High growth, very dry soil and asset condition impacted capital expenditure

Growth in new dwellings 53% higher than forecast – 148,000 against a forecast of 97,000.

- Our 2015 forecast was intentionally conservative so that customers would not 'pre-pay' for less certain growth investments. When higher growth occurred, we responded prudently and delivered efficiently, demonstrating that this 'risk-sharing' approach was appropriate.

Extremely dry soil conditions

- Two years of very dry weather and high evaporation have led to extremely low soil moisture, which has driven a large increase in sewer chokes caused by tree roots. We now expect 21,000 chokes in 2018–19 (40% more than the annual average back to 2008-9).
- This has led to non-compliance on some Environment Protection Licences, particularly on dry weather overflow measures. An urgent program to improve environmental performance is ongoing and we expect there will be some impact on capital expenditure priorities post 2020.

Managing costs within the infrastructure portfolio

- As new information has become available, we have re-balanced infrastructure renewals to focus on the highest risk investments, deferring lower risk work to manage costs.
- For example, we deferred lower risk stormwater renewals to focus on renewing wastewater treatment assets that were in a poorer than expected condition, impacting our performance.

2016–20 achievements

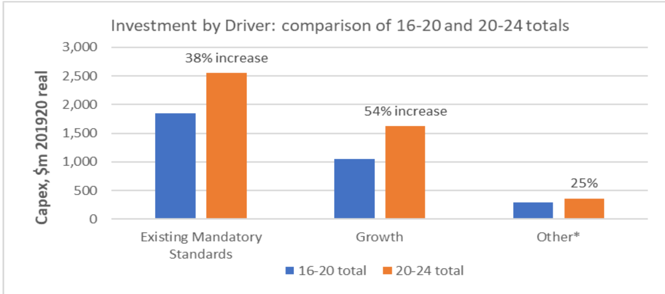
- New water and wastewater services delivered on time to serve new properties, and we have continued to provide affordable and reliable services to existing customers.
- We replaced our legacy customer billing system and put in place secure, flexible IT system foundations, ready for the addition of enhanced capabilities. We have improved digital security in response to cyber threats and data security requirements.
- To date, we have complied with the service obligations in the Operating Licence, except for an expected breach of the water continuity (single interruptions) standard in 2018–19. This is mainly due to a single event in April 2019 on a critical water main, that affected up to 15,000 properties.

- We commenced a complex multi-year program to rehabilitate three of the most critical large sewers which serve 3.4 million people. Initially hampered by access and safety issues, the work drove innovation in equipment and work methods, and it is now set up well.
- We have also made process improvements – new priorisation processes in wastewater treatment and water filtration provide more regular performance and risk insights, which we can respond to if required. This is being rolled out across other investment areas. Improved integrated planning processes, as demonstrated by the staging and capacity sharing across Quakers Hill and St Marys treatment plants, take account of growth and renewal needs.

2020–24 Forecast capital expenditure

2020–24 – higher capital expenditure driven by growth and wastewater renewals

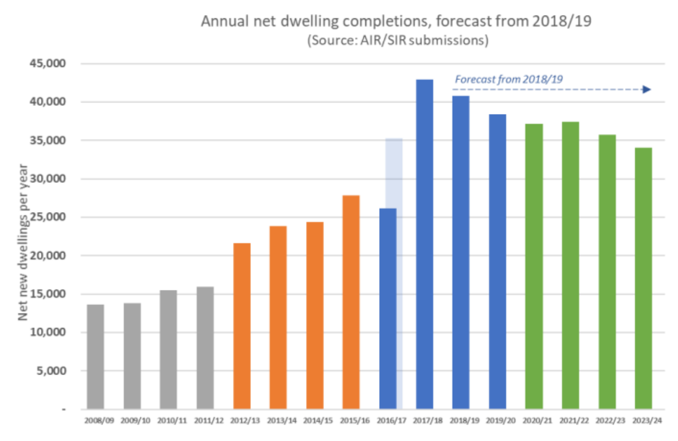
- Capital expenditure for 2020–24 is forecast to be $4.5 billion, 42% above 2016–20.
- This is driven by continuing high growth and higher asset renewal investment (Existing mandatory standards).



* 'Other' is Discretionary Standards, Government Programs, Business Efficiency & New Mandatory Stds

High dwelling growth and greenfield infrastructure development

- The forecast is for 144,000 new dwellings from 2020 to 2024 – continuing the recent high levels. Very high investment in transport infrastructure around Sydney will also continue, including the Western Sydney Airport.
- There is no existing infrastructure in some of these new development areas. Whereas recent growth investment has tended to be simple service extensions and discrete augmentations at system bottlenecks, our growth forecast of $1.6 billion reflects that we can no longer service growth with existing capacity. In particular, we need to invest in wastewater treatment plant capacity for greenfield developments.



- Some investment will address new discharge limits for the Hawkesbury Nepean river. These seek to manage the impact of growth by reducing nutrient concentration limits.

Expenditure on asset renewals will increase compared to 2016–20

- We plan to spend 38% more on asset renewals to meet Existing mandatory standards than in 2016–20. The investment will be distributed differently across asset classes and there will be changes in focus within programs.

- One of the largest increases is in the critical sewers program, including renewals of the three largest sewers. This work is staged over multiple years due to complexity, availability of specialist resources and safety. We will also focus on greatly improving environmental performance – through more CCTV inspections of sewers in waterway catchments to identify issues before chokes or collapses occur.
- The investment increase is underpinned by improved condition assessment and risk analysis. This bottom up forecast is in line with what top down asset population analysis has predicted in recent years. All renewal programs seek to minimise asset lifecycle costs while managing risk at acceptable levels and contributing to continued reliable and safe service provision.

Managing higher capital expenditure

- While factors beyond our control are driving up our forecast spend, we are striving to service growth and meet obligations in the most efficient way. We subjected our forecast to an internal challenge process; this led to reductions across various program forecasts, with an overall 17% average reduction to the infrastructure forecast.
- We have again assumed some risk in our growth expenditure forecast, excluding some less certain investments which we will finance if required. We have also made some efficiency and performance improvements within specific programs.

Beyond 2024

Longer-term forecast indicates that higher capital expenditure will continue

- Greater Sydney's population is expected to reach around 8 million by 2056 with higher density in some areas. Supplying water, wastewater and stormwater services, plus other infrastructure, for this unprecedented level of growth creates challenges. The 2020–24 investment forecast has considered the volume, location and certainty of longer-term growth, particularly where this could influence treatment plant capacity decisions now.
- In future, we will participate in new, more integrated infrastructure planning processes envisaged in the Greater Sydney Commission's 'Greater Sydney Region Plan'. The most immediate opportunity is likely to be for the greenfield development area at South Creek, part of the 'Western Parkland City' concept.

Key messages – Digital

- During 2016–20 we have successfully delivered the Customer Experience Platform (CxP), a new customer billing platform which replaces our 32-year-old billing system.
- Capital expenditure on Digital in 2016–20 will be $411.4 million, 27% above the 2016 allowance of $324.0 million.
- The difference is largely made up of a deferment of expenditure from the 2012–16 price period, an overspend on delivering CxP, and unplanned IT security costs.
- Since CxP went live in June 2019, we will now refocus on the Business Experience Platform (BxP) and invest heavily from late 2019 onwards.

- For 2020–24 we propose Digital capital expenditure of $374.7 million. This expenditure remains focused on renewing our core digital assets (70%).
- We seek to position Sydney Water as a digital utility by the end of the next regulatory period. The next step is to implement the remaining major components of BxP at a cost of $19 million in 2020–24.
- Our forecast capital expenditure also reflects the need to continue enhancing cyber security and completing the transition to the Government Data Centre (GovDC), while still running our existing data centres. We have allocated $104.4 million for this.
- After the strong foundations of our updated core systems are in place, the transition towards becoming a digital utility will be advanced through a large number of smaller investments where we plan to focus on analytics and the customer.

Structure of this attachment

Servicing a growing city of over five million people requires a substantial program of capital expenditure, which is significantly impacted by many factors. To present a full picture of our activity and performance, this attachment covers:

- our capital expenditure program over the current regulatory period, including changing investment drivers and variances against IPART's allowance
- improvements in forecasting and delivery processes since 2016, and planned enhancements towards 2020 and beyond
- our forecast for 2020–24, including investment drivers, assumptions and uncertainty
- the same information for Information Technology, which is separate in Section 3.

1 Capital expenditure 2016-20

1.1.1 Current period capital expenditure

In June 2016, IPART set us a regulated capital expenditure allowance of $2.695 billion ($2019–20) for 2016–20. By 2020 we expect to invest $3.194 billion, around $498 million more than the determination.[1] The annual breakdown is shown in Table 1-1.

Table 1-1 Capital expenditure 2016–17 to 2019–20 ($2019–20 million)

Capital Expenditure	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	640	827	889	837	3,194
IPART Allowance	714	707	688	586	2,695
Difference	**-74**	**120**	**201**	**252**	**498**

* Forecasts as at January 2019

1.1.2 Overview of capital investment environment (2016–20)

External environment

As well as higher growth and soil dryness, our capital investment has been delivered against a background of:

- A significant ramp up in infrastructure investment in Sydney. In early 2019, over $25 billion of greenfield infrastructure investment was at or past the procurement stage in NSW.[2] This impacts us in three ways – it can change growth patterns (such as along transport corridors), we sometimes need to move existing infrastructure, and we need to compete in a constrained market for some services.
- Increasingly disruptive cyber-attacks targeting business, government and even security agencies in Australia and overseas. We have some new data security and reporting obligations, including via the *Commonwealth Security of Critical Infrastructure Act 2018*.

Internal changes

Since 2016 we have introduced a range of improvements in how we plan and deliver capital expenditure. Highlights include:

- More and deeper engagement with customers, covering our service standards and specific investment plans

[1] This excludes unregulated capital expenditure and borrowings, which are not included in any part of this attachment.

[2] Based on public data collated by Infrastructure Partnerships Australia https://infrastructurepipeline.org/projects-jurisdiction-chart/, accessed 26 March 2019

- Improved identification of renewal investment needs in wastewater treatment plants (now being rolled out to other investment areas)
- Improvements in integrated planning, ensuring that renewals can be optimised in conjunction with growth investment.

Case studies are provided throughout this attachment. General asset management processes are covered in **Attachment 15: Asset management governance**.

1.1.3 Capital expenditure by Driver

Capital expenditure is categorised by 'driver' in line with definitions set out by IPART. These are summarised below.[3]

Expenditure Driver definitions summarised:

Existing mandatory standards: Obligations imposed by a statute or regulation that is mandatory and enforceable. Relevant expenditure includes asset renewals which maintain service performance in line with an existing obligation.

New mandatory standards: As above except it relates to expenditure driven by new enforceable obligations.

Discretionary standards: Performance standards determined by Sydney Water which are not externally enforceable. These can include service performance above a mandatory level which is justified based on 'community willingness to pay'.

Growth: Capital expenditure to meet the requirements of new customers or increased requirements of existing customers in accordance with mandatory standards.

Government programs: Expenditure to meet specific government requirements, potentially overriding other objectives such as commercial return.

Business efficiency: Expenditure justified based on expected reductions in operating expenditure and where savings are reflected in the operating budget.

1.1.4 Capital expenditure by Product

To give a general overview of the relative capital investment in each product, Table 1-2 shows capital expenditure actuals and variances by product in the 2016–20 period. This information is shown here for completeness – henceforth, all investment specific information is categorised by Driver first.

[3] IPART provides full definitions in its Annual Information Return template, 'Metropolitan Water Suppliers in NSW - Annual Information Return (AIR)'

Table 1-2 Capital expenditure 2016–20 by Product ($2019–20 million)

Product	Total (Actual & Forecast)	IPART Determination	Variance
Water	660	712	-52
Wastewater	1,931	1,455	476
Corporate	495	380	115
Stormwater	106	149	-42
Regulated Recycled	2	0	2
Total	**3,194**	**2,695**	**498**

1.1.5 Capital expenditure by Driver

Capital expenditure by driver in the current period is shown in Table 1-3.

Table 1-3 Capital expenditure 2016–20 by driver ($2019–20 million)

Driver	2016–17	2017–18	2018–19	2019–20	Total ($)	% of total
Existing Mandatory Standards	392	456	532	467	1,848	58%
New Mandatory Standards	16	58	49	48	172	5%
Discretionary Standards	0	0	1	0	2	0%
Growth	195	267	277	313	1,052	33%
Business Efficiency	30	44	30	9	112	4%
Government Programs	7	1	0	0	8	0%
Total	**640**	**827**	**889**	**837**	**3,194**	**100%**

The most significant investment drivers in the period are:

- $1.85 billion for renewing assets and ensuring the delivery of services to meet *existing mandatory standards*.
- $1.05 billion on new infrastructure to service higher demand and new customers in greenfield and infill *growth* areas.

1.1.5.1 Capital expenditure by Driver – major variances

Under our regulatory framework IPART sets an allowance at the start of the price period, based on activities and decisions covered during the price review. We are entitled to re-prioritise when new information became available, meaning capital investment delivered is different to the IPART determination. The variances by investment driver are shown in Figure 1-1.

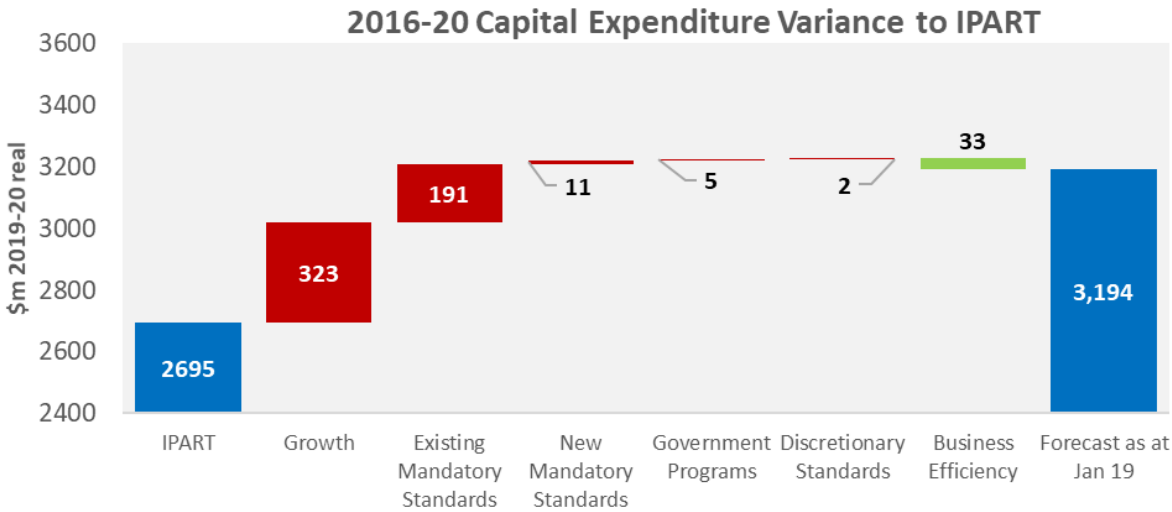


Figure 1-1 Capital expenditure variances by driver for 2016–20

The most notable variances are in Growth and Existing mandatory standards:

Growth investment is forecast to be $323 million more than the allowance of $729 million

We have spent more due to the higher than forecast new dwellings. However, customers did not bear the risk of funding some of the investments which appeared less certain in 2015. Details on growth investment are provided in section 1-3.

Existing mandatory standards is forecast to be $191 million more than the $1,657 million allowance

The major sources of this variance are in Digital renewals, reticulation sewers and across various wastewater treatment programs.

Expenditure and variances in the period are described by Driver in the following sections. A detailed list of all major programs and annual outputs delivered over 2016–20 is provided in Appendix 9A, Capex Tables.

1.2 Existing mandatory standards investment

Capital expenditure categorised under the 'Existing mandatory standards' driver largely relates to asset replacement to maintain appropriate service performance. It makes up the largest portion (around 58%) of all capital expenditure from 2016–20. The annual allowance and actual capital expenditure in Existing mandatory standards are shown in Table 1-4.

Table 1-4 Existing mandatory standards expenditure 2016–20 ($2019–20 million)

Existing Mandatory Standards	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	392	456	532	467	1,848
IPART Allowance	396	380	446	435	1,657
Difference	**-4**	**76**	**86**	**32**	**191**

We will invest around $191 million more in maintaining existing standards than provided in IPART's determination.

Relationship between assets, service performance and investment planning

Investments categorised under this driver clearly contribute to meeting existing mandatory standards. However, compliance with mandatory standards and good service performance is not just a question of investment in assets. Performance depends upon:

- having the right assets in place **and** operating and maintaining them appropriately
- the **combined effect** of different asset types operating together in an integrated system.

In seeking to meet mandatory standards, it would not be efficient for us to simply invest more renewing a single type of asset. Conversely, excellent service performance on system-wide measures does not necessarily mean that there has been over-investment.

Investment plans for this driver consider these more complex interactions alongside:

- asset condition and performance and the implications of failure on costs, safety, service and the community
- the environment in which the particular assets operate
- how to manage the assets at the most the efficient lifecycle cost.

Some asset classes influence performance on more than one mandatory standard. For example, reservoir renewals could positively impact water continuity, water pressure and water quality performance.

Given this, a review of investments delivered (and of planned investments) needs to take account of the interconnected nature of the systems and the different aspects of performance which assets contribute to within these systems.

1.2.1 Existing mandatory standards – Water

2016-20 highlights: Existing mandatory standards – Water

What do we do and why

Maintain water network assets so that they continue to reliably supply clean water to our customers at the required levels of quality, availability, pressure and taste.

Performance

We complied with all water quality and supply requirements to date. However, we expect to breach the Water Continuity Standard in the Operating Licence in 2018-19.

Investment summary

By June 2020, we will have invested $467 million in:

- inspecting and condition assessing water network assets
- renewing and refurbishing water mains, reservoirs, water pumping stations and water filtration plants.

Variance to IPART's allowance

While we have revised the allocation of spend in light of new information, there is no overall variance to the allowance.

We spent very close to our allowance in the 2016–20 as shown in Table 1-5. However, we made some changes within the portfolio reflecting:

- improved planning and better targeting of renewals, particularly for water mains
- the unforeseen need to address a much higher than average level of water main breaks, caused by extremely dry soil conditions
- deferral of some program expenditure to direct funds towards higher priority areas.

Table 1-5 Water existing mandatory standards expenditure 2016–20 ($2019–20 million)

Water Existing Mandatory Standards	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	129	117	118	103	**467**
IPART Allowance	124	113	115	114	**467**
Difference	**4**	**4**	**3**	**-11**	**0**

What are the 'existing mandatory standards' for the water network?

We seek to reliably deliver clean water to our customers at the right levels of quality, availability, pressure and taste. Specific regulatory obligations are captured in the Operating Licence:

- System Performance Standards on water pressure and water continuity

- performance commitments in our Customer Contract, which forms part of the Operating Licence
- prepare and maintain a drinking water quality management system consistent with the Australian Drinking Water Guidelines (ADWG), and implement this to the satisfaction of NSW Health[4]
- follow the Economic Level of Water Conservation (ELWC) method[5].

We are also required to comply with obligations which are not specific to Sydney Water, including safety, environmental and heritage legislation. For more details see **Attachment 2: Service levels and performance.**

1.2.2 Performance (Existing mandatory standards – Water)

Water quality

Annual audits since 2016 have found that we complied with requirements to maintain and follow a drinking water quality management plan. The audit report for 2017–18 also indicated compliance.

Service performance

To date, we have complied with all water service system performance standards covering water continuity, water pressure and drinking water quality, except for a breach of the water continuity performance standard (single interruptions) we will report for 2018–19. This is mainly due to a single event in April 2019 on a critical water main, that affected up to 15,000 properties. The standard currently requires that less than 40,000 properties experience an unplanned water interruption greater than 5 hours in a year.[6] We expect to have around 46,000 properties experience an unplanned water interruption greater than 5 hours in 2018–19.

Our performance was also very close to the limit in 2017–18. Performance has been influenced by a higher number of large water main breaks, and very dry soil conditions that have likely contributed to higher than average breaks and leaks.[7]

Performance linkage to investment

As indicated in Figure 1-2, Water Continuity Drivers, water continuity performance is partly influenced by underlying asset health (eg via long term replacement trends) but it also depends significantly on various operational responses.

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[4] This is specified in clause 4.1 of our Operating Licence.

[5] This sets out how to evaluate if the cost to society of a water conservation project is less than the value of water it saves. It should be applied to any investment, including water efficiency, leakage and recycling (where recycling is for the purposes of water conservation).

[6] As currently set out in Operating Licence clause 4.2.2(a)(i). Later in 2019,'40,000 properties' will be replaced with a measure based on 'x properties in every 10,000'. This allows the standard to change with growth in the number of properties on the system and avoids the target becoming unintentionally more stringent over time.

[7] At 7,493, 2017-18 main breaks and leaks were 24% above the average of 5,962 recorded over the preceding seven years. Annual average main breaks from 2008-9 to 2016-17 was calculated from the publicly reported National Water Initiative Indicator 'IA8'.

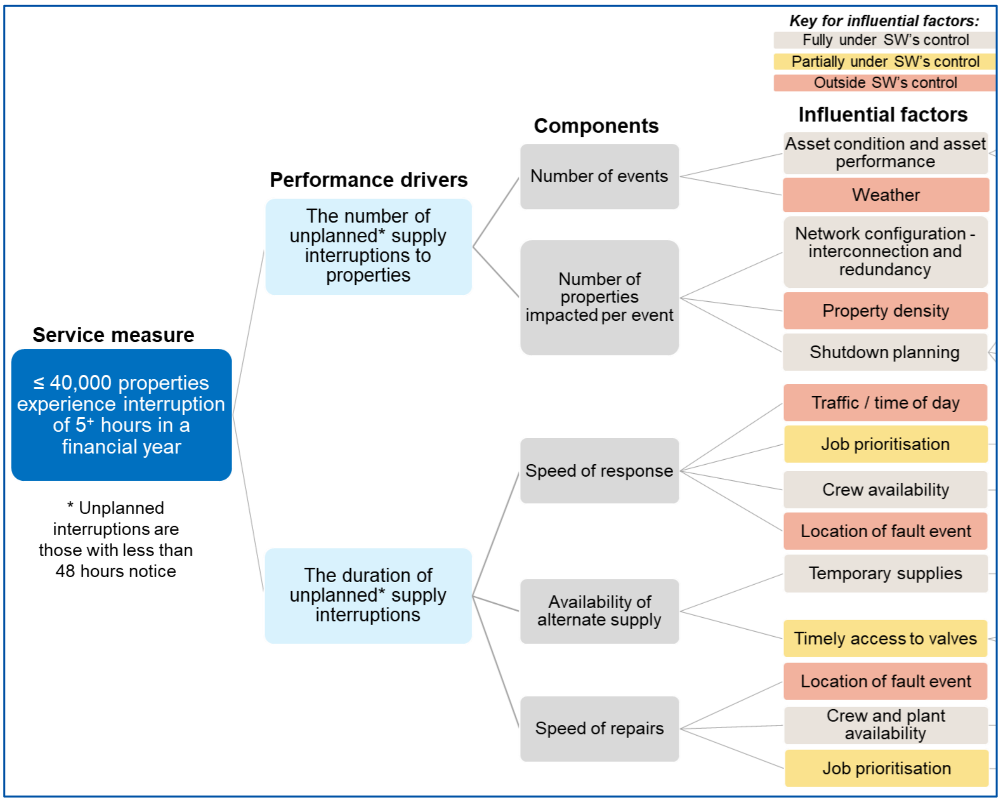

Figure 1-2 Water Continuity drivers

For example, the duration of supply interruptions depends partly on the speed of response. In turn this could be influenced by crew availability, traffic, work prioritisation and access to the asset.

There are parts of Sydney where access is particularly constrained, especially where there has been 'infill' growth and where other infrastructure work may be occurring.

We actively monitor performance and the factors that affect it, and continuously adapts its renewal and maintenance strategies to achieve best outcomes.

1.2.3 Investment details and variances (Existing mandatory standards – Water)

Summary of investments delivered

From 2016–20, major investments in relation to existing mandatory standards for water included:

- planned renewal and rehabilitation of 127 km of water mains costing $192 million, and emergency remediation of broken water mains costing $36 million
- renewal and rehabilitation of 20 water reservoirs to maintain water quality and reliability with a forecast cost of $75.3 million
- $55.5 million to renew 20 water pumping stations assets to ensure reliable water supply and adequate pressure
- $29.5 million for renewals at the five water filtration plants owned and operated by Sydney Water to maintain compliance with the ADWG.

Program 'outputs' are provided in Appendix 9A, Capex Tables.

Variances to the IPART allowance

The major variances to the IPART allowance are outlined in Figure 1-3.

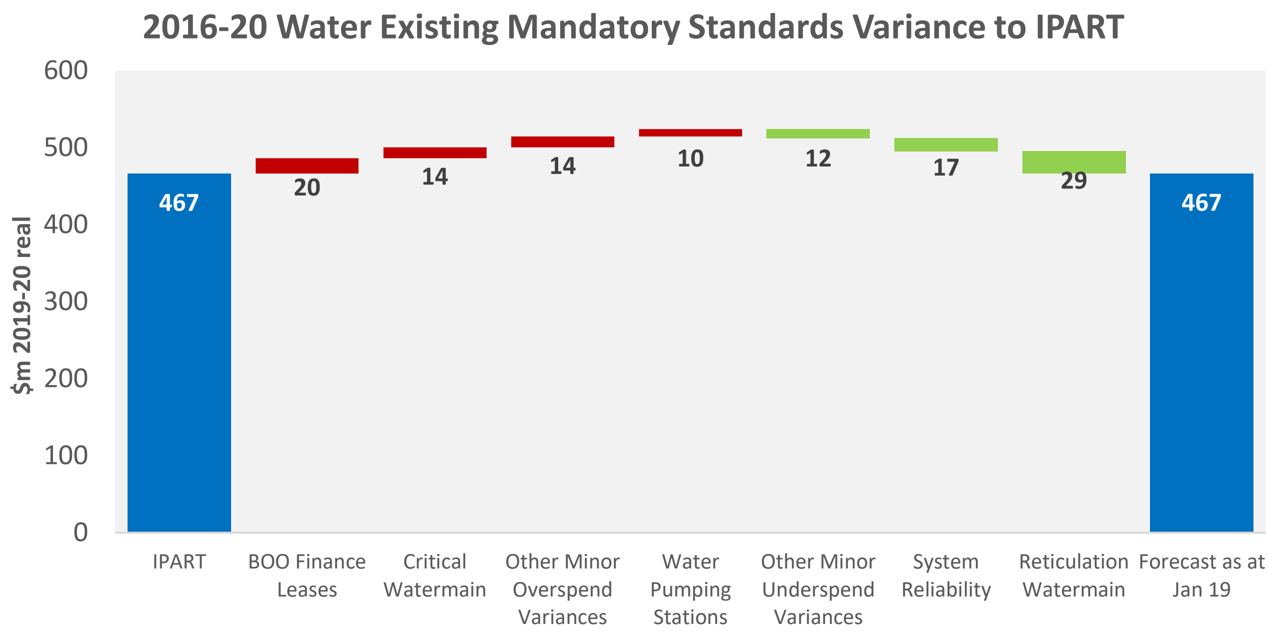

Figure 1-3 Existing mandatory standards (Water) major variances to allowance ($2019–20 million)

Except for the Build Own Operate finance leases, these variances are explained further below.[8]

Critical water mains

Capital expenditure on critical water mains is expected to end up $14 million above the allowance. The scope of the program had to be changed when dry soil conditions began to increase the rate of breaks, changing the risk profile. We re-prioritised and focused on what were now the highest risk repairs, some of which were capitalised against the Critical Water Mains program. Some originally planned work has been deferred to partially offset the impact.

Water pumping stations

Expenditure on Water Pumping Stations is $10 million above the determined allowance. The delivered work was largely as planned but higher costs were identified during detailed planning. Reasons include that:

- changes to large pumping assets require interaction with the electricity distribution businesses – some consequent changes to connection requirements led to higher costs
- there is a limited pool of suitably skilled contractors who can provide this type of high voltage electrical work.

[8] Information on the Build Own Operate finance leases is confidential.

A small portion of the overspend was due to a higher than expected volume of capitalised repairs.[9]

Other minor areas of overspend

A range of other small variances add up to $14 million above the allowance. This includes:

- Water Filtration Plants – We spent $3.8 million over the allowance on an urgent fire protection project to ensure compliance with the relevant Australian standards and codes.[10] The project scope increased due to site access constraints and extra defect remediation identified during the work.
- Customer meters – We spent $5.4 million over the allowance, mainly due to an increase in the amount of reactive renewals work.
- Hydraulic System Services - Expenditure is $4.7 million higher than the allowance of just over $2 million (although less than the allowance has been spent against the equivalent 'wastewater' program).[11] The largest expenditures were to replace SCADA at Richmond WFP and to replace critical remote telemetry units across the water network.

Negative variances – underspends against the allowance

Programs where expenditure has been less than the allowance include:

- Reticulation Water Mains: Program expenditure is now expected to be $29 million lower than the allowance. The asset strategy for this program seeks to achieve the lowest lifecycle cost and the forecast was set to balance renewal expenditure with the cost of future maintenance and break repair.[12] We improved our analysis approach and identified a smaller number of cost-effective replacements.
- system reliability: we deferred $17 million worth of work.

$12 million in other small negative program variances in Figure 1-3 represent:

- Reservoirs ($2 million): Additional renewal work was identified following condition assessments, but the impact was offset by deferring others. Deferrals were achieved through 'sharing' reservoir contingency with new reservoirs installed for growth in adjacent zones.
- Externally driven work ($10 million): A lower than expected volume of work was required to move assets to facilitate an external party's infrastructure investment.

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[9] This followed a change in how we apply our capitalisation policy. Following a review of approaches taken by six other Australian water utilities, we lowered the threshold for capitalisation of asset renewals, overhauls and replacements. This brought our approach more into line with these other utilities.

[10] The project was initiated following Fire and Bushfire risk assessments at Warragamba, Orchard Hills, Nepean, Cascade and North Richmond. It was continued from the previous IPART determination period.

[11] This is discussed further in section 1.2.6.2

[12] This allows Net Present Value (NPV) and Payback Period (PP) analysis for each job – unless there are any externalities to consider, only 'NPV positive' renewals are carried out. As a result, resources are focused on the most cost-effective replacements, balancing mains renewal with the cost of future maintenance and repairing breaks.

1.2.4 Existing mandatory standards – Wastewater

2016-20 highlights: Existing mandatory standards – Wastewater

What do we do and why

We work to maintain an efficient, safe and reliable wastewater transport and treatment system at the lowest lifecycle cost which:

- provides health and other community benefits, such as clean beaches
- operates according to Environmental Protection Licences and Operating Licence conditions in wet and dry weather
- manages other community impacts such as odour
- enables the sustainable re-use of resources, where possible and efficient.

Investment summary

By June 2020, we will have invested $926 million to maintain wastewater services through:

- inspecting, condition assessing and renewing network and treatment assets
- de-silting wastewater network assets
- renewing and refurbishing assets when required.

Achievements include the completion of Malabar PARR program, the North Head NSOOS Scrubber, Cronulla Odour projects and a major project to significantly rehabilitate St Marys and Quakers Hill wastewater treatment plants (almost complete).

Performance

We complied with all Operating Licence conditions but not with some environmental obligations, partly due to adverse weather conditions.

Variance to IPART's allowance

Expenditure outturn is forecast to be $109 million (13%) higher than the $817 million allowance. Reasons include a wastewater pumping station breakdown, and finding wastewater treatment plant assets to be in poorer condition than expected.

Capital expenditure for this driver and product over the period is shown in Table 1-6.

Table 1-6 Wastewater existing mandatory standards expenditure 2016–20 ($2019–20 million)

Wastewater Existing Mandatory Standards	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	188	217	280	242	926
IPART Allowance	173	179	232	233	817
Difference	**14**	**38**	**48**	**9**	**109**

Summary of the existing mandatory standards for wastewater

The main sources of wastewater mandatory standards are:

- the Operating Licence, which includes limits on the number of private properties which experience wastewater overflows in dry weather in a year[13]
- Environment Protection Licences (EPLs) issued under the *Protection of the Environment Administration Act 1991*. There are 23 wastewater EPLs, regulating the performance of 28 treatment plants and their related networks through system specific limits on nutrient discharge loads, discharge volumes, overflows and plant bypasses in wet and dry weather.

EPLs also include over-arching requirements for 'proper and efficient management' of systems and plant, complaints processes and reporting conditions, for example:

- *'no deterioration and continuing improvement in the sewage treatment system environmental performance relative to existing conditions'*
- regardless of any upper limits set, Sydney Water should *'minimise the frequency and volume of overflows and sewage treatment plant bypasses'.*[14]

Given these objectives, it would not be acceptable for performance to remain just below a maximum limit for a long period. We need to keep improving performance over time.

We are also subject to legislation not specific to us, covering safety, traffic management, environment and heritage requirements, for example.[15]

Example EPL conditions

EPL O4.8a – 5-year rolling average chokes per year per 100 km (<81)

EPL 7.4 – Limit on the number of dry weather overflows to waterways

EPL L7.2 – Limit on frequency of wet weather overflows from the network

EPL L1.3 - prohibits the pollution of waters at any time if caused by overflows due to a failure to operate and maintain the reticulation system in a proper and efficient condition.

Investment plans seek to meet all these requirements, considering how the integrated system delivers the many aspects of service. Planning also considers lifecycle cost, asset condition and the risk and impact of asset failure on costs, safety, service and the community.

1.2.5 Service performance (Existing mandatory standards – Wastewater)

Operating Licence

We have complied with our Operating Licence system performance standards (SPS 4 and SPS 5) for wastewater since 2016. However, underlying indicators suggest lower performance in 2018–19 and 2019–20. See **Attachment 2: Service levels and performance**.

[13] The two current measures are (see Attachment 2):

- System Performance Standard 4 (Operating Licence clause 4.2.3): The number of private properties which experience uncontrolled wastewater overflows in dry weather
- System Performance Standard 5 (Operating Licence clause 4.2.3): The number of private properties which experience more than three uncontrolled wastewater overflows in dry weather.

[14] Clause A1.4, Environment Protection Licence – 1963, Winmalee Sewage Treatment System including the Sewage Treatment Plant

[15] Wastewater assets can have recognised heritage value due to age, technological and/or architectural significance.

Environmental performance

We have not fully complied with some environmental obligations. As noted, a full set of performance results is in **Attachment 2: Service levels and performance** but the most relevant are provided below.

From 2016–17, there has been an increase in EPL non-compliances, as shown in Figure 1-4.

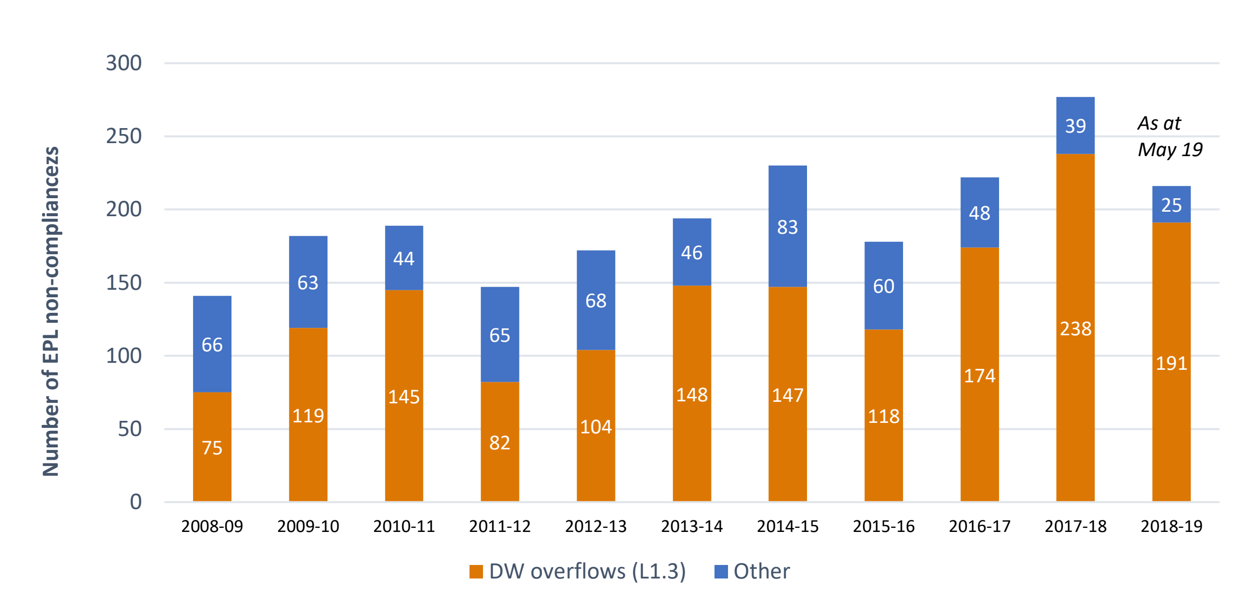


Figure 1-4 Annual Non-Compliances against EPL Conditions (including EPL Condition L1.3)[16]

The number of pollution events impacting waterways has been increasing since 2015-16. Most of the non-compliances on L1.3 (and on L7.4) are due to higher numbers of chokes which led to overflows.[17] The most common cause of chokes are tree roots, which enter sewers when seeking out moisture in the ground.

[16] EPL Condition L1.3 prohibits the pollution of waters at any time from overflows resulting from a failure to operate and maintain the wastewater reticulation system in a proper and efficient condition

[17] Other causes of 'chokes' include oil and grease build-up (ie 'fatbergs'); silt and construction debris; and other solids which do not naturally disperse (eg 'wipes in the pipes')

The impact of extremely dry ground conditions from 2017 onwards can be seen in Figure 1-5, with the number of chokes increasing in the last two years.

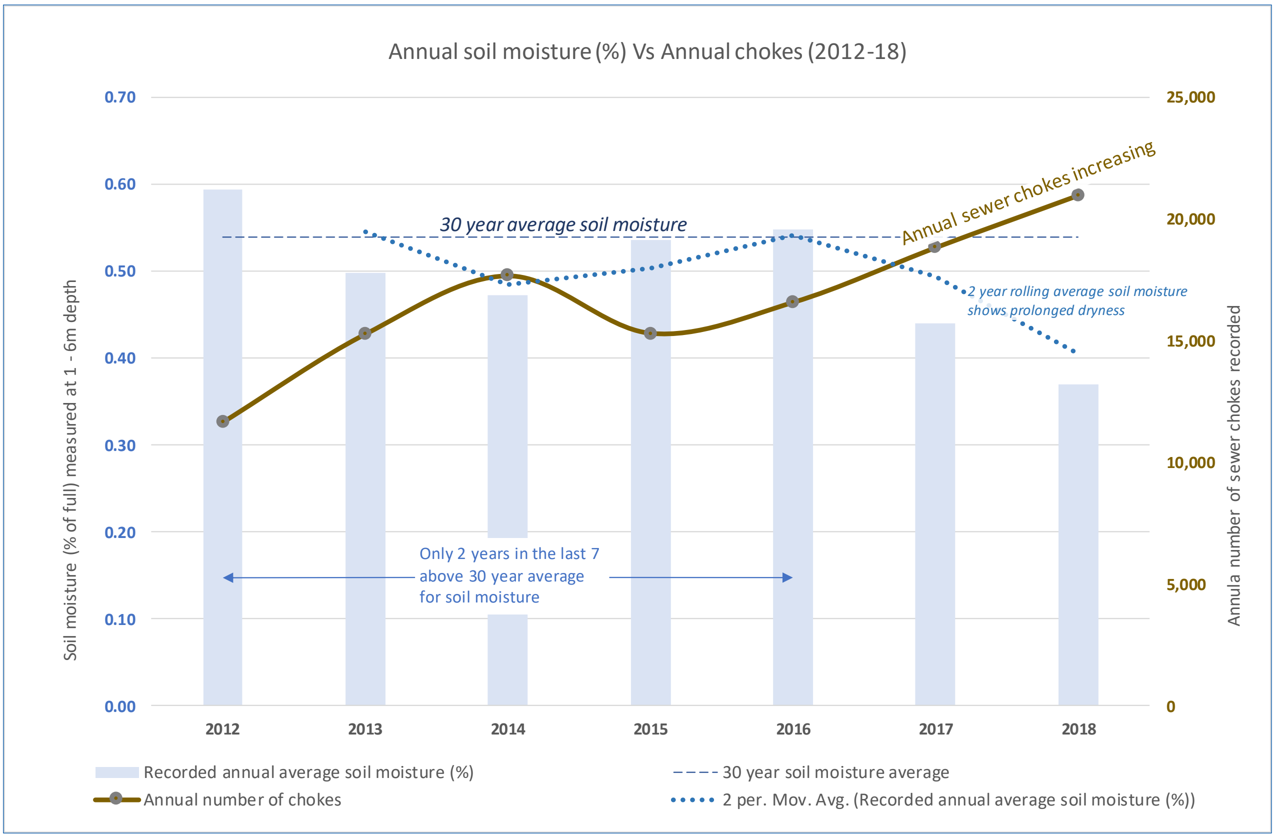


Figure 1-5 Soil moisture measurements and numbers of chokes

While chokes have increased, the network remains in compliance with the rolling average target of 81 chokes per 100km over a five-year period (EPL O4.8a).

There have been nine dry weather overflows from wastewater pumping stations within the 2016–20 period to date, against an annual target of zero (EPL L1.4).[18]

Environment Protection Licences – Treatment

We have achieved most target outcomes including load, concentration and flow limits for wastewater treatment and water recycling plants. Two exceptions are covered below.

In 2017–18, Bondi wastewater treatment plant breached some oil and grease concentration limits (although not the absolute limits).[19] This was likely driven by changing catchment demographics, increasing population and lower water consumption. A response is being considered as part of catchment planning for the plant.

Also in 2017–18, Picton wastewater treatment plant exceeded a concentration limit and the total volume discharge limit.

[18] EPL L1.4 specifies the 'Number of Wastewater Pumping Station dry weather overflows'.

[19] Both 50%ile and 90%ile limits were breached. Concentrations at Bondi have increased from 25mg/L in the mid-1990s to over 50mg/L in 2018.

Other performance measures

Beachwatch data published by the NSW Office of Environment and Heritage (OEH) shows that Sydney's waterways and beaches have become cleaner and safer for recreational activities. The management of wastewater and stormwater has been a clear contribution to this.

1.2.6 Investment details and variances (Existing mandatory standards – Wastewater)

Summary of investments delivered

Over 2016–20, the total of $926 million investment in relation to existing mandatory standards for wastewater included:

- $247 million to maintain the reliability of 28 wastewater treatment plants
- $200 million to significantly progress upgrades of St Marys and Quakers Hill wastewater treatment plants, improving reliability and mitigating the environmental risk of lagoon failure
- $182 million to inspect and renew the critical sewer network to maintain the asset failure risk at an appropriate level.

We also expect to complete the Malabar Performance and Reliability/Renewals (PARR) project and North Head scrubber replacement projects.

Variances to the IPART allowance

We expect to spend $109 million more than the $817 million allowance. Major variances by program are outlined in Figure 1-6 – programs denoted (T) are treatment plant related and programs denoted (N) are network related.

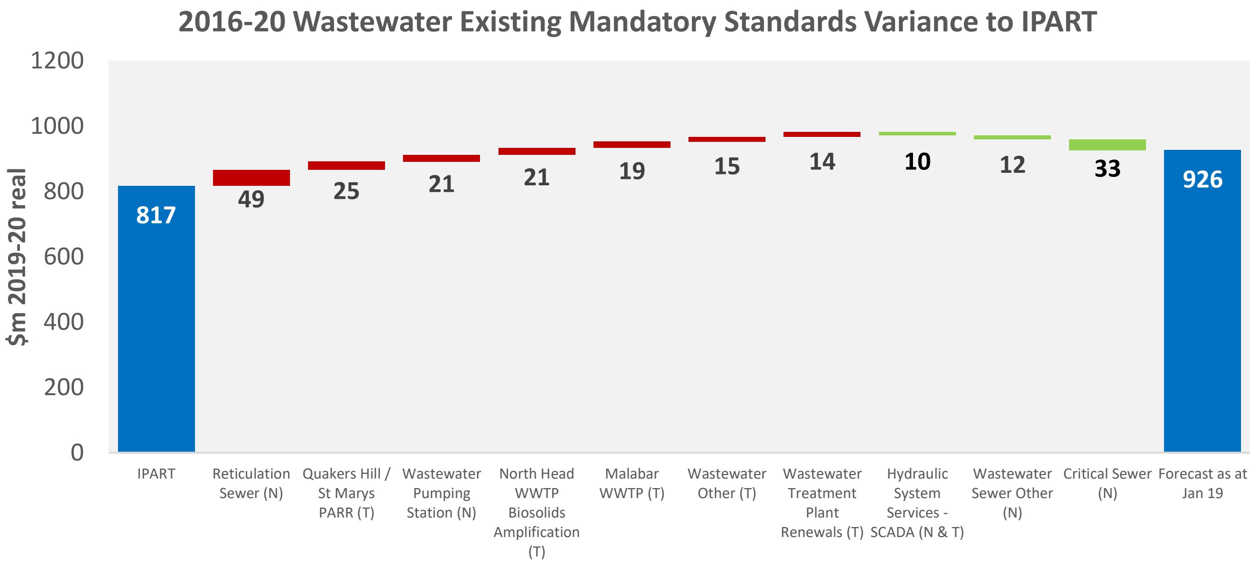


Figure 1-6 Maintaining wastewater services major variances to Determination ($2019–20 million)

These results are explained in the separate 'Treatment' and 'Network' sections below.

1.2.6.1 Treatment plant programs and variances

Wastewater Treatment Plant Renewals Program

The wastewater treatment plant renewals and reliability program consists of around 280 individual projects to deliver a wide range of renewed asset types across different plants. By 2020, we expect to have spent $247 million on this program – $14.5 million more than IPART's allowance.

This is partly due to our improved risk-based planning approach (see 'Project See', below). This identified more high-priority asset renewals, in particular high risk dewatering assets. There was also an increase in capitalised asset rehabilitations.

Project See: Improving renewals decision-making

'Project See' is a major initiative to improve and standardise the renewals decision-making framework – initially for wastewater (and water) treatment plants and progressively across all asset classes.

Too many reactive renewals

In 2014-15, just over a third of treatment plant renewal expenditure originated from a set plan, with the balance coming from unplanned reactive projects.

Project See objective: reverse the proportions of planned - unplanned work

The project aimed to establish a stable portfolio-wide plan across WWTP and WFP - ensuring that asset problems were identified, planned for and addressed *prior to* performance issues or failure where efficient. A 'one-off' comprehensive condition assessment was undertaken to establish an improved baseline of asset condition and risks.

The improved process includes:

- high frequency condition assessments, with a portion of the plant reviewed each month and the whole plant assessed annually
- using asset condition and consequence of failure assessments to develop robust consistent risk scores for each asset
- using the risk scores to conduct quarterly prioritisation reviews on candidate project lists for progression to initiation business case.

Outcomes:

- a much greater proportion of renewals jobs are now 'planned'
- we are not proactively pre-planning work which can be done reactively for lower cost
- we have a deeper and more consistent understanding of risk across WWTP assets
- work is optimised across the portfolio in terms of efficiency, timing, work bundling, data handling and business case preparation.

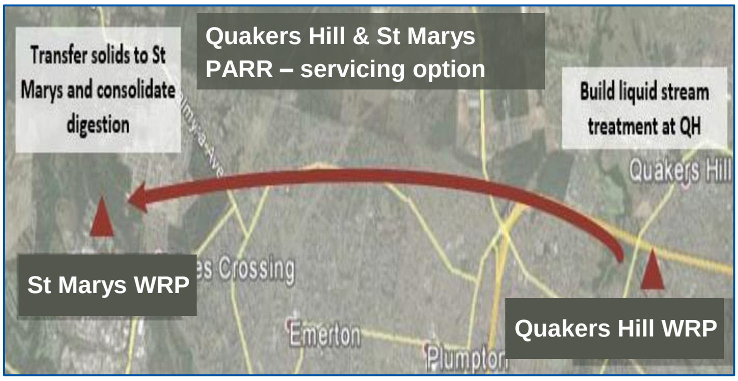
While it normally addresses shorter term priorities, this process greatly informed the development of the 2020–24 wastewater treatment plant renewals program.

St Marys and Quakers Hill

A combined Process and Reliability / Renewal (PARR) project is being undertaken to improve reliability and performance at Quakers Hill and St Marys. Assets were in poor condition, performance was deteriorating and there was an elevated environmental risk due to potential failures of Intermittently Decanted Aerated Lagoon (IDALs) at Quakers Hill.[20]

In 2017, it became clear that it would be efficient to also consider future population growth and tightening environmental standards in the catchment. Options were re-assessed to get the best outcome across both sites. The solution includes:

- treating the combined liquid stream at an upgraded Quakers Hill WRP[21]
- using spare digestion capacity at St Marys and creating a centralised biosolids handling facility there – reducing biosolid truck movements and odour around the more residential Quakers Hill area
- the scope for more cost-effective energy production via the digestion process at St Marys, which mitigates against future energy price increases.



The renewal aspect is forecast at around $199.6 million in this period[22]. This is $25.3 million more than the allowance, mainly due to higher construction costs identified after planning. The re-scoping of the work led to a review of delivery approach. To create a package of work which would drive scale efficiencies and be attractive to a competitive field of providers, the work was bundled with the Riverstone amplification. This led to the appointment of a 'delivery partner' to manage delivery on our behalf, including the appointment of sub-contractors. Benefits included:

- procurement scale efficiencies and the introduction of competitive tension within the project
- avoiding 'margin on margin' costs via direct engagement with Tier 2, 3 and 4 level contractors on a program wide basis
- creating partnership incentives for the 'delivery manager'.

Malabar wastewater treatment plant

We expect to spend $32.4 million at Malabar to complete a significant renewal program to improve plant reliability, performance during wet weather and the quality of biosolids. This final phase of the multi-year project will upgrade dewatering assets, inlet works, electrical assets and control systems. It will also refurbish five digesters. We forecast that the final spend will be $19 million more than the allowance.

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[20] The lagoon liners are no longer fully intact and a lack of process redundancy means repairs are not possible.

[21] A new plant at Quakers Hill with liquid process capable to receive, treat or transfer the ultimate Average Dry Weather flow of 38 ML/d. The treatment plant will consist of new preliminary, primary and secondary treatment units and augmentation of the existing tertiary filters.

[22] Some of the project is allocated to the Growth driver.

North Head wastewater treatment plant

We are renewing the de-watering, digestion and thickening assets at North Head. This will improve reliability, maintain the quality of biosolids (to reduce disposal costs) and reduce community odour impacts. The forecast cost is $20.6 million.

Other wastewater treatment renewals

We will spend $4.8 million on previously unforeseen renewal work at Cronulla wastewater treatment plant to improve plant reliability and mitigate the risk of further EPL non-compliance.[23]

We will spend $9.2 million to complete the North Head Northern Suburbs Ocean Outfall Sewer (NSOOS) scrubber upgrade, replacing the existing chemical unit with a bio trickling filter. This will improve performance and reliability, reduce odour emissions and improve safety.

1.2.6.2 Networks programs and variances

Major programs in the Network portfolio and some of the key variances are described below.

Critical sewers

We expect to spend $181.7 million to proactively manage the 'high consequence failure' risk within 2,700 km of trunk wastewater mains. This is to avoid catastrophic structural failures that could cause extensive environmental damage and high repair costs. We expect to renew around 18km of critical sewers in the period.[24]

We will complete less work than initially planned, investing $33.3 million less than the allowance. The is largely due to delays to the NSOOS project caused by significant access and safety issues. The complexity of the project only became apparent during the initial physical inspections. The practical challenges and the delays caused by unexpected issues are detailed below.

[23] In 2016-17 there were 10 non-compliant filter bypasses, with a total volume of 576 ML[3.] There was also an increasing risk of breaching the Total Nitrogen calculation and annual load limits.

[24] As forecast in February 2019

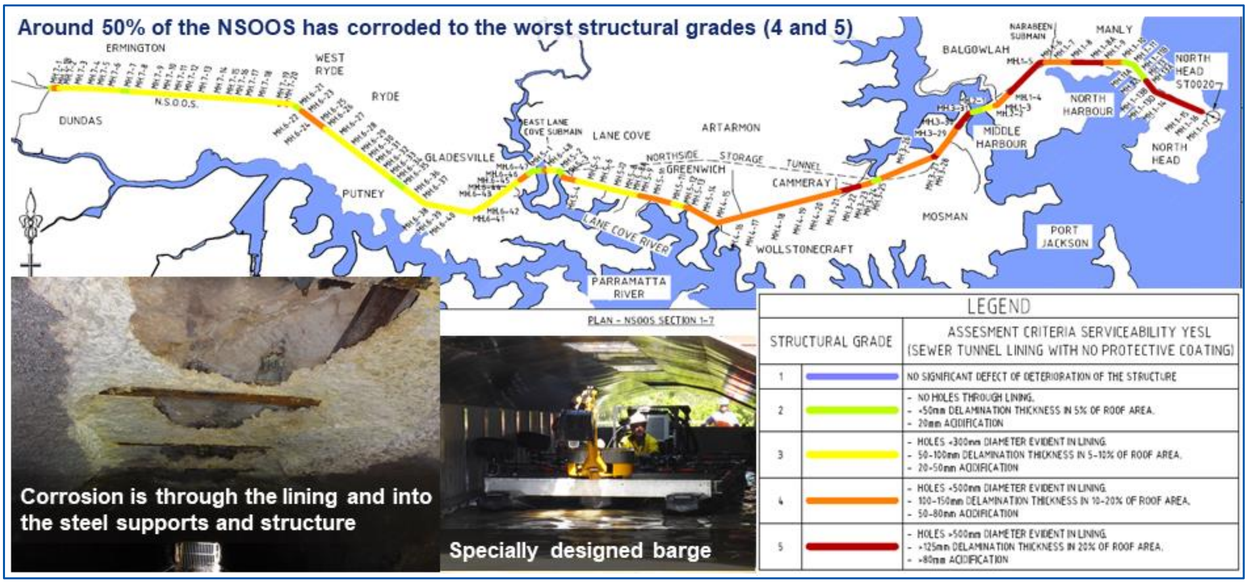
Northern Suburbs Ocean Outfall Sewer (NSOOS) renewal / rehabilitation

The NSOOS is one of Sydney's largest and longest sewers, stretching for 28km at depths of up to 90m. It serves 1.3 million people and average flows are around 60% of capacity.

Poor condition drives urgent need for refurbishment

The map indicates the NSOOS' condition along its length. Red and orange indicates where corrosion is through the concrete lining and into the structure, elevating the risk of collapse. Inspections revealed significant silting, exacerbated by dropped lining material. The silt reduced sewer capacity and increased the overflow risk. Clearing it led to a delay of remediation work.

NSOOS condition assessment and corrosion examples



A full or partial collapse would have significant community and environmental impact and re-build costs could be very high. However, the work presents substantial practical and safety challenges:

- bespoke equipment and work processes had to be developed for asset surveying, silt removal and managing unstable tunnel roof areas
- a daily and weekly maintenance schedule for the equipment had to be developed and optimised once performance became known
- there is a very limited pool of qualified service providers – two are engaged and work simultaneously in discrete sections
- the work schedule needs to avoid higher flow periods, wet weather and upstream or downstream asset issues
- such specialised work in this environment needs to be staged over several years.

Innovation and continuous learning

While this is very complex work in a challenging environment, it has driven innovation. The forward program benefits from the asset-specific knowledge gained from these first packages. While one package is delivered, planning and design for the next is undertaken, using updated knowledge of sewer conditions, work methods and costs.

While these issues impacted delivery in this period, the second of seven work packages will be underway by 2020 and future work packages are greatly informed by the knowledge gained.

Wastewater pumping stations

We operate 680 pumping stations across the wastewater network. Our asset management strategy seeks to maintain performance and avoid dry weather overflows at the lowest lifecycle cost.

In the current period we expect to spend $92.1 million to complete 23 major pumping station renewals and 19 pump renewals. This is $21.3 million higher than IPART's allowance, due to electrical and flood requirements which were more stringent when considered in detail.[25] There has also been a higher than forecast amount of capitalised asset remediation.[26]

Reticulation sewers

This program of work delivered renewal of around 76 km of small-diameter wastewater mains – less than originally planned, but with expenditure of $96.9 million recorded against the allowance of $48.2 million. A significant proportion of the expenditure recorded against this program had not been capitalised previously and was not in the original scope.[27]

Hydraulic System Services (SCADA/operational technology)

The objective of this program was to renew telemetry and control equipment (SCADA) on the wastewater system. We spent $10 million less than the allowance of $49 million, with a large portion of the work completed being related to SCADA upgrades and increased automation.

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[25] For example, when seeking the approval of electricity distribution businesses for new pumps, other costs were identified as a result of local network requirements.

[26] This was partly due to the change in how we implement the capitalisation policy and partly due to emergency remediation costs.

[27] This was due to the change in how we implement the capitalisation policy.

1.2.7 Existing mandatory standards – Stormwater

2016-20 highlights: Existing mandatory standards – Stormwater

What do we do and why

We work to maintain an efficient, reliable stormwater service which safely transports stormwater when required, mitigates flood risks and manages the health of waterways into which stormwater flows.

Investment summary

By June 2020, we will have invested $57.4 million to inspect, condition assess and renew stormwater assets including open channels, culverts and pipes.

A further $9.4 million of investment will aim to manage the environmental impacts of stormwater coming through our assets on waterways.

Performance

We have maintained the service and managed risk, avoiding collapses and slightly reducing the proportion of assets in the lowest condition categories. When required, we worked with local councils to prepare Floodplain Risk Management Plans and invest in line with those plans.

Variance to IPART's allowance

We expect to spend $31 million less than the $99 million allowance due to a combination of delays reaching agreement with Councils; a third-party error; and some work re-prioritisation.

Table 1-7 shows the annual allowance along with actual and forecast expenditure for the period.

Table 1-7 Stormwater existing mandatory standards expenditure 2016–20 ($2019–20 million)

Stormwater Existing Mandatory Standards	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	16	19	16	18	68
IPART Allowance	24	17	35	23	99
Difference	**-9**	**2**	**-19**	**-5**	**-31**

Stormwater service background

Stormwater is mainly rainfall run-off which flows to drains, creeks and rivers before discharging into the ocean. It needs to be managed as it can result in flooding and risks to public safety, property damage and infrastructure disruption. If poorly managed, it can also cause erosion and disperse pollutants which impacts waterways, the environment and social amenity (eg at beaches). As urban development increases the extent of hard surfaces, the higher volumes of run-off and more pollutants need to be managed in the network.

Our role and obligations in stormwater services

Under our Operating Licence, Sydney Water must provide, operate, manage and maintain a Stormwater Drainage System as described in section 14(1)(b) of the *Sydney Water Act 1994* (NSW).[28] Our obligation only covers parts of the city as shown in Figure 1-7.

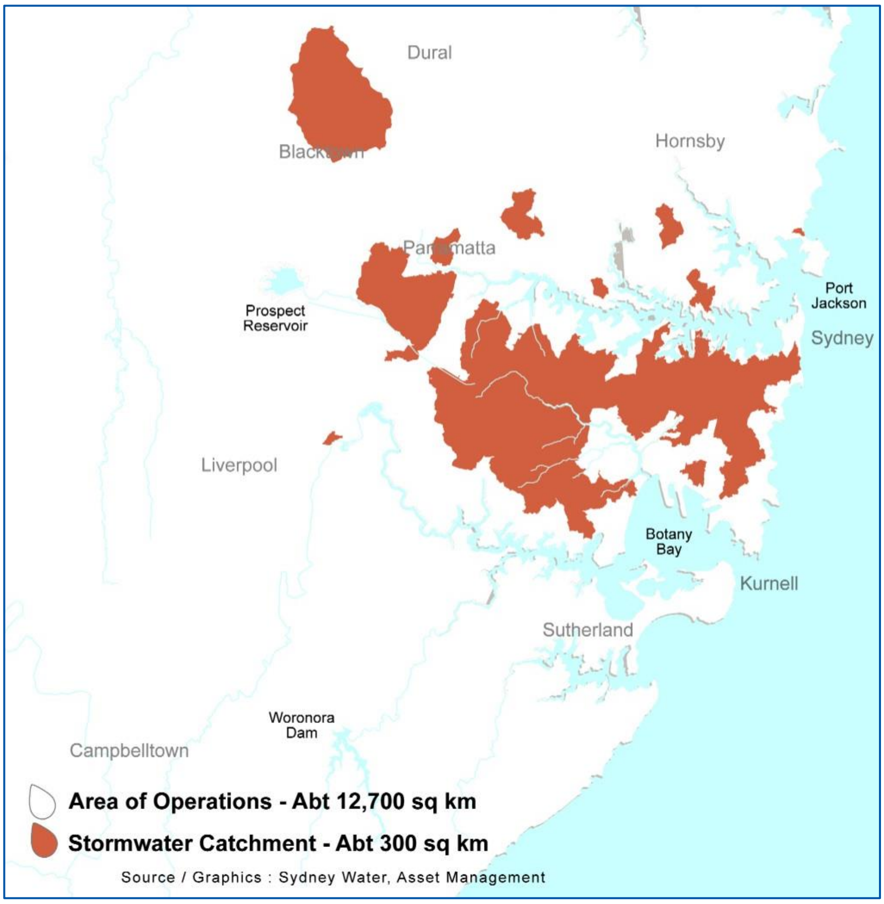

Figure 1-7 Sydney Water stormwater catchments

Stormwater management in Sydney is complex as many other authorities own and manage stormwater assets. While there is interaction between parties' stormwater assets, there is no authority which coordinates capital planning in relation to stormwater networks.

We own around 450km of stormwater network assets. Over 70% of these were commissioned before 1941 and some much earlier. More than 40km of channels are understood to have been established before 1850.

While the Operating Licence provides the overarching obligation, many factors influence how the service is planned and provided.

[28] Where the Licence defines **Stormwater Drainage System** as:

> *"the stormwater drainage channels, land for drainage, pipes, detention structures and stormwater quality improvement devices and other equipment that Sydney Water provides, manages, operates and maintains under the Act to provide stormwater services."*

Sydney Water Corporation Operating Licence 2015-2020, p28

As a result, the efficient delivery of capital works which deliver the intended benefits requires extensive engagement with, and often the consent of, other authorities.

This is particularly true of stormwater naturalisation projects, and most of the projects in the Flood Risk and Waterway Health program. It is not unusual for the lifecycle of projects to exceed a typical four-year price period. We are also required to implement parts of the Council-led Floodplain Risk Management Plans where these require capital solutions in declared catchments.

1.2.8 Investment details and variances (Existing mandatory standards – Stormwater)

Variances to the IPART allowance

We expect to spend $31.3 million less than the $99.4 million allowance, less than originally forecast in all three program areas (renewals, flood risk and waterway health). Major variances by program are outlined in Figure 1-8.

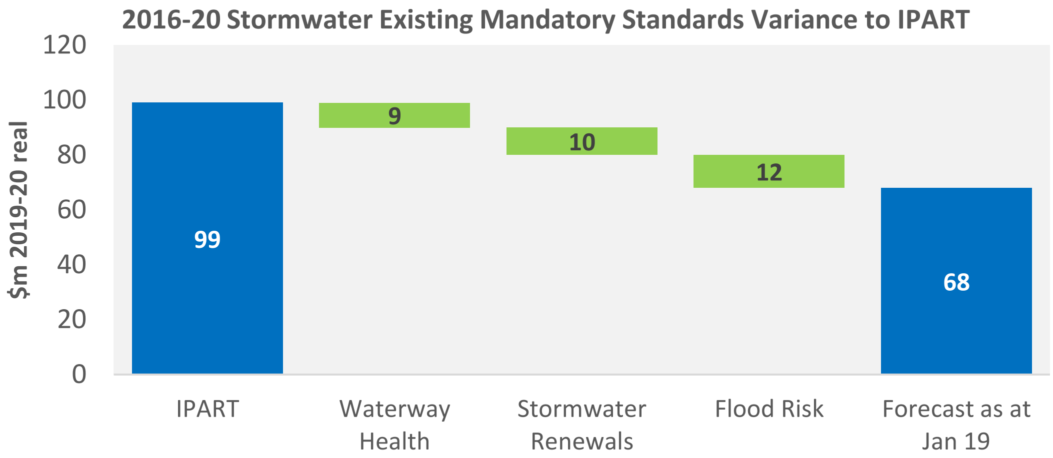

Figure 1-8 Stormwater services major variances to the IPART Determination ($2019–20 million)

Variances in the three programs are discussed in the sections below.

Stormwater asset renewals

Our expenditure on the stormwater renewals program is expected to be $57.4 million, $10 million less than the allowance.

The program objective is to maintain assets in safe and fit-for-purpose condition to provide the stormwater service. This is informed by asset condition assessments which in conjunction with 'consequence of failure' ratings result in risk rankings.[29]

The objective has been met and the program has:

[29] Stormwater asset failure includes channel collapse. Risk consequences we consider include public safety, property damage and an asset's ability to perform (eg the inability to convey the required volume of stormwater).

- managed risk, avoiding collapses and slightly reducing the proportion of assets in the lowest condition categories[30]
- maintained public safety through renewing approximately 3 km of open channel fencing
- maintained existing levels of performance with no net reduction in hydraulic capacity and increasing capacity where necessary
- increased asset knowledge and informed future priorities through over 150 km of condition assessments.

Most of the planned program was completed including:

- renewal of 750 m of open channels along Powells Creek which were in poor condition with an elevated failure risk. The project required engagement with community and stakeholders and channel naturalisation was well received.
- renewal and naturalisation of 600 m of open channel along Johnsons Creek. This reduced the asset risk, maintained the environmental performance and improved amenity
- multiple renewals of other stormwater network assets which were in poor condition.[31]

We also renewed part of the heritage listed Alexandria Canal and started work on assets in the Sydney CBD. Given the long lead times for stormwater renewals, we undertook extensive stakeholder engagement on critical open channel renewals which will likely commence after 2020.[32]

This underspend of $10 million is because part of the original scope was deferred, and the funds were redirected to higher priority renewal work[33]. Other work was delayed due to an extended negotiation of licence deeds for works on council land. Projects commenced but deferred due to re-prioritisation are 'plan ready' for delivery in future.

Waterway health

Our expenditure on the waterway health program is expected to be $9.4 million, $9.3 million less than the allowance. The program objective is to manage the impact of increased urbanisation on waterway health.

To manage increasing volumes of urban stormwater run-off and pollutants we install capture and treatment devices and create naturalised land features. These capture litter and other gross pollutants (primarily plastic bottles) as well as filtering out nutrients and other microscopic pollutants.

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[30] There have been no channel collapses. The proportion of the 'Grade 5' assets will decrease from 3.6% to 3.1% and the proportion of the 'Grade 4' assets will decrease from 3.0% to 2.8%. These will change when ongoing inspections are included in the condition register and risk analysis takes place.

[31] 21 project sites across the stormwater network

[32] We have identified options and developed concept designs acceptable to stakeholders (eg councils) for 1200 m of channel renewal

[33] Capital expenditure in the Stormwater Portfolio was reduced to a maximum of $64 million.

These investments often require significant community and stakeholder consultation, as shown in the example below.

Stakeholder engagement on stormwater issues

We engage with stormwater stakeholders in a meaningful way and incorporates the feedback into investment plans.

While we have always consulted with councils to an extent, the scope and sophistication of direct customer and community engagement on stormwater issues has increased. Since 2016 we have held:

- 14 community information sessions, with at least another 22 planned before 2020
- over 130 workshops and meetings with councils in Sydney, across 15 projects
- 11 project-specific consultations, where we heard from 730 community members. Many were very supportive of our projects.

"This is a great initiative - please make it happen" – Iron Cove Creek consultation

"Stormwater management is a real challenge in the area, so the proposed scheme to better manage stormwater and improve the amenity of the park is very welcome." - Hoskins Park consultation

- On average, 86% of customers supported creek naturalisation projects and 80% support waterway health improvement projects.

Further information on customer engagement processes is in **Attachment 3: Customer Engagement**.

Flood risk program

Our expenditure on the flood risk program is expected to be $1.4 million, $12 million less than the allowance. We have been unable to deliver the most significant item in this program. This is due to unauthorised third party works, which delayed the development of a design solution for the Erskineville project. This often occurs with stormwater projects involving multiple councils and other stakeholders (all with differing skills, resources and priorities)

While we worked towards delivering the flood risk program in the period, the slow process contributed to the underspend. While some work will not be delivered, it is thoroughly planned and will be ready for implementation after 2020.

1.2.9 Existing mandatory standards – Corporate

2016-20 highlights: Existing mandatory standards – Corporate

What do we do and why

We invest to renew a wide range of corporate assets that support service delivery and business functions, including information technology, buildings, facilities and other property.

Investment summary

By June 2020, we will have invested $386 million including $349 million on information technology (covered in section 3).

The non-digital expenditure mainly covers land, property and easement work.

Performance

There are no specific performance obligations which relate directly to these investments but most corporate facilities support many aspects of our performance.

Variance to IPART's allowance

By June 2020, we expect to spend $112 million more than the $274 million allowance, largely driven by Digital investment.

Table 1-8 – Corporate existing mandatory standards expenditure 2016–20 ($2019–20 million)

Corporate Existing Mandatory Standards	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	60	104	119	104	**386**
IPART Allowance	74	71	65	64	**274**
Difference	**-14**	**32**	**55**	**40**	**112**

Variances to the IPART allowance

As shown Figure 1-9, the main reason for variance was additional spend in information technology.

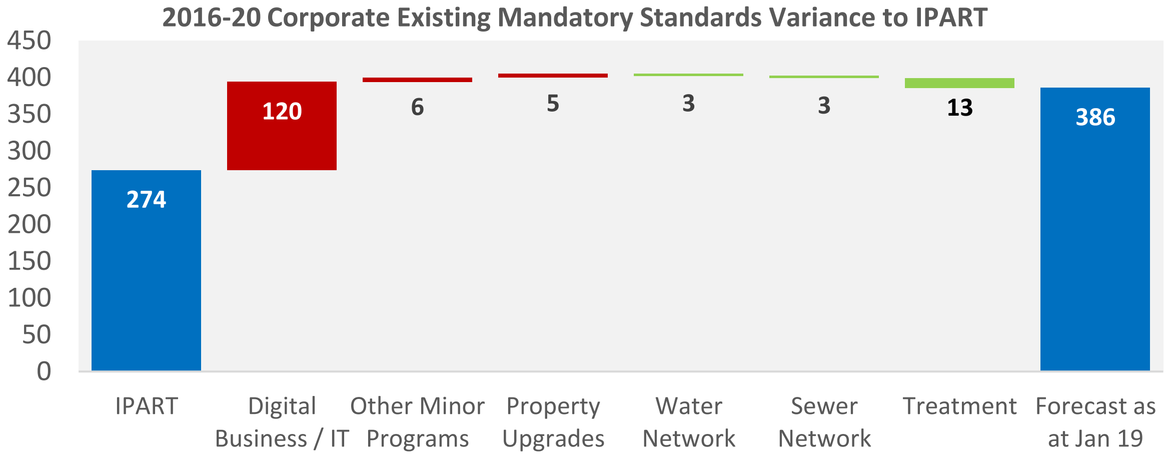

Figure 1-9 Existing mandatory standards (corporate) major variances ($2019–20 million)

The information technology variances are discussed in section 3.1. Small overspends in the property portfolio relate to extra work for:

- inspecting land and easements and clearing contamination and hazardous materials
- remediation of land embankments and rock faces at coastal sites
- office accommodation renewals.

1.3 Growth investment

2016-20 highlights: Growth investment

What do we do and why

As Sydney's population and economy grows, we need to be able to provide safe, affordable and reliable water, wastewater and stormwater services to new and existing customers. This requires timely and efficient investment in network and treatment assets for each product as demand grows.

Investment summary

By June 2020, we will have invested $1,052 million – split between Network (65%) and Treatment (35%).

Most growth investment took place in the North West and South West Growth areas, which together make up 40% of the total.

Performance

During a period of unprecedented growth in new dwellings in greenfield and existing areas, we have provided services on time for new customers.

Variance to IPART's allowance

As growth was higher than assumed in the (conservative) forecast submitted in 2015, we expect to spend $323 million more than the $729 million allowance.

We consider that this outcome demonstrates the effectiveness of the 'risk sharing' approach – in forecasting conservatively we did not ask customers to prospectively fund less certain capital investments. As the growth did eventuate, we believe the investment was prudent and efficient and should be included in the asset base going forward.

Growth expenditure will be above the IPART allowance over the period as shown in Table 1-9.

Table 1-9 Growth expenditure 2016–20 ($2019–20 million)

Growth (total)	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	195	267	277	313	**1,052**
IPART Allowance	232	249	166	82	**729**
Difference	**-37**	**18**	**110**	**232**	**323**

How growth drives investment

Under the Operating Licence we are required to offer services in the areas we serve:

> *Sydney Water must ensure that Drinking Water and Wastewater Services are available on request for connection to any Property situated in the Area of Operations.*[34]

Development can occur across Sydney, the Blue Mountains and the Illawarra region as a result of land release by government, population increase and increased economic activity. When services are requested, we usually need to invest in water and wastewater network but sometimes new treatment capacity and/or stormwater assets are also needed.

The amount and type of investment and its timing depends upon:

- the amount of capacity which exists in the relevant parts of the systems
- the expected amount, location and likelihood of further growth in the area.

It can be more efficient to invest in more capacity upfront than to make separate investments in smaller amounts of capacity as demand arrives. This is because the incremental cost of a larger pipe (for example) is less than two excavations to lay smaller pipes. Figure 1-10 illustrates this using notional investment costs for two sizes of pipe and a 2.5% discount rate – a higher initial investment in a large pipe has a lower net present cost.

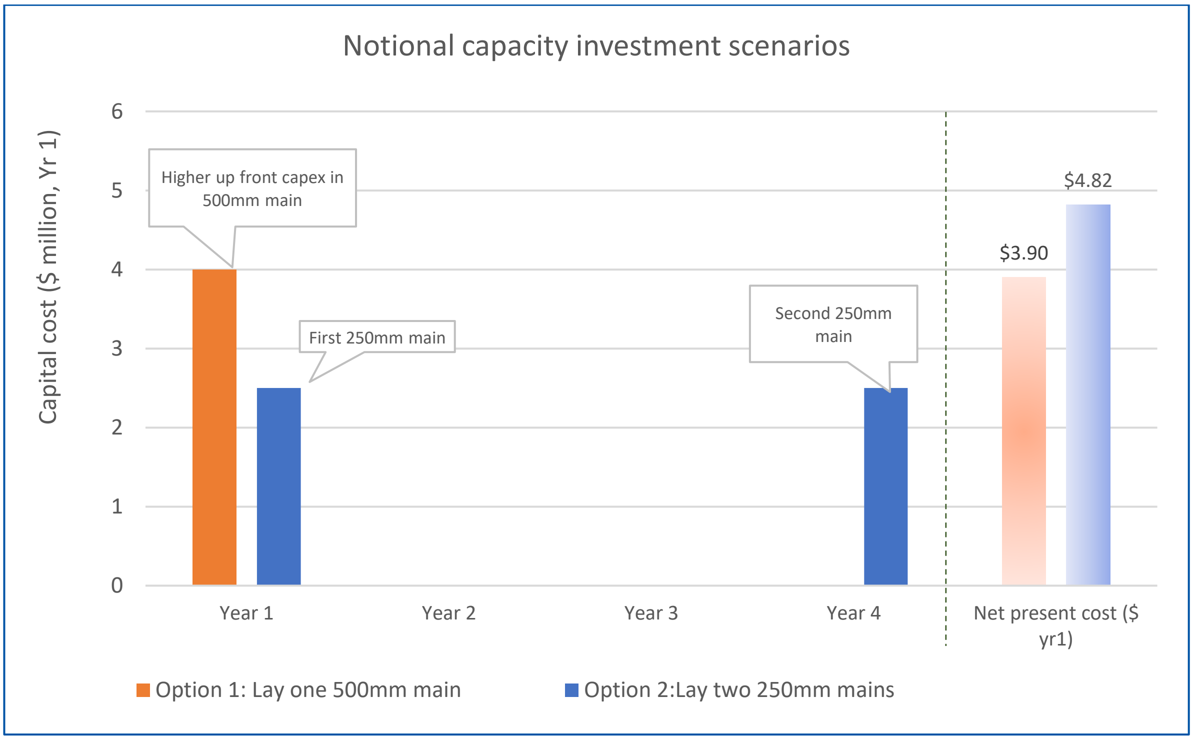

Figure 1-10 Illustration of efficient capacity investment

In some scenarios it will be more efficient to wait – especially if the demand forecast is uncertain.

[34] Clause 1.6.1, Sydney Water Corporation Operating Licence 2015-2020, page 4. Clause 1.6.2 constrains the above point with regard to connection being *financially viable*

Risk-sharing approach to our 2016–20 forecast

In our 2015 price proposal, we submitted a conservative forecast for growth capital expenditure. At that time, it was not certain that very high levels of growth would continue for all four years, so we proposed lower expenditure in 2018–19 and 2019–20. This 'risk sharing' approach meant that customer bills during 2016–20 were lower as they did not include upfront capital investment for the less certain growth. Figure 1-11 shows the variance between the new dwellings[35], the capital forecasts we submitted and the actual/latest forecast to 2020.

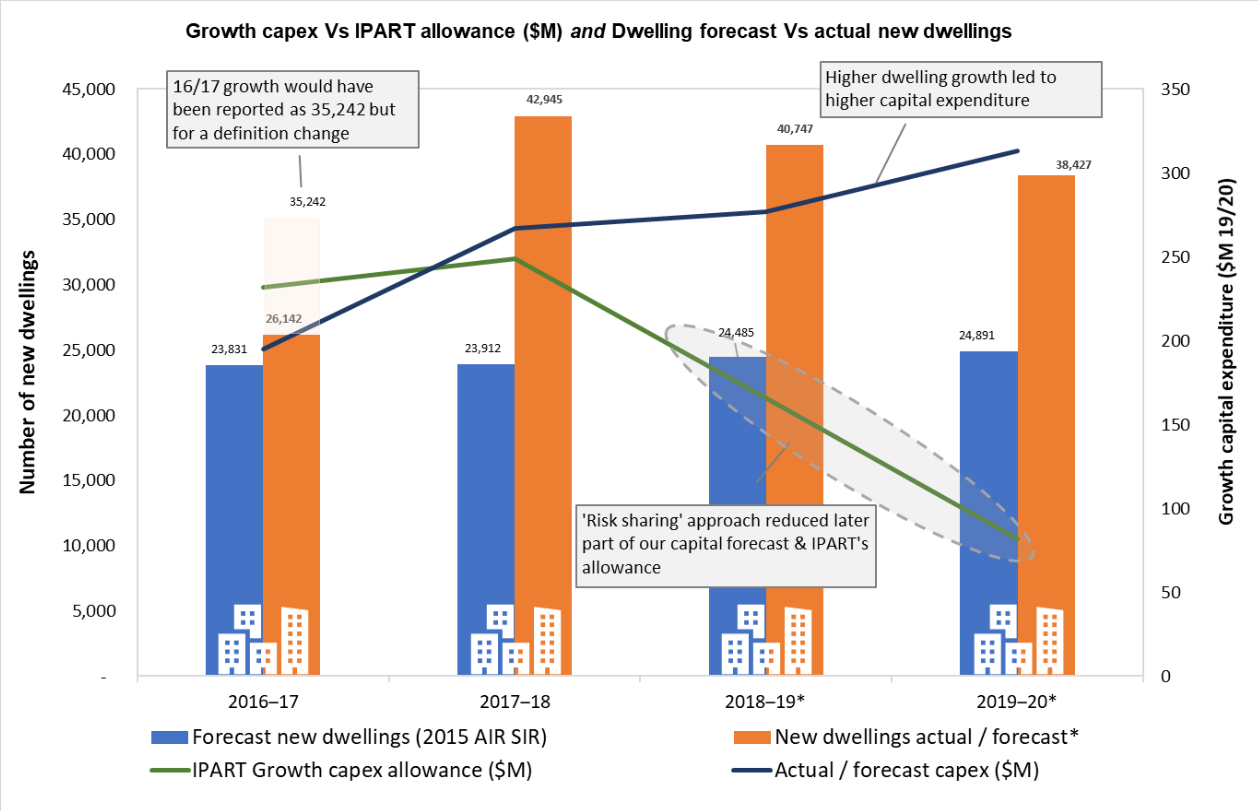

Figure 1-11 Actual growth in new dwellings 53% higher than forecast

Our approach meant that we accepted the risk of covering the financing costs if this less certain development did occur, and new assets were required.

In fact, there are expected to be around 51,000 new dwellings more than forecast, as well being more geographically dispersed than expected.[36] Capital expenditure has been higher as a result. In our view, the overspend against the allowance is an indication of the 'risk sharing' approach working as it should.

To ensure that these less certain growth areas could be serviced if development eventuated, we applied the 'plan ready' strategy. This means infrastructure investment plans for possible developments are developed to the point that work can commence quickly if and when there is

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[35] Reported in the AIR/SIR submission in 2015 (for the 2016-20 forecast) and in the latest 2019 AIR/SIR showing actuals up to 2017/18 and forecasts thereafter.

[36] Total residential properties forecast was 97,119 in the AIR/SIR and the latest actual/forecast total is 148,261.

certainty (but not before). This is an efficient approach, especially during high growth periods. We also publish a Growth Servicing Plan each year to ensure the market can make informed investment decisions.

Performance

We have successfully delivered infrastructure to serve the new properties when required. We are proud of this achievement – actual net dwelling completions have markedly increased compared to recent history from approximately 15,000 per annum during the period 2006-07 to 2011-12 to over 42,000 in 2017–18, as shown in Figure 1-12.

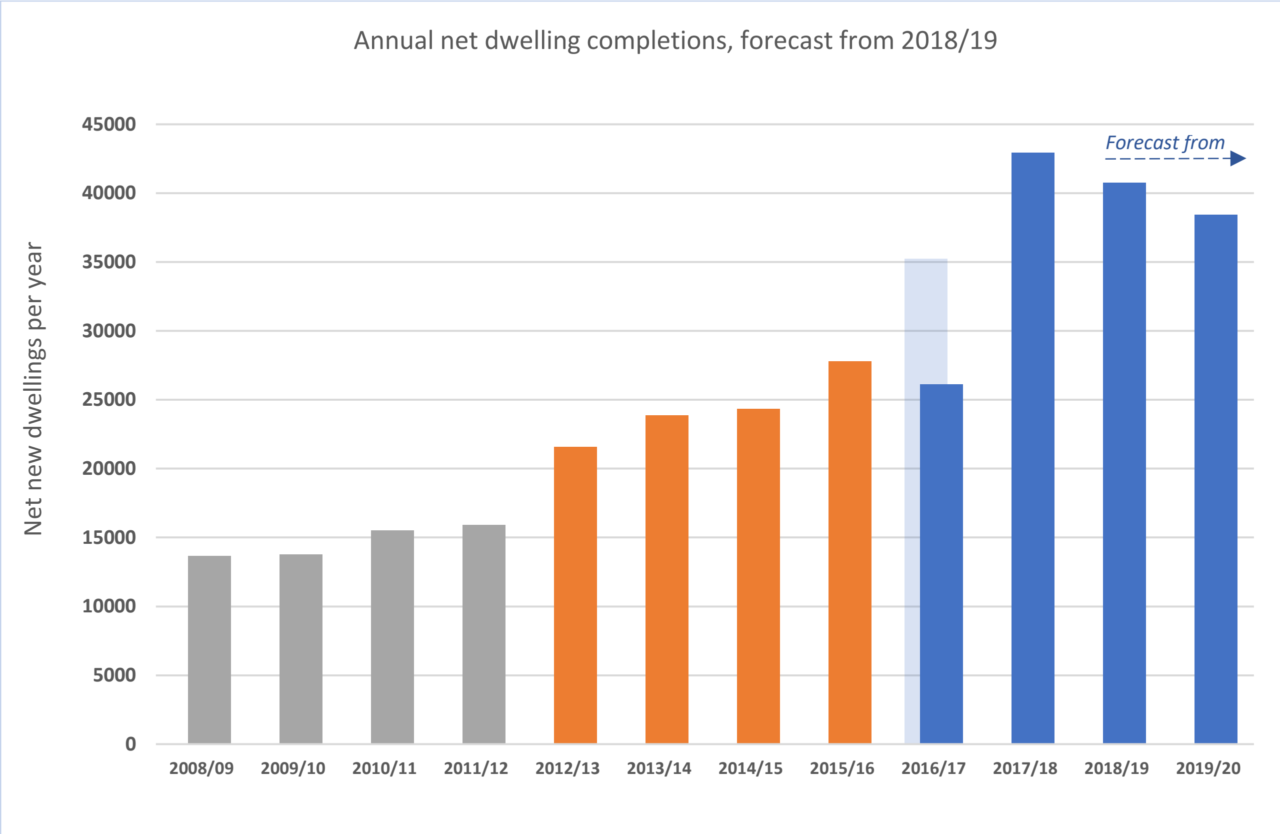

Figure 1-12 Net dwelling completions since 2008-9[37]

Note: The reported 'new dwellings' figure for 2016/17 was lower than 2015-16 as it was adjusted for a one-off definition change. The extra data point in pale blue shows 2016–17 new dwellings on the same basis as the other years.

Growth distribution has been influenced and sometimes changed by external planning decisions, particularly transport investments and up-zoning along related corridors.

Our approach to delivering growth infrastructure

Growth related investment is guided by the metropolitan vision and directions set by the Greater Sydney Commission, and by the Department of Planning and Environment's land release and rezoning program. We seek to validate these with our own development intelligence information to confirm the timing and prudency of investments.

[37] Reported in the AIR/SIR submission in 2015 (and in the latest 2019 AIR/SIR for actuals up to 2017/18, with forecasts thereafter.

There are two approaches to delivering network assets for growth:

- We usually deliver the more important infrastructure such as trunk mains, pump stations and reservoirs. This is about two thirds of the 2016–20 program (by value). We stage the delivery of major infrastructure to most efficiently meet current and future demand.
- Developers deliver less critical work including reticulation mains, especially when there is less development certainty and/or requested timeframes are not achievable. Developers are then reimbursed reasonable and efficient costs once infrastructure has been commissioned and handed over to us, and lots are connected to the system.

1.3.1 Investment details and variances (Growth)

Overview of investments delivered

We are currently providing capacity to meet a higher level of demand for new water, wastewater and stormwater services than was forecast in IPART's 2016–20 Determination.

Over 40% of our investment is forecast to be in the North West and South West growth areas. Growth driven investment in infill areas is forecast to be 6% of total spend.

Variances to the IPART allowance

We forecast spending $323 million more than IPART’s growth determination and by asset type, most of the variance has been incurred in treatment projects as shown in Table 1-10.

Table 1-10 Network and Treatment Growth variances 2016–20 ($2019–20 million)

Growth	Network growth variance	Treatment growth variance	Total
Actual/Forecast*	683	369	**1,052**
IPART Allowance	583	146	**729**
Difference	**100**	**223**	**323**

Major variances by growth area are shown in Figure 1-13. Some programs have been consolidated for presentation.

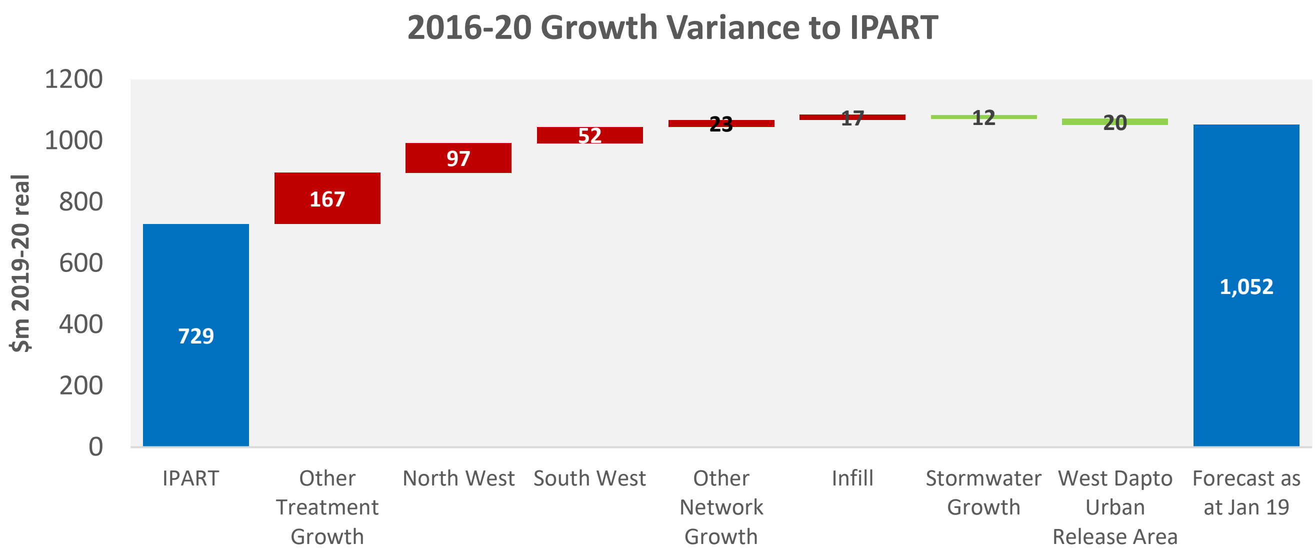

Figure 1-13 Growth major variances to IPART Determination ($2019–20 million)

The most significant underspend relates to the West Dapto Urban Release Area. Investment was $20 million lower due to delays in land rezoning and subsequent developments to the Yallah Marshall Mount and Tallawarra precincts. The sections below describe major variances.

1.3.1.1 North West Growth Area (NWGA)

Network

In network assets we expect to spend $40 million more than originally forecast. We have constructed and/or amplified two wastewater pumping stations, 17 km of wastewater mains and over 9 km of water mains. The main contributors to the variance are increased costs to deliver a large wastewater pumping station and projects in NWGA Package 3.[38]

Treatment

In treatment assets we expect a variance of $57 million, mainly due to:

- Amplification of the Riverstone wastewater treatment plant to service 30,000 additional dwellings by 2020.[39] The variance of $42 million is largely the result of a 15-20% increase in civil works rates, driven by wider infrastructure investment in Sydney.
- Bringing forward investment in treatment capacity in the integrated Rouse Hill, Castle Hill and Riverstone system. Due to the commencement of the North West Metro rail link, growth is much higher than forecast. However, this investment targets long term

[38] Which includes Packages 3B, 3C and 3D delivering a mix of wastewater and water mains and a wastewater pumping station

[39] The amplification will increase hydraulic capacity from 4 ML/day to 14.2 ML/day

optimisation across the three plants through capacity sharing and consolidating biosolids processing at Riverstone.[40]

1.3.1.2 South West Growth Area (SWGA)

Network

We expect to spend $52 million more than the original forecast.[41] The main reason is the decision to deliver trunk water mains along the Northern Road, in conjunction with a major road upgrade. We determined that this was the most efficient and safest way of providing trunk water services, as well as being the model with the least impact on the community.

1.3.1.3 Other Treatment Growth

Increases in growth-related scope over a range of other projects have led to a variance of $167 million compared to the 2016–20 determination. These include:

- St Marys / Quakers Hill PARR which will be $66.5 million higher than forecast due to accelerated growth in the region. Other elements of this project are allocated to existing mandatory standards.
- An extension in the scope of dewatering work totalling $41.5 million across five sites. Shellharbour, Wollongong, Glenfield & Penrith wastewater treatment plants are forecast to exceed their existing digester capacity before 2020 and West Hornsby WWTP, by 2021. The work is required to maintain plant capacity and manage the risk of non-compliant odour release. Other elements of this project are allocated to existing mandatory standards.
- Picton WRP is undergoing a capacity amplification and other work is taking place to improve the management of effluent. This is required to address non-compliant discharges for which the EPA imposed three Pollution Reduction Plans (PRPs). The cost is forecast to be 24 million higher than the allowance.
- Planning and amplification of West Camden wastewater treatment plant commenced when growth in the adjacent catchment accelerated. While the expected variance is $17.5 million, increasing hydraulic capacity at West Camden is the efficient solution for interim flows from SWGA. [42] After these are transferred back in 2026, the higher capacity at West Camden will accommodate growth in its catchment of around 90,000 in ‘equivalent population’ (EP) terms.[43]

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[40] This logic is covered comprehensively in the regional plan. It addresses current capacity issues and considers the ability to serve a forecast increase in dwellings from 14,000 in 2016 to 102,000 dwellings in 2064.

[41] Which included construction or amplification of four wastewater pump stations, five water pump stations, two new water reservoirs, over 42 kilometres of wastewater mains, and over 24 kilometres of water mains.

[42] Hydraulic capacity relates to the ability of a plant to deal with a volume of wastewater flow. It is usually measured in megalitres per day (ML/d). This work will increase hydraulic capacity at West Camden from 16ML/d to 28 ML/d.

[43] ‘Equivalent population’, also known as Equivalent Persons and shortened to EP, is a standard way of expressing the biological demand created by the number and characteristics of people, dwellings and businesses in a wastewater catchment. It allows an assessment of a plant’s ability to process influent wastewater in line with its particular discharge and other requirements.

- $20.9 million for planning and amplification of North Head wastewater treatment plant to cater for immediate biosolids reliability issues and growth. Some of this project is allocated to the existing mandatory standards driver.
- A range of other smaller variances include expenditure to commence planning on projects to be completed after 2020, including new treatment plants:
  - at Lowes Creek in the SWGA to serve an 300,000 EPs by 2036
  - at South Creek to serve the Western Sydney Airport and Aerotropolis.

1.3.1.4 Infill

We are forecasting a $16.6 million variance due to higher than forecast infill growth.

1.3.1.5 Other network growth variances

A net overspend of $23 million is forecast across:

- Network Growth External: A $211.6 million program delivered by developers which will result in over 1300km of new network as well as other assets.
- Other Greenfield network: A $56.4 million program to construct or amplify six wastewater pump stations, one water pump station and network assets.

1.3.1.6 Stormwater Growth

Stormwater growth investment will be $12.5 million less than the allowance. This was partly due to delays in acquiring land from multiple landowners around the Rouse Hill service area. Other stormwater expenditure was able to be deferred with other investments being identified as higher priority in 2016–17.

1.4 New mandatory standards

2016-20 highlights: New mandatory standards investment

What do we do and why

We invest to meet newly introduced mandatory standards. In this case, expected new wet weather overflow standards were not finalised when IPART's determination was made.

Investment summary

By June 2020, we will have invested $172 million on:

- upgrading the Winmalee wastewater treatment plant to meet more stringent nutrient discharge concentration limits put in place by the EPA
- reducing Wet Weather Overflows – addressing internal surcharges on customer premises and overflows to public areas including waterways.

Performance

Investments undertaken in the period have contributed to better environmental performance.

Variance to IPART's allowance

We expect to spend $11 million more than the $161 million allowance.

Table 1-11 New mandatory standards expenditure 2016–20 ($2019–20 million)

New mandatory standards	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	16	58	49	48	**172**
IPART Allowance	31	36	50	44	**161**
Difference	**-15**	**22**	**-1**	**4**	**11**

1.4.1 Investment details and variances (New mandatory standards)

The capital expenditure within this period is $11 million more than in IPART's determination with key variances shown in Figure 1-14.

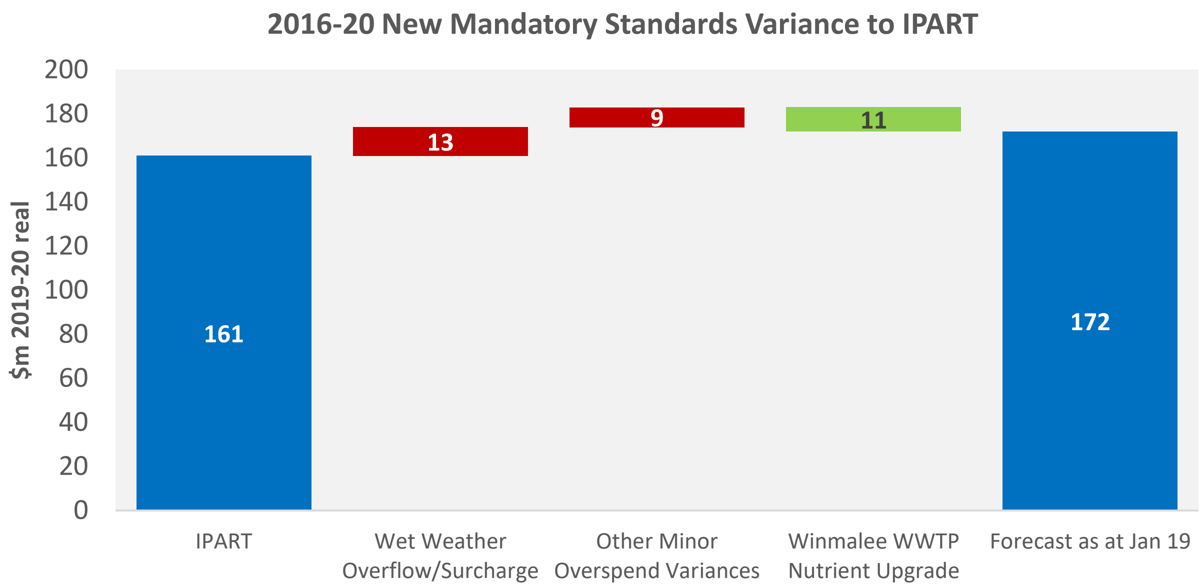


Figure 1-14 New mandatory standards major variances to IPART Determination ($2019–20 million)

Wet Weather Overflows (including Wet Weather Surcharges)

Our 2016 price proposal included expenditure for the Wet Weather Overflow Abatement program, including scope to reduce both internal wastewater overflows (surcharges) and overflows in other public areas. The allowance set by IPART was $130 million.

The changes to EPLs which we were negotiating in 2016 are still not finalised. As a result, we implemented a prudent amount of work for internal and other overflows.

We expect to spend $85.9 million on wet weather overflows. This is to undertake Pollution Reduction Studies (PRSs) and meet Pollution Reduction Programs (PRPs) in our EPL for wet weather overflow. Work includes separating the last combined stormwater and sewer system in Woolloomooloo, reducing wet weather discharges to waterways in Wolli Creek, and in the Upper Parramatta catchment. We will also be undertaking planning for the next program of works and for the development of a robust monitoring program.

We have spent less on wet weather overflow scope due to a delay in agreeing with the EPA the level of enhancement required in the new standard.

The program also addressed repeat wet weather surcharges (internal overflows). Work was undertaken where the cause of an overflow was a lack of network capacity (and therefore was likely to repeat in similar weather). More work than forecast was required, as storm events over 2015, 2016 and 2017 identified previously undetected constraints in the sewer system.

Winmalee wastewater treatment plant nutrient upgrade

The upgrade at Winmalee is to comply with PRP800 set by the EPA. The objective of PRP800 is to reduce the impact of nitrogen and phosphorous discharged into local waterways and the Hawkesbury Nepean River system.[44]

We expect to spend $11.2 million less than the $26.2 million allowance by June 2020. The concept design phase took longer than expected and extra asset condition inspections were undertaken to ensure that any upgrade work would not be compromised by existing assets. The balance of work will be carried over into 2020–24.

1.5 Government programs

2016-20 highlights: Government programs investment

What do we do and why

From time to time we invest in projects which are specifically mandated by the NSW Government. By June 2020, we will have invested $8 million for this driver.

Investment summary

In line with a NSW Government initiative, by 2020 we will invest $5 million to complete the delivery of the Priority Sewerage Program (PSP). This project delivers wastewater services to villages without sewer networks.

The 'replacement flows' program requires recycled water to be used for environmental flow in the Hawkesbury – Nepean river, instead of using dam water for this purpose.

Performance

The investment concludes the outstanding Government programs work.

Variance to IPART's allowance

We expect to spend $5 million more than the $3 million allowance.

Expenditure will be above the IPART allowance over the period as shown in Table 1-12.

Table 1-12 Government Programs expenditure 2016–20 ($2019–20 million)

Government Programs	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	7	1	0	0	**8**
IPART Allowance	0	2	0	0	**3**
Difference	**7**	**-1**	**0**	**0**	**5**

[44] The Pollution Reduction Program (PRP800) covering the Winmalee Wastewater System (EPL No 1963) sets revised nitrogen and phosphorous loads in the final effluent: Total Nitrogen (TN) concentration of <3mg/L and median Total Phosphorous (TP) concentration of <0.1mg/L. These will be achieved with a new tertiary denitrification process, carbon dosing facility and chemical dosing facility; refurbishment of flash mix and flocculation zones; amplification of filtration capacity and storage for process security; hydraulic controls; desludging pipework and modifications to the aeration system and anoxic selectors.

1.5.1 Investment details and variances (Government Programs)

Summary of investments and variances to the IPART allowance

The capital expenditure within this period is $5 million more than in IPART's determination with key variances shown in Figure 1-12.

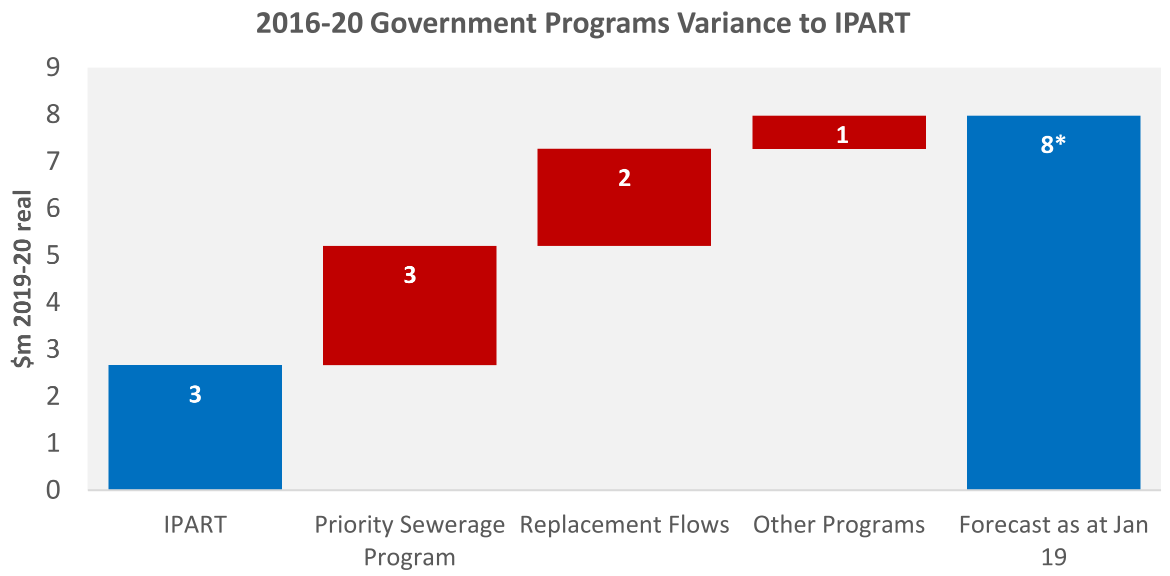


Figure 1-15 Major variances to the IPART Determination ($2019–20 million)

*Numbers do not add due to rounding

There is a $3 million variance in finishing the Priority Sewerage Program, with work including:

- completing various sewerage schemes to service 600+ property connections in Galston and Glenorie ($1.4 million)
- constructing on-site pressure sewer systems to collect domestic flows from properties in Galston and connecting them into the new sewer network ($2.6 million).

A $2 million variance is also expected for the completion of the Western Sydney Recycled Water Initiative ('Replacement Flows') program. This is the final part of an investment which allows tertiary treated wastewater to be further treated so it can substitute for water currently released from Warragamba Dam for river health purposes.

1.6 Business efficiency

2016-20 highlights: Business efficiency investment

What do we do and why

We undertake business efficiency investments where they are justified on the basis of expected reductions in operating expenditure.

Investment summary

By June 2020, we will have invested $112 million on business efficiency investments. Major components included setting up the 'customer hub' and the 'multi-function business centre' – both with IT and process components.

Variance to IPART's allowance

We expect to spend $33 million less than the $146 million allowance. The largest single factor was the decision not to undertake the odour control work in a section of the NSOOS sewer which is now to be remediated.

Table 1-13 Business efficiency expenditure 2016–20 ($2019–20 million)

Business Efficiency	2016–17	2017–18	2018–19*	2019–20*	Total
Actual/Forecast*	30	44	30	9	**112**
IPART Allowance	55	40	26	25	**146**
Difference	**-25**	**3**	**4**	**-16**	**-33**

1.6.1 Investment details and variances (Business efficiency)

Summary of investments delivered

The Customer Hub project has enhanced the capability of people, processes and technology to deliver a better customer experience. Front line customer facing staff now have timely access to correct information in the right form to enable more customer focused decision-making.

The Multi-Function Business Centre Model has centralised core business transactional and operational functions, saving $4 million a year.

The $10.3 million Energy Efficiency Program delivered a range of energy efficiency improvements across a range of equipment including blowers, lighting, solar installations and co-generation to reduce grid-sourced energy.

A further $56.7 million of the $112 million included in this section is for IT investment which is covered in section 3.

Variances to the IPART allowance

The capital expenditure will be $33 million less than the $146 million allowance, with key variances shown in Figure 1-16.

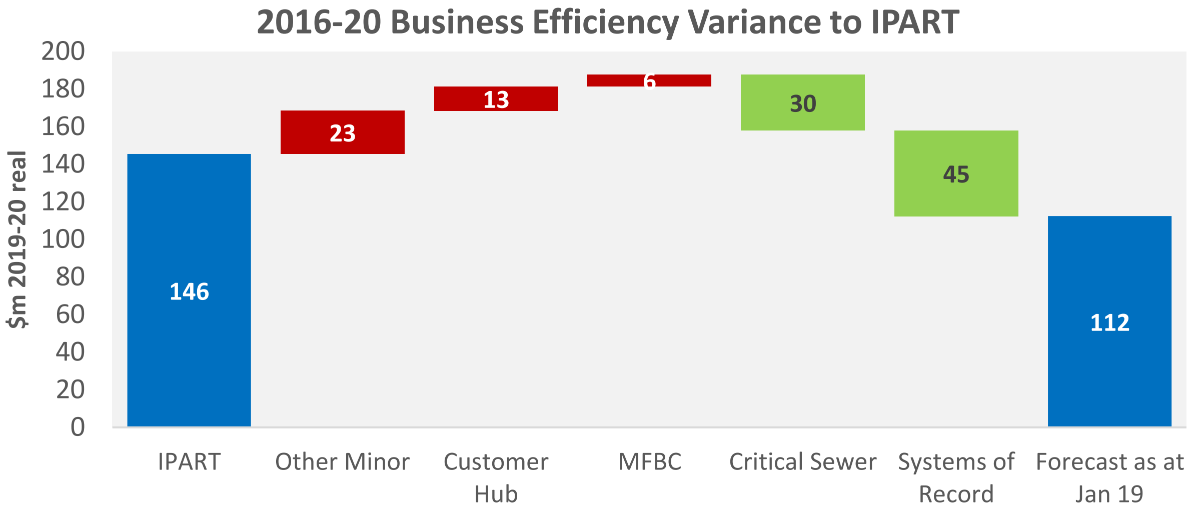


Figure 1-16 Business efficiency variances to IPART Determination ($2019–20 million)

Two small overspends were due to the Customer Hub and the Multi-Function Business Centre programs, both with IT components. The related processes are still in the process of being rolled out. The Customer Hub enables us to be proactive in the way we communicate with customers and to be predictive in the way we manage our networks. By providing front line customer facing staff with the right information, in the right form, and at the right time, we can make better decisions and enhance customer outcomes. The project has been recognised with a Global Water Award for Smart Water Project of the Year.[45]

The largest underspend of $30 million is due to the deferral of some odour and corrosion reduction work in the Critical Sewer program. It was found that locations on the NSOOS previously identified as needing large Odour Control Units (OCUS) ended up within the scope of the NSOOS renewal program. It is prudent to wait until after the renewal work before re-assessing whether these OCUs will still be viable investments.

The Other Minor and Systems of Record variances relate to information technology expenditure.

[45] https://globalwaterawards.com/2019-smart-water-project-year/

2 Capital expenditure 2020–24

2.1 Forecast capital expenditure (2020–21 to 2023–24)

Table 2-1 profiles the forecast capital expenditure of $4,537 million.

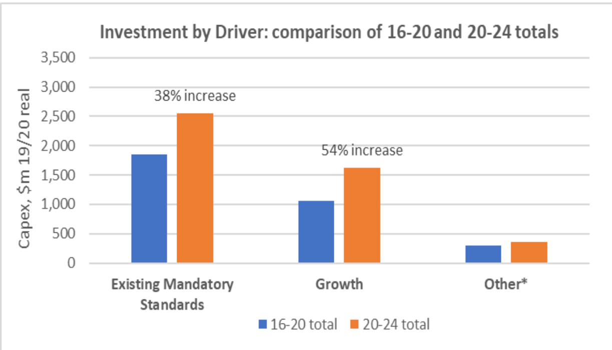
Table 2-1 Forecast capital expenditure 2020–24 ($2019–20 million)

	2020–21	2021–22	2022–23	2023–24	2020–24 total	2016–20 total
Capital expenditure	1,004	1,024	1,249	1,260	**4,537**	**3,194**

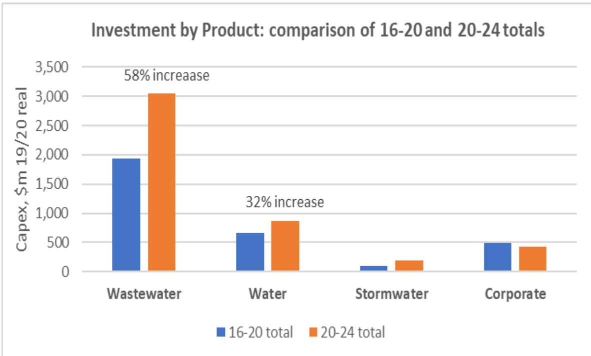
The 42% increase on the 2016–20 capital expenditure is mainly driven by the continuing high growth and higher asset renewal investment to meet Existing mandatory standards, particularly for wastewater.

The extent of the increases by driver and product are shown in Figure 2-1.

Capital investment increases by Driver



Capital investment increases by Product



* 'Other' drivers are Discretionary Standards, Government Programs, Business Efficiency & New Mandatory Stds.

Figure 2-1 Capital expenditure changes between periods

Growth investment includes a higher wastewater treatment component than in the past. This is because a treatment capacity 'tipping point' will be reached and we will no longer be able to service growth using existing spare plant capacity. While we will continue to use latent capacity where possible[46], there is no existing infrastructure near some of these new developments.

Expenditure on asset renewals to meet Existing mandatory standards will increase and the portfolio composition will change slightly in the next price period. The increase is driven by evidence of deteriorated assets, increased failures and reduced performance, underpinned by improved condition assessment and risk analysis.

[46] For example, the North West Treatment Hub strategy envisages that capacity upgrades at Rouse Hill and Castle Hill Water Recycling Plants can be deferred by diverting waste through nearby Riverstone wastewater treatment plant, where there is spare capacity.

Asset classes with higher forecast renewal expenditure include critical sewer renewals, reservoirs and wastewater treatment plants. The complex work to rehabilitate Sydney's largest and most important sewers will continue and increase. This higher forecast and its composition change aligns with the results of top down asset population analysis in recent years.[47]

2.1.1 Managing the capital expenditure increase and uncertainty

Servicing a city whose population will reach eight million requires significant investment. We are conscious of the need to service growth and meet obligations efficiently, but also that there is some uncertainty with the pace of growth. We have sought to manage both the extent of the increase and the uncertainty in growth.

As a result, the forecast has in built efficiency assumptions which challenge us to deliver for less than the amount originally calculated via our bottom up process.

Considering efficiency during forecast development

The capital forecast was developed through an iterative process and different efficiency improvements were applied at different points, depending on the program type. Steps included:

- building program-specific efficiency savings into program forecasts, such as for the use of new technology
- savings from integrated planning – meeting multiple needs with a lower cost integrated solution
- Applying an 'efficiency challenge' to the infrastructure forecasts, where program forecasts were reduced assuming a combination of future improvements in unit costs, scope optimisation, technology and procurement
- reducing growth capital forecasts so that customers would not be funding investments which were based on less certain growth (and therefore increasing our risk if this investment is required).

Program development and program specific efficiencies

While developing the bottom up forecasts for 'infrastructure' programs[48] the process seeks to optimise the timing of active projects and ensure that any program interactions are addressed.

For example, there may be a renewal need at treatment plant which can be negated by delivering a growth project differently – two 'needs' which are separately identified are considered together for an integrated solution.

An example of this is the forecast in the Treatment Growth program to respond to high growth in the North West Growth Area.

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[47] In the coming period, some of the increase in renewals is related to 'Mechanical/Electrical' asset types installed in the 1970s and 1980s. Many of these are now reaching the point of replacement for the first time.

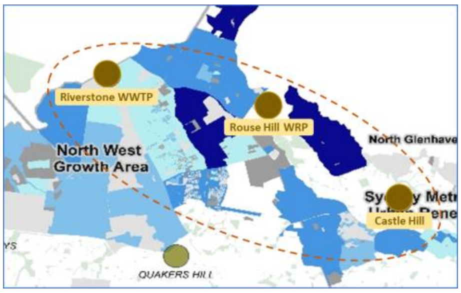
[48] Where 'Infrastructure' covers the main network and treatment assets, excluding corporate expenditure such as for IT and property.

North West Growth Area: integrated catchment planning

The population increase in the area has been forecast to increase by around 260,000 between 2016 and 2036.

Castle Hill and Rouse Hill treatment plants are at capacity and cannot service additional demand. Riverstone WWTP is already being amplified to service local growth.

The Growth Servicing Investment Plan identified an efficient way of managing these needs in an integrated way.



This will optimise the use of capacity within the catchment with staged amplifications and flow transfers between the plants. The plan also envisages consolidation of biosolids processing at Riverstone. This integrated solution provides:

- a lower overall investment than three separate capacity upgrades
- flexibility to address future needs (eg by maintaining the final usable space at Rouse Hill)
- mitigation for an increasing odour management problem at Rouse Hill where development is moving closer to the site.

Program forecasts also include specific efficiencies opportunities. These can reflect improvements which, while not yet be proven, are expected to be made in the coming period. These improvement initiatives are documented in the relevant sections.

An example in this forecast is the use of 'smart lining' in water mains – while testing is not yet complete, we have built in a saving of around $6 million across the water main renewal programs.

Efficiency challenge process applied to renewals

The bottom up program forecasts were consolidated and the extent of increase in capital expenditure looking ahead was apparent in more detail.[49]

There was a round of budget workshops where renewal program forecasts were subject to an efficiency challenge based on assumed future improvements in processes and technology. Efficiency adjustments were applied to many (but not all) programs and resulting in 'post-efficiency' renewal forecast which was $600 million lower. On average this was a reduction of around 17% of the forecast, *for the renewal programs included*.[50] To be clear this was not a process of scope reduction. Rather it reflects a challenge we have set ourselves *to deliver the same outcomes for less*.

[49] This consolidation of all the bottom up renewal budgets was effectively a 'pre-efficiency' forecast.

[50] For avoidance of doubt, this was not a uniform 17% reduction - some program forecasts were reduced by more and some by less.

Risk assumed in the Growth forecast

Given that our 'risk sharing' approach in 2016–20 worked well and benefitted customers, we have again assumed some risk in our growth expenditure forecast, by excluding some less certain investments which we will only finance if they are required. This resulted in a reduction to the growth expenditure forecast of over $720 million.

Figure 2-2 represents how the forecasting process built in efficiency assumptions and factored in growth uncertainty.

Efficiencies applied to the forecast

Most of the infrastructure program forecasts have had efficiency reductions applied to them based on the methods explained above. We applied program-specific optimisations and efficiency reductions first.

We then applied percentage reductions to some programs after an 'efficiency challenge' process which assumed future cost, process and technology improvements.

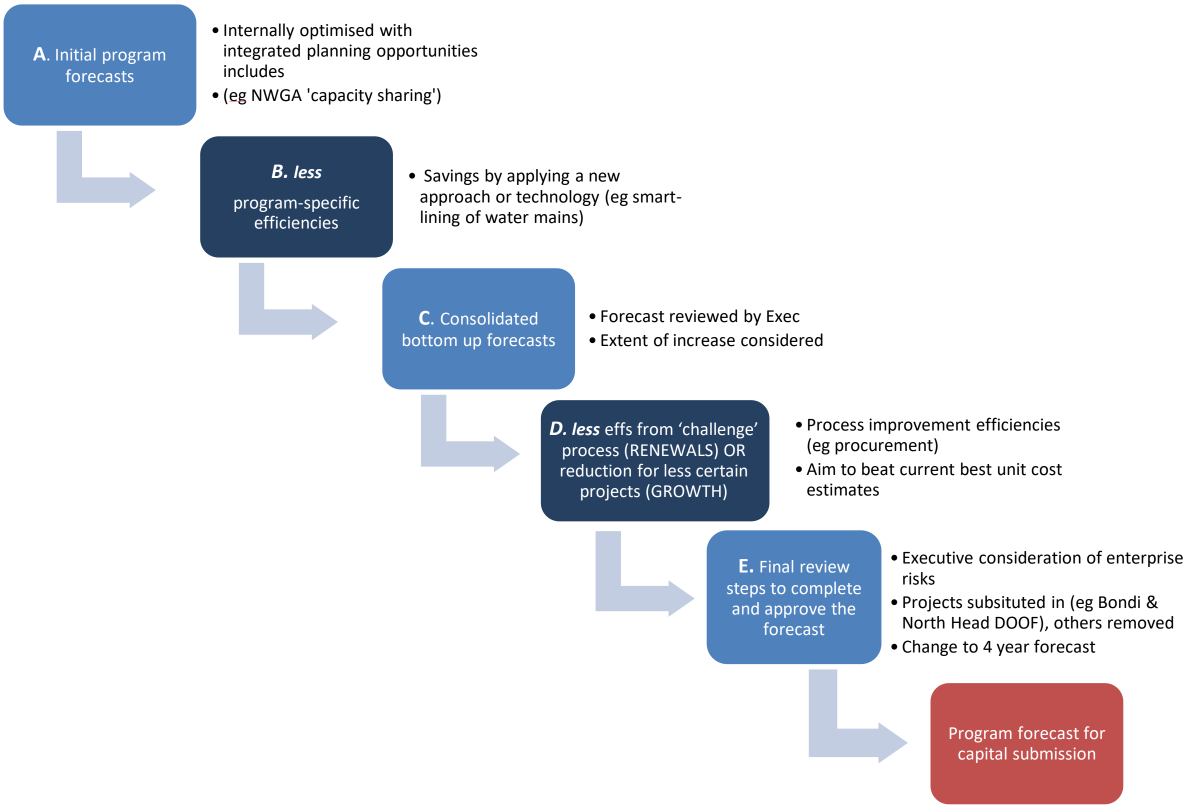


Figure 2-2 High level steps in capital forecasting and delivery

In the summary table for each program we have noted what efficiencies have been built in.

Summary of efficiencies applied to the Infrastructure forecast

By way of example, Table 2-2 shows the largest efficiency cuts we made to the Infrastructure program forecasts between steps C and E. Our initial forecasts were made for a five-year period (to 2025) and the numbers in the table are based on those. Later in the process we decided to submit a four-year forecast to IPART, largely due to uncertainty in future investment drivers.

Note that the table relates to internal steps relating to the evolution of our capital forecast – it does not align with how the forecast is presented in this proposal.[51]

Table 2-2 – Application of major efficiency reductions to the Infrastructure forecast ($19-20 million)

Step	Details	Infrastructure forecast	Forecast period
C: Consolidated bottom up forecasts	Infrastructure forecast including integrated planning benefits and specific efficiencies added together	$6.2 billion	**5 years**
D: Efficiency challenge	**Renewals:** Across renewals programs a total reduction of $600 million was applied. Programs with a higher risk profile (eg Critical Sewers) were not included **Growth**: the forecast was reduced by $720 million to discount some less certain investments **Other adjustments**: scope reductions and transfers of around $250 million[52]	$4.6 billion	**5 years**
E: Final review steps	Executive decision to rebalance portfolio: • removed some lower risk projects • projects added to address emerging issues Forecast converted to 4 years and re-profiled.	$3.9 billion	**4 years**

Better planning and delivery will contribute to efficiency improvements

While the program specific efficiencies are known and costed, reductions derived from the 'efficiency challenge' are less certain. However, in seeking to manage expenditure to the lower forecasts we have set we plan to implement various improvements in capital planning and delivery. These are discussed in section 2.1.5.

2.1.2 Cost estimates

At any given time, we are managing a high number of capital investment projects at different lifecycle stages. The majority of projects will be *in development*, having passed through an initiation business case gate, to either needs assessment, options assessment or delivery. The remainder, such as those in the later years of this forecast are *candidates*.

As projects move through the lifecycle there is increasing clarity around the precise scope, risk, time and cost to deliver the desired outcomes. This can lead to cost changes which are managed through project level contingency allowances that reduce as a project moves through the lifecycle.

The 2020–24 capital forecast includes a mix of projects at different lifecycle stages. As the horizon of this forecast is five years away, it includes some projects in development with the balance being

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[51] As noted earlier, 'Infrastructure' is an internal construct allowing us to track and manage like investments. It therefore does not align to IPART products or drivers.

[52] Where around $100 million related to a transfer of scope to another program area

candidates. The forecast for projects in development uses the latest available cost estimates from our TM1 financial system. These capture the most up-to-date forecast of the final project cost, based on performance to date and the remaining risk/opportunity profile of the project.[53]

Cost estimates for candidate projects use a range of available sources to provide cost estimates that are as robust as possible at this early stage, including:

- recent ‘actual’ benchmark costs for similar 2020–24 candidate project types and component types
- recent tender price returns for similar work packages
- Modern Engineering Equivalent Replacement Asset (MEERA) values of maintainable unit replacement costs from the Maximo Asset Management system
- full capitalised project costs at the output level from our fixed asset register
- the Growth Servicing Investment Plan (GSIP) planning/costing tool for growth candidates.

The approach to forecasting for each sub-program and discrete project is included in the program summary sections below.

2.1.3 Deliverability

With the existing delivery model, we have successfully delivered up $700 million of infrastructure in a year, in the current period. While the forward program is higher, the value of the delivery challenge is similar assuming:

- one-off land purchases totalling $112 million can be excluded
- that large, complex and discrete greenfield treatment projects may need to be tendered in the open market and delivered through specific arrangements.

We also expect that the new procurement, planning and delivery model Partnering for Success (P4S) will assist in delivering a larger program:

- the ‘planning partnership’ will ensure that projects can be developed on time
- delivery capacity is expected to increase and there will be more certainty over resource availability.

More information on P4S is provided in section 2.1.5.2.

2.1.4 Key assumptions

This 2020–24 forecast includes:

- growth in new dwellings, predicted using a range of sources, including government and market information

[53] These are usually P50 cost estimates

- water demand based on existing properties, the expected net change in these and average usage
- wastewater 'demand' changes (more accurately, the changes in wastewater flow in a catchment), taking account of property growth and locations as well as the impact of changes in equivalent population (EP) in an area.[54]

2.1.5 Capital forecasting and delivery process improvements

The generic steps in developing and delivering the capital investment forecast are summarised in Figure 2-3.

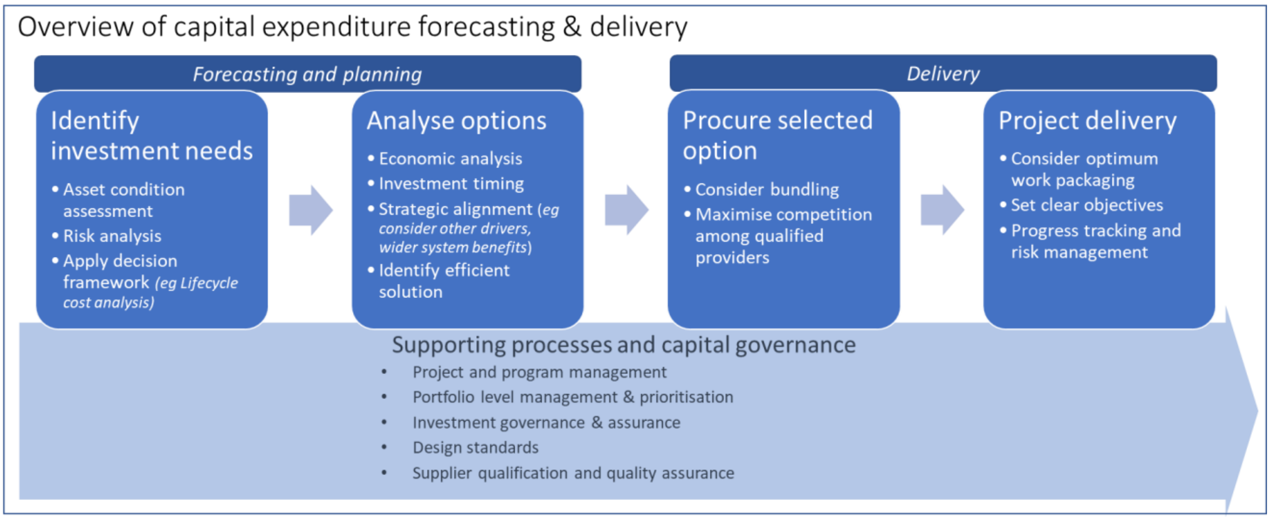


Figure 2-3 High level steps in capital forecasting and delivery

While these four generic steps broadly apply to all capital investment, the processes undertaken at each step vary for different projects and investment types. For example, the approach for a large greenfield wastewater treatment plant needs to be quite different from the process used in forecasting renewals of lower value, high population assets such as reticulation water mains.

[54] In wastewater, the assumed waste stream produced by an Equivalent Population is location dependent as it depends on the average water consumption in an area for a property type. For example, an apartment with water demand of 'x' will create a wastewater flow of close to 'x' assuming no internal re-use. A house on a large block with a demand of 'y' may generate a wastewater flow of less than 'y' assuming some level of garden watering, car washing etc.

2.1.5.1 Forecasting and planning – future improvements

Planning process improvements and which will contribute to efficiency and provide other benefits are shown in Table 2-3.

Table 2-3 Capital planning improvements

Planning process improvement	Benefits
Identifying investment needs Extending improved treatment plant renewals process (the result of Project See) to network assets. Process includes regular prioritisation reviews which assess and respond to changes in asset condition, performance and service outcomes.	Work optimised across the portfolio in terms of efficiency, timing, work bundling, data handling and business case preparation A deeper and more consistent understanding of comparative risks and consequences to allow better prioritisation. Currency of the forward program and allocation of capital and resources to priority projects.
Integrated strategic & systems planning Further developing integrated planning, so that all relevant growth and replacement issues are considered across a suite of regional, asset class, catchment level plans.	Addressing multiple needs in an integrated way including by scoping growth investment to avoid or defer asset renewal Eg in 2016–20 reservoir renewals were deferred through ‘sharing’ contingency with new reservoirs installed for growth in adjacent zones.
Options analysis Improve the approach to economic analysis, including how community impacts and customer-derived insights are applied in investment analysis.	Ability to more accurately consider options and select the most economically efficient one.

More details are provided throughout this attachment and in **Attachment 15: Asset Management**.

2.1.5.2 Delivery – future improvements

We are changing our approach to procuring both planning and delivery services for capital investment, with the new approach much better aligned to the size and scope of the forward-looking program.

The current approach uses many contractors on a high number of discrete projects, making it less efficient to scale up. As many current contracts will expire by 2020, it is an appropriate time to make a change.

We are in the process of putting in place a new planning and delivery model called Partnering for Success (P4S). Through 2019 and 2020 we will implement a new sourcing, contract & delivery approach incorporating partnerships in both planning *and* project delivery. P4S is expected to contribute to our efficiency over the longer term through:

- Simplification of the supply chain and reduced administrative burden on procurement and management
- Improved delivery efficiency through scale, work continuity and resource optimisation
- Cost savings though incentivised performance.

Partnering for Success (P4S)

Through 2019 and 2020 we will implement a new sourcing, contract and delivery approach incorporating partnerships in both planning and project delivery.

What is driving the change?

- Many existing panel contracts are due to expire soon
- There is a need to scale up for a larger investment program
- The current approach requires hundreds of contracts per year, allocated across thousands of suppliers.

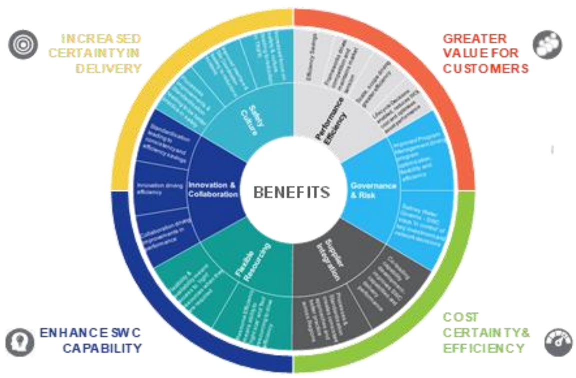
What we are changing to and why

The model includes a Planning Partner, three Regional Delivery Consortia and a shared purchasing function to maximise buying power.

- Planning Partner - works closely with our in-house team on planning and early design for projects across our area of operations. The Planning Partner has already been appointed.
- Regional Delivery Consortia - will work with our project management staff in three Regional Integrated Delivery Teams to deliver detailed design, construction, maintenance[55] and facilities management.

Collaborative framework contracts are for five (+five) years, with extension subject to achievement of Key Performance Indicators. These include non-cost measures to ensure that behavioural and partnership goals are achieved.

The arrangement will use the 'NEC Suite[56]' standard form collaborative contract. It will be set up so that parties share knowledge and work towards shared goals.



2.1.5.3 Supporting process and capital delivery – future improvements

We plan to extend recent improvements in capital prioritization, from wastewater treatment and water filtration plant renewals to all infrastructure investments

The process will include the application of enhanced asset condition, performance information and service outcomes. in a regular project portfolio prioritisation reviews. These reviews will include relevant stakeholders who assess and decide upon responses to the latest information. This ensures the forward program remains current and capital and resources are allocated to priority projects. The process is integrated with infrastructure-wide investment decision making and governance.

[55] Excluding the existing insourced civil maintenance function

[56] New Engineering Contract (NEC) is a formalised system created by the Institution of Civil Engineers

Once also rolled out across network assets, the level and quality of information to trade off thousands of project investments will improve and our maturity in prioritising investments will increase further.

At the *enterprise* level, a business-wide capital prioritisation process and governance process has recently been put in place. A new investment review committee of the Executive has been established to increase financial accountability and drive a totex view of investment planning and prioritisation.

2.1.5.4 Continuing technical innovation

There are a range of areas where we expect to implement new technical solutions to existing challenges, many of which we are actively involved in developing. These include:

- automatic chlorine dosing plants
- smart water pipe re-lining
- new sensors with the potential for an 'Internet of Things' solution to sewer monitoring
- assessing raw water quality to support chemical optimisation and maximise treatment capacity after heavy rain.

These innovations have been supported by our small Research and Innovation team.

Research and Innovation at Sydney Water

Our Research and Innovation program is an insurance policy against future risks and a way of applying our expertise to future opportunities.

By leveraging effective local and international partnering across industry, academia and other experts, our financial contribution is much amplified in terms of the knowledge we have access to.

The current focus is to find and solve existing problems, through:

- data analytics and intelligence
- being connected to the right communities of experts
- technology evaluation and adoption.

2.1.6 Capital investment trends

For context, Figure 2-4 shows capital expenditure going back over 30 years and forward into the forecast period.

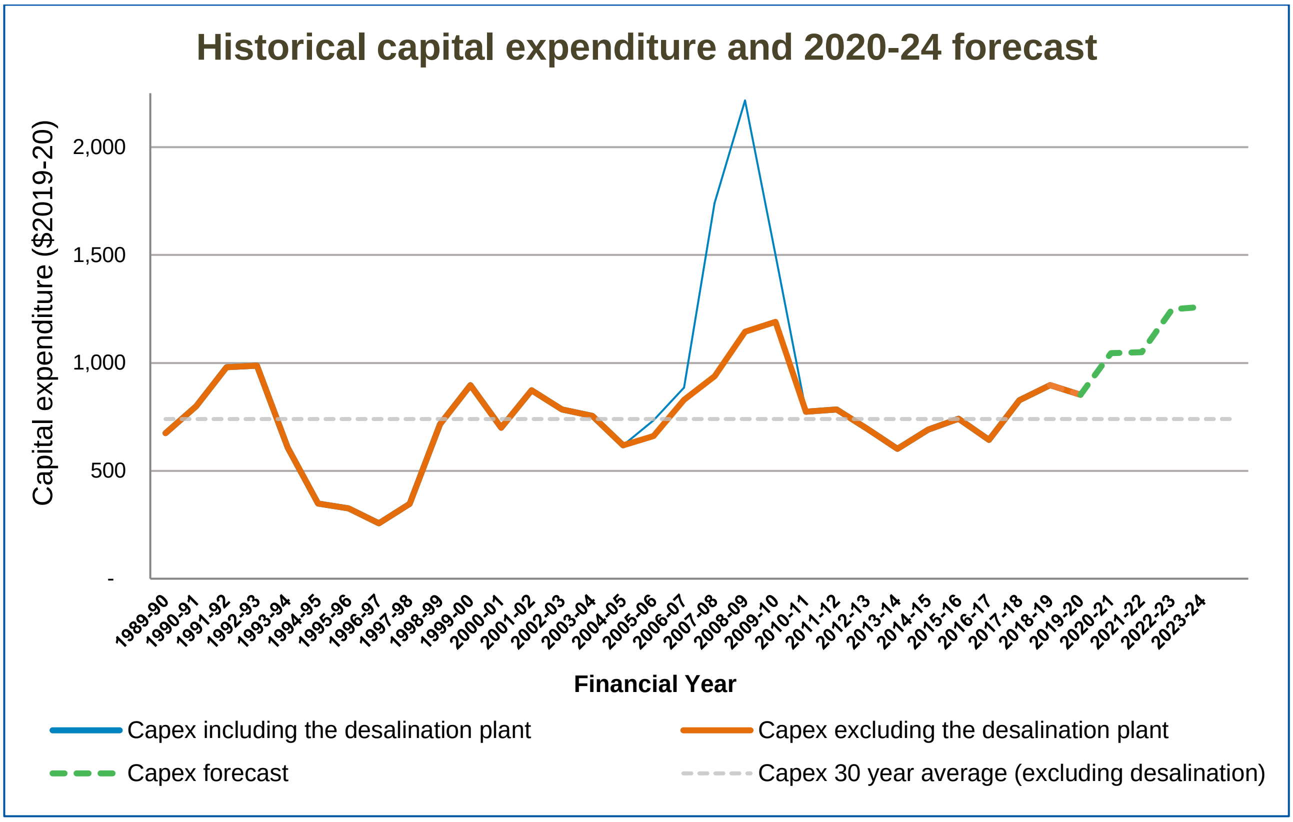


Figure 2-4 Capital investment from 1990 to 2024 ($2019–20 million)

This profile indicates that annual capital investment over 2020–24 will be higher than the 30-year average, but comparable to that observed as recently as 2008–2009 and 2009–10 (excluding expenditure on the desalination plant).

2.1.6.1 Period to period capital expenditure by Product

Figure 2-5 compares capital investment by Product between 2016–20 and 2020–24.

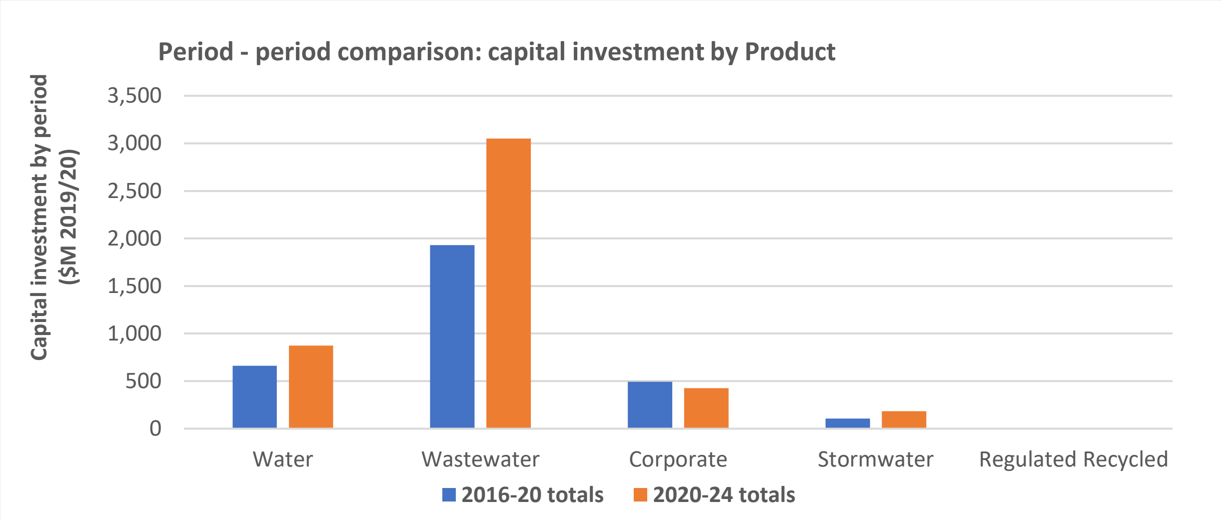


Figure 2-5 Product level capital investment comparison

This Product level view shows clearly that there are pressing investment needs for the wastewater service. The increase in wastewater relates to:

- treatment plant – meeting growth and addressing assets risks
- wastewater network – addressing the risks in three critical sewers servicing 3.4 million people as well as meeting growth.

Table 2-4 shows the proposed 2020–24 capital expenditure of $4.5 billion by Product and the proportion of the total forecast each represents. Around two-thirds of the forecast capital expenditure is in wastewater.

Table 2-4 Capital expenditure by product 2020–24 ($2019–20 million)

Product	2020–21	2021–22	2022–23	2023–24	Total ($)	Total (%)
Water*	204	227	231	213	**874**	19%
Wastewater	623	627	884	917	**3,051**	67%
Corporate	137	117	90	82	**427**	9%
Stormwater	40	54	43	48	**185**	4%
Regulated Recycled	0	0	0	0	**0**	0%
Total	**1,004**	**1,024**	**1,249**	**1,260**	**4,537**	**100%**

* Note that capital expenditure relating to the under the Build Own Operate finance leases is included in Appendix 9B, Confidential.

From this point onward the forecast is categorised by Driver first, then by Product.

2.1.6.2 Period to period capital expenditure by Driver

Figure 2-6 shows annual capital expenditure by driver in the current price period alongside the forecast for 2020–24.

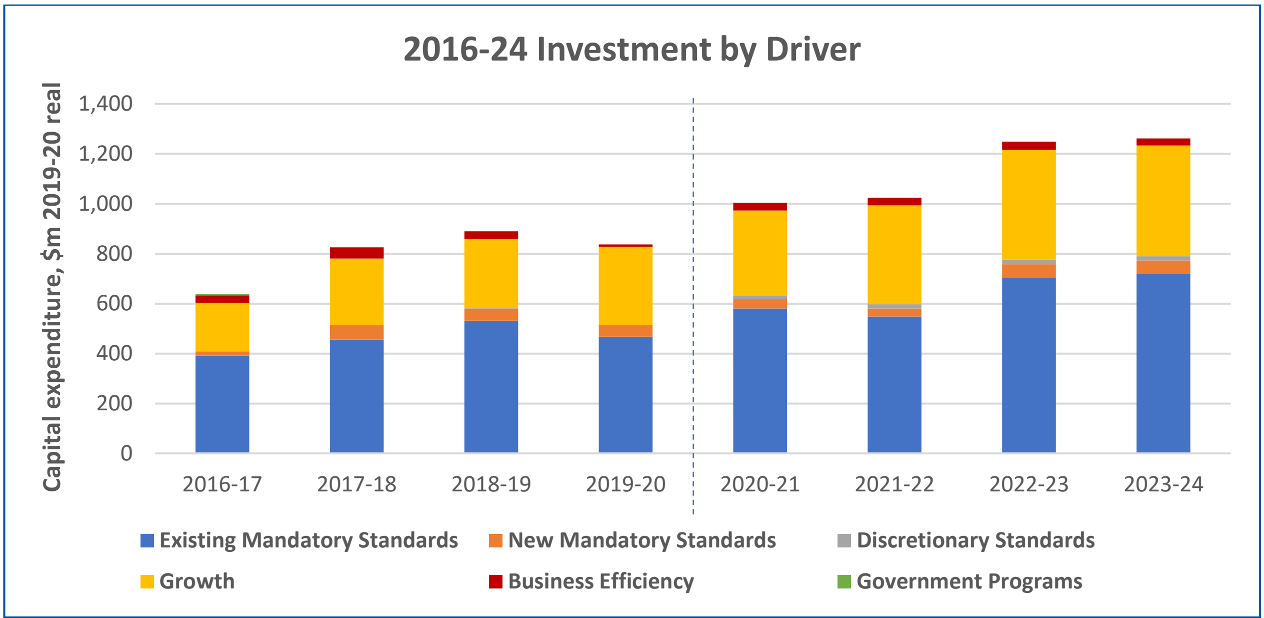


Figure 2-6 Annual capital investment by driver 2016 - 2024 ($2019–20 million)

The vast majority (92%) of the 2020–24 investment is to service growth and to maintain existing mandatory service standards.

2.1.7 Capital Program by Driver

Table 2-5 shows the proposed 2020–24 capital expenditure of $4.5 billion by investment Driver.

Table 2-5 Forecast capital expenditure by Driver 2020–24 ($2019–20 million)

Driver	2020–21	2021–22	2022–23	2023–24	Total ($)	Prop^n of total (%)
Existing mandatory standards	581	549	703	718	**2,551**	56%
New mandatory standards	38	32	54	55	**179**	4%
Discretionary standards	12	16	20	16	**64**	1%
Growth	342	396	439	445	**1,621**	36%
Business efficiency	31	31	33	27	**122**	3%
Total	**1,004**	**1,024**	**1,249**	**1,260**	**4,537**	**100%**

Note: There is no forecast expenditure for the 'Government programs' driver.

Specific information on the investments included are provided in the remainder of this attachment, where each program in the forecast is allocated to a Driver and Product.

2.2 Existing mandatory standards – forecast

Around $2.6 billion or 56% of our proposed capital expenditure program is to continue to meet existing standards, through efficiently timed asset renewal and reliability investments which manage service performance. The breakdown of the forecast by Driver is shown in Table 2-6.

Table 2-6 Existing mandatory standards capex by product 2020–24 ($2019–20 million)

Product	2020–21	2021–22	2022–23	2023–24	Total
Water	138	140	145	147	**570**
Wastewater	305	278	460	471	**1,514**
Corporate	108	88	59	58	**313**
Stormwater	30	43	39	42	**154**
Regulated Recycled	0	0	0	0	**0**
Total	**581**	**549**	**703**	**718**	**2,551**

As shown in Figure 2-7, wastewater renewals are the most significant, making up almost 60%.

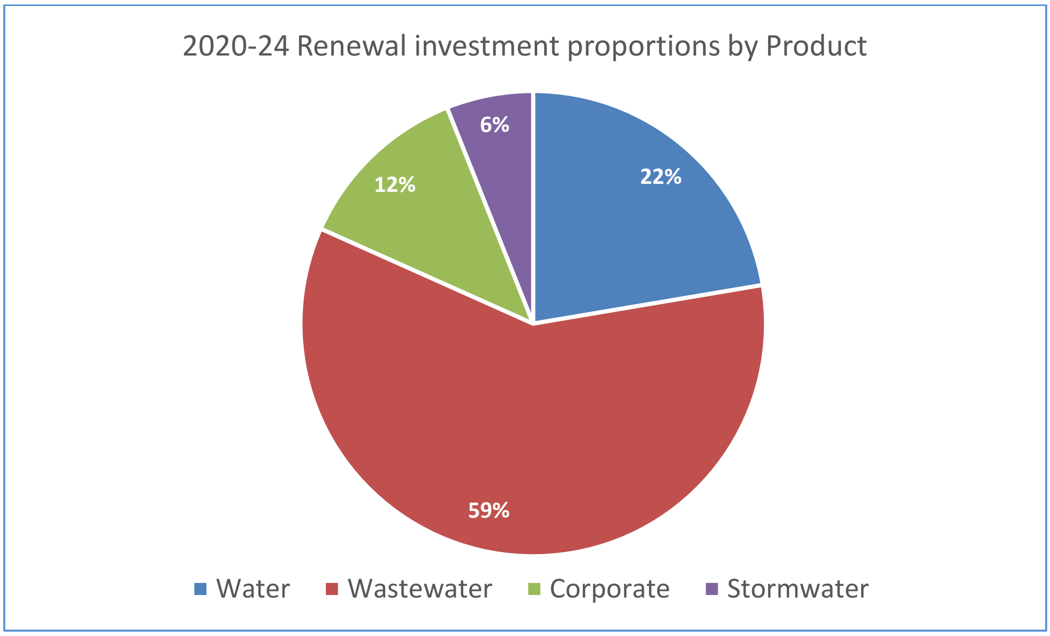


Figure 2-7 Existing mandatory standards capital expenditure by product 2020–24

2.2.1 Existing Mandatory Standards - Water

We will invest $570 million over the period to renew or remediate failed, end-of-life or high risk water mains, valves, water pumping stations, reservoirs and water filtration plants. This is based on a combination of recent condition assessments and top down analysis which predicts the 'years to end of service life' in asset populations.

Table 2-7 provides a breakdown of forecast investment to maintain water services.

Table 2-7 Existing mandatory standards (Water) capital forecast 2020–24 ($2019–20 million)

Asset Class	2020–21	2021–22	2022–23	2023–24	Total
Critical water mains	33	32	35	35	**135**
Reticulation water mains	24	23	23	23	**94**
Water pumping stations	18	18	17	17	**70**
Reservoirs	31	32	28	31	**123**
Water filtration plants	3	4	6	1	**14**
Customer metering	13	13	13	13	**52**
Water other*	16	18	24	26	**84**
Total	**138**	**140**	**145**	**147**	**570**

*** '**Water other' includes $47 million of projected funding for a forecast level of water main breaks which will be capitalised. It is not a program like the others listed here

Proposed investments, forecast outputs and planned outcomes are detailed in the sections below.

2.2.1.1 Meeting existing mandatory standards for water services

The various aspects of water service which need to be delivered by this integrated system are detailed in section 1.2.1 and in **Attachment 2: Service levels and performance**. They include water cleanliness, clarity and taste and reliability attributes like the number, frequency and duration of supply interruptions. Other obligations cover safety (of staff and the community), the Economic Level of Water Conservation methodology reporting obligations and service terms in the Customer Contract.[57]

Expenditure in this portfolio seeks to renew water distribution assets ***at the lowest lifecycle cost and with an acceptable level of risk*** to achieve the range of objectives above.

[57] See section 1.2.1 for full details.

While this forecast includes different asset-related programs, delivering ‘water services’ relies on assets operating well within an interconnected system. Figure 2-8 illustrates:

- how water assets combine in a system to deliver all the obligated aspects of ‘service’
- the extent to which specific asset types contribute to delivering a particular service attribute.

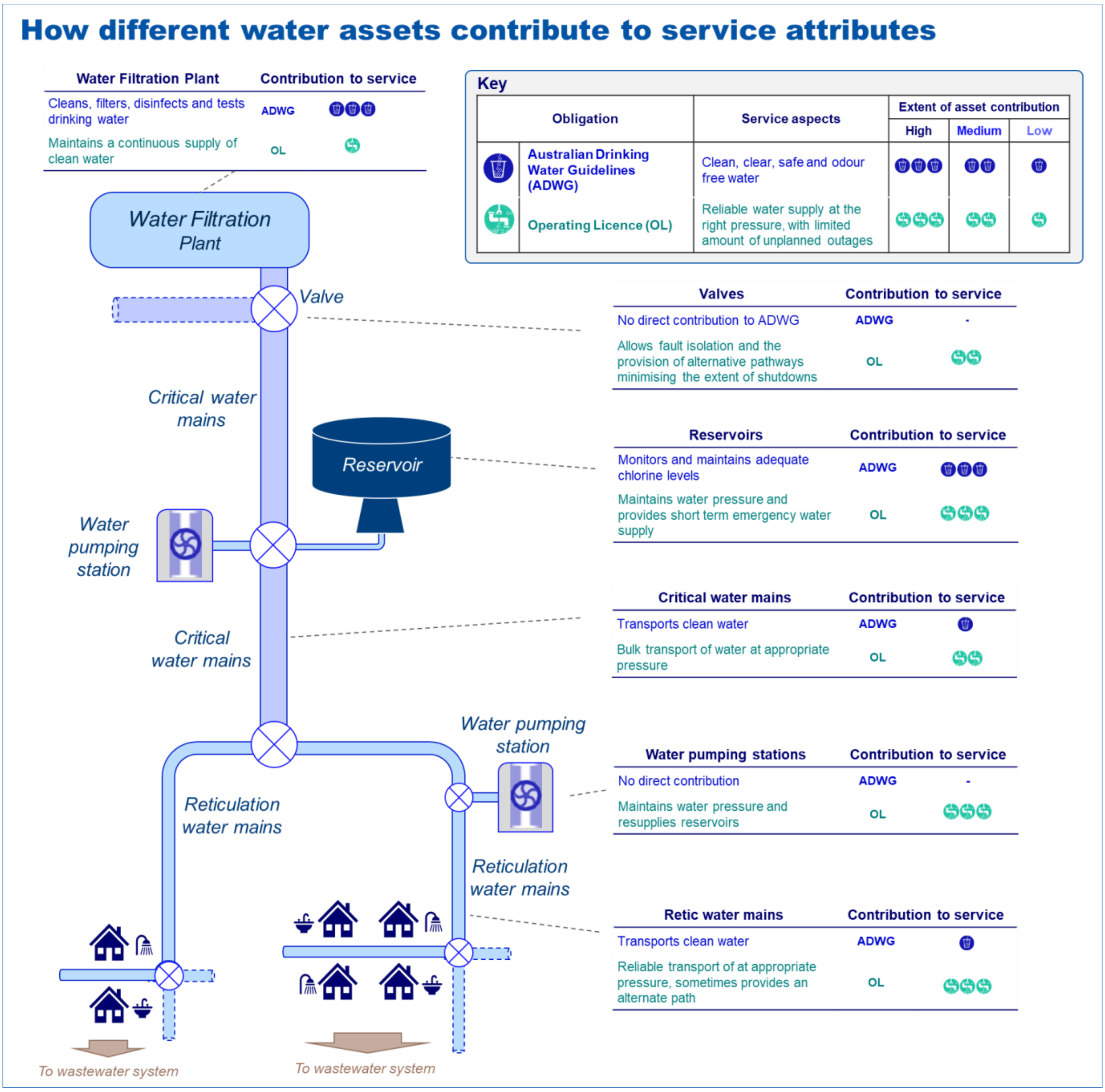


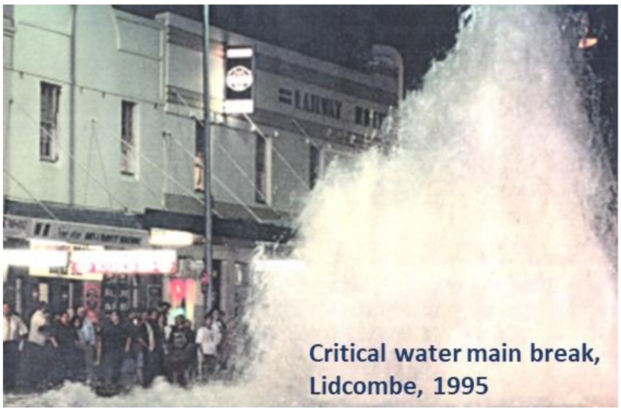
Figure 2-8 Delivering water services through an interconnected network

2.2.1.2 Critical water mains forecast

Critical water mains are generally those with a diameter 300 mm and above. There are around 4,000 km of critical water mains, which is around 18% of the water network by length.

They are designated ‘critical’ if their failure poses a high risk of significant community impact (eg flooding a major road as shown here) and/or a significant water supply interruption.[58]

Due to the impact of asset failures (breaks), critical water mains are managed proactively, and the aim is to renew them before the risk of failure becomes too high.


Critical water main break, Lidcombe, 1995

2020–24 Program overview

Capital expenditure forecast	$134.9 million
Investment objectives	The primary objective is to reduce the risk of critical water main failures to an appropriate level at an efficient economic cost, where risk takes account of the impact of asset failures on service, and community and environment. A secondary objective is to ensure that the volume and impacts of unexpected failures can be effectively managed, through initiatives such as the inspection and renewal of high risk valves.
Scope summary	Assessment, inspection, leak detection and renewals across hundreds of kilometres of critical water mains. Also, with a change in focus from 2016–20: • Refurbishment of above-ground pipelines and joints, which are now known to be more impacted by corrosion and are more at risk of breaks. • Inspection and renewal of hundreds of large valves – critical for isolating faults so that remediation work impacts fewer customers. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	The forecast assumes that the use of a new spray lining technology will realise around $3m of savings in critical water mains renewals. The technology is currently being tested (see below). A further program-wide efficiency factor of -20% has also been applied.

Basis of 2020–24 forecast

The assessment and inspection process identifies critical water mains and valves at an unacceptable level of risk and prioritises them for renewal or rehabilitation. Steps include:

- An annual top down review (incorporating age, previous condition assessments, recent performance) which forecasts the expected condition of the asset population and allocates risk ratings.

[58] Some smaller water mains are therefore designated critical due to their location, not their size.

- Progressively more targeted and detailed assessments are carried out as an asset's risk ratings increase. Level 1 inspections are high level; Level 2 inspections are more detailed, for assets identified as higher risk and being considered as renewal candidates.
- Prioritisation of renewals of water mains with an unacceptable level of risk.

This program forecast establishes an expected amount of investment over the period. All actual water main replacements are assessed on a case-by-case basis closer to when they occur.

Cost estimates and delivery approach

Cost estimates are broadly based on past procurement with adjustments for expected market conditions in the future. The forecast assumes that work will be packaged and allocated quarterly in 3.6 km renewal blocks.

Most inspections and renewals in this program will be undertaken through the relevant Regional Delivery Consortium, as per the P4S framework.

Smart-lining: potential new approach to water main rehabilitation

Overview

We are currently completing a project to test and validate new spray lining technologies. These allow pipes to be relined in situ with a fast setting material which can provide structural support as well as repair cracks and small leaks.

If proven, spray-lining could be a lower cost option than re-laying for both critical and reticulation water mains.

Research project

The key focus is the validation and implementation of smart liners in critical and small water pipes. It is run through a Cooperative Research Centre led by the Water Services Association of Australia. It is currently at the lab testing phase, where it will test spray lining products not currently used in Australia. Then, new lining technology will be installed at a selection of test sites by 2021.

Potential benefits

The technology is new in Australia and has not been tested in every environment; we expect that it will not suit every situation. An estimated saving of $6 million is built into the critical water mains and reticulation water mains forecasts.

2.2.1.3 Reticulation water mains forecast

Reticulation water mains are generally smaller diameter pipes (less than 300mm) and those which would not be classed as 'critical' if they were to break. Given the lower consequence of breaks, and that condition assessments of buried pipes are costly and sometimes inconclusive, these assets are managed reactively.[59]

[59] Water main problems often occur on the outside of the pipe, so they cannot normally be detected from the inside. The alternative, which is to dig down and view the outside of the pipe, is costly and can lead to more failure risk if the dig itself disturbs the supporting earth.

2020–24 Program overview

Capital expenditure forecast	$93.5 million
Investment objectives	Manage water mains according to the least cost balance of renewal and maintenance costs, so that long term network condition and performance (including but not limited to water continuity) is not deteriorating.
Scope summary	Reactive renewal of over 100 km of reticulation mains Addressing reticulation capacity optimisation issues and installing 6 km of link mains to improve system resilience. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	The forecast assumes that the new spray lining technology described above will realise around $3m of savings. This is an estimate as the technology is still being tested (above). A further program-wide efficiency factor of -20% has also been applied.

Basis of 2020–24 forecast

Reticulation water mains are planned for replacement when the same section fails three times in two years. At that point we expect future failures to become more frequent and it is more efficient to replace than repair.

To establish the program scope, we consider historic failure rates / service performance and the known condition of assets to predict how much of the network will trigger this ‘3 breaks in 2 years’ criteria.

Cost estimates and delivery approach

Cost estimates are based on past procurement with adjustments for expected market conditions in the future. The program will be delivered through the relevant Regional Delivery Consortium, as per the P4S framework.

2.2.1.4 Reservoirs forecast

There are more than 250 reservoir assets across the network. Reservoir assets contribute to a secure and reliable water supply by storing water locally and play their role in ensuring drinking water cleanliness and public health through local disinfection. As well as water storage space, they also include instrumentation, chemical dosing plant and control valves.

2020–24 Program overview

Capital expenditure forecast	$122.7 million
Investment objectives	We seek to manage the performance and condition of reservoirs at the lowest lifecycle cost, such that they continue to contribute to meeting the ADWG as well as water continuity and pressure requirements. In this forecast, the major objective is to efficiently extend reservoir lives by replacing roofs and removing bitumen lining from reservoir walls. This will address safety risks and poor reliability.

Scope summary	The scope of this program is different to the 2016–20 program. The bulk of it is made up of 24 large and discrete roof and/or lining renewal projects rather than a higher volume of very similar jobs. The largest single project ($21m) is to renew the Potts Hill Reservoirs which serve as the primary water storage for the Sydney metropolitan area. Other program scope includes: • Level 1 and 2 inspections of over 300 assets • Replacing re-chlorination devices with a new cost-saving design • Replacement of a range of smaller equipment such as inlet control valves, instrumentation and control devices and vermin screens. This includes a level of reactive replacement.
Efficiencies assumed	The forecast assumes that we will replace end-of-life units with a new type of automatic chemical dosing plant, developed by Sydney Water. While it is still being tested (see below) the forecast assumes a saving of around $9 million compared to a like-for-like replacement. A further program-wide efficiency factor of -17% has also been applied.

Basis of 2020–24 forecast

Condition assessment, inspection and performance analysis has identified the assets at risk. As with critical water mains, known at-risk assets are subject to more detailed assessments and renewal candidates are identified. This program forecast takes account of current known condition and risks and the expected levels in the future.

Cost estimates and delivery approach

Cost estimates for the smaller like-for-like renewals in this program, including mixing devices and flow meters, are based on average unit costs achieved through recent procurement. The larger reservoir rehabilitation projects have been developed on a more bespoke basis, especially Potts Hill.

Some of the work will be undertaken through the relevant Regional Delivery Consortium, as per the P4S framework. There may be a need to engage additional experts from outside of P4S – for example, some inspections require specialist divers.

Automated dosing plant: new approach to chlorine dosing in reservoirs

Overview

We are in the final phase of developing and successfully on-site testing a new design of automated chlorine dosing equipment. This new Sydney Water designed technology is cheaper than the existing units.

Potential benefits

The new units are also expected to be around $1 million cheaper per unit than a like-for-like dosing plant replacement, depending on the site. As there are nine replacements in the forecast, we have built in a $9 million saving into the forecast.

2.2.1.5 Water Pumping Stations forecast

Water pumping stations operate in two ways. Booster stations increase water pressure to ensure adequate service is maintained. Conventional stations transport water to higher elevations so that customers at those elevations can receive water.

This relatively small population of assets needs to be managed carefully – due to their age, they are often housed in older buildings and have bespoke configurations which have evolved by location over decades. As a result, this program consists of several discrete projects to address specific issues at pumping stations with obsolete equipment for which we can no longer get spares or support.

We manage water pumping stations according to an efficient balance of renewal and maintenance costs, ensuring that assets contribute to service (mainly water continuity and pressure), stay reliable and that the condition of the asset population reflects an acceptable level of risk.

2020–24 Program overview

Capital expenditure forecast	$69.6 million
Investment objectives	The primary objective is to get rid of non-standard, obsolete equipment to reduce failure risk and achieve an efficient lifecycle cost, taking into account the impact of asset failures on service, the community and the environment. We will replace or overhaul assets that have reached the end of their useful life and no longer contribute to the required service level. This work will also help improve operator safety.
Scope summary	The bulk of the scope is made up of: • four major pumping station renewals covering a full range of mechanical/electrical assets • renewal of high voltage electrical assets at five pumping stations The rest includes minor reliability investments, equipment overhauls and reactive work on smaller components (eg Pressure Reducing Valves). Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	A program-wide efficiency factor of -14% has been applied.

Basis of 2020–24 forecast

To establish the program scope, we consider historic failure rates/service performance and the known condition of assets. If the water pumping station asset is identified as condition grade 4 or 5, it will trigger a review or more detailed condition assessment. If that identifies an unacceptable risk, the asset becomes a renewal candidate.

Cost estimates and delivery approach

Estimates for the major cost items have been developed based on the specific situations. They are generally not comparable to past jobs due to site access issues, the specific nature of electrical upgrades and integration of equipment. The major renewals need to be undertaken by specialist contractors for these reasons.

2.2.1.6 Remaining program forecasts

The sections below summarise the remaining programs in the Existing mandatory standards – Water forecast.

Water filtration plant renewals

2020–24 forecast: $13.5 million ($2019–20 million)

Scope: Reliability and renewals program investing in our five water filtration plants, including:

- plant renewals
- civil remediation works to improve safety access items and covers
- electrical renewals.

Objectives: We will renew or remediate failed, end-of-life or high-risk treatment plant equipment where the condition of an asset combined with the consequence of failure is high.

Forecast method: Candidate cashflows based on estimates determined by incorporating asset lifecycle data and historical data from Maximo[60]. Estimates are refined using project cost benchmarking and unit rates as candidates progress through business case stage gates.

Efficiency assumption: A program-wide efficiency factor of -16% has been applied.

Customer metering

2020–24 forecast: $52.0 million

Scope: Replace an expected 613,122 customer meters

Objectives: Ensure compliance with the *National Measurement Act 1960* (Cmnwlth) and ensure equitable billing of customers through maintaining comparable accuracy across all meters.

Forecast method: A model based on the population of meter types and their failure rates, ages and usage (total lifetime number of litres measured).

Water other

Three programs adding up to $84 million are grouped together under ‘Water other’ in Table 2-7.

Capital expenditure of $16.9 million on the Build Own Operate Plants is discussed in confidential Appendix 9B. A further $47 million is projected funding for a forecast level of water main breaks, which will be capitalised.

The remaining $20 million capital expenditure at the Nepean water filtration plant:

2020–24 forecast: $20 million

Scope: Nepean water filtration plant raw water upgrade project to ensure continuity of water supply during periods of poor water quality.

Objectives: Improve the plant’s ability to meet the ADWG when the quality of intake water is decreasing.

Forecast method: Cost estimates are broadly based on past procurement with adjustments for expected market conditions in the future. The estimating team also tested the market for major components of the delivery.

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[60] Covering service life, base replacement costs, major periodic maintenance costs

2.2.2 Existing Mandatory Standards - Wastewater

We forecast investment of $1,514 million to:

- renew or remediate failed or high-risk sewers, pumping stations and treatment plant equipment where asset condition combined with consequence of failure creates a high risk
- reduce wet weather overflows to the environment and wet weather surcharges into homes.

The forecast is developed based on a combination of a bottom up analysis considering recent condition assessments and risk, and top down analysis of asset populations. The forecast out to 2024 is based on an appropriate quantum of risk across the assets. For candidate projects, which may be later in the forecast period, there are always further analysis and governance steps to validate the need and solution.

2.2.2.1 Meeting Existing mandatory standards for wastewater services

The range of service and environmental obligations which need to be met by our wastewater networks and treatment plants are covered in the Operating Licence and Environment Protection Licences (EPLs). The existing requirements were described in section 1.2.4, along with various other requirements including safety.

Expenditure in this portfolio seeks to renew wastewater distribution assets ***at the lowest lifecycle costs and with an acceptable level of risk*** while achieving the range of objectives above.

As explained for the water network in section 2.2.1, appropriate environmental performance and service delivery in wastewater relies upon a network of assets operating together in an interconnected system. Different asset types contribute to delivering the various service attributes to greater and lesser extents.

Changes to environmental licensing

Over the period of this forecast, we expect changes to our EPLs, though some of these are not yet certain. There will be new discharge limits for the Hawkesbury Nepean river starting in 2025. These seek to manage the impact of growth by reducing nutrient concentration as the volume of discharge increases. Investment will be needed before then to ensure compliance.

Changes to wet weather overflow limits are expected but the levels are not yet certain - this is addressed in the New mandatory standards section.

More information on environmental standards and performance is provided in **Attachment 2: Service levels and performance.**

Table 2-8 provides a breakdown of forecast investment to maintain wastewater services.

Table 2-8 Forecast capital investment for maintaining wastewater services ($2019–20 million)

Asset Class	2020–21	2021–22	2022–23	2023–24	Total
Network portfolio					
Critical sewers* (N)	59	78	219	216	**572**
Wastewater pumping stations (N)	25	28	27	27	**106**
Wet weather surcharge (N)	19	15	12	12	**57**
Reticulation sewer (N)	12	12	12	12	**46**
Sewer network (N)**	20	19	20	20	**80**
Treatment portfolio					
Wastewater treatment plants (T)	82	74	64	85	**305**
Cronulla WWTP Upgrade (T)	20	5	5	0	**31**
Deep Ocean Outfall * (DOOF) (T)	0	0	71	71	**143**
North Head WWTP Biosolids (T)	13	9	2	0	**24**
Quakers Hill/St Marys PARR (T)	30	0	0	0	**30**
Network and treatment					
Hydraulic system services (N and T)	26	37	29	28	**120**
Total	**305**	**278**	**460**	**471**	**1,514**

***** The forecasts for Critical sewers and the Deep Ocean Outfall plant work will be re-profiled in our submission to IPART's Draft report and the expectation is that it would be more evenly spread.

****** 'Sewer Network' is not a program like the others listed here. It is projected funding for a forecast level of sewer remediation which will be capitalised.

Further details on these investments (with the exception of Sewer Network) are presented below – Network programs (N) are discussed before Treatment programs (T).

2.2.3 Wastewater network renewal programs

2.2.3.1 Critical Sewers forecast

Critical sewer assets are managed proactively due to their high consequence of failure. This relates to very high costs once structural repair is required and because failure can cause extensive environmental damage.

In 2020–24 this program will be higher than in 2016–20 as the scope will differ significantly.

2020–24 Program overview

Capital expenditure forecast	$572.2 million
Investment objectives	The program objectives are to: • Manage public health, environment, compliance, safety and reputation risks associated with critical sewer assets to an acceptable level as specified in the Sewer Main Asset Master Plan. • Achieve the above at lowest lifecycle cost – for these assets this involves timely proactive work to avoid asset failure[61].
Scope summary	The scope includes: • Continuing rehabilitation of the major sewers (NSOOS, SWSOOS and BOOS)[62], including preliminary de-silting ($171 million). The balance of the program scope covers: • Condition assessment of critical sewers and associated infrastructure including deep maintenance holes, vent shafts and renewal of these assets, where justified by risk • Renewal of the above assets, where justified by risk. • Installation of new and renewal of existing odour and corrosion units. This is to slow corrosion, make the assets safe for entry and to manage odour. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	A program-wide efficiency factor was not applied.

Scope details - NSOOS, SWSOOS and BOOS

In 2016–20, we worked with specialist contractors to develop a safe method for de-silting and rehabilitating the three largest wastewater pipes, starting with the NSOOS. From 2020–24 we will undertake more work on these three sewers as they all have sections in very poor condition and are silted. The major focus will still be the NSOOS, on which another three packages of work are planned. Work will continue more quickly than in 2016–20 as we now have much more information about condition and silting levels and have an established work method. Planning for the BOOS and SWSOOS work is in progress.

[61] 'Failure' of a critical sewer is where lining fails to the point where corrosion can attack the underlying structure of the sewer. Once this has occurred the cost of remediation increases sharply.

[62] Northern Suburbs Ocean Outfall Sewer, South Western Suburbs Ocean Outfall Sewer and Bondi Ocean Outfall Sewer

Work on the BOOS and SWSOOS will take advantage of some of the NSOOS methods but there are differences, such as local and asset specific conditions. We have forecast investment of $171 million for the rehabilitation of more than 15 km of these assets.

Scope details – inspection and renewal of wastewater pipes and associated assets

Another major element of this program includes the condition assessment and risk-based renewal of critical sewers and related infrastructure, such as deep maintenance holes and vent shafts. Condition assessments are undertaken on a cyclical basis where the frequency increases as an asset's condition deteriorates. Renewals are triggered when the risk rating becomes unacceptable. For critical sewers we seek to renew before 'failure' occurs, ie just before the underlying structure is compromised.

This includes a significant element of work to address the recent deterioration in environmental performance. The number of chokes has increased to the extent that it requires a more focused package of condition assessment than previously. As already noted, we are currently experiencing very high levels of chokes and the network is not compliant with EPL conditions in some catchments. Addressing the underlying issue will require a resource intensive program of work which will take years to complete.

In targeted parts of the network we will undertake a much higher amount of CCTV assessments – to identify potential chokes or collapses proactively. This reflects the change in asset management strategy for some sewer assets which were being managed reactively. Given the dry soil conditions and the number of chokes recorded, the change in approach is necessary to improve environmental performance and comply with waterway Sewer Catchment Asset Management Plans.

While sewers are the main focus by value, this element of the program also addresses deep maintenance holes (more than 15 m deep) and vent shafts, for which risk analysis considers other specific consequences of failure (eg worker safety).

Scope details – odour control and chemical dosing units

The program includes work to replace existing and add more network odour control and chemical dosing units. This will extend the lives of sewers by reducing corrosion, remove toxic gases to ensure worker safety, and reduce odour impacts on the community. Some renewals are also being targeted to allow access to more competitive chemical supplies.[63]

Basis of 2020–24 forecast

Different parts of this program expenditure forecast were developed in different ways. For the three major assets we used the costs of recent packages of work as well as detailed planning for the next packages.

For the other renewals, we considered the current condition of assets as well as recent failure rates/service performance to forecast a volume of work over the period. As for other risk-based

[63] This is possible where a particular unit only accepts chemicals in a specific format and there are less options to procure these efficiently.

renewals, further analysis and governance steps are required before an investment actually takes place.

Cost estimates and delivery approach

Work on the three major sewers needs to be undertaken by specialist contractors; cost estimates are based on recent work at the specific sites.

Other estimates are based on recent procurement or the current best available unit rates, although the actual delivery of the work may be undertaken by the P4S delivery partner under different terms.

2.2.3.2 Wastewater pumping stations forecast

The wastewater pumping stations program also includes low pressure sewerage systems (LPSS) and vacuum sewerage systems (VSS).

We manage these assets proactively, as failures will generally lead to wastewater overflows with the potential for environmental damage.[64] The program seeks to replace or overhaul assets when required based on risk assessments and detailed condition inspections. It also seeks to ensure asset reliability and improve response to overflow risks.

2020–24 Program overview

Capital expenditure forecast	$105.9 million
Investment objectives	The objective is to manage the assets at the lowest lifecycle cost which maintains performance and manages the risks of overflows to the environment and community.
Scope summary	The majority of the scope is split relatively evenly between: • major site-wide renewals, mechanical/electrical renewals, like-for-like replacements and planned overhauls • reliability projects to prevent dry weather overflows from pumping stations, including work to improve resilience to more extreme weather events There is also an allowance for reactive overhauls and emergency work. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	A program-wide efficiency factor of -22% has been applied.

Basis of 2020–24 forecast

Candidates for this program were identified through risk analysis, assessing the likelihood of failure and the consequence (which includes impacts on public health for these assets). Analysis showed that around 15% of assets presented an unacceptable level of risk.

Initially, top down risk analysis considers both the consequence and probability of failure for components (or ‘maintainable units’) within each pumping system. Consequence of failure was

[64] For example, 371 out of 650 wastewater pumping stations are situated in locations rated as ‘critical’ in terms of public health if they failed and overflows occurred

based on the type of system and its location. Probability of failure for each asset or system is based on asset inspections, condition assessments, maintenance analysis, testing and recent failure investigations. The combined risk rating was the basis of a prioritised set of work. Due to the age of some of these assets, a lack of available spares increased their risk rating, especially for now obsolete electrical equipment such as pump starters.

Assets which are currently known to have the highest risk scores make up the early years of the program, whereas later years include candidates which are expected to present the highest risk at that time. This is re-assessed when information becomes available.

Cost estimates and delivery approach

The forecast is based on internal cost estimates for the packages of work in the program. Due to differences in scope they are not directly based on unit costs from current work.

2.2.3.3 Program forecast - Wet Weather Customer Internal Surcharges

Internal surcharges occur when wet weather causes wastewater overflows inside a property. This reactive program seeks to minimise the occurrence of repeat events. It is a reactive program as it is normally not cost effective to fix potential overflows. However, a small element of the 2020–24 program is a pilot to investigate the effectiveness of a more targeted approach. The types of work needed if the problem is on our network varies by location. Solutions range from simple and low cost (eg installing a reflux valve) to more complex assets solutions, such as increasing capacity or adding emergency relief structures.

2020–24 Program overview

Capital expenditure forecast	$57.1 million
Investment objectives	The primary objective is to ensure customers do not experience repeat discharges within their homes, and do not experience a repeat discharge outside their home at a frequency of more than once in two years.
Scope summary	Avoiding repeat internal surcharges through: • planning and delivery of a forecast level of low, medium and high complexity projects (based on historical work patterns) • completing a complex single project to manage the risk of further surcharges at the Queen Victoria Building • a pilot project to proactively reduce surcharge risk in a high surcharge area.
Efficiencies assumed	A program-wide efficiency factor of -16% has been applied.

Basis of 2020–24 forecast

The main reactive part of the program is estimated based upon the number of different types of jobs recorded in recent history.[65] The assumption is that there will be 15 jobs per year of which six are low complexity, five are medium complexity and four are difficult.

The pilot study scope is based upon the known number of properties at risk in the chosen area, Concord East. The project will investigate and implement the better of two conceptual options – one being the provision of non-return valves to all 880 properties and the other being a combination of reducing infiltration through Emergency Relief Structures and increasing wastewater network capacity. Both have similar costs.

Cost estimates and delivery approach

The forecast uses an average cost for each of these different project types, again based on past projects of similar types.

2.2.3.4 Program forecast - Reticulation sewers

Reticulation sewers are the smaller wastewater pipes (with diameters less than 225 mm) which connect properties to the main trunk sewer network. There are around 24,000 km of reticulation sewers and they make up the bulk of the sewer network. Over half are constructed from vitreous clay and were laid before 1975.

We seek to manage reticulation sewers and vent shafts at the lowest lifecycle cost, while preventing asset failures and overflows. This maintains continuity of services to customers and avoids environmental harm. The lowest cost approach to managing these assets is usually 'plan to repair'.[66]

2020–24 Program overview

Capital expenditure forecast	$46.3 million
Investment objectives	The program objective is to manage blockages of small diameter sewers at the lowest whole of lifecycle cost and by doing so: • meet EPL and Operating Licence obligations by preventing overflows to properties and waterways • maintain continuity of the service by transporting waste to treatment plants.
Scope summary	We will meet these objectives through a program of work including: • condition assessment of reticulation sewers using CCTV inspections • re-lining of sewer mains from the condition assessment analysis

[65] The forecast actually assumes a slightly lower workload than the recent average, smoothing out the impact of a past backlog

[66] This is due to the relatively low consequence of individual overflows and because repair and clean-up costs are generally much less than the cost of proactively finding potential overflows and taking action. The cost of looking for potential chokes is high because the 'yield' of CCTV scans is usually not high. The number of possible future chokes per kilometre of CCTV scan is normally low.

	• replacing associated assets (eg vent shafts) based on condition assessments or reactively • proactive inspection and remediation of a small proportion of the network. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	A program-wide efficiency factor of -19% has been applied.

Basis of 2020–24 forecast

The asset management strategy uses trigger criteria to identify the efficient point to re-line or renew smaller sewers. The normal trigger for a CCTV inspection is three chokes in five years. At this frequency, it is considered that the asset has deteriorated but more importantly the cost of cleaning up, doing CCTV inspections then clearing the choke is higher than the cost of re-lining. Once the trigger is reached specific analysis confirms if it is more efficient to re-line the sewer.

To establish the program scope, we forecast a future level of work based on this asset management strategy. While the exact candidates are not known, each project which goes ahead will be subject to confirmatory analysis before expenditure actually occurs.

Cost estimates and delivery approach

Estimates are based on existing contracts (for example, the unit rate for a kilometer of CCTV inspection) and market conditions.

2.2.4 Wastewater treatment programs

2.2.4.1 Program forecast – Wastewater treatment plant reliability and renewals

The Wastewater treatment plant reliability and renewals program will invest in our 28 wastewater treatment plants to maintain service levels and environmental performance, plus manage odour and safety at the lowest lifecycle cost.[67] While a significant proportion of the investment will be concentrated in larger projects, the balance of the forecast includes a high volume of smaller replacements.

2020–24 Program overview

Capital expenditure forecast	$305 million
Investment objectives	Replace or overhaul equipment to manage failure risk, maintain performance and achieve an efficient lifecycle cost taking account of the impact of asset failures on service, safety, the community and environment.
Scope summary	The main components of this program are: • replacement and reliability improvements of treatment plant inlet works • replacement and reliability improvements of de-watering plant • renewal of civil infrastructure, mainly to improve worker safety • electrical safety work.

[67] The 28 wastewater treatment plants comprise 13 wastewater treatment plants, 12 water recycling plants and 3 stormwater treatment plants. In this section, all are referred to as wastewater treatment plants.

	The balance of the scope consists of almost 300 smaller renewal candidate jobs identified across the plants. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	A program-wide efficiency factor of -34% has been applied.

One of the focus areas is renewal of inlet works. These projects were brought forward after a detailed review of all inlet works was undertaken. We have prioritised work across 11 sites based on a combination of asset condition and the seriousness of potential downstream impacts on the plant. Screening and grit processing protect downstream assets and processes and when unwanted materials enter:

- asset wear is increased and operating lives are shortened
- plant processing capacity is reduced, even to the point where bypasses are required
- operating costs can be higher, due to more frequent cleaning of screens and responding to downstream issues such as blockages.

Work is being undertaken now on the best way to approach these renewals. A standard concept will be developed and tested in early projects and refined for later work.

Basis of 2020–24 forecast

Some projects will already be active at the beginning of the price period; the forecast for those is based upon the latest information about timing and cost.

The rest of the program scope is based upon risk analysis which considers historic failure rates, service performance, and the known condition of assets. Each asset's risk score is based upon the probability of failure and the consequence impact in the particular location. The program forecast is based on risk tolerance – high risk assets are in scope (subject to the usual investment gates).

The program content is not fixed at this point and projects in the candidate or development stages are subject to change, based on updated risk assessments and re-assessing the best way to achieve program outcomes.

Some renewals may not go ahead if updated or more detailed risk assessments and investment appraisals show that other work should be prioritised.

Cost estimates and delivery approach

Cost estimates for active projects are based on the stage they are at, using cost benchmarking, unit rates and first principle estimates. Candidate estimates are based on internal cost estimates using historical costs.

The projects within this program will likely be delivered by the Regional Delivery Consortia after P4S is implemented. Smaller, lower risk projects may be delivered internally by Customer Delivery.

2.2.4.2 Active treatment projects finishing after 2020

Three large stand-alone treatment projects have mixed-driver scopes including renewal and growth-driven work. All three will be active before 2020 and continue into the forecast period. After 2020 the renewals scope of these three projects will total $84.2 million for completion of:

- the North Head WWTP Biosolids upgrade, which will reduce the risk of EPL non-compliance and reduce odour and disposal costs associated with poor quality of biosolids ($23.9 million after 2020). The forecast includes an efficiency factor of 13%.
- the Quakers Hill/St Marys WWTP PARR renewal and amplification project, eliminating the risk of structural failure of the Quakers Hill IDALS and improving reliability (see section 1.2.6.1) ($29.6 million after 2020). The forecast includes an efficiency factor of 13%.
- the Cronulla WWTP renewal and amplification project, improving reliability to ensure licence compliance ($30.7 million after 2020). The forecast includes an efficiency factor of 13%.

2.2.4.3 Deep Ocean Outfall plant upgrades

We have forecast expenditure of $143.0 million on plant improvements to comply with oil and grease effluent concentration limits at two of the three large ocean outfall WWTPs (Bondi and North Head).

Project need

The concentration of oil and grease in influent reaching these three plants has increased significantly in recent years.

At Bondi it has doubled since the mid-1990s.[68] This is due to changed catchment demographics, higher population and lower water consumption. As a result, the plant is either at or close to its capacity to remove enough oil and grease to meet its EPL requirement. In 2017–18 Bondi breached both its 50%ile and 90%ile oil and grease concentration limits.

Concentration limits are being reached at North Head and they may be breached in 2018–19. In addition, North Head could breach its overall load limits by 2021 if population increases as forecast and influent content does not change.

Scope

The forecast scope envisages that options studies will be undertaken to determine suitable and cost-effective solutions to the issue. Options include amplifications or process improvements using settlement enhancement, dissolved air floatation and chemically assisted removal.

Cost estimate

The cost estimate reflects an early view of the possible scope. It is based on installing chemically assisted sedimentation for around one quarter of the flow (which is estimated to bring the load and concentration values to below the limits). Work at Bondi is expected to be prioritised first as the

[68] From 25mg/L in the mid-1990s to over 50mg/L in 2018

issue is most pressing there, with North Head being the next priority later in the period. While the issue also exists at Malabar we do not expect it to require work before 2024.

2.2.4.4 Program forecast – Hydraulic system services

Over the 2020–24 period we forecast capital expenditure of $120 million on hydraulic system services. These systems provide control and measurement of the assets via telemetry and SCADA. The focus is on maintaining existing SCADA assets while selectively increasing the application of real-time technologies to automate, monitor and control our water and wastewater processes and assets.

Scope

This program seeks to maintain data networks to ensure that the monitoring and control capability is secure, reliable and resilient. It also aims to maintain the existing SCADA assets and automation capability at treatment plants. This forecast capital expenditure is in line with the amount for similar work over 2016–20.[69]

Supported by initial pilots, we also plan to:

- selectively enhance capabilities in instrumentation, controls (for increased automation) and laboratory systems (for analysis of water and waste water quality).
- develop and deploy 'Internet of Things' (IoT) technology to support more pro-active asset management with the aim of improving customer and environmental outcomes.

Maintain and enhance automation at treatment plant

Overview

As technology and data processing improves, there is an opportunity to increase the level of automation in wastewater treatment plants.

Scope

At some plants, the current 'level 4' automation will be maintained, allowing plant to run without manual intervention for a minimum of 48 hours.

At other plants, we will move towards higher automation levels. Over time this will allow plant operation to be monitored and optimised using models and artificial intelligence, with less operator intervention.

This capability will become especially important as we seek to manage plant on an integrated 'hubbed' basis, with benefits including capacity sharing and improved resilience.

[69] Total expenditure of around $50 million was briefly covered in sections 1.2.3 and 1.2.6.2.

2.2.5 Stormwater Existing mandatory standards

We plan to invest $154.4 million across three stormwater programs focusing on:

- the renewal of assets in poor condition including pipes, culverts and open channels
- removing pollution from urban stormwater runoff before it discharges to waterways
- providing additional network capacity in areas of high flood hazard.

Table 2-9 Forecast capital investment for maintaining stormwater services ($2019–20 million)

Asset Class	2020–21	2021–22	2022–23	2023–24	Total
Stormwater renewals	17	26	33	36	**111**
Flood risk	6	13	5	3	**27**
Waterway health	7	5	1	4	**16**
Total	**30**	**43**	**39**	**42**	**154**

Further details on these three programs are provided in the sections below.

2.2.5.1 Stormwater renewals

This program will renew stormwater assets targeting a reduction in risk rankings of stormwater assets and to enhance employee and community safety. It will also provide detailed, up-to-date condition and risk information on over 40% of the network.[70]

2020–24 Program overview

Capital expenditure forecast	$111.4 million
Investment objectives	The primary objective is to implement capital solutions that maintain existing stormwater service levels and improve community and worker safety as required.
Scope summary	The program scope includes: • condition assessment of around 160 km of network • renewal of open stormwater channels conduits (eg pipes and culverts) • renewal of 6 km open channel fencing and four gross pollutant traps. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	A program-wide efficiency factor of -21% has been applied.

[70] The network is around 450km long and condition assessment of 200km is planned.

Basis of 2020–24 forecast

Projects in this program are identified from our condition assessment program and are prioritised by risk ranking, based on assessed consequence of failure. As this risk-based forecast expenditure is more than in the 2016–20 period, we cross-checked it against a 'top down' benchmark of average renewals based on asset value and expected lifetime. The forecast appeared reasonable in comparison, especially considering the very low investment in these assets since 2008.[71] As for other renewals, specific projects will only proceed after progressing through the relevant governance steps.

Cost estimates and delivery

Unit costs for the various components of this program were developed based on a combination of MEERA values (for open channels, box culverts and pipes), the current lowest tendered rates (for fencing), and previous actual costs (for gross pollutant traps). MEERA values were validated against actual costs for several similar, completed projects, using an average unit cost basis.

2.2.5.2 Flood risk

The program seeks to manage flood risks, including community safety as well as infrastructure and property damage. These risks usually increase with more urbanisation. Recent analysis shows that only around half the stormwater network has adequate capacity for a one-in-five-year storm event capacity.[72]

Flood risk investments are developed under the NSW Flood Prone Lands Policy. This requires councils to lead specialist committees which develop plans to address specific local risks.

2020–24 Program overview

Capital expenditure forecast	$26.8 million
Investment objectives	The objective is to appropriately manage flood risk to ensure community safety and protect property and infrastructure from floods.
Scope summary	Projects in this program include: • increasing the flow capacity of 630 metres of the network • commencing construction of one stormwater detention basin. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	Collaboration with councils has reduced overall capital costs (eg through better arrangements for land access) A program-wide efficiency factor of -24% has been applied.

[71] The Modern Engineering Equivalent Replacement Asset (MEERA) value of these assets is $3.5 billion. The annual average of this forecast (at around $28 million) is 0.8 per cent of the MEERA value. As these are mainly civil assets with lives of around 100 years, a simple benchmark average value for renewals would be around $35 million (or 1% of MEERA). In the period 2008-12, renewals were around 0.1% of MEERA value annually. In conclusion, while this forecast increases stormwater renewals compared to the past, it would not be sustainable to maintain renewals at very low levels compared to the benchmark – at some point, renewals need to increase.

[72] Source: Figure 10, Stormwater Asset Master Plan 2018.

Basis of 2020–24 forecast and cost estimates

Projects are based on the requirements of the Erskineville Flood Safe and Dominey Reserve management plans. Our cost estimates are based on design work and exclude costs borne by other stakeholders.

2.2.5.3 Waterway Health

The program aims to manage stormwater's impact on 'water quality' in the waterways of our declared catchments. In this context, 'water quality' can include elements of ecological and social values of waterways. This is an integral part of the service and 'stormwater quality improvement devices' are part of the Stormwater Drainage System defined in our Operating Licence. The proposed 2019–23 Operating Licence clarifies that managing stormwater impacts on waterways can be an integral consideration in providing the service.[73]

Customer engagement indicates that stormwater expenditure which has benefits on Sydney's waterways is well supported.

2020–24 Program overview

Capital expenditure forecast	$16.1 million
Investment objectives	The objective is to manage the impact of storm run-off on the health of waterways in declared catchments.
Scope summary	This program includes: • installation of litter booms • construction of gross pollutant traps • construction of natural stormwater treatment systems. Outputs are detailed in Appendix 9A, Capex Tables.
Efficiencies assumed	Collaboration with councils has reduced overall capital costs (eg through better arrangements for land access) A program-wide efficiency factor of -40% has been applied.

Basis of 2020–24 forecast

There is no formal definition of the water quality 'standard' to be met when managing the impact of stormwater on waterways.[74] To develop this plan, we therefore engaged with customers to understand how they valued improving stormwater quality, and their willingness to pay for this type of investment.[75] We found that customers support investments in stormwater management to improve the quality of waterways. Further, customers in declared stormwater catchment areas

[73] The new licence will include at the end of Clause 2.1.3, 'Note: For the avoidance of doubt, the provision, management and maintenance of Stormwater Drainage Systems (and Services for providing those Stormwater Drainage Systems) under clause 2.1 may include stormwater quality management and other measures as necessary to manage impacts of stormwater on waterway health'. Section 2, 'Licence Authorisation, Sydney Water Operating Licence (draft), 2019 to 2023, December 2018

[74] Such a standard would need to account for the attributes of the particular waterway.

[75] 'Willingness to Pay for the Outcomes of Improved Stormwater Management' prepared for Sydney Water by Gillespie Economics (2018) and 'Customer-informed IPART submission (CIPA) Phase 3', prepared for Sydney Water by Woolcott Research and Engagement (2018).

supported funding the continuation of a waterway health program. For further details on customer engagement in relation to waterway health, refer to **Attachment 3: Customer engagement**, section 3.7 'Waterway Health Improvement Program'.

Once customer priorities were understood, we developed a draft program targeting the most valued attributes. Candidate projects were identified internally from the teams maintaining stormwater assets, and externally through engaging with councils.

Cost estimates and delivery

Cost estimates are based upon actual recent project costs (for litter booms and pollutant traps); detailed concept planning costs (natural stormwater treatment systems) and the most recent delivery forecasts (for active projects).

2.2.6 Corporate Existing mandatory standards

We will invest $312.7 million to renew a range of corporate assets which support business functions including information technology, buildings, facilities, customer meters and equipment. The objective is to maintain the ability of the assets to support the business, meet obligations such as for safety and ensure that lifecycle costs are minimised.

Table 2-10 Forecast capital investment for maintaining corporate services ($2019–20 million)

Asset Class	2020–21	2021–22	2022–23	2023–24	Total
Digital Business / IT	97	73	46	46	**261**
Property	9	12	11	10	**42**
Other	3	3	3	3	**10**
Total	**108**	**88**	**59**	**58**	**313**

Proposed program and activities

$260.8 million is to renew information technology infrastructure, as outlined in more detail in section 3.2.

The other programs include:

- $41.6 million for property maintenance, amenities and storage facilities and workplace accommodation renewals to maintain workforce safety and efficiency
- $10.3 million on minor plant and laboratory equipment.

2.3 Growth

2.3.1 Longer term planning context

We will invest $1.6 billion on water and wastewater infrastructure so that:

- services can be provided to around 144,000 newly connected premises on a timely basis

- the downstream wastewater network and treatment plant has adequate capacity for the increased waste flows
- upstream water infrastructure has adequate capacity to meet the increased water demand.

In the past, we have often been able to service growth by building local assets to connect new dwellings to existing networks and using existing treatment plant capacity. Looking ahead there are areas where new demand will trigger the need for new wastewater treatment plants, particularly for the inland catchments. As a result, more than 60% of growth investment is in the Treatment portfolio.

Investment forecast considers longer term needs

As explained in Section 1.3, to ensure that growth investment is efficient, it is important to take account of the volume, location and certainty of longer term growth (eg past 2030). This is particularly important in Sydney at its current stage of development, especially as much of the growth in the longer term will be inland.

Greater Sydney's population is expected to increase to around 8 million by around 2056, double the amount in the year 2000. This increase of three million over the current population will also change population distribution and greatly increase density in some areas. This creates challenges for supplying water, wastewater and stormwater services, as well as for the rest of the city's infrastructure.

To assist with infrastructure planning, the Greater Sydney Commission has set out the metropolitan vision and directions to 2056 in its 'Greater Sydney Region Plan'. An extract from this in Figure 2-9 shows the changes in population density from 1996 to 2016 and the forecast towards 2036.

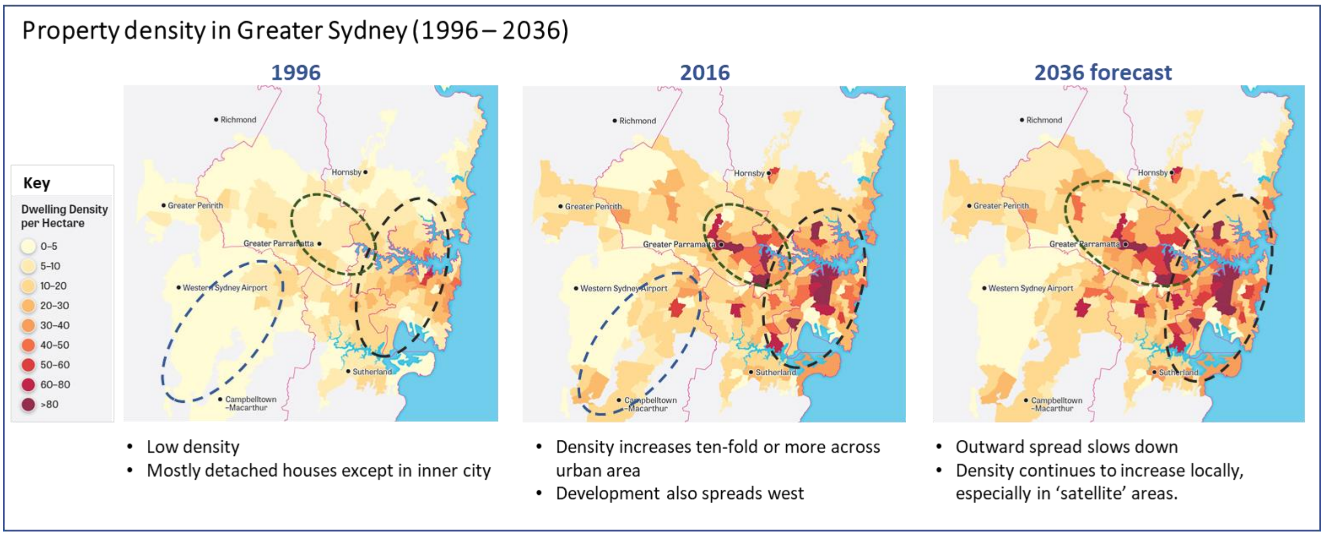

Figure 2-9 Past and forecast population density in the Greater Sydney Region

In response to the projected increase, the Greater Sydney Region Plan includes the 'three cities' concept, envisaging an Eastern Harbour City, Central River City and Western Parkland City.[76]

The plan recognises the benefits of planning to meet these challenges early and sets out a framework for much more coordination in land use and infrastructure planning than in the past. We will have an active role in this planning process as it develops, with the most immediate opportunity being planning for the greenfield development area at South Creek (part of the 'Western Parkland City' concept).

2020–24 Growth investment forecast

Our 2020–24 growth forecast has considered longer term growth projections and the three cities vision. While some analysis indicates that integrated water solutions may become cost effective alternatives later in the 2020s, decisions on this can be taken in the next decade, in light of more information. Our 2020–24 investment plan does not limit our options in this respect and our 'adaptive pathways' approach retains flexibility for the future.

Table 2-11 Forecast capital investment for servicing growth by portfolio ($2019–20 million)

Growth Area	2020–21	2021–22	2022–23	2023–24	Total
Network Growth	150	178	132	147	**607**
Treatment Growth	192	219	306	298	**1,015**
Total	**342**	**396**	**439**	**445**	**1,621**

Similar to the 2016–2020 program, we have applied a 'risk sharing' approach to ensure that customers do not fund the less certain projects. The forecast includes only the more certain projects for developments with a high chance of proceeding. Less certain investments have been excluded but if growth does eventuate we will deliver a service as required.

Some of the network growth investment will still be delivered by developers (as per the current situation described in section 1.3).

2.3.2 Investment Drivers

We are required to offer services in the areas we serve and by 2024, we expect to be serving around 144,000 new properties. There will also be major infrastructure investment around Sydney, including the Western Sydney Airport, which will need new treatment infrastructure, and the Sydney Metro West rail link.

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[76] The 'three cities' plan envisages an Eastern Harbour City, Central River City and Western Parkland City, evolving over the period to 2056. In moving towards this, the government wants to embed the principle of 'better integrating land use and infrastructure'. This will require more coordinated investment in growth areas across transport, health, education and water to ensure the creation of new places and neighbourhoods that matter more than the individual assets which serve them. More details are available in the 'Building Momentum: State Infrastructure Strategy 2018-2038' (Infrastructure NSW) and the 'Greater Sydney Region Plan' (Greater Sydney Commission).

As shown in Figure 2-10, some growth will be concentrated in large development areas and around new transport infrastructure, but some pockets of ‘infill’ demand will be more distributed.

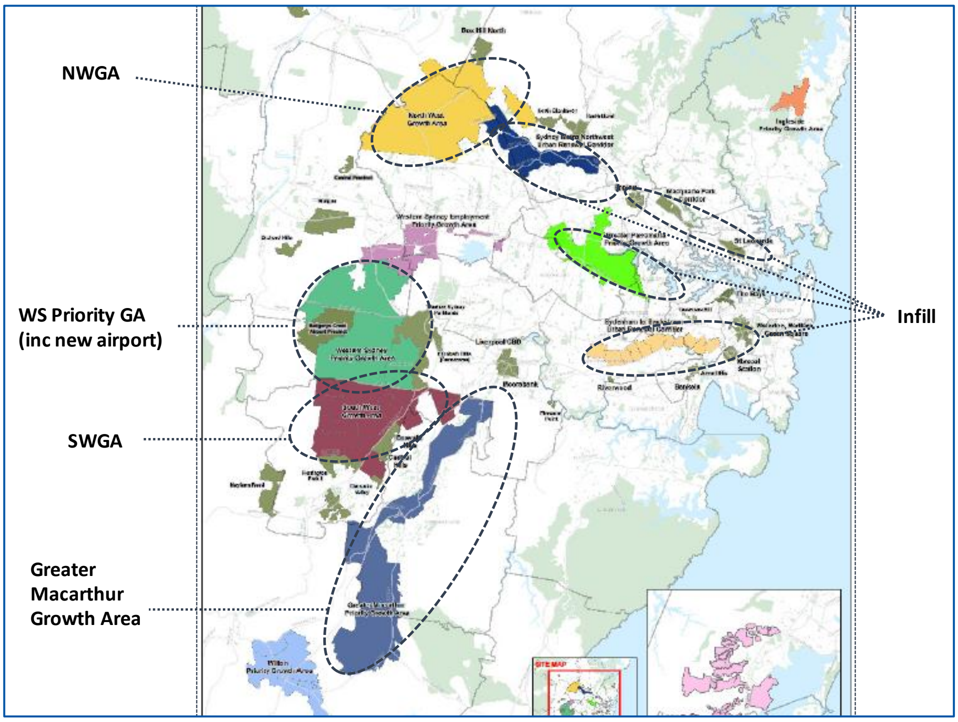


Figure 2-10 Geographic areas with growth investments

2.3.3 Network Growth investment forecast

We will invest $606.7 million in network infrastructure for growth over the period, split across several sub-programs. Table 2-12 provides a breakdown.

Table 2-12 Network growth capital expenditure forecast by growth area ($2019–20 million)

Network Growth Area	2020–21	2021–22	2022–23	2023–24	Total
North West Growth Centre	17	27	33	19	**96**
South West Growth Centre	25	45	30	29	**129**
Infill	10	19	29	55	**114**
West Dapto Urban Release Area	16	24	4	0	**44**
Network Growth External	62	26	28	27	**144**
Network Growth Other*	20	37	8	16	**80**
Total	**150**	**178**	**132**	**147**	**607**

* Includes the Macarthur Growth Area, the Western Sydney Airport Growth Area and other smaller programs.

2020–24 Program overview

Capital expenditure forecast	$606.7 million
Investment objectives	Program objectives are to provide: • new network infrastructure to facilitate the connection of around 144,000 new properties • adequate pipe and storage capacity in the wastewater system so that environmental requirements are not breached when flows increase.[77]
Scope summary	The scope includes installing water and wastewater mains as well as pumping stations, reservoirs and overflow storages. These will be delivered across: • existing growth areas, through carefully staged packages of works targeted to areas with demonstrable demand • the Greater Parramatta to Olympic Peninsula growth areas – this also includes stormwater investments and the planned upgrade of the largest pump station in the North Head network system • the new Western Sydney Airport, servicing the initial need first with staged work thereafter Completing 2.6 km of trunk drainage works in the Rouse Hill Development Area.
Efficiencies assumed	The base forecast assumes that development occurs more slowly – it includes investments for expected new dwellings up to 2021 and then smooths that investment profile over the years to 2024. The forecast was also reduced by 14% so that customers do not fund less certain projects (the same 'risk sharing' as in the 2016–20 period).

Basis of 2020–24 forecast

The network growth forecast has been developed on a geographic basis with each water supply zone and wastewater catchment generally being covered by a Growth Servicing Investment Plan (GSIP) which is developed every four or five years.

Each GSIP includes a strategic assessment of system capacity, based on hydraulic modeling which used population projections to assess the system under future demands and flow conditions. The GSIP identifies investment needs and possible solutions to create an indicative 30 year capital investment plan.

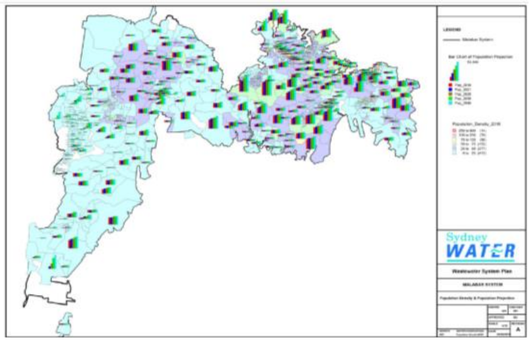
As GSIP's needed to be updated, we followed a similar process to develop the 2020–24 network growth forecast, except that the earlier years were considered in much more detail. To review all GSIP data by growth area/sub-program we:

[77] This largely means providing additional system storages to ensure the frequency of directed overflows due to growth, for systems:

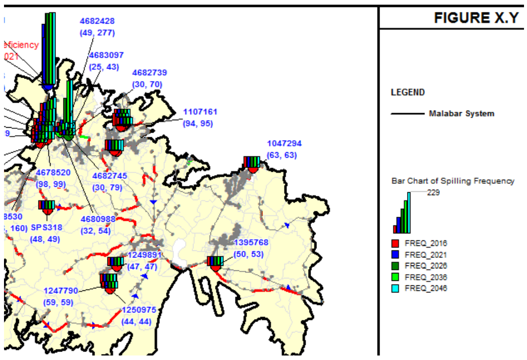
1. with a licence limit:
    a. does not exceed the licence limit OR
    b. is zero where the existing overflow frequency ≥ the licence limit.
2. with a "no deterioration" clause (ie there is no specific licence limit) maintains the 2015 system wide performance (this is the case for Bondi, Cronulla, Malabar and North Head systems)

- updated dwelling and population projections based on industry, government, and internal development intelligence
- converted these into localised new connection, wastewater flow and demand forecasts and created new input datasets for hydraulic models
- ran hydraulic models to identify future capacity constraints and any related non-compliance. For example, modelling considers if a wastewater network will comply with wet weather overflow targets in light of higher flows
- reviewed constraints against active projects and the previously identified candidate projects to find any unaddressed issues
- developed capital forecasts for new candidates based on asset class, size, length and the relevant planning cost estimate. We assigned a likelihood of progressing to each candidate (High, Medium, Low)
- to avoid capital overlaps, we reviewed candidates against all relevant plans including blueprints, regional servicing plans, active projects and previously identified candidates
- consolidated the active projects and candidates into a list of projects which make up the capital investment forecast – this excludes less likely projects in growth precincts where there is less certainty (eg due to zoning delays).[78]

Example: population density modelling



Example: wet weather overflow modeling



Cost estimates, efficiencies and risk sharing

As described in section 2.1.2, cost estimates for candidates use planning cost estimates, validated against available benchmarks such as recent procurement and delivery outcomes. Cost estimates for projects in development are more certain as they are refined based with newer information.

As already noted, we believe it is not appropriate to ask customers to fund less certain projects. In developing this forecast, we therefore adopted a conservative approach in two ways:

- We adopted the Greater Sydney Commission's 2016-36 housing targets for determining Network Growth investment – this forecast is slightly lower than more up to date forecasts.

[78] Less certain growth precincts which are not included in this forecast include Wilton New Town, Appin (North, West and East), Bingara Gorge, Sydenham to Bankstown Corridor, the Bays Precinct and Ingleside (North and South Precincts)

- Candidate projects included in the forecast are only those identified as being required through GSIP modelling up to 2021 – in effect, we are assuming that growth will be slower than the forecast.

Summary details on major network growth sub-programs are shown in Table 2-13.

Table 2-13 Major network growth sub-programs

Sub-program / Project	Scope and estimated new dwellings served
NWGA Metro North West Renewal Corridor	New water and wastewater network for 24,000 dwellings. Improve the wet weather performance of Rouse Hill wastewater system[79]
NWGA Elizabeth Macarthur Ck	New trunk drainage along Elizabeth Macarthur Ck, facilitating housing development by providing flood protection and preventing erosion
NWGA Package 4	Provide new water and wastewater network for 33,000 new dwellings
SWGA Eastern Front & Liverpool CBD	Provide new water and wastewater for 3,000 new dwellings in the Second Release Precincts and 12,000 new dwellings in the Liverpool CBD
SWGA SW Delivery	Provide new wastewater services for 8,500 new dwellings in the Lowes Creek and Marylands precincts
SWGA Western front stage 2A	Trunk drinking water network for 30,000 new dwellings and extend trunk mains to provide interim services for the Western Sydney Airport
Infill GPOP Stage 1	Water, wastewater and stormwater assets to support forecast growth of 60,000 dwellings and 70,000 jobs
Infill SP0067 replacement	Upgrade largest pump station in North Head wastewater network to service population and job growth in the Greater Parramatta Olympic Peninsula area
Infill Wastewater storage	Several wastewater storage augmentation projects to manage compliance with EPLs (no deterioration in wet weather overflows)
External Growth Developer Services[80]	The forecast includes funding for an agreement to deliver water services to Redbank / North Richmond development precinct.
Other Greenfield (includes Western Sydney Airport, Greater Macarthur and West Dapto)	Airport / Western Sydney Aerotropolis - Drinking Water Stage 1: trunk drinking water 16,000 new dwellings and 62,000 jobs Shell Cove – new wastewater network for 1,400 dwellings East Tahmoor – new wastewater network for 750 dwellings Menangle Park St. 2 – new water and wastewater for 5,000 dwellings Yallah Marshall Mount – new water and wastewater network for 4,300 dwellings Calderwood (Pack. 3) – new water and wastewater network for 4,500 dwellings.

[79] To comply with the EPL limit of 12 overflows events in 10 years

[80] In some circumstances, extensions and/or amplifications are delivered by developers under commercial agreements, while development is occurring.

2.3.4 Treatment Growth investment forecast

Due to continuing development in the western parts of Sydney and the relative lack of wastewater treatment capacity there, the treatment growth portfolio makes up the largest part of the growth forecast. We will invest $1,014.7 million in treatment infrastructure for growth over the period.

Figure 2-11 shows the locations and drivers of some of the major investments.

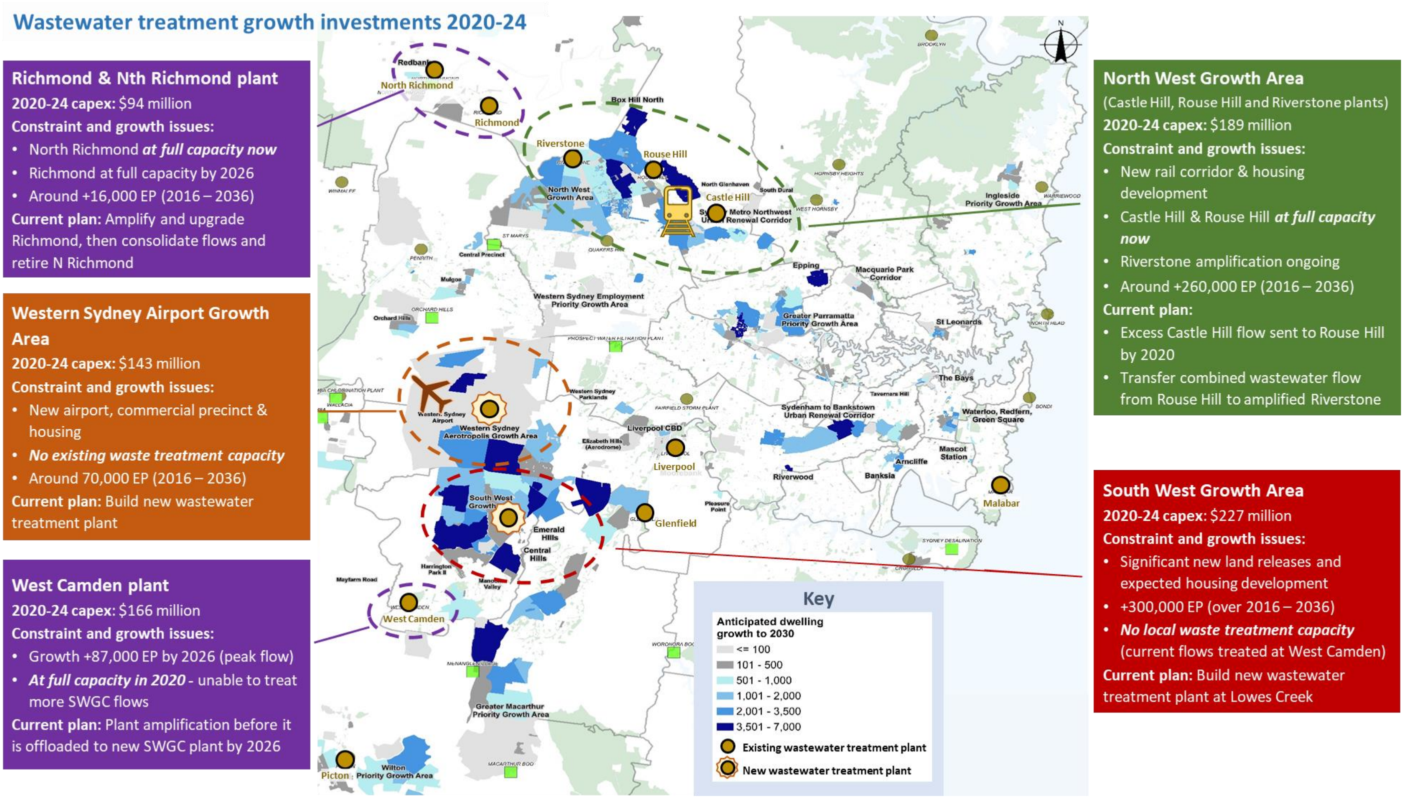


Figure 2-11 Major treatment growth investments

This full forecast split across several sub-programs as shown in Table 2-14.

Table 2-14 Treatment Growth sub-programs and projects

Treatment Growth Area	2020–21	2021–22	2022–23	2023–24	Total
North West Growth Centre (NWGA)	42	34	50	63	189
South West Growth Centre	4	12	79	132	227
Western Sydney Airport Growth Area	7	10	59	67	143
Malabar system	3	15	15	0	32
Treatment Growth Other	137	147	103	36	423
Total	**192**	**219**	**306**	**298**	**1,015**

The servicing approaches and investments which are currently included in these sub-program areas are described further below.

Program overview 2020–24

Capital expenditure forecast	$1,014.7 million
Investment objectives	Upgrade, amplify and build new water and wastewater treatment facilities and related infrastructure to service population growth whilst maintaining regulatory compliance. Where relevant, this will include meeting stricter nutrient discharge limits at the inland treatment plants.
Scope summary	The scope includes: • land purchase and the construction of new treatment plants to service the South West and Western Sydney Aerotropolis Growth Areas. The WSAGA is currently serviced by dispersed septic tanks • upgrading nine existing plants with various hydraulic and digestion capacity increases depending on the particular constraint • planning for new treatment capacity for the Greater Parramatta Olympic Peninsula.
Efficiencies assumed	The forecast was also reduced by 24% so that customers do not fund less certain projects (the same ‘risk sharing’ as in the 2016–20 period).

Basis of 2020–24 forecast

As for network growth, the treatment growth process uses the new dwellings forecast and considers the dry and wet weather flows this will create.

However, for treatment plant we need to assess both hydraulic constraints (the volume of flow the plant can accommodate) and the plant’s ability to process the load to the required standard.[81] To identify ‘load processing’ constraints, the demand is converted into ‘Equivalent Population’ (EPs) for a particular catchment.

[81] Where the plant’s biological capability needs to be able to meet the relevant EPL conditions for nutrient concentrations, for example.

An example output of a hydraulic capacity assessment during average dry weather flows is shown in Figure 2-12.

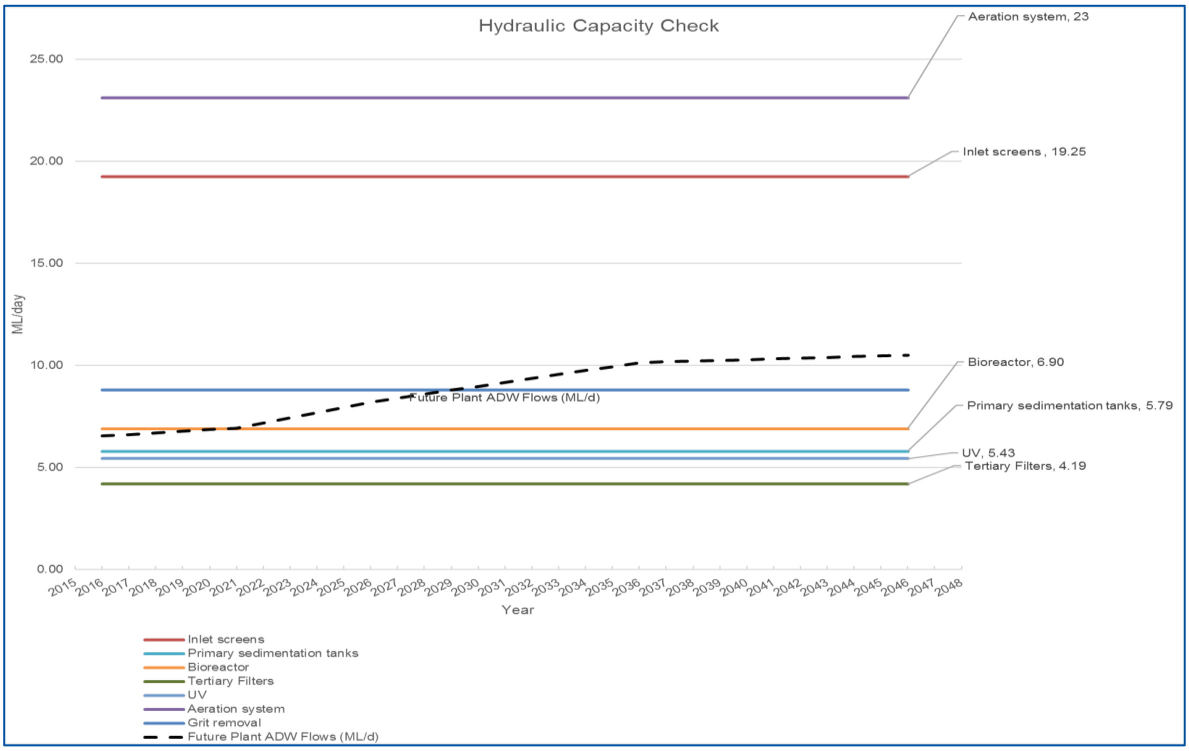


Figure 2-12 Hydraulic capacity assessment (Castle Hill)

Source: Growth Servicing Investment Plan, Castle Hill Water Recycling Plant, DRAFT (August 2018)

The analysis has assessed the hydraulic capacity of various plant components. In this case, it shows that the bioreactor reaches hydraulic capacity in 2021.

The process to develop options for addressing plant capacity constraints involves taking account of integrated catchment plans and facility blueprints. For example, these can consider options to transfer wastewater away from a constrained plant to another in the same catchment or even an adjacent one. Facility blueprints are reviewed to assess whether planned renewal work could impact servicing options. This step seeks to ensure that all feasible options can be considered in assessing the most efficient.

Efficiencies assumed / risk sharing

Treatment Growth candidate project investments were based on a combination of Department of Planning and Environment forecasts and Growth Servicing Investment Plan data (including the conversion of new dwellings and jobs into ‘equivalent population’ for the relevant areas).

To ensure the forecast represented was realistic in practice, the initial bottom up program was reprofiled based on consideration of deliverability constraints.[82] This led to some expenditure being pushed back in time.

[82] For example, taking account of our experience of the value of work that can realistically be delivered on a brownfield treatment plant site in a year.

As for network growth the capital forecast was reduced to reflect the uncertainty in the population growth forecast so that we take some of the financing risk rather than customers.

2.3.5 Summary details on major treatment growth sub-programs

Information on planned plant investments is provided for each sub-program in the sections below. The investments described reflect the latest plans for the meeting the forecast needs. They are subject to change when new information becomes available and as investments move through the planning and governance process, when more detailed option analysis takes place.

2.3.5.1 North West Growth Area

The treatment plants at Castle Hill and Rouse Hill are at capacity and cannot service additional demand and Riverstone wastewater treatment plant is already being amplified to service local growth. Growth Servicing Investment Plan has identified an efficient way of managing the needs in an integrated way. This involves staging amplifications of the three plants and transferring flows between them at different points in time to optimise the use of combined plant capacities. The forecast capital expenditure for this sub-program is $189 million.

To address growth to 2024 the current plan seeks to:

- transfer the increased inflows at Castle Hill to Rouse Hill
- transfer combined flows at Rouse Hill to the amplified Riverstone plant.

The steps are shown in Figure 2-13.

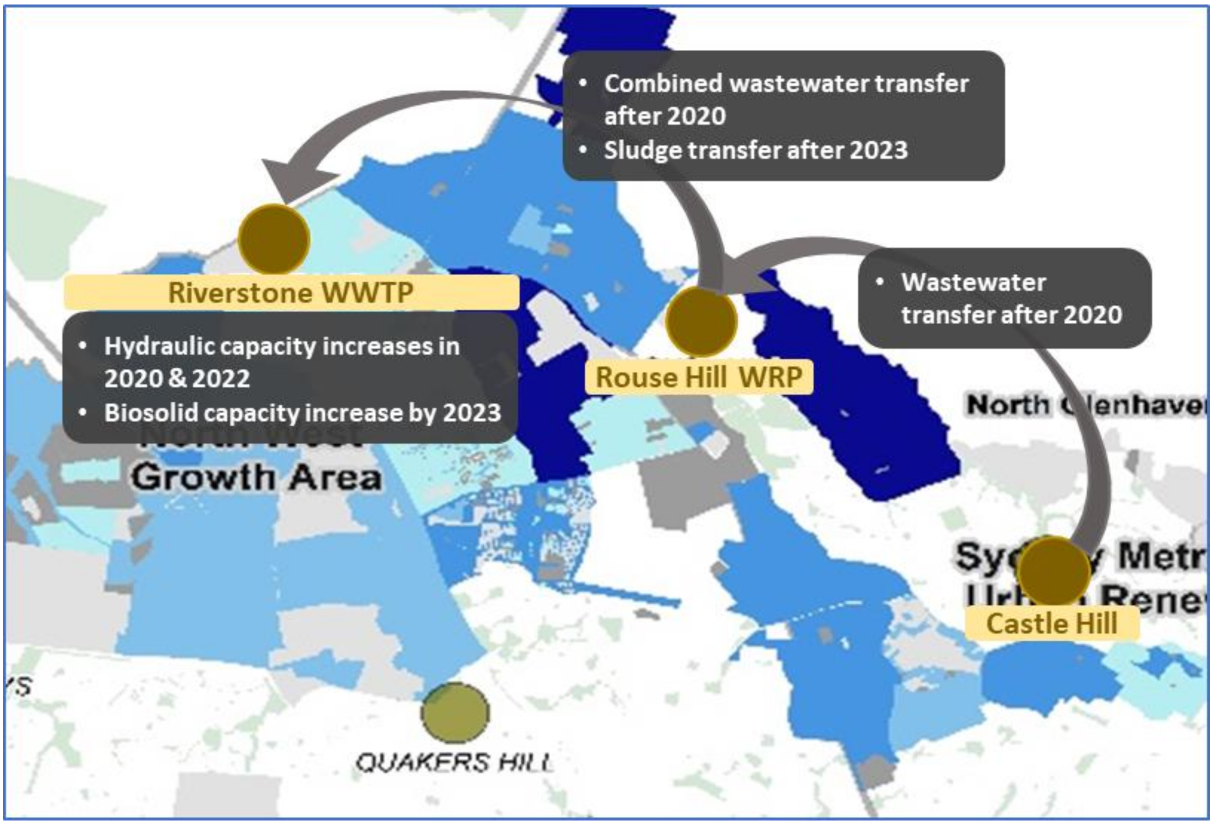


Figure 2-13 North West Growth Area transfers

To allow this to work, upgrades to existing plant are required, including re-purposing of existing assets in some cases.[83]

In the second phase, the current plan is to make the sludge transfer arrangement more permanent and consider the options for ensuring that both Rouse Hill WRP and Castle Hill WRP can meet their environmental obligations given the growth in their catchments. The plan is also to consolidate biosolid treatment at Riverstone, with expect benefits in terms of cost, odour and community disruption from trucks.

This work sets the NWGA up well to accommodate the growth occurring now but also into the future, with the area expecting an increase in demand of around 260,000 EP between 2016 and 2036.

2.3.5.2 South West Growth Area

Looking over a longer horizon, the SWGA area has projected growth of 300,000 EP by 2036. Planning therefore needs to ensure that what we do now is efficient in the longer term and while retaining flexibility.

The servicing strategy involves the construction of a new treatment plant at Lowes Creek, providing capacity to serve planned developments and to offload plants in adjacent catchments which are currently servicing earlier SWGA developments.

The two development 'fronts' are currently served via transfers to adjacent catchments as follows:

- The 'Eastern Front' precincts are currently serviced via a wastewater transfer of to the Liverpool WRP.[84] By 2024, this plant will be capacity constrained across a number of process elements.
- The 'South Western Front' is currently serviced by a temporary wastewater transfer to the West Camden WRP, although there will be insufficient capacity at that plant by 2026.

Significant further development is now expected within the 'South Western Front' and two more land releases expect to add 30,000 new dwellings.[85] Rezoning of both precincts is expected in 2019 and the first occupied dwellings are forecast in 2021. This growth will be catered for initially by the West Camden WRP. Due to capacity limits at the existing treatment plants, transfers cannot continue indefinitely and they do not provide a solution for longer term growth.

We therefore plan to build a new Lowes Creek treatment plant, to service the existing demand and the significant new land releases. In 2020–24, work will include:

- land acquisition for the new Lowes Creek greenfield treatment plant

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[83] Planned work includes: Mechanical primary amplifications at Riverstone to treat the higher combined inflows; Castle Hill will be modified to manage the increased flow and to facilitate the transfer (including repurposing the digester as a flow equalisation tank); and Rouse Hill will be modified to for local growth and to support the transfer to Riverstone (including a new raw sewage transfer line)

[84] The Eastern Front includes Austral, Leppington North and Leppington precincts

[85] South Creek West (23,000 new dwellings) and Lowes Creek/Marylands Precinct Acceleration Protocol (PAP) (7,000 new dwellings)

- planning and construction of the new 30 ML/d tertiary treatment / advanced treatment plant
- planning and construction of an effluent transfer pipeline to discharge the wastewater to the Nepean River and a brine pipeline to the Liverpool WRP for disposal to the deep ocean outfall via the Malabar system.

2.3.5.3 Western Sydney Airport Growth Area

We are planning to invest $143 million for treatment in the Western Sydney Airport Growth Area (WSGA).[86] The airport and nearby commercial and residential developments are expected to add around 80,000 jobs and 11,000 homes.

The area has no system connection and is currently serviced by dispersed septic tanks. Construction of the airport has commenced and planning is progressing as to how to service this large new demand site.[87] Once the airport is open and following further scheduled land releases, a further 12ML/d of wastewater treatment capacity will be required by 2026.[88]

The 2020–24 forecast covers plans to acquire land and plan and construct a greenfield tertiary treatment plant (with completion targeted for 2026). The plant will be constructed in way which allow additional capacity to be added later.

2.3.5.4 Malabar system

We are planning to invest $32.5 million in the Malabar system, which has significant network capacity limitations. Catchment growth has triggered a major amplification of the network including duplication of major trunk mains due to wet and dry weather capacity constraints.

2.3.5.5 Others

We are planning to invest $423 million in planning to commence and/or complete the following projects, which are subject to change and refinement as they move through planning.

Richmond and North Richmond WWTP

We forecast spending $94.1 million on plant consolidation and tertiary denitrification. Both plants are already at or close to being constrained and significant growth is forecast in the area, with an expected increase of 16,000 EP by 2030.

North Richmond is currently at capacity (for total nitrogen) and hydraulic capacity is expected to be exceeded in 2020.

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[86] This includes the Aerotropolis Core, the Northern Gateway, South Creek, Kemps Creek, North Luddenham, Badgerys Creek, Mamre Road, Rossmore and the Agribusiness precinct

[87] Airport construction is expected to create around 11,000 jobs. While these are not all on site, there will be a significant workforce based there. See: ‘Western Sydney Airport, Community update, May 2019’, https://www.wsaco.com.au/images/pdf/Community%20Update%20-%20May%202019.pdf

[88] The 12ML/d demand is based upon the Aerotropolis core area with an estimated 60,000 jobs and 8,000 homes, with hydraulic demand of 5.4 ML/d or greater; Northern Gateway with an estimated 22,500 jobs and 3,400 homes (+2.2 ML/d); and South Creek, estimated to add 500 jobs.

The Richmond plant is expected to be capacity constrained by 2026. We plan to dismantle North Richmond due to site size constraints and treat the consolidated flow at an amplified and improved the Richmond plant. This will include the addition of a denitrification processing unit.

West Camden WRP

The West Camden WRP Stage 3 upgrade from 16ML/d to 28 ML/d is forecast to cost $165.9 million. The capacity will cater for the SWGA flow until 2026, with longer term growth in the catchment expected to be catered for until 2043.

Orchard Hills WFP

We currently plan to spend $42.7 million to amplify this water filtration plant. Currently, capacity is temporarily reduced when incoming water is of poor quality. Due to demand growth there will be insufficient capacity by around 2024. To address the constraints, we will more than double the capacity with new filters, a water pumping station and rising main.[89]

Picton WRP

We plan to address an effluent disposal constraint. The current forecast for $23.1 million envisages a permanent effluent management solution which will reduce discharged nutrients, maximise re-use opportunities and improve source control. The details are dependent on PRP studies and EPA licence negotiations.

Other small treatment investments

These include:

- Penrith WWTP aerobic digester amplification ($7.4 million). This work will partly resolve the existing capacity constraint. Moderate growth is also forecast (an extra 25,000 EP by 2030) and options for meeting this will be assessed once constraints are identified.
- St Marys WWTP side stream upgrade ($10.2 million). This will mitigate a future Total Nitrogen (TN) constraint at North Head WWTP when a forecast transfer occurs.
- Bondi WWTP - completion of a biosolids storage upgrade for $3 million.
- North Head WWTP completion of the biosolids upgrade for $3.8 million. This will address reliability, odour and capacity issues as well as forecasted growth to 2043.

2.3.5.6 Contribution of mixed driver projects

Five projects which are allocated a combination of growth and existing mandatory standards drivers contribute $72.7 million to the growth forecast. All five are expected to be in progress by 2020. The projects are:

- Nepean water filtration plant amplification and raw water upgrade with a growth portion of $23.6 million. This project is briefly described in section 2.2.1.5.

- North Head WWTP Biosolids Amplification with a growth portion of $23.9 million. The project is briefly described in section 2.2.4.2.
- Cronulla WWTP upgrade, with a growth portion of $13.2 million. This project has been started to address the risk of further non-compliant filter bypass and so that its 'total nitrogen' limit is not breached. It is briefly described in sections 1.2.6.1 and 2.2.4.2.
- Quakers Hill/St Marys PARR is a multi-year project to address a range of performance and reliability issues. The growth portion is $9.9 million. The project is described in sections 1.2.6.1 and 2.2.4.2.
- Dewatering renewals has a growth portion of $2.2 million. The project is described in section 2.2.4.1.

2.4 New mandatory standards

We will invest $179.4 million on New mandatory standards. The majority of this is to meet expected new wet weather overflows requirements.

Table 2-15 Forecast capital investment for new mandatory standards ($2019–20 million)

Asset Class	2020–21	2021–22	2022–23	2023–24	Total
Wet Weather Overflow	31	32	54	55	172
Winmalee WWTP Nutrient Upgrade	7	0	0	0	7
Total	**38**	**32**	**54**	**55**	**179**

The Winmalee expenditure relates to the finalisation of the Nutrient Upgrade project from the 2016–20 period – this has been covered in Section 1.4. The Wet Weather Overflow program is described below.

2.4.1.1 Program forecast – Wet Weather Overflows

This program addresses wastewater overflows which occur in wet weather when rain inundates sewers.

Before 2020, the regulatory obligation on wet weather overflows is expected to change from a numerical limit to a risk-based credit approach. This approach will target the *impact* of wet weather overflows on the environment, rather than just a *frequency* reduction;[90] and 'credits' will be achieved on that basis. We are currently in discussion with the EPA to finalise the details of this.

The program is based on the expected level of work that can be delivered to meet the latest draft of the regulatory requirement.

[90] For example, 100 low impact overflows could have a lesser environmental impact than 50 overflows at more sensitive locations.

2020–24 Program overview

Capital expenditure forecast	$172.0 million
Investment objectives	The objectives are to meet the expected new environmental target and undertake monitoring to establish a baseline against which the investment is validated.
Scope summary	Finalising the monitoring program which detects wet weather impacts above those of urban runoff. Development of a decision framework then planning the implementation of solutions which will have the most impact. Work to reduce or remove inflow from our network, targeted in line with the impact-based approach. This is a combination of work on our assets and on private plumbing.
Efficiencies assumed	The program overall reflects a more efficient approach to dealing with overflows, compared with a traditional approach using storage or other network solutions. Even the need for storage is not removed, reducing infiltration reduces the work required on the network.

Regulatory change

This regulatory issue has been the subject of negotiation for some time. Our approach has always been to target a better environmental outcome while managing the cost for customers. Earlier in the process we commissioned an external cost benefit analysis which validated that the 'impact' approach could achieve better environmental outcomes than a 'frequency' measure.

The discussion with the EPA about setting the new standard is focused on the different levels of work which different risk levels will drive. The current draft standard is based on achieving credit points for investment which manages environmental impact (this is an offset regime).

Basis of 2020–24 forecast

The planned program scope is a combination of:

- repair of our assets such as emergency relief structures (ERSs), maintenance holes and pipes
- a new approach for source control on private properties, where this achieves the same outcome at a lower cost.

Source control is a holistic solution to reduce inflow and infiltration into the wastewater system. This involves repairs to privately owned wastewater assets where damage to these causes higher levels of inflow and infiltration into our system. This combined approach is the lowest cost solution to meet our environmental regulatory requirements. A traditional approach to achieving the same environmental outcome would cost more. We are proposing to spend $25 million across 2020–24 on source control on private properties, as part of our broader wet weather overflows program.

As supported by customers, we will recover costs of the whole program from general customer bills. For more detail see **Attachment 7: Regulatory framework and application**, section 3.3.

In 2020–24 work will focus on high risk catchments, identified through a risk-based assessment agreed with the EPA. These are Upper Parramatta, Lane Cove and Mid Parramatta and potentially Prospect Creek.

For this forecast, we have assumed that the scope of work includes:

- remediation of 57 Emergency Relief Structures (ERSs)[91]. These have been found to be a source of backflow from rivers and creeks getting *into* the sewer network and contributing to overflows elsewhere. This work aims to ensure these no longer allow water in.
- minor upgrades to more than 200 other ERSs and maintenance holes (to reduce inflow and infiltration)
- source control on private plumbing where cost effective.

The forecast assumes that the EPA sets the regulatory requirement at the level aligned to the scope above. If the standard is set more strictly (ie we are required to achieve more credit points), the cost of meeting it will significantly increase.

Cost estimates and delivery approach

Cost estimates are informed by the costs of recent work on ERSs in the Wolli Creek catchment, although ERS costs do vary with location. A direct comparison of program costs with 2016–20 costs is not applicable as the 2016–20 work was mainly focused on providing storage solutions, not targeting infiltration.

The delivery approach for the work on private properties is not new or complex and we will focus on ensuring that a high volume of small jobs can be delivered in parallel.

2.5 Discretionary Standards investment

In line with customer views, we will invest $63.5 million to deliver the Vaucluse-Diamond Bay upgrade, bringing the local wastewater system up to the same standard as the rest of Sydney.

Current regulation allows for a discharge of effluent at the location and this investment will be our first ever 'discretionary standards' project, where:

> *A 'Discretionary Standard' is a standard that is determined by the agency itself and is not externally enforceable. This could include (but is not limited to) a level of service which is higher than the level enforceable under a mandatory standard. To set a discretionary standard, agencies may need to supply additional justification, such as 'community willingness to pay' analysis.*

Engagement with customers and the community showed a strong preference to minimise untreated wastewater discharges from the three cliff-face outfalls at Vaucluse-Diamond Bay, by diverting the untreated wastewater to a treatment plant during dry weather.

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[91] These are overflow points on the wastewater network designed to allow discharge during wet weather

Table 2-16 Forecast capital investment for discretionary standards ($2019–20 million)

Program	2020–21	2021–22	2022–23	2023–24	Total
Vaucluse-Diamond Bay	12	16	20	16	64
Total	**12**	**16**	**20**	**16**	**64**

Context

The vast majority (more than 99%) of Sydney's wastewater is treated before it is released to the environment. However, wastewater collected from five suburbs is discharged untreated at the Vaucluse-Diamond Bay area from three cliff-face outfalls built between 1916 and 1936. This is allowed under the Environment Protection Licence for Bondi Wastewater Treatment System (EPL 1688). As the EPL allows this, there is no regulatory driver for change.

Any expenditure to address this discharge would be above and beyond that required and would be considered as achieving a 'discretionary standard'.

Environmental study

Up until recently there was no indication that the untreated wastewater outfalls were having any adverse impact on people or the environment. However, a more recent study found that there is both an environmental impact and a localised risk to public health.

VDB environmental study

In 2016, the EPA applied PRP 305.3 on the Bondi System's EPL, requiring a study of the impacts of these three ocean outfalls.

The study, 'Vaucluse-Diamond Bay Ocean Discharges: Pollution Study Report (PRP 305)' found that the outfalls impact the environment in the immediate vicinity of the outfalls. It found that the discharge:

- has degraded the nearby ocean floor habitat
- creates a visible pollution plume on top of the water about 75% of the time
- had potential human health impacts to around 2,000 people a year who access the water (eg spearfishing, swim events).

There was no indication of any impact on beaches.

While there is still not a formal regulatory requirement to address the issue, this is the only instance in New South Wales of untreated wastewater being discharged into the ocean every day. We therefore wanted to explore how to progress an investment under a 'discretionary standard', which led to us undertaking customer willingness to pay analysis.

Understanding our customers' views

We engaged with both the local community and the wider customer base via face-to-face forums and online surveys to understand their views on these untreated wastewater outfalls. Results were used to assess if customers preferred the current approach and no change in their bill, or whether if they were willing to pay to limit the untreated wastewater overflows and, if so, how much.

Most customers surveyed in forums and online surveys preferred diversion of the untreated wastewater to a treatment plant during dry weather. In forums, 87% of our customers preferred this option and 65% preferred it in the online surveys. Results indicated that customers were willing to pay $2.30 per year for the project, based on project cost estimates available at the time. This amount should cover the full cost of the investment[92]. See **Attachment 3 – Customer engagement,** section 2.5 for more information.

Proposed project

We are proposing to spend $63.5 million in capital expenditure to build additional pumping stations and pipes to transport wastewater from the Vaucluse-Diamond Bay area (where the outfalls are) to the Bondi wastewater treatment plant. This will stop untreated wastewater outfalls during dry weather. The outfalls will still be used on occasion during heavy rainfall, similar to emergency relief overflow points throughout our wider wastewater network.

We consider that the proposed project is consistent with our customers' preferences and their willingness to pay for the project.

2.6 Business efficiency

We will invest $121.6 million on business efficiency works to deliver future operating cost savings and efficiencies. The majority of this is for information technology and is addressed in section 3.

Table 2-17 Forecast capital investment for business efficiency programs ($2019–20 million)

Program	2020–21	2021–22	2022–23	2023–24	Total
Information technology (Digital business)	29	30	31	23	114
Energy Efficiency	1	1	1	3	8*
Total	31	31	33	27	122

* Rounding in annual values means that table total does not add to $8 million.

Outside investment in information technology, we will invest $7.7 million for ongoing energy efficiency initiatives as part of our Energy program. This aims to manage the impacts of growth on our energy consumption and costs while also mitigating against future energy price increases.

[92] That is, the sum of this in aggregate is more than the cost of the investment

3 Information Technology (Digital)

Many of the fundamentals that affect Sydney Water's options and decisions around IT digital capital investment are shifting. These technology megatrends were important factors in decisions made by our Digital Business Group in 2016–20, and influence the objectives for 2020–24:

- There has been a **continuing shift towards cloud-based IT services** within the market. This has led many businesses to gradually move from infrastructure and capital expenditure focused solutions, to software and operating expenditure-based solutions which make use of the increasing hyperscale computing infrastructure and cloud-based technologies available. For utilities and other businesses, this has led to greater reliance on software as a service (SaaS) solutions. Key investment decisions made in 2016–20 and planned for 2020–24 will allow this transition to occur more easily than with our historical systems. One element is the move from our own facilities into the Government's Tier 4 data centre, GovDC.
- There has been **increasing focus on data security and managing network critical risks**. All utilities and government services face increasing cyber security risks as they transform into digital utilities; as prominently noted in the 2017 Finkel Review of the energy sector, and recent decisions around the 5G network investment globally. IPART has also proposed new cyber security requirements in our 2019–23 Operating Licence. [93]
- **Rapid progress in 'Internet of Things' (IoT) technologies** is enabling smart city outcomes that can maintain Sydney as a globally competitive and appealing place to live and work. For water utilities, IoT has implications for monitoring and more efficiently managing physical infrastructure, as well as eventually enabling new approaches to demand management and pricing. We are considering how the potential benefits of IoT can be best harnessed through changes to our internal structures and investment decisions. This could assist in maintaining existing assets and planning better for the future.
- There has also been a significant **increase in customer expectations for digital connectivity** when interacting with service providers. Consumers have experienced the benefits of digital connectivity in government (via Service NSW), banking and, increasingly, energy – where the leading providers deliver a seamless online experience. Our customers are coming to expect the same level of capability in their interactions with us. Key investments made during 2016–20 reflect an increased focus on improving customer experience platforms.

These trends and their spending implications were not fully anticipated in our 2015 price proposal. While the core goals of the Digital Business remain the same – refreshing core systems and transitioning towards a digital utility – we have had to adapt our approach and plans to:

[93] IPART, *Review of the Sydney Water Corporation Operating Licence 2015-20 – Final Report*, April 2019, Recommendations 77 and 78.

- take best advantage of the newly available technologies
- alter our spending decisions to implement our revised strategy
- reprioritise our investments to ensure that the most important investments are made first.

This decision-making is borne out in our decision to prioritise the successful replacement of our 32-year-old billing system.

In any transition from capital infrastructure solutions to SaaS-based operating expenditure solutions there will be adjustment costs. This is illustrated in Figure 3.1 which shows that over a period of transition, there will be upward pressures on both capital and operating expenditures. Over time though, the move to an opex-based system should lead to a lower combined operating and capital expenditure profile – referred to as 'totex'. This occurs when the capital expenditure declines at a faster rate than operating costs are increasing. We are currently managing such a transition and we are looking to do so in a way that minimises the impact on our totex.

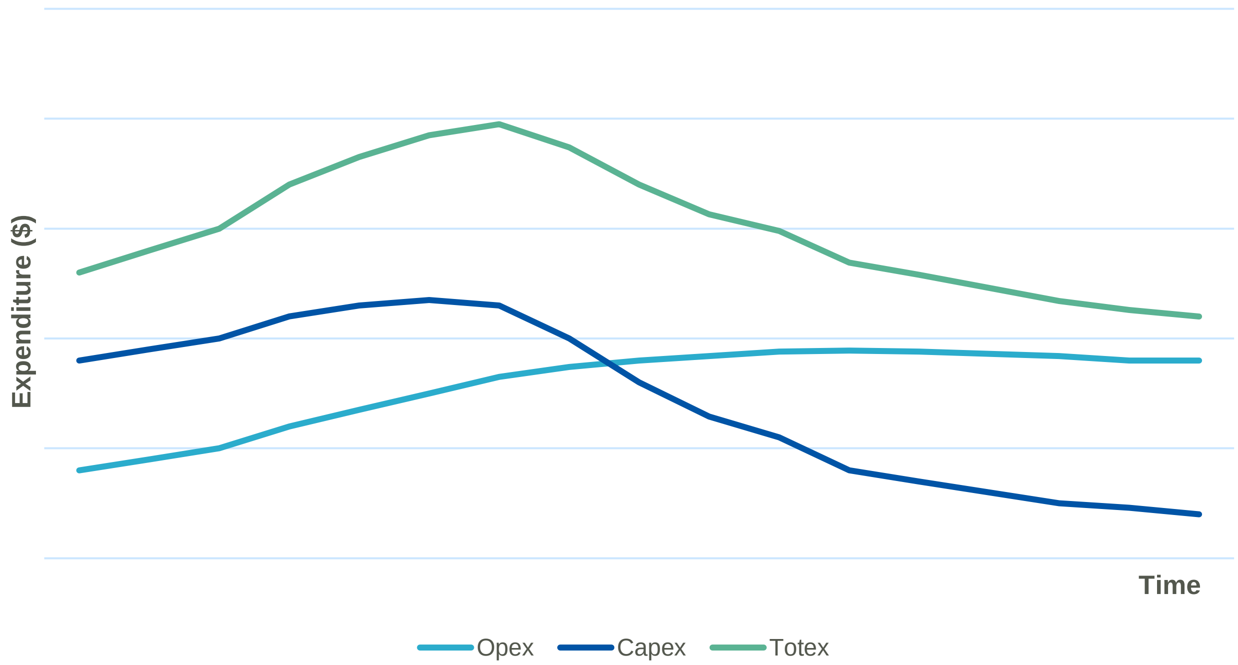

Figure 3-1 Opex, Capex and Totex implications of an IT system transition

There is increasing complexity associated with IT and digital solutions and these have a growing role in delivering our services. As for the 2015 efficiency review, we therefore propose that, IPART appoints a specialist reviewer with strong IT skills in relation to utilities to assess this expenditure.

3.1 Current price period – 2016–20

Our price proposal for 2016–2020 included two significant transformation projects. CxP to replace a 32-year-old billing system and transition associated legacy systems, and BxP to deliver an improved enterprise resource planning (ERP) platform.

While focused on CxP, we were also able to develop a cost effective and internationally recognised Customer Hub application. These achievements are important first steps to our future digital strategy and are components of our transition to a digital utility.

Digital capital expenditure in 2016–20 is shown in Table 3-1, with the variance by category illustrated in Figure 3-2.

Table 3–1 Digital business expenditure 2016–20 ($2019–20 million)

Digital Business	2016–17	2017–18	2018–19	2019–20	Total
Actual/Forecast*	74.6	117.2	125.7	93.9	**411.4**
IPART Allowance	86.6	84.1	77.2	76.1	**324.0**
Difference	**(12.1)**	**33.1**	**48.5**	**17.8**	**87.3**

Capital expenditure on Digital in 2016–20 will be $411.4 million, 27% above the $324.0 million allowance.

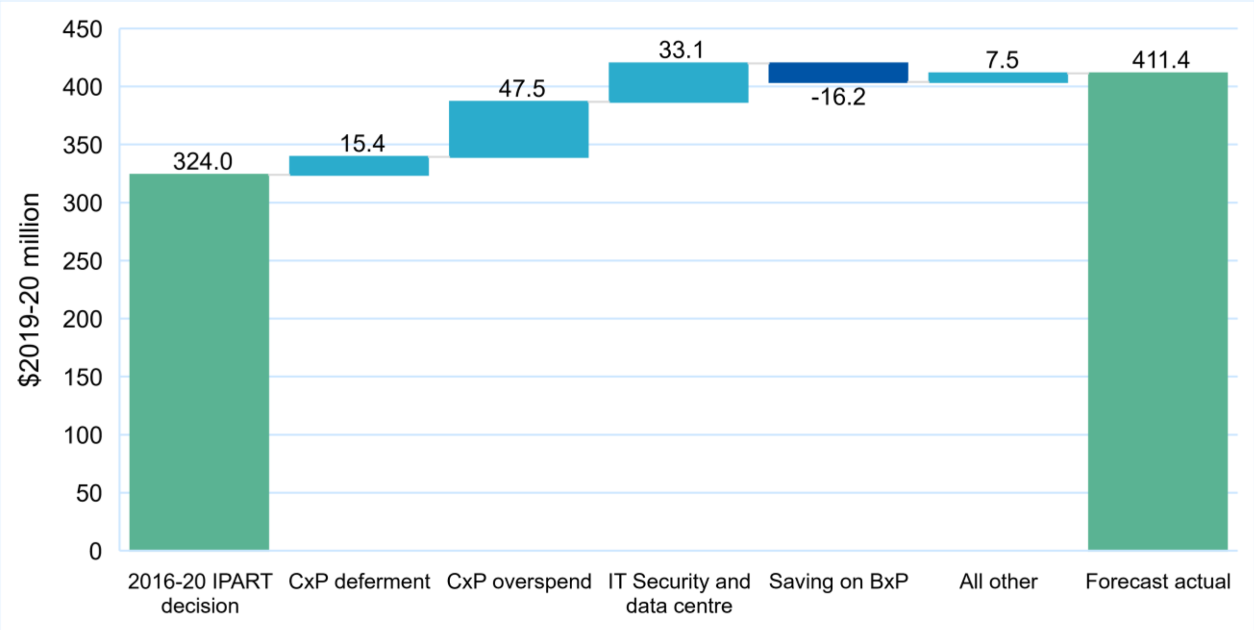

Figure 3-2 Variance from IPART allowance by type of expenditure

The overspend is mainly due to:

- $15.4 million of deferred expenditure from the 2012–16 price period, largely due to a delay in commencing the BxP and CxP programs
- a $47.5 million overspend on delivering CxP, due to the unforeseen cost of upgrading linked legacy systems
- unplanned security and data centre costs of $33.1 million, largely relating to existing data centre enhancements and transition, plus investments in information security.

These overspends were partially offset by underspends in other areas:

- BxP is expected to be $16.2 million below the allowance, due to the decision to pause the program and focus resources on the delivery of CxP
- customer investments (including developing our website and contact centre) are expected to be $33.7 million under allowance – we deferred these activities as other programs, including the successful delivery of a low-cost Customer Hub solution, generated other benefits for customers.

3.1.1 CxP and BxP

CxP and BxP are transformational programs that refresh core systems and business processes. The two programs are closely interlinked but the successful deployment of CxP was prioritised as a business-critical function.

CxP replaced our previous billing system which at over 32 years old, was identified as an increasing risk to our business. The risks related to the difficulty of responding to policy changes, the lack of skilled individuals to maintain an aging billing system, and potential challenges in sourcing replacement hardware in an emergency.

During 2017 we identified that delivering the originally planned BxP would pose significant project delivery risks for CxP. There were technical challenges to deploying both projects simultaneously as well as constraints on physical resources. We therefore decided to pause the planned BxP in late 2017 and prioritise the successful deployment of CxP. As a result, CxP went live in June 2019.

3.1.1.1 CxP

The delivery of CxP means that we are now able to replace our outdated billing system (ACCESS) with a new harmonised SAP billing and customer management system. The need to mitigate the operational risk of an aging asset and the inability to respond to emerging business needs, made the replacement of ACCESS a priority initiative.

Delivery of CxP will:

- simplify our complex application architecture
- retire a score of existing systems and satellites (including the existing billing system), and
- over time as new business processes are put into place, deliver savings through reduced support, licensing and maintenance costs.

Delivery of CxP cost $62.9 million more than anticipated, with the increase made up of:

- $15.4 million due to deferment from 2012–16
- $47.5 million of overspend in 2016–20.

The overspend relative to IPART's 2016 allowance arose because:

- The CxP business case was developed prior to the procurement process to test the market for the solution cost, with cost estimates calculated using the experience of internal staff. After the procurement process the cost increased with the inclusion of a mobilisation phase (at $2.4 million) and an increase (of $4.8 million) in the cost of the Blueprint phase for the selected supplier.

- When the program commenced it was believed that the Business Process Designs (BPDs) were 80% complete. During the Blueprint phase they were found to be only 50-60% complete, creating additional costs for scope increase and work to complete the BPDs ($4.2 million).
- additional costs for the establishment of the Project Management Office ($0.8 million).

Table 3-2 Actual expenditure on CxP, 2016–20 ($2019–20 million)

CxP	2016–20
IPART Approved	125.64
Actual Spend	188.55
Overspend	(62.91)
Timing	15.37
Budget variation	**(47.5)**

As part of the continued scoping and design of CxP, we decided to integrate CxP and BxP into a common SAP S/4HANA platform over the older ECC6 system. As the need for future upgrades will be avoided, this is expected to deliver $56.5 million of benefit in the form of avoided costs. Deploying an ERP on S/4HANA in the first place avoids the need to migrate an operational system later, when ECC6 becomes obsolete.

CxP will be one of the first ISUs deployed on the S/4HANA platform. ISU (Industry-Specific: Utilities) is SAP's industry specific solution for utilities, supporting business functions such as meter reading, meter data management, scheduling, billing, invoicing, accounting, customer service, and integration to customer relations management. It is widely used by electricity and gas utilities worldwide but has not been widely adopted yet by water utilities.

The decision to implement this system using SAP's S/4HANA business suite will assist us in taking advantage of IoT technologies. In a globally competitive market it also assists with attracting talented professionals to work with us on CxP and BxP.

3.1.1.2 BxP

Our primary achievement for BxP in 2016–20 was to implement core components of SAP ERP in advance of CxP. This was to significantly reduce integration complexity for CxP, avoid costly renewal of bespoke systems, and deliver efficiencies through process improvement, data collection and analysis. Instead of delivering the originally planned BxP, we delivered a more basic version. This allowed us to achieve improved functionality through Contingent Workforce Management and Source to Contract systems, without threatening the delivery of CxP.

The major remaining components of BxP, the new finance and procurement systems, will recommence in late 2019, with completion aimed for 2024-28. The implication is that the operating expenditure benefits originally envisaged from implementation of BxP will only begin to be realised in the next price period.

To acknowledge the fact that the initial progress on BxP did not completely add to our productive capital base, we would be willing to write off approximately $10 million of expenditure incurred in 2016–2020. This expenditure has not yet been removed from the Regulatory Asset Base as it does not meet IPART's materiality threshold.

The delivery of BxP is a key priority now that CxP has been successfully prioritised and delivered. As such, we have budgeted to invest heavily in BxP in 2019–20 and into 2020–24.

3.1.2 Digital IT security

Investments in Digital IT security relate to cyber security, maintenance of existing data centres, and the relocation to a new data centre. In 2016–20, we will transition from our existing facilities – a Tier 1 data centre – to the Tier 4 government data centre (GovDC).

Table 3-3 Actual expenditure on IT security, 2016–20 ($2019–20 million)

	2016–20	Exceeding allowance
Data Centre (Maintenance & Resilience)	21.37	10.03
Data Centre (GovDC Transition)	21.45	21.45
Information Security	7.50	1.60
Total	**50.32**	**33.09**

3.1.2.1 Information security

Information security spending totalled $7.5 million in 2016–20, reflecting a $1.6 million overspend against the IPART allowance.

Cyber security is emerging as a key concern for digital utilities. The prominence of cyber security risks for utilities (water, energy and telecommunications), is tied into an increasing convergence of information technologies (IT) and operational technologies (OT), along with the reliance on IoT and Cloud services, which represent new pathways for security threats. IPART has proposed cyber security requirements be placed on us as part of our next Operating Licence.[94] These concerns were also raised in relation to the energy infrastructure by the Independent Review into the Future Security of the National Electricity Market ('the Finkel review').[95]

Breaches of large payment systems and confidential information is an emerging issue faced by essential infrastructure services, both in Australia and globally. CERT Australia, an Australian government body focused on cyber threats to national infrastructure and systems, identifies a

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[94] IPART, *Review of the Sydney Water Corporation Operating Licence 2015-20 – Final Report*, April 2019, Recommendations 77 and 78. Available at https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/licensing-public-water-business-licence-end-of-term-review-of-operating-licence-2015-2020-sydney-water/working-papers/iparts-report-to-the-minister-sydney-water-licence-review-12-april-2019.pdf
[95] Finkel, A., Moses, K., Munro, C., Effeney, T., O'Kane, M. (2017) *Independent Review into the Future Security of the National Electricity Market,* < https://www.energy.gov.au/publications/independent-review-future-security-national-electricity-market-blueprint-future>.

strong relationship between the use of the internet and information and communication technology (ICT) in critical infrastructure delivery, and the risk and impact of a cyber security incidents.[96]

A cyber security or data breach incident at Sydney Water would have implications for public health, employee and contractor safety, as well as our reputation. While new technologies such as cloud-based customer functionality and smart metering have the potential to lead to efficiency gains and benefits for consumers, they require improvements to security in parallel.[97]

The broader water network has experienced a rise in cyber-attacks in line with increased digitalisation. For example, in Western Australia, Water Corporation's CFO observes 1.2 million connection attempts to the Water Corporation per day, with 7,000 of these malicious. A recent attempt overseas saw hackers breach a water utility's control system and alter chemical systems for treatment. Breaches like these have large negative impacts including physical damage and the potential for loss of life.[98]

Given the recent increased importance placed on managing cyber security risks, we have also reprioritised our expenditure since the budgeted numbers for 2016–20 and 2020–24 were finalised for our proposal. In recognition of the more immediate need to address cyber security issues, we have decided to bring forward expenditure of $4.2m from the 2020–24 price period (2021-23) to 2019–20.

3.1.2.2 Data centre relocation to GovDC

The largest component of IT security spending in 2016–20, and a key initiative to ensure ongoing cyber security, is the decision to transition data storage from our current data centres to a government data centre ('GovDC').

NSW Government policy requires all NSW Government agencies (except State Owned Corporations) to relocate remaining data centre and computer room infrastructure into GovDC and decommission specialist infrastructure by mid-2019. While not directly applicable to us as a State-Owned Corporation, we acknowledged the merits of the reform and committed to hosting our strategic CxP SAP platform at GovDC, as four of the five data centre migration triggers listed in the Data Centre Reform Circular[99] were applicable to our existing arrangements:

- the lease on an existing building or data centre lease is ending
- there is a major equipment/infrastructure refresh due
- there is a major software refresh due
- the current data centre is too unreliable or inefficient for future needs.

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[96] CERT Australia, *Critical infrastructure & big business* (2019) <https://www.cert.gov.au/critical-infrastructure-big-business>.
[97] WaterSource, 'Water utilities set to tackle cyber security', *Water source* (online), 28 November 2016 <https://watersource.awa.asn.au/business/assets-and-operations/water-utilities-set-to-tackle-cyber-security/>.
[98] Thea Cowle, 'Caught in the network', *The Australian Water Association Magazine* (online), November 2016 <https://issuu.com/australianwater/docs/current_november_2016/1?ff&e=32264009/57258143>.
[99] NSW Department of Finance, Services & Innovation, *Data Centre Reform* (2019) <https://arp.nsw.gov.au/dfsi-2016-01-data-centre-reform>.

Most notably, the Greater Sydney Commission has requested we surrender the lease of our Homebush Data Centre site, as part of their development of the Central River City. The move from our own Tier 1 data centres to GovDC's data centre is also central to enhancing IT security at Sydney Water.

Although this move has contributed to a large unplanned expense, the GovDC data centre has features which would have been prohibitively costly to retrofit into our own data centres. There is therefore a large avoided capital cost that is associated with undertaking this move and avoiding an expensive upgrade in our infrastructure.

GovDC provides improved technical and operational standards, such as:

- enhanced uptime – GovDC's Tier 4 data centre operates 24/7, achieving 100% uptime since 2013
- resilience – data storage is paired across centres in Silverwater and Wollongong
- security – centres are protected by a range of physical security measures
- adaptable storage – GovDC's centre supports the new approach to buying and using ICT services "on-tap", with the ability to scale up storage as required
- environmental efficiency – GovDC's centres hold a 4.5 star energy rating in the national standard for data centres (NABERS).

In total, $21.5 million will be spent on the transition to GovDC and establishing our enterprise SAP capability in 2016–20. This full amount is considered an overspend against the IPART allowance, as the need to transition to a new data centre was not planned or proposed for 2016–20.

3.1.2.3 Existing data centre maintenance and resilience

As a result of increased IT security risks, we made a number of large unplanned investments to address cyber security and transition to best practice data centre security, as recommended by the NSW Government.

There will be a period where we will incur costs relating to the maintenance and upkeep of our existing centres, alongside the costs of the GovDC transition. We are currently in this transition period, which is expected to continue well into 2020-24. In 2016–20, $21.37 million was spent on the maintenance of our current Tier 1 data centres, reflecting an additional $10 million over the IPART allowance.

3.1.3 Customer investments

During 2016-20, we decided to reduce our expenditure on customer investments such as developing our website and contact centre. Delivering CxP was our key strategic priority, and this decision was necessary to manage some of the overspend in the revised CxP business case.

Offsetting this reduction was the development of projects including:

- **Skills Based Routing:** to enable first call resolution, reduced call transferring and lower call waiting time. This investment centres on improving customer experience and the capacity of the Contact Centre to manage increased call complexity and volumes. The project will be a key enabler for other customer-focused initiatives such as the Customer Operations Hub and Multi-Function Business Centre (also known as Business Connect), and a key success factor in the deployment of CxP.

- **Customer Centre of Excellence (CCoE):** to deliver tangible customer benefits, enable improved understanding of customer expectations and need, as well as to build a 'customer centric' capability for Sydney Water.
- **Home Owner's Onboarding:** designed to improve the customer experience of the change-of-home ownership process.

Other projects also included Customer Experience (Cx) Measurement, development of the contact centre and the Customer Hub.

The Customer Hub is a key initiative in our move from a traditional asset-centric philosophy ('fix the asset to fix the problem') toward a customer centric philosophy (aiming to minimise the impacts of service changes on customers). It was primarily established to support customers through their 'troubleshoot' journey, by providing a highly valued customer experience.

The process aims to provide proactive communications and case management for customers, and seeks to act on customer feedback in real time. Following the success of a pilot in Western Sydney, the Customer Hub now services the entire customer base of five million people and is co-located with the Sydney Operations Centre. As part of this co-location process, three separate existing teams that address services faults were combined under a single point of leadership - the Customer Hub Manager.

This restructure and relocation has a range of benefits for the provision of services, including:

- enhanced collaboration and hand-over to solve customer issues
- fast and accurate communication between previously siloed functions
- collective situational awareness with coordinated response
- a single cultural identity for customer relations
- integrated leadership and strategic direction.

The Customer Hub has delivered significant quantifiable benefits to customer experience:

- 140,000 properties had water interruptions avoided or mitigated, which equates to an approximate 30% reduction in customer impact.
- Over 80% of customers who have interacted with the Customer Hub indicated that they were satisfied or extremely satisfied that they were kept informed about progress on faults.
- More than $1 million has been avoided in rebate costs as a result of these avoided incidents.

The Hub has also been recognised by industry for its innovative customer-centric approach.

The Customer Hub took out the Global Water Award for 2019 Smart Water Project of the Year, following on from its recognition as the Australian 2019 Digital Utility of the Year – Water. This award recognised the Customer Hub as the project that most effectively harnessed digital solutions to achieve excellence in water or wastewater management in 2018. The Hub was also named 'Best NSW Government initiative' in the Committee for Sydney's 2018 Smart City Awards, in recognition of its use of IoT technologies to improve water infrastructure.

Other minor enhancements have been made across the board, which have already led to quantifiable benefits in customer experience:

- a newly introduced banner on our 'Water supply & service updates' webpage, to inform customers about widespread impacts crews are in the process of addressing. This has already led to a noticeable reduction in the number of 'no water' calls
- the customer notification process for completed maintenance work was streamlined
- the implementation of a new Voice of Customer measurement dashboard reduces reporting effort and allows customer feedback to be analysed at a staff-member specific level.

Overall, even while delivering a range of beneficial improvements for customers, while having reducing customer spending in net by $33.7 million compared to the allowance.

3.1.4 Expenditure comparison by capital portfolios

To align with classifications from our 2015 price proposal and internal business management practices – so that capital costs can be compared between periods – we have also categorised the expenditure above on the basis of Digital Businesses' capital portfolios.

The Digital Businesses' capital portfolios include:

- **Foundation systems**: foundational infrastructure technologies (eg end user devices, servers, networks and telephony) and enterprise services (eg connectivity/integration, security and collaboration). The new GovDC facilities are included in the foundational systems and they make up the largest proportion of the cost in the 2016–20 period.
- **Systems of record**: these systems and associated services support common business capabilities such as finance, human capital management, payroll, procurement, and customer management and Enterprise Asset Management systems that all businesses require to operate effectively. We continue to consolidate these business capabilities onto a unified SAP implementation, adopting standard processes. BxP and CxP make up the largest proportion of these costs in 2016–20.
- **Systems of differentiation**: these systems and associated services support business capabilities to deliver enhanced customer service through accurate and timely information. In 2016-20, key investments in this category include Customer Hub, as well as developer and drawing management tools and field services management technologies.

The results in Table 3-4 compare expenditure over 2016-20.

Table 3-4 Expenditure by portfolio, 2016–20 (2019–20 million)

	2016–17	2017–18	2018–19	2019–2020	Total
Foundation Systems	13.5	24.1	29.1	12.3	**79.0**
Systems of Record	40.0	72.5	77.0	78.1	**267.6**
Systems of Differentiation	21.1	20.6	19.6	3.5	**64.8**
Total	**74.6**	**117.2**	**125.7**	**93.9**	**411.4**

3.2 Forecast for 2020–24

For 2020–24 we propose IT capital expenditure of $374.7 million (Table 3-5), focused on:

- renewing our digital assets (70%)
- delivering enhanced services and business efficiency (30%).

This is 15.6% higher than the 2016–20 allowance and 9.6% lower than expected expenditure in 2016–20.

Table 3-5 Forecast digital business expenditure by asset portfolio 2020–24 ($2019–20 million)

	2020–21	2021–22	2022–23	2023–24	Total
Renewal	29.22	29.87	31.43	23.38	**113.90**
Enhancement	96.52	72.79	45.56	45.94	**260.81**
Total	**125.74**	**102.66**	**77.00**	**69.32**	**374.71**

The increase is the result of our transition away from our historical core systems, and the larger role that digital will play as we transition towards a digital utility. Deploying new, contemporary systems will require an initial capital investment, but result in a shift of expenditure from capital to operating expenditure in the long run.

We anticipate that the combination of operating and capital expenditure (totex) will decrease over the longer term, with the long-term goal being to operate systems which are more reliable and secure, and less reliant on ongoing capital expenditure. However, Figure 3-1 shows there will be a period of transition involving adjustment costs and an increase in totex. This will need to take place over 2020–24. The prudency of our move from our historical core systems and into contemporary systems has been internally tested through the development of detailed business cases for these major projects.

These business cases recognised that there will be an interim increase in operating expenditure to maintain historical systems over the coming regulatory period, while they are being decommissioned and replacement systems are being developed. This is represented in the overall increase in IT totex expected in the 2020–24 period.

3.2.1 Digital investment environment

While our upcoming investment is still focused on refreshing our historical core systems, a range of other factors also affect our investment decisions during 2020–24, as well as where we are seeking to position ourselves strategically by 2024. The major trends include:

- we need to maintain and enhance our resilience to physical IT security and cyber security threats, given the increased digitalisation of our operations and processes. We must ensure customers' privacy and protect their critical information.
- we now have an opportunity to fully and successfully deliver BxP which, by completing our ERM, will enable operational simplification in the future. This will help to control our operating expenditure growth, while ensuring that we meet our legislative requirements.
- as digital connectivity becomes commonplace in the utility sector, our customers will expect from us the same capability to deliver a high quality service flexibly adapted to their requirements. This may include more tailored product choices; measuring, communication and transparency on our performance in meeting their needs; and simplified interactions with our core systems.

As the NSW Government provides a clearer picture of its vision for integrated developments in urban areas, we must also focus further on how our investments are part of a larger contribution to the future development of Sydney as a smart city.

We can make a significant contribution to the vision of agencies such as the Greater Sydney Commission and Infrastructure NSW, for a city that operates on digitally-enabled infrastructure. Our contribution to information sharing, cyber security and urban amenity will help ensure Sydney remains globally competitive. There is also a greater role for us in using our information as an asset to assist in broader government decision-making.

There are emerging technologies, such as internet enabled digital sensors that are declining in price and increasing in physical resilience. These technologies are now at the point where they will provide an opportunity for us to do business differently and manage our assets far more efficiently. This will eventually allow for the transition from reactive to predictive interventions. This is particularly important in light of the current challenges we have faced with the performance of our water and wastewater networks (highlighted in **Attachment 2: Service levels and performance** and **Attachment 10: Operating expenditure**).

3.2.2 Major investment themes in the 2020–24 period

3.2.2.1 Completing BxP

In 2020–24 we plan to invest $19 million in the completion of BxP, which was paused in 2017 to de-risk the delivery of CxP to replace the 32-year-old ACCESS billing system.

BxP was assumed to be a foundation requirement for CxP. Instead it has been so far delivered as a minimum viable product that enabled CxP to function independently. This version of BxP now requires completion. In order to fully deliver an ERP that can realise the benefits for the business, there will need to be the addition of new finance and procurement systems over 2020–24.

An important efficiency that we are focused on has been using off-the-shelf products. This significantly reduces implementation costs relative to a customised solution. It also enables better project planning and decision-making. We are also collaborating closely with SAP, which means we have access to the highest quality implementation team, thus minimising project delivery risks.

Delivery of BxP is expected to be completed in 2020–24. The delay in implementing BxP means that the direct benefit of lower operating costs considered in the previous regulatory decision has not yet been realised and will only be partially realised by 2024.

There is still an evolving business case for BxP. The $19 million of capital expenditure budgeted for BxP in our proposal for 2020–24, was our best estimate at the time of completing our budgeting process. Subsequently, our business case has evolved considerably. While not quite finalised, we now believe there is likely to be a considerable increase in the required expenditure over 2020–24.

3.2.2.2 Cyber security and data centres

In 2020–24 we have allocated $104.4 million to maintaining existing essential data centre infrastructure and security as well as major enhancements – investing in new cyber security measures, relocating data centres and improving resilience (see Table 3-6).

Continuing the relocation of our Homebush and Parramatta Data Centres to the GovDC sites will remain a prominent project for the Digital Business team in 2020–24. Our allocation of $55.4 million reflects our strategic investment in physical IT security and cyber security. Although not mandatory under the new government procurement policy, we consider that it delivers significant benefits in terms of both efficiency in expenditure and – more importantly – resilience and security.

One of the four Department of Finance, Services and Innovation DC migration key triggers that applied to us was the lease on an existing data centre coming to an end. This was crucial to our decision-making, as the Greater Sydney Commission (GSC) have requested we surrender the lease of our Homebush Data Centre site, as part of their development of the Central River City. We expect that this lease will end during 2020–24.

This situation means we need to invest in a new data centre, regardless of other factors influencing the transition to GovDC. GovDC was assessed as the lowest cost option, it met our requirements in terms of physical and cyber security of our digital assets, as well as providing the best disaster recovery and resilience uplift.

Table 3-6 Forecast expenditure on cyber security and data centre, 2020–24 ($2019–20 million)

	2020–21	2021–22	2022–23	2023–24	Total
Essential Infrastructure & Security Technology Maintenance	2.7	3.1	3.1	3.1	**11.8**
Essential Infrastructure & Security Technology New	1.9	-	-	-	**1.9**
Cyber & Security New - in progress	6.9	5.8	-	-	**12.7**
Cyber & Security New - upcoming	2.4	3.0	2.9	1.8	**10.1**
Datacentre Relocation	34.9	20.5	-	-	**55.4**
Disaster Resilience Uplift	7.3	5.2	-	-	**12.5**
Total	**56.1**	**37.5**	**5.9**	**4.8**	**104.4**

In our budgeting process to forecast capital expenditure on the Data Centre move, we subsequently recognised that some savings were not captured. In particular, there are savings or avoided capital costs associated with not having to scope a number of applications or make ongoing investment in our existing data centres. In total we estimate the reduction in capital expenditure over 2020–24 that is not currently budgeted for, could be in the order of $15-30 million.

Further, as noted in Section 3.1.2.2, the GovDC data centre has features which would have been prohibitively costly to retrofit into our own data centres. There is therefore a significant avoided cost associated with undertaking this move rather than upgrading our existing Data Centres.

3.2.2.3 Becoming a digital utility – smaller projects with customer focus

We seek to position ourselves as an effective digital utility by 2024. This requires that we build our capability as a digitally connected utility which involves investing $34.3 million in further developing our analytics capability and enabling innovation and mobility (see Table 3-7).

We are also planning to invest $56.4 million in a range of customer facing systems such as customer engagement, customer hub and our developer systems. By 2024, these preparatory steps mean we will be poised to contribute to the government's vision of digital smart cities.

Moving towards a digital utility requires a large number of relatively small projects, when compared to the refresh of our historical core systems, such as:

- continuing to consolidate and simplify our Systems of Record technology landscape, including an increase in use of cloud and SaaS options
- enabling customer and business self-service

- balancing the convergence of IT and OT so that information is accessible, with the operational technology controls continuing to be securely managed
- integrating existing data sources such as customer information, network information and operational plans, to enhance data analytics processes.

One particular investment to achieve our digital utility goal is the effort to continually enhance the capabilities of the Customer Hub. This project involves piloting and implementing IoT technologies for real time monitoring and control of water and wastewater systems.

As we proceed with these investments, we need to evaluate and quantify the benefits of adopting IoT technologies. For example, our network already has over one million points of digital monitoring, but it is still not possible for us to predict a main leak with adequate reliability. Moving towards the effective adoption of IoT technologies will likely see the points of monitoring increase to over 10 million in the longer run. The benefits of this increase, and their contribution to our network and, ultimately, Sydney's smart cities vision, will depend on our ability to understand, exploit and react to the data being generated.

What is clear is that the timing of these investments is crucial to develop our ongoing capabilities. If significant investment is not made in the coming two price periods, we will be significantly underperforming in terms of customer and shareholder expectations by 2028.

Table 3-7 Forecast expenditure on digital utility measures for 2020–24 ($2019–20million)

	2020–21	2021–22	2022–23	2023–24	Total
Analytics and Information Management (Foundation)	4.6	4.6	3.6	4.6	**17.3**
Analytics and Information Management (Consumption)	1.5	0.8	1.1	1.1	4.6
Digital Innovation	0.5	0.5	0.5	0.5	**2.1**
Mobility	1.2	3.0	2.8	3.4	**10.4**
Total	**7.8**	**8.8**	**8.0**	**9.7**	**34.3**

3.2.3 Expenditure comparison by capital portfolios

We have categorised the forecast expenditure for the next price period on the basis of the Digital Business' capital portfolios – foundation systems, systems of record and systems of differentiation.

Current and future expenditure is outlined in Table 3-8 below.

Table 3-8 Forecast expenditure by digital business capital portfolios, 2020–24 ($2019–20 million)

	2020–21	2021–22	2022–23	2023–24	Total
Foundation Systems	61.1	41.5	13.4	30.4	**146.3**
Systems of Record	19.0	22.7	33.9	9.2	**84.8**
Systems of Differentiation	45.7	38.5	29.7	29.8	**143.6**
Total	**125.7**	**102.7**	**77.0**	**69.3**	**374.7**

The expected trends in spending in each portfolio are as follows:

- **Foundation systems:** the biggest driver of planned spending is the relocation to GovDC ($55.4 million, representing 38% of the foundation systems spend in the future period).[100] Other priorities include cyber security measures ($22.8 million, 16% of the total planned for foundation systems). These costs largely relate to the first half of the period, from 2020-22. From 2022-24, we expect to spend more on maintaining essential application and information technologies ($33.2 million, with two thirds of this amount planned for 2023–24). Relatively consistent spending across the period is expected to maintain and develop essential infrastructure and security technologies ($13.7 million in total) and user technologies ($11.8 million in total).
- **Systems of record**: BxP is expected to require significant investment in the first half of the price period.[101] As it nears completion, spending will then focus on delivering the Enterprise Asset Management system, to the value of $38.14 million, with 60% of this expenditure planned for 2022–23. We also expect to spend $20.4 million on spatial mapping technologies across the period.
- **Systems of differentiation** – there are a range of smaller spending projects in this category. Key investment priorities are customer engagement ($23 million, 16% of the portfolio spend), and the continued development of Customer Hub ($17 million, 12% of the portfolio). Other investment is planned to develop modelling capabilities ($20 million), analytics and information management ($21 million) and developer technologies ($16 million).

[100] As noted in the section though, there are some avoided capital costs associated with the migration that were not taken into account in the budgeting process that we have subsequently recognised should be considered. These would lead to a reduction in this figure.

[101] As noted earlier there is an expectation now subsequent to the budgeting process, that the budgeted $19m capital expenditure for BxP for 2020-24 will be considerably higher.

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Attachment 10
Operating expenditure

Price proposal 2020–24

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Operating expenditure

Key messages

- Operating expenditure has increased beyond our IPART allowance over 2016–20. Much of this has been driven by prolonged dry weather and higher than anticipated growth. This expenditure reflects our commitment to restoring environmental performance to a much better level, and to addressing leaks and breaks in our water network.
- We expect to overspend our 2016–20 total operating expenditure allowance of $5.3 billion by $254 million or 4.8%, due to:
    - a $114 million increase in bulk water costs (largely due to starting up Sydney Desalination Plant)
    - a $140 million increase in core operating expenditure, where $47 million of efficiency gains have been offset by factors including drought in 2018–19 ($46 million), higher electricity prices ($46 million), increased digital requirements, such as cyber security ($30 million) and the need to address declining environmental performance outcomes ($28 million).
- Our operating expenditure assumes average weather conditions. We expect to spend more if weather makes it harder to maintain our operational performance. We do not factor in costs of water restrictions. If drought continues, it is likely to result in additional costs of $78 million above our agreed budget for 2019–20.
- Whether drought continues or not, many key drivers of higher expenditure in 2016–20, especially those in 2019–20, are likely to endure. There is a need for higher baseline expenditure. Much of this relates to new higher fixed costs, but it also highlights that we are no longer able to entirely absorb the costs of growth. Population growth has averaged 1.7% a year in 2016–20, well above the historic trend.
- We are proposing a transitional re-baselining of our operating costs for 2020–24. We propose total operating expenditure of $5.4 billion (2.4% below 2016–20). That is around 65% of our total expenditure, and just over half our allowed revenue.
- Core operating expenditure (excluding bulk water purchases) is around 70% of this or $3.9 billion (2.1% above 2016–20). About half of this is market-tested and not controllable in the short term – including contractors, materials, Build Own Operate water filtration, property and electricity.
- We are targeting efficiencies of $83 million over 2020–24, a 0.5% a year productivity improvement.

- The allowance we have proposed is challenging. Our actual expenditure requirements may well turn out to be higher. We cannot be sure of the cost to return our wastewater network to a more sustainable performance level. If drought persists and dam levels are significantly lower, we will spend more to address drought and meet our water conservation obligations.
- However, new challenges have emerged, due to factors such as drought, significantly higher electricity prices, higher growth, and new Information Technology (IT) security requirements. These have introduced unexpected costs, particularly in 2018–20 – resulting in core operating expenditure $140 million above the IPART allowance over 2016–20.
- In the previous (2012–16) IPART Determination, we were able to decrease operating expenditure while increasing customer satisfaction and maintaining compliance with our environmental and Operating Licence requirements.
- Many of the cost pressures faced in the second half of the current period are expected to endure, even without drought. Therefore, we propose a re-baselining of our core operating expenditure allowance in 2020–24, to $79 million or 2.1% above our 2016–20 expenditure. This higher level is required despite our commitment to achieve further efficiencies of $83 million over the next period.

1. Operating expenditure 2016–24

1.1 Operating expenditure – key terms

Please note the following terminology:

- **Total regulatory operating expenditure** – the total operating expenditure after deducting a small amount for unregulated items. Total operating expenditure is allocated to water, wastewater, stormwater and miscellaneous services (such as trade waste and ancillary and miscellaneous customer services). The forecast operating and capital costs form the basis of the revenue requirement and price for each of our regulated services.
- **Core regulatory operating expenditure** – the operating expenditure that IPART will consider as part of its efficiency review. It captures the day-to-day operating, maintenance and administrative costs of delivering water, wastewater and stormwater services, such as labour, materials, contractors and energy. It includes bulk water costs associated with privately owned and operated water filtration plants, but excludes bulk water purchases from WaterNSW and Sydney Desalination Plant Pty Limited (SDP). These non-core operating expenditures are uncontrollable and each subject to a separate IPART Determination. The costs are passed through to our customers, and over 2016–20 they will make up over 30% of our total regulatory operating costs.

  We have greater control over some core operating expenditure, but not all. The unit costs for electricity, labour, contractors and materials partly depend on market conditions. For example, recent structural changes in the energy market have significantly increased electricity prices over 2016–20. Irrespective of how well we manage our electricity usage and contracts, we have still faced increased costs.

Figure 1-1 shows how our total and core operating expenditure filters into our services.

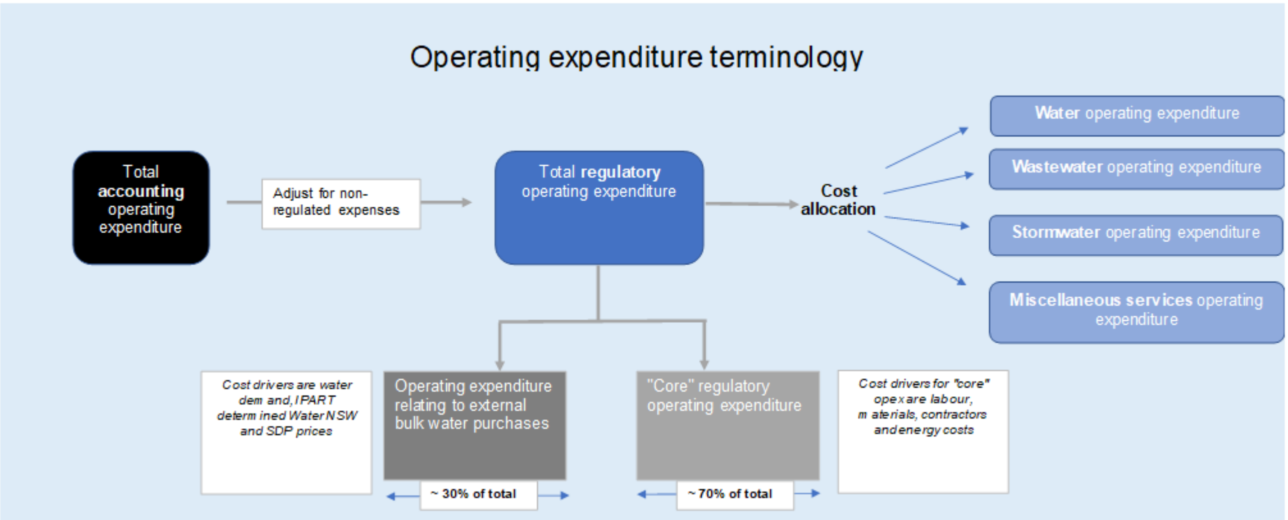


Figure 1-1 Operating expenditure terminology and components

1.1.1 Approach to estimating operating expenditure

We have an annual budgeting process to determine total operating expenditure based on a rolling five-year budgeting approach. This is done as part of the annual Statement of Corporate Intent (SCI) submitted each year to meet NSW Treasury shareholder requirements. The budgeting approach is done from October each year until March the following year. We derived our estimates for the period 2019–20 to 2020–24 between October 2018 and March 2019.

Key elements of the budgeting process for the SCI include:

- All business units use the same overarching assumptions to guide them and all are aware of how they should consider corporate objectives. These include labour costs, weather assumptions, growth projections and regulatory requirements.
- We develop budgets with reference to existing operational plans, including asset condition and maintenance plans, service delivery plans, capital investment plans and risk assessments.
- We challenge budgets for their efficiency and consistency at two separate points:
    1. when group budgets are consolidated we undertake a heat mapping process using a risk-based framework, to categorise expenditure as low, medium or high risk
    2. when the Executive does a cross-divisional review.
- After approval by the Executive, the Board considers and approves forecasts, which are finally endorsed by the Shareholders and their representative, NSW Treasury.

This process also provides the operating expenditure forecasts for our pricing proposal to IPART covering 2019–20 and the 2020–24 regulatory period.

All unregulated revenue and costs are ring-fenced from our regulated business. Some items are treated differently for the purposes of regulatory accounting. This ensures our prices and revenue targets are based on the cost of supplying the regulated products and services.

The 2015 Atkins-Cardno Efficiency Review noted that our governance structure for developing and reviewing the budget is highly advanced and compares favourably with other companies.[1] Our process is summarised in Figure 1-2 and described below.

1.1.2 Business unit budgeting

Business units do a bottom-up budget of operating expenditure based on their expected activities over the year. These budgets are based on P50 estimates, ie. where there is an equal probability of the cost being an under or over forecast.

An implication of the P50 estimate is that the costs of extraordinary events like prolonged drought, are not included. Therefore, drought conditions and associated costs, represent an unanticipated cost increase.

[1] Atkins-Cardno, *Sydney Water Corporation – Expenditure Review, Final Report*, December 2015, a report prepared for IPART, p. 76.

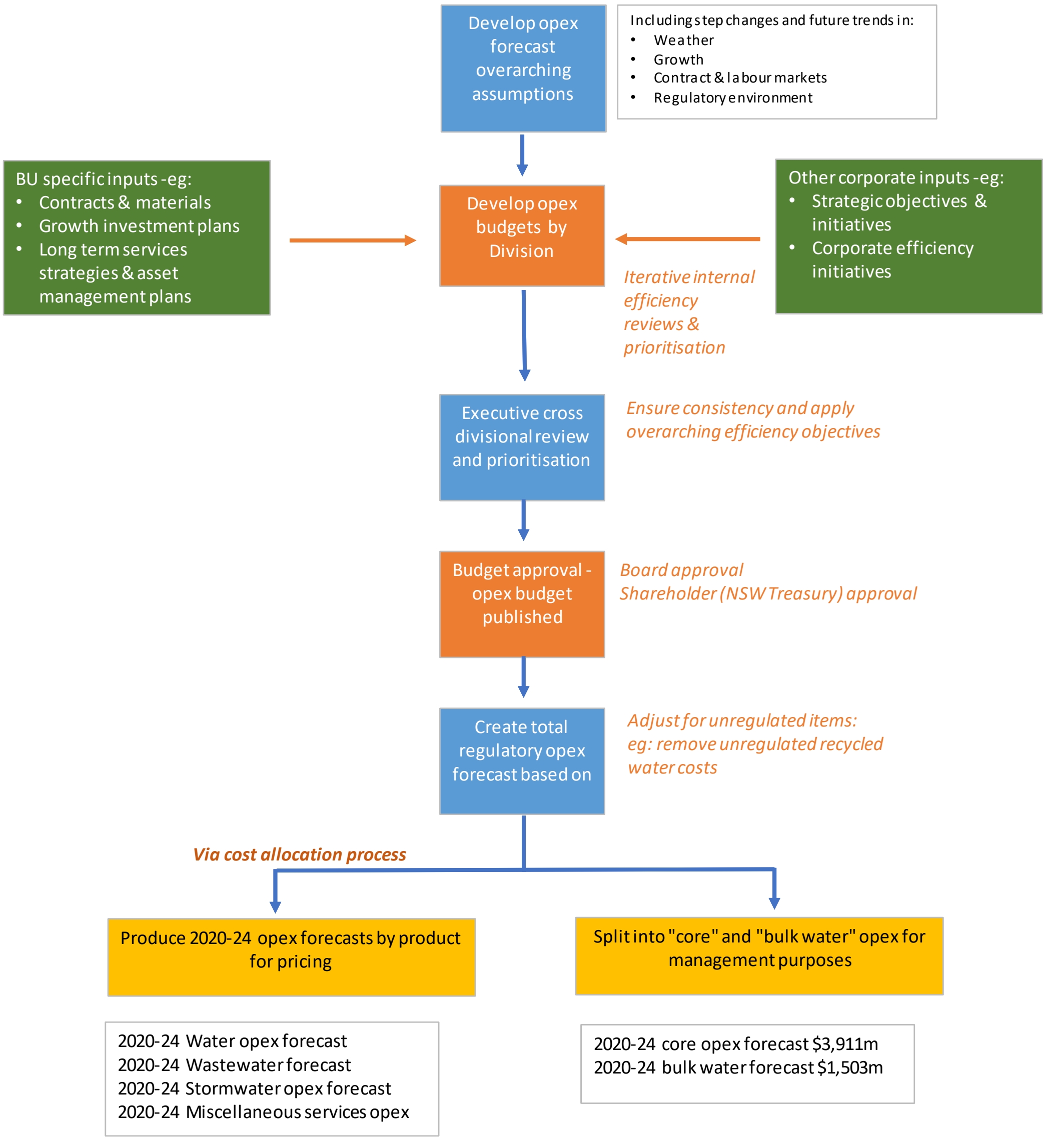


Figure 1-2 Operating expenditure budgeting process overview

1.1.3 Group budgets and Executive cross-group review

We consolidate business unit budgets at a group level. We identify and prioritise efficiency opportunities using a risk-based framework. Through this 'heat mapping' process, Group budgets are reduced and submitted to the Executive. Atkins-Cardno judged our heat mapping process to be effective in identifying potential cost savings and budget reductions.[2]

The Executive does cross-divisional expenditure reviews that consider our whole value chain, to identify duplication, overlapping expenditure and further efficiency opportunities. The final budget is then integrated into the SCI and is reviewed and approved by the Board and then NSW Treasury.

[2] ibid.

1.1.4 Developing opex for regulatory purposes by Product (including treatment of common costs)

Total regulated operating costs are derived for water, wastewater, stormwater and regulated (s16A)[3] recycled water services. Managers assign cost centres and (if necessary) account for contributions to the products using the regulatory cost model (RCM). Wherever possible, the RCM assigns the directly attributable costs to the designated service. This method aligns to the reporting needs of IPART's Annual Information Return.

Not all costs are directly attributable, but we have an approach for allocating the shared or common costs. Costs that cannot be directly attributed to a service, or are shared among more than one service, are defined as pooled business support and corporate costs and separately tracked in the model. They are mainly planning, administration, financial management, digital, human resources and property costs.

In its 2016 Pricing Determination, IPART recommended that we allocate corporate costs to all our products and services, including unregulated recycled water and commercial services. This was to ensure benefits from any economies of scope are shared with all regulated customers and that we do not have a cost advantage in the delivery of potentially contestable services.

In this price proposal, in line with IPART's costing principle, we have allocated the pooled business support and corporate costs to all products and services on the basis of their direct costs, including bulk water costs. The exception is unregulated commercial services. For these services the contractor costs are excluded for cost allocation purposes because they are immaterial, involving relatively insignificant administrative and management time.

1.2 Summary of operating expenditure 2016–24

Over 2016–20, we expect to overspend our $5.3 billion total regulatory operating expenditure allowance by $254 million, or 4.8%. We expect to overspend our $3.7 billion allowance for core regulatory operating expenditure (excluding WaterNSW and SDP costs[4]) by $140 million, or 3.8%.

This variation has been required to respond to the challenges of dry weather and drought as well as some new uncontrollable and business-as-usual costs. Key drivers include:

- prolonged dry weather and higher than anticipated growth, resulting in greater demand and declining service performance
- substantial increases in electricity prices resulting from structural change in the electricity market
- the need for greater planned and reactive maintenance on wastewater networks to improve deteriorating performance against environmental requirements
- the need for additional expenditure to address the new economic level of water conservation (ELWC) requirements in our Operating Licence
- the need to improve IT security and reliability.

[3] See Attachment 2: Service levels and performance.
[4] In this attachmen when assessing our expenditure on SDP against IPART's determination, we use prices from IPART's 2017 SDP Determination, not IPART's 2016 Determination of Sydney Water's prices.

Many of the increases, particularly those in 2019–20, will be sustained and endure in the interim over 2020–24. Therefore, despite further future efficiency gains, we propose a transitional upward re-baseline of operating costs from 2020 (see sections 3 and 4).

The total operating expenditure over 2016–20 and the forecast expenditure for 2020–24 are highlighted in Table 1-1 and Figure 1-3 below.

Table 1-1 Total operating expenditure 2016–24 ($2019–20 million)

	2016–17	2017–18	2018–19*	2019–20*	Total 2016–20	2020–21	2021–22	2022–23	2023–24	Total 2020–24
Our expenditure										
Total regulatory opex	$1,356	$1,333	$1,419	$1,437	$5,545	$1,342	$1,349	$1,358	$1,365	$5,414
Core regulatory opex	$939	$937	$981	$975	$3,832	$972	$976	$980	$983	$3,911
Percentage change from previous year (%)										
Total regulatory opex		-1.7%	6.4%	1.3%		-6.6%	0.5%	0.7%	0.5%	
Core regulatory opex		-0.3%	4.8%	-0.6%		-0.3%	0.4%	0.3%	0.4%	

As shown above, total operating expenditure between 2017–18 and 2018–19 will increase by $85 million or 6.4%, and core operating expenditure by $45 million or 4.8%.

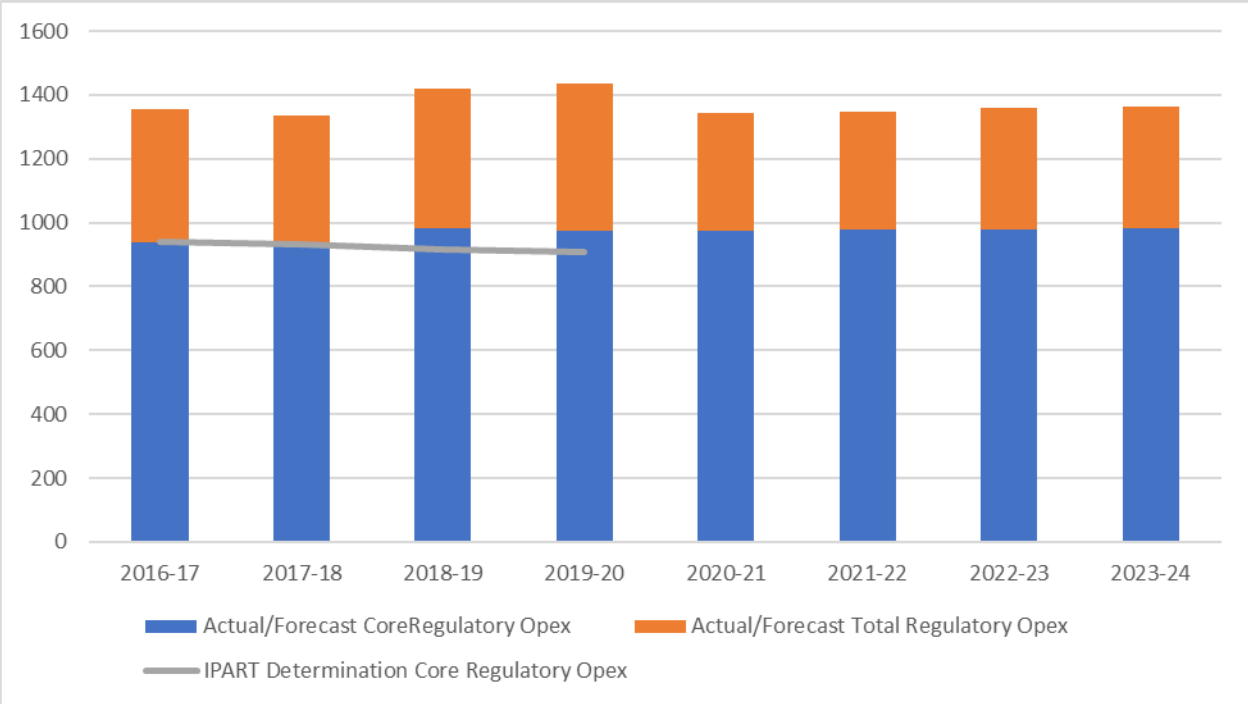


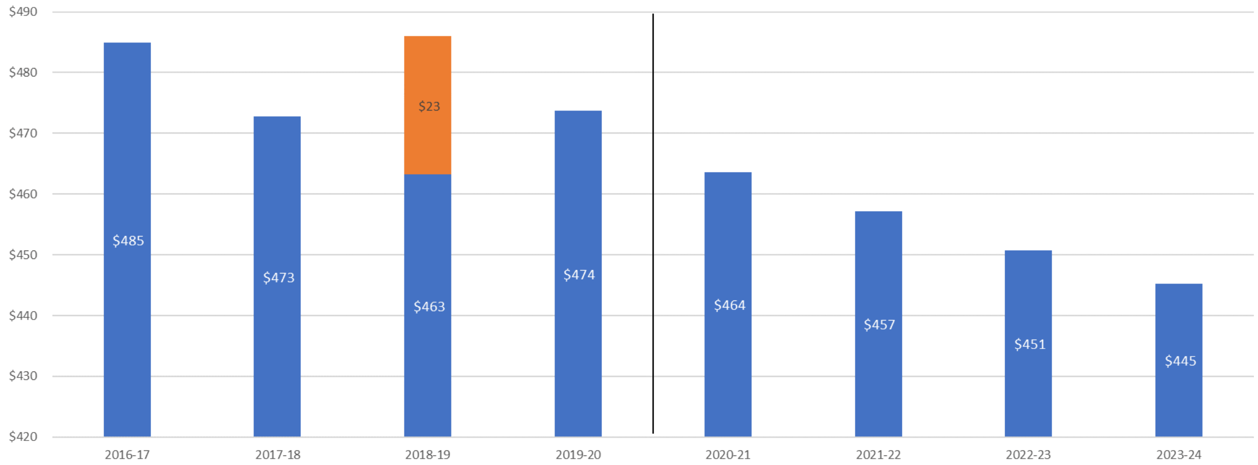
Figure 1-3 Total operating expenditure 2016–24 ($2019–20 million)

Figure 1-3 shows total operating expenditure across 2016–20 and 2020–24.

This does not include $78 million that we may spend to help manage the onset of drought, which has been approved (outside the formal annual budget) if drought conditions continue. The expenditure would go towards water restrictions, leak detection, water efficiency programs, water savings advertising, water use intelligence and analytics.

At the same time as core regulatory operating costs increased in 2018–19, core operating expenditure on a per property basis also increased as shown in Figure 1-4. A significant contributor to this has been drought costs of $46 million in 2018–19, which are discussed in section 3.1.

Even without the contribution of drought, the operating expenditure per property for 2019–20 is higher than expected. This is largely due to higher reactive network maintenance costs, expected water conservation spend to meet the economic level of water conservation operating licence requirements, higher digital costs to manage IT security and resilience, uncontrollable increases in property costs, and higher costs to manage future growth. These additional costs are discussed in section 3.



[a]This does not include the additional $78 million that we may spend to help manage the onset of drought.

Figure 1-4 Core operating costs per property 2016–2024, actual and forecast ($2019–20)[a]

In total, over 2016–20, core operating expenditure per property will decline by 0.8% per annum. Over 2020–24, these costs are forecast to decline by 1.3% per annum.

Finally, our opex Efficiency Carryover Mechanism compares our core operating expenditure against our allowances and assesses differences within and between periods, as a proxy for revealed information as to the permanency of any underspends over the regulatory period. Any permanent underspends are rewarded with a 4-year carry-over of savings (if appropriate)[5].

Given the core regulatory operating expenditure overspend outlined above, we will not claim an Efficiency Carryover Mechanism in the 2020-24 price period. However, we see continued merit in retaining the scheme and propose its retention – see **Attachment 7: Regulatory framework and application**, Section 2.2.

[5] IPART, *Review of prices for Sydney Water Corporation: From 1 July 2016 to 30 June 2020,* page 58.

2 Operating expenditure 2016–20

2.1 Operating expenditure 2016–20 – overview by service

For 2016–20, total regulatory operating expenditure will be $5.5 billion, and core regulatory operating expenditure will be $3.8 billion. The $1.7 billion of non-core operating expenditure comprises costs of WaterNSW supplying raw water, and SDP, which has a specific set of regulated charging arrangements based on its operating status and volumes purchased.

As summarised in Table 2-1 below, of the $5.5 billion costs over 2016–20:

- water operating expenditure is $3.2 billion (or 57% of total operating expenditure), of which
  - $1.7 billion (or 54% of the total water operating expenditure) relates to bulk water costs associated with WaterNSW and SDP
  - $367 million (or 11.5% of total water operating expenditure) is BOO costs.
- wastewater operating expenditure is $2.2 billion (or 40%)
- stormwater operating expenditure is $59 million (or just over 1%)
- regulated recycled water operating expenditure (under Section 16A) makes up $104 million, (or just under 2%).

Table 2-1 Operating expenditure 2016–20 by product ($2019–20 million)

	2016–17 Actual	2017–18 Actual	2018–19* Forecast	2019–20* Forecast	Total
Total regulatory opex	1,356.0	1,333.4	1,418.7	1,436.7	**5,544.8**
Water	761.5	766.4	822.1	836.5	3,186.5
BOO water filtration costs	92.5	91.4	89.3	93.7	366.9
WaterNSW costs	210.2	216.3	221.9	220.3	868.7
SDP costs	206.6	180.6	215.4	241.1	843.7
Water Delivery costs	252.2	278.1	295.5	281.4	1,107.2
Wastewater	557.9	527.2	553.4	557.2	2,195.7
Stormwater	10.5	15.3	16.9	16.4	59.1
Regulated s16A Recycled water	26.1	24.5	26.3	26.6	103.5

The results show that over 2016–20, the cost of providing water to customers increases, with a particularly large increase in both water and wastewater operating costs between 2017–18 and 2018–19. Comparing 2018–19 with 2017–18, wastewater costs increase by $26.2 million or 5.0%, and water costs increase by $55.8 million or 7.3%.

2.2 Operating expenditure 2016–20 by category

Core operating expenditure is driven by costs such as labour, materials, contractors and energy. These represent the day-to-day operating, maintenance and administrative costs that we incur in delivering our services. It includes expenditure associated with the privately owned and operated water filtration plants under the Build Own Operate arrangement. About 50% of core operating expenditure is market-tested, including contractors, materials, BOO filtration, property and electricity.

2.2.1 Current period

As summarised in Table 2-2 below, of the $3.8 billion of core operating expenditure in 2016–20, the components of each cost category are as follows:

- **Labour and contractors** – labour and contractor post-capitalisation represents $2.5 billion or 67% of core operating expenditure in 2016–20.[6] Pre-capitalisation, the labour and contractors account for 79% of the expenditure. These costs include wages and salaries for our direct labour force, and costs of contractors and consultants (eg. data management contracting, and electrical and mechanical maintenance outsourcing) engaged through the procurement process established in 2012–16.
- This procurement process enables us to optimise our buying power through new initiatives and by grouping products and services together. Costs associated with contractors (post-capitalisation) are expected to increase from 2017–18 to 2018–19 by $23.1 million or 7.6%. Cost associated with labour (post-capitalisation) remain relatively unchanged over the period.
- **BOO water filtration plants** – make up $367 million or just under 10% of core operating expenditure in 2016–20. BOO costs remain relatively unchanged over the current period.
- **Energy** – represents $202 million or around 5% of core operating expenditure in 2016–20. It relates to electricity for water and wastewater treatment, pumping stations and the delivery of water (it does not include the carbon price). Increased flows of water and wastewater as a result of water demand and growth, incrementally increases energy costs.
- We have a flexible approach to purchasing and delivering savings from energy efficiency, which provided for large cost savings in 2012–16. Energy costs during 2016–20 increased by $20.1 million or 50% between 2016–17 and 2017–18, primarily due to increasing electricity prices. These are discussed further in section 3. While electricity prices are expected to decline in 2019–20, they are not expected to return to the levels experienced in 2016–17.

[6] Contractor capitalisation is around 70% of non-labour capitalisation. Materials costs makes up the other 30%.

- **Materials** – represent $149 million or around 4% of core operating expenditure in 2016–20. This includes chemicals and preventative maintenance programs. Chemicals used on water and wastewater networks and treatment works make up 40% our material costs. Chemical prices have increased during the period, driven by higher energy price impacts on an energy-intensive manufacturing process. Poor raw water quality increases chemical costs in water treatment and filtration plants.
- **Wastewater treatment** – accounts for 75% of chemical costs; 25% for network odour control and 50% for treatment of wastewater in wastewater treatment plants.
- **Water treatment** – accounts for around 25% of chemical costs. This includes chemicals required for network dosing and water treatment at insourced filtration plants. At times of drought, poor raw water quality can arise as dam levels get lower. While the cost of materials decreased by $14.3 million or 35% in 2017–18 primarily due to a one-off revaluation of inventory, material costs increased back to the normal 2016–17 levels by 2018–19.
- **Property** – represents $184 million or around 5% of core operating expenditure in 2016–20. It includes fees to external parties for the lease and licence management of properties, and our property disposal and/or recycling programs. Property costs increased by $4 million or 9% from 2017–18 to 2018–19, and by a further $2 million or 4% from 2018–19 to 2019–20.
- **Administration** – which is $65 million of core operating expenditure over 2016–20 includes customer services, and administration and overhead costs related to strategy, governance, finance and regulation, human resources, information technology corporate services and business improvement.

We seek to control costs associated with procuring contracts, energy and materials, using an effective competitive tendering process. Through this we believe our costs reflect the efficient cost of delivering services. Driving further reductions is very challenging, particularly given the large efficiencies achieved in 2012–16. Labour and administration costs are within our control, but we have a very limited scope to drive further efficiencies while maintaining operating performance.

Table 2-2 Core operating expenditure 2016–20 by category

$19–20 million	2016–17	2017–18	2018–19	2019–20	Total
Total regulated core opex	939.2	936.5	981.3	975.4	3,832.4
Labour	323.0	329.1	326.9	327.2	1,306.2
Contractors	308.5	300.8	323.9	326.4	1,259.7
Materials	40.7	27.5	41.8	38.6	148.6
Property	44.9	43.1	47.1	49.1	184.3
Administration	16.8	16.8	16.1	15.5	65.0

Transport	17.9	17.2	16.5	16.7	68.2
Electricity	39.7	59.8	54.4	47.6	201.5
Data Management	22.9	25.1	26.0	27.1	101.0
Other Core Opex	32.1	25.7	39.3	33.6	130.7
BOO Filtration	92.6	91.4	89.3	93.7	367.0

2.3 Total operating expenditure 2016–20 and the 2016 Determination

Despite realising efficiencies in the current period of around $47 million, unexpected and uncontrollable costs have contributed to total regulatory operating expenditure in 2016–20 that is 4.8% or $254 million higher than IPART's $5.3 billion allowance (see Table 2-3).

Of the cost categories listed above, over 56% of these costs are market-tested via tender processes (contractors, materials and BOO filtration) or external market prices (property and electricity).

Compared to the 2016 Determination:

- $114 million is due to higher bulk water costs from WaterNSW and SDP, and
- $140 million is due to higher core operating expenditures.

Table 2-3 Total operating expenditure v IPART determined levels 2016–20 ($2019–20 million)

	2016–17 Actual	2017–18 Actual	2018–19* Forecast	2019–20* Forecast	Total
IPART Determination					
Total regulatory opex	$1,353.7	$1,324.8	$1,309.6	$1,302.7	$5,290.8
Bulk water	$415.3	$391.9	$395.2	$395.9	$1,598.3
Core regulatory opex	$938.4	$932.9	$914.4	$906.8	$3,692.5
Our expenditure					
Total regulatory opex	$1,356.0	$1,333.4	$1,418.7	$1,436.7	$5,544.8
Bulk water	$416.8	$396.9	$437.4	$461.4	$1,712.4
Core regulatory opex	$939.2	$936.5	$981.3	$975.4	$3,832.4
Variation from determination					
Total regulatory opex	-$2.3	-$8.5	-$109.1	-$134.1	-$254.0
Percentage variation	-0.2%	-0.6%	-8.3%	-10.3%	-4.8%
Bulk water	-$1.5	-$5.0	-$42.1	-$65.5	-$114.1
Percentage variation	-0.4%	-1.3%	-10.7%	-16.5%	-7.1%
Core regulatory opex	-$0.8	-$3.6	-$66.9	-$68.6	-$139.9
Percentage variation	-0.1%	-0.4%	-7.3%	-7.6%	-3.8%

2.4 Variation in non-core operating expenditure

Bulk water costs associated with WaterNSW and SDP are $114 million ($2019–20), or 7.1%, above the IPART allowance (Table 2-4). These non-core operating expenditures are based on prices determined through separate IPART processes and are uncontrollable. They are also the largest single item contributing to the percentage variation in total regulatory operating expenditure relative to the IPART Determination. They account for 45% of the $254 million higher expenditure.

Of the bulk water costs over 2016–20 outlined in Table 2-4:

- SDP costs are $844 million, which is $100.2 million or 13.5% higher than our IPART Determination in 2016, updated for IPART's SDP determination in 2017. This is largely due to costs relating to the restart and operation of the desalination plant in 2018–19 and 2019–20 (14 months operation is assumed, provided for under the operating rules). In particular, the costs are forecast to be $63.7 million or 36% higher in 2019–20 than what was allowed for in the IPART Determination for SDP in 2017 (discussed further below).
- WaterNSW costs are $869 million, which is $13.8 million or 1.6% above the IPART Determination. Higher demand for water from a combination of drought and higher than expected growth in our customer base in 2017–18 and 2018–19 has led to higher bulk water purchase volumes, and there have been costs for pumping water from the Shoalhaven during 2018–19.

Table 2-4 Bulk water costs for 2016–20 ($2019–20 million)

	2016–17	2017–18	2018–19*	2019–20*	Total
IPART Determinations for WaterNSW and SDP					
WaterNSW costs	208.6	211.4	216.3	218.6	854.9
SDP costs	206.7	180.4	179.0	177.4	743.5
Actual/Forecast					
WaterNSW costs	210.2	216.3	221.9	220.3	868.7
SDP costs	206.6	180.6	215.4	241.1	843.7
Variation from IPART Determination					
WaterNSW	(1.6)	(4.9)	(5.6)	(1.8)	(13.8)
SDP	0.1	(0.2)	(36.5)	(63.7)	(100.2)

In our 2016 determination, IPART based forecasts on SDP's prices to Sydney Water remaining constant in real terms at 2016–17 prices. Subsequently, in IPART's 2017 SDP Determination, it determined that we should pay significantly lower prices to SDP.

Figures mentioned here are all based on IPART's 2017 SDP Determination, not IPART's 2016 Determination of Sydney Water's prices. The difference between the two is shown in Table 2-5.

Table 2-5 Adjustment for 2017 SDP Determination ($2019–20 million)

$19–20 million	2016–17	2017–18	2018–19	2019–20	2016–20 Total
SDP cost in Sydney Water 2016 Determination	206.7	206.3	206.3	206.3	825.6
SDP 2017 Determination	206.7	180.4	179.0	177.4	743.5
Difference	**0.0**	**(25.9)**	**(27.3)**	**(28.9)**	**(82.1)**

2.5 Variation in core operating expenditure

Core operating expenditure in the current period is $3.8 billion, $140 million or 3.8% higher than the IPART allowance of $3.7 billion. Figure 2-1 demonstrates that the allowance for core regulatory operating expenditure was largely met in 2016–17. However, it has been or is expected to be exceeded from 2017–20 – by $66.9 million or 7.3% in 2018–19 and $68.6 million or 7.6% in 2019–20.

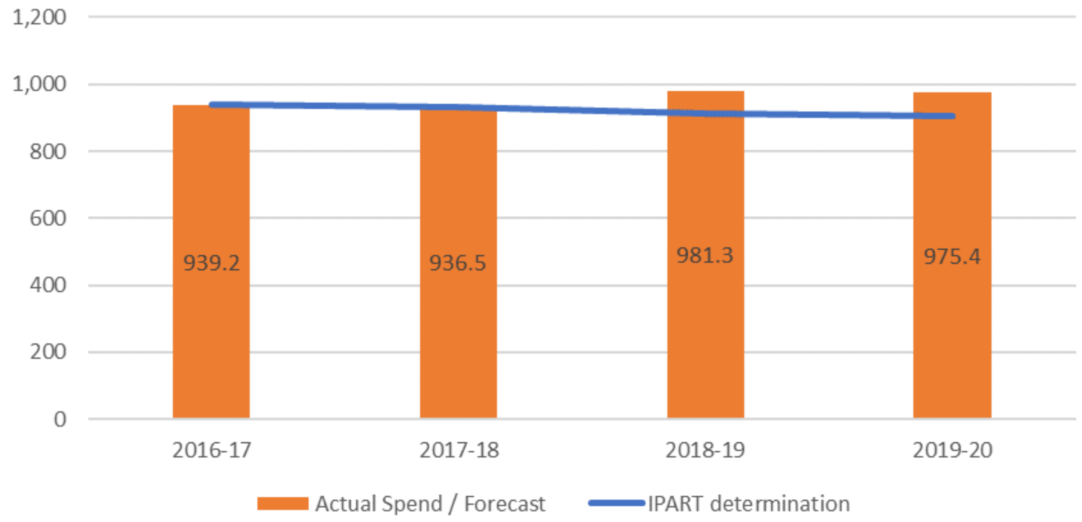


Figure 2-1 Core operating expenditure and IPART allowance in 2016–20 ($2019–20 million)

Actual BOO water filtration costs are lower than the IPART allowance through the period. Figure 2-2 shows that the overspend in core operating expenditure is not associated with BOO water filtration plants. BOO costs in every year of the 2016–20 period are lower than forecast due to lower escalation of contracted costs, reclassification of financing expenses and better than historical raw water quality.

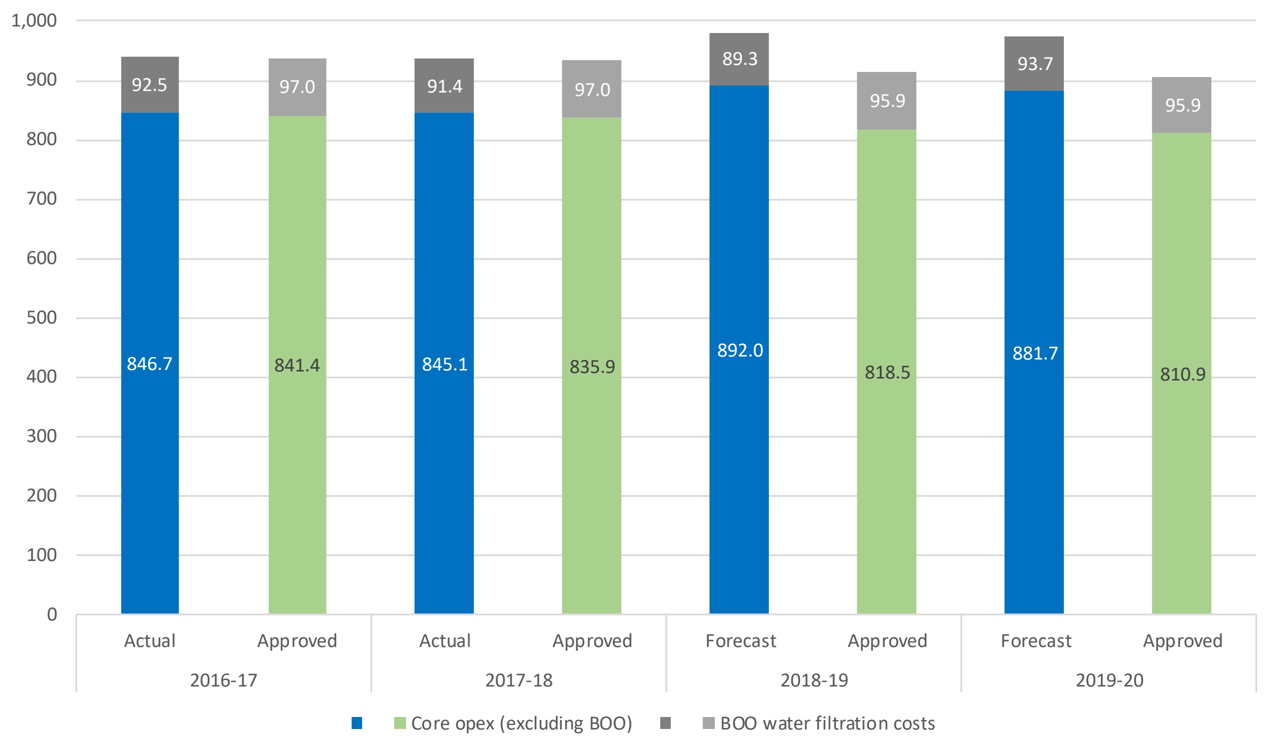


Figure 2-2 Core operating expenditure and BOO water filtration costs v IPART allowance in 2016–20 ($2019–20 million)

Variations in core operating expenditure compared to the IPART Determination are broken down by category in Table 2-6. Of the $140 million of higher core operating expenditure, higher costs arise largely as a result of:

- labour and contractor costs (after capitalisation) being $109.3 million or 4.5% above the 2016 Determination, with overspend of $45.8 million or 7.0% in 2018–19, and $50.9 million or 7.8% in 2019–20
- electricity costs that are $54.6 million (27.1%) above the 2016 Determination, with overspend of $21.8 million (57.2%) in 2017–18, $17.2 million (46.2%) in 2018–19, and $13.3 million (38.7%) in 2019–20. Further detail is provided in section 3.3
- property costs that are $14 million (8.2%), data management costs that are $7.7 million (7.6%), and transport costs that are $6.5 million (10.5%) above the 2016 Determination.

The reduction in expenditure in Table 2-6 mainly arises from:

- material costs that are $57.1 million (27.8%) below the 2016 Determination
- BOO costs that are $18.8 million (5.1%) below the 2016 Determination.

Table 2-6 Variances in core operating expenditure 2016–20 by category ($2019–20 million)

	2016–17	2017–18	2018–19	2019–20	2016–20 Total
Variation by category (IPART allowance versus actual/forecast core opex)					
Labour (after capitalisation)	-13.7	-21.5	-19.6	-33.5	-88.2
Contractors	11.4	11.1	-26.2	-17.4	-21.1
Materials	11.7	23.9	9.3	12.3	57.1
Property	-1.6	0.3	-4.8	-7.8	-13.9
Administration	-0.6	-1.2	-0.3	-0.6	-2.7
Transport	-1.8	-1.4	-1.3	-2.0	-6.5
Electricity	-2.3	-21.8	-17.2	-13.3	-54.6
Data Management	-1.0	-1.0	-2.0	-3.7	-7.7
Other Core Opex	-7.4	2.4	-11.4	-4.7	-21.2
BOO Filtration	4.4	5.6	6.6	2.2	18.8

Capitalisation is much higher than expected in the 2016 Determination. In 2017–18, we aligned our capitalisation policy with the practice of other water utilities. After comparison with six major water utilities in Australia, we improved our processes to determine whether expenditure on asset renewals, major overhauls and replacements should be treated as capital expenditure or operating expenditure. We implemented changes in how capitalisation is applied, with no substantive change to the capitalisation policy. As a result of the change, labour costs incurred to improve asset condition and increase asset life from 2017–18 were capitalised.

In the 2016 Determination, we were allowed operating expenditure of $12.4 million each year of 2016–20 for labour costs to improve asset condition and increase asset life. The change in how capitalisation is applied implies that to assess our performance properly against the determination, the line depicting the IPART allowance should actually be $12.4 million lower from 2017–18 to 2019–20, as shown in Figure 2-3.

This also means that over 2016-20, our total operating expenditure actually exceeded the 2016 Determination by $291 million or 5.5%, and our core operating expenditure exceeded the 2016 Determination by $177 million or 4.8%.

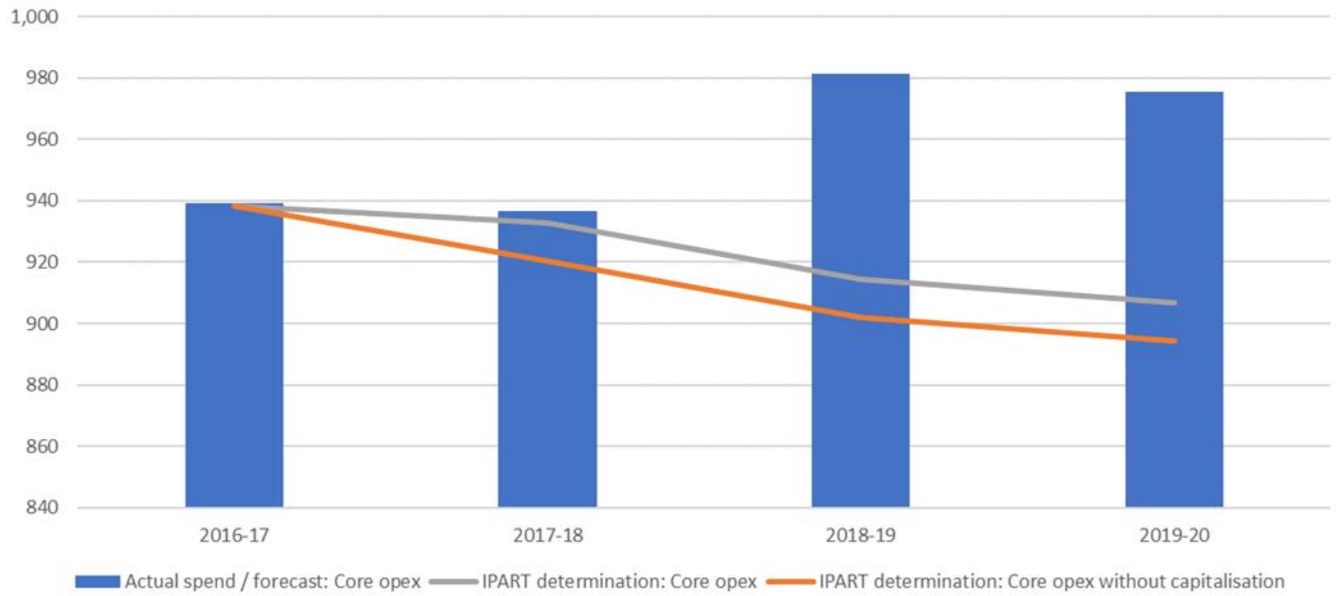


Figure 2-3 2016 Determination adjusting for a change in how capitalisation is applied from 2017–18 ($2019–20 million)

To address issues with the way capitalisation is applied, we propose that for the final determination IPART remove $12.4 million of capital expenditure from our wastewater regulatory asset base in each year from 2017–18 to 2019–20.

3 Variations in core operating expenditure in 2016–20

The key drivers that have increased our operating expenditure over the current period have been:

- drought conditions
- the need to improve network strategy and deteriorating operating and environmental performance
- fulfilling ELWC requirements
- significant increases in electricity prices
- higher levels of growth than expected resulting in greater water demand, wastewater collection and treatment and increased asset maintenance
- city planning to ensure new western parkland city and other rapidly developing growth centres are served by the required water and wastewater infrastructure
- higher land tax due to the increasing land value of our property holdings
- the need to meet an unexpected shortfall in defined benefit superannuation schemes
- the need for improved IT security and reliability.

There have also been either efficiencies or improved consumer outcomes achieved during the current period through the:

- Production Improvement Program (PIP)
- creation of a Multi-Function Business Centre (MFBC) (centralised shared services function for transactional corporate support functions)
- creation of our Customer Hub
- reform of the Finance Services functions.

Many of the drivers of variations in expenditure highlighted above – both increases and decreases – arise in the second half of the current period and are expected to endure in 2020–24. Figure 3-1 and Table 3-1 below summarise the key variances. More detail is provided below.

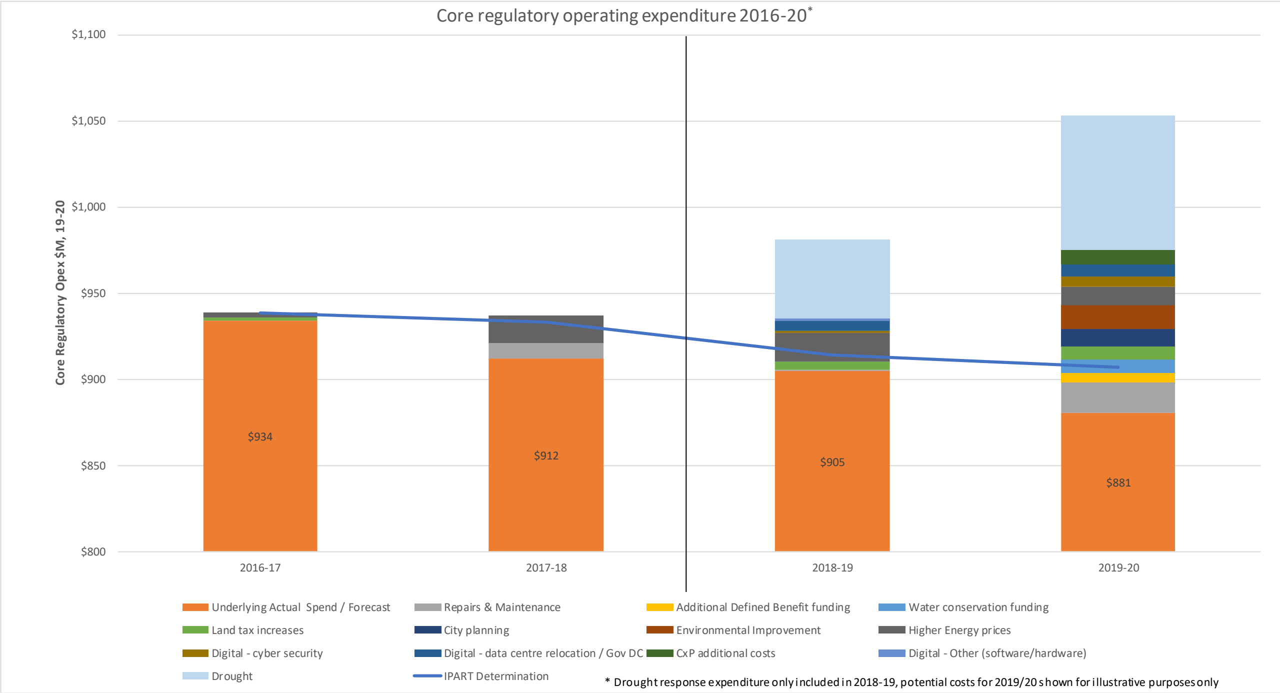


Figure 3-1 Variations to core regulatory operating expenditure 2016–20 ($2019–20)

Table 3-1 Total operating expenditure variances 2016–20 ($2019–20 million)

Variations in total expenditure	Variance in total expenditure	Comments on variance
Bulk water	(114.0)	Over expenditure largely due to the cost of restart and operation of SDP in 2018–19 and 2019–20.
Core operating expenditure		
Net combined savings to BAU	41.9	Includes savings of $47.3m due to reforms and efficiency initiatives mainly resulting from $32m of cost savings from the PIP and $9.4m of the MFBC
BOO Filtration	18.5	Lower cost escalation, better than historical water quality and reclassification of finance expenses.
Drought-related costs	(46.1)	Increased weather-related network repairs and maintenance, water efficiency programs and communications in 2018–19 only
Network strategy – wastewater	(27.7)	$14.5 m preventative maintenance for 2017–18 and 2019–20 $13.2m reactive environmental improvement 2019–20
Network strategy – water & ELWC	(21.3)	$13.3m for preventative maintenance in 2017–18 to 2019–20 $8m in water conservation spending to meet new Economic Level Water Conservation (ELWC) requirements in 2019–20

Energy	(45.8)	Substantially higher electricity prices due to market structure changes in 2017–18 and higher than expected network costs in 2016–17 and 2017–18. Higher costs despite efficiency savings of $2.6m
City planning	(10.0)	Unbudgeted $10 million in operating expenditure in 2019–20 to plan for significant population growth in Sydney's west
Land Tax	(14.0)	Statutory expenditure that is outside of our control
Additional Defined Benefit	(5.5)	Unbudgeted additional contributions of $5.5 million to fund additional required contributions for defined benefit superannuation scheme liabilities
IT Digital	(30.0)	Cost of cyber security of $7.5m in 2018–20, and Data centre move to GovDC (Enterprise costs, CxP hosting of $13m from 2018–20, Ongoing CxP costs of $8.5m from 2019–20 and $1m additional data management costs.

3.1 Prolonged drought

The current drought in the Greater Sydney region is one of the worst ever experienced. Dam levels across the region have dropped from 96% in April 2017 to just above 50% in May 2019, reflecting a fall of about 0.4% every week.[7] Estimates suggest that total water storages for the Sydney area will reach 40% by March 2020 and 30% by October 2021. Such depletion not only creates cost pressures but is likely to lead to lower demand and revenues, as water restrictions are put in place.

Periods of prolonged dry weather affect not only storage levels in Sydney's dams, but also increase the frequency of chokes and breaks in the wastewater system, and the number of breaks and leaks in the water network. Figure 3-2 depicts the negative effect of drought periods on soil moisture, and the relationship between soil moisture and the number of chokes in our wastewater network. It illustrates the need for increased repairs and maintenance under drought conditions.

Total operating expenditure related to drought is $46.1 million in 2018–19. It is comprised of two types of drought-related operating expenditure:

- proactive spending of $19 million to reduce water consumption levels, such as media campaigns and water efficiency programs. This also includes a small proportion of costs on the management of water restrictions and demand efficiency advertising
- reactive spending of $27.1 million to address performance issues created by drought, such as weather-related repairs and maintenance.

This significant drought-related expenditure was not budgeted for in 2016–20. As noted in section 1.1.2 our expenditure forecasts are based on P50 estimates. We budget for a range of weather conditions, but our cost forecasts do not include provision for water restrictions and conditions of extended drought.

[7] https://www.abc.net.au/news/2019-05-05/water-restrictions-loom-sydney-dam-levels-drop-in-drought/11081008

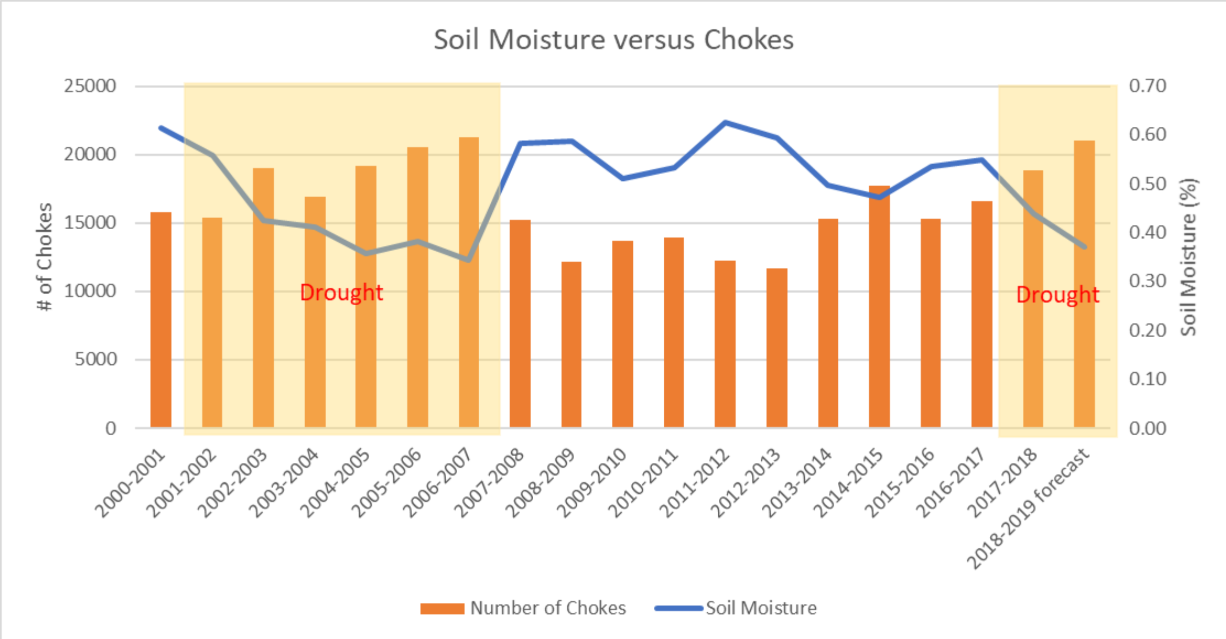


Figure 3-2 Drought periods, soil moisture and number of chokes

We estimate that if the drought continues in 2019–20, a further $78 million of operating expenditure will be incurred, with $43 million on proactive expenditure and $35 million on reactive expenditure. The costs relate to detecting leaks, water savings advertising, managing water restrictions, water efficiency programs, and water use intelligence and analytics. This cost is not included in the forecast.

The expenditure in response to prolonged drought illustrates how it creates an asymmetric risk for our operating costs. That is, we face the risk of uncontrollable cost increases without any offsetting savings.

The unbudgeted reactive spend related to drought identified above also highlights the impact of drought on network resilience and performance. Drought puts pressure on the relationship between proactive or planned expenditure and reactive expenditure. It increases the need for more reactive expenditure and contributes to a backlog of planned maintenance. This is discussed further in section 3.2.

3.2 Network strategy

Effectively managing network assets, while maintaining customer service levels and licence performance has been a key priority. Our approach to asset management is to look at and balance a number of considerations, including asset condition, operating environment, service standards, risk appetite, consequence of failure, lifecycle costs, and customer expectations.

This approach is designed to deliver the best overall outcomes for our customers, our operating and environmental performance, and financial return, within an acceptable risk framework.

In the context of maintenance, for example, we apply several different asset maintenance approaches, ranging from an “avoid fail” strategy for critical water and wastewater mains, to a “plan to repair” strategy on less critical wastewater treatment plant components.

How those two main approaches are applied:

1. **Plan to repair –** is a maintenance strategy, where interventions are scheduled in response to failures. This is applied to assets where the consequence of failure can be managed within acceptable level of service, safety or cost impact.
2. **Avoid fail –** is a maintenance strategy, where interventions are scheduled to prevent or minimise failures. This is applied to assets where the consequence of failure cannot be managed without unacceptable loss of service, safety or cost impact.

Table 3-2 below shows the maintenance strategy we use to manage our assets for some asset classes.

Table 3-2 Our asset management approaches

Asset category	Asset management approach
High-risk water and wastewater mains	Avoid fail approach based on condition monitoring data compiled over a period of years and interventions scheduled to prevent or minimise high consequence failures.
Other water and wastewater mains	Plan to repair where interventions are scheduled in response to failures. Failures are low consequence and are managed without unacceptable loss of service, safety or cost impact.
Wastewater treatment plants	Components are managed either as avoid fail or as plan to repair based on assessed consequence of failure.

Our asset management plans and the information they contain are integral to setting maintenance, repair or reactive work, inspection and replacement volume forecasts at the beginning of each price period. Importantly, these forecasts are based on average weather conditions, an average level of reactive work to respond to water and wastewater network faults, and the use of average volumes of chemicals. They are also a significant final input to our core operating regulatory expenditure forecasts.[8]

In the past, our approach to water and wastewater network assets has been conservative, but satisfactory in terms of customer service and performance levels. Preventative maintenance and repair work on network assets was conducted on a frequent basis, which saw us meet customer needs and operating and environmental licence conditions with reasonable headroom.

In 2012–13, following the end of the Millennium Drought and a return to average soil conditions, we determined that we had capacity to adopt a higher risk appetite in our network asset management approach. Accordingly, we made a number of changes and reductions to preventative network maintenance programs and moved to a ‘plan to repair’ strategy. We believed that this would drive cost savings for customers, without significantly affecting service and performance levels. Past reductions to preventative maintenance have meant greater reactive work now being required on our water and wastewater assets, as reflected in our growing backlog and declining operating and environmental performance.

[8] An extension to this process involves us using asset management plans when considering wider service strategies for geographic areas. This is still developing, but in future it means that asset replacement, maintenance and inspection cycles can consider the wider needs of an area.

We are currently facing one of the worst droughts on record with prolonged dry weather conditions and higher levels of growth than anticipated. This has brought about greater network faults and increased the reactive backlog on our water and wastewater assets.

There is an immediate need to address these issues to avoid higher lifecycle costs on our water and wastewater assets. We are now re-evaluating the appropriate balance between preventative maintenance and repair work on our network assets. In the interim, to address the current issues and to stabilise declining environmental performance, we have implemented a new asset management strategy for reticulation sewers. This is based on preventative maintenance, rather than the previous plan to repair strategy.

In the current period, we have increased our expenditure above 2016 Determination levels in the following cost categories:

- preventative maintenance costs for water and wastewater networks by $27.8 million – where $14.5 million is for wastewater reticulation networks, with $11 million of that in 2019–20
- repair costs for wastewater networks by $13.2 million – where $13.2 million has been allocated to a new Environmental Process Improvement Program in 2019–20
- $8 million for water conservation expenditure from 2019–20 to meet the ELWC requirement in our Operating Licence.

Table 3-3 provides further detail on these operating cost variations in preventative and reactive maintenance on our water and wastewater networks. It also highlights that $39 million of the $49 million increase in operating expenditure over the period, occurs in 2019–20.

Table 3-3 Net increase in network expenditure 2016–20 ($2019–20 million)

	2016–17 Actual	2017–18 Actual	2018–19* Forecast	2019–20* Forecast	Total
Wastewater					
Preventative maintenance	-	3.5	-	11.0	14.5
Repair	-	-	-	13.2	13.2
Water					
Preventative maintenance	-	5.5	1	6.8	13.3
Economic Level of Water Conservation	-	-	-	8.0	8.0

These cost variations are discussed in further detail below, in the context of the recent performance of our wastewater and water networks.

3.2.1 Our wastewater network

On the wastewater network, our changes to the balance between preventative maintenance and repair work have led to a number of network resilience and environmental performance issues. As detailed in **Attachment 2: Service levels and performance**, our performance against EPL conditions relating to chokes and dry weather wastewater overflow incidents has been deteriorating.[9]

With respect to chokes, our current performance trends indicate that we will most likely breach the EPL limits based on the five-year 1995–2000 rolling average by 2021.[10] Figure 3-3 shows our choke performance relative to EPL limits based on the five-year 1995–2000 rolling average (EPL Condition O4.8a), and our gradually deteriorating performance.

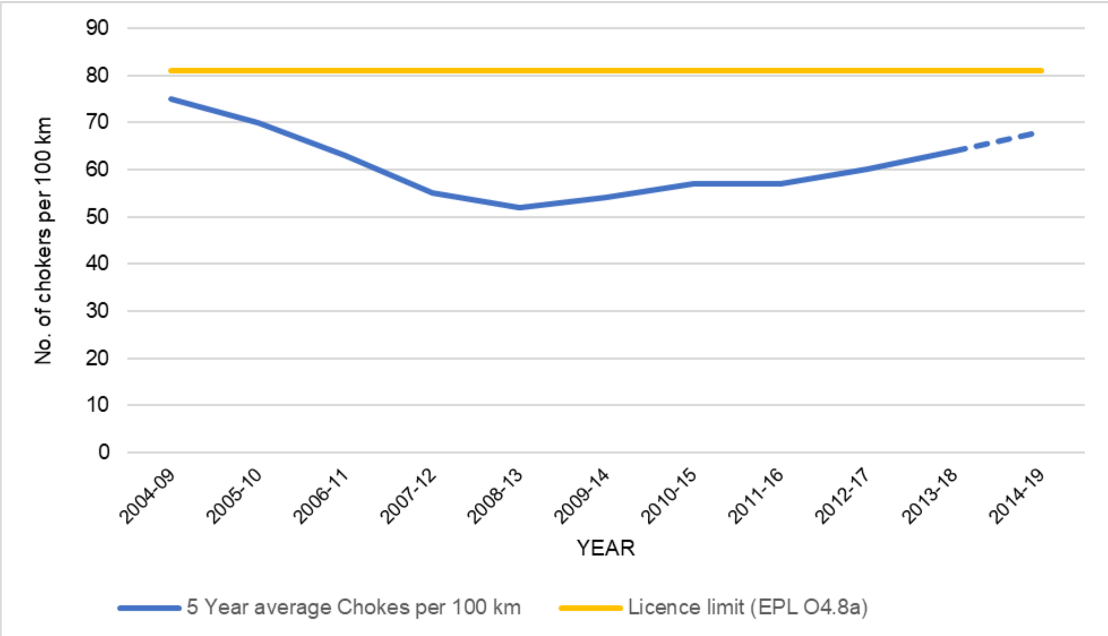


Figure 3-3 Five-year rolling average choke performance, 2004–09 to 2014–20

While typically chokes will not cause wastewater overflows, severe chokes can cause dry weather wastewater overflows in breach of EPL Condition L1.3. In 12 of the 23 EPLs overseeing our 24 wastewater systems, we have further limits setting out the maximum number of dry weather overflow incidents that can occur in a year. In addition, we have a duty to notify the EPA of any dry weather overflow incidents, which cause or threaten material harm to the environment. This duty applies over and above any EPL requirements.[11]

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[9] Our environmental performance is governed by 27 separate EPLs, 23 of which oversee our 24 wastewater treatment systems. Across these different EPLs, there are a number of common conditions relating to chokes and wastewater overflow incidents. More specifically, those conditions are EPL Condition L1.3, which requires us to operate our wastewater reticulation system in a proper and efficient manner so that wastewater overflows do not pollute waterways, and EPL Condition O4.8a, which requires us to ensure the current five-year rolling average of chokes per 100km of pipe for all wastewater treatment systems is in line with that calculated for the period 1 July 1995 to 30 June 2000 (81 chokes/100km per year).

[10] The annual number of chokes across our wastewater system has been rising. In 2012–13, there were 11,620 chokes. In 2017–18, there were 18,540 chokes. Our current forecast for 2018–19 is that there will be 21,000 chokes across the network.

[11] We have a duty to notify the EPA of a dry weather overflow incident that causes or threatens "material harm" to the environment – even if it may not have been in breach of EPL Condition L1.3 or the dry weather overflow limits in some of our wastewater system EPLs.

As the number of annual chokes in our wastewater network has increased, we have observed an on-par rise in wastewater overflow incidents reportable to the EPA (see Figure 3-4). As of June 2019, we have further recorded breaches against 4 of the 12 dry weather overflow limits in our wastewater treatment system EPLs.

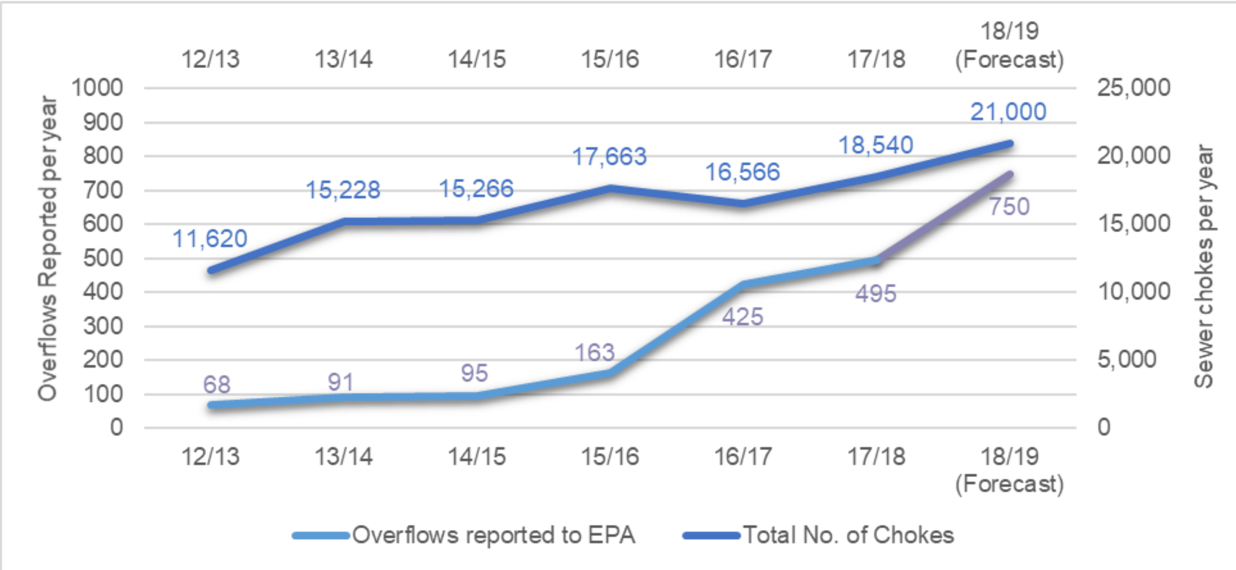


Figure 3-4 Annual chokes and EPA wastewater overflow incidents, 2012–13 to 2018–19

Our deteriorating choke and wastewater overflow performance is due to a complex interaction of factors.

3.2.2 Prolonged dry weather

Prolonged periods of dry weather reduce soil moisture content and tree roots block pipes in search of water. With blockages, chokes can occur and the risk of wastewater overflows substantially increases. The present drought (as described in section 3.1) has seen soil moisture fall, followed by a rise in chokes and wastewater overflow incidents.

3.2.3 Urban density

Urban density and growth can also have an impact on the number of chokes and overflow incidents in our wastewater system. High population growth around existing wastewater pipes can cause a larger volume of wastewater to flow through these pipes, such that even shallow tree roots and small amounts of silt and litter can result in chokes and overflow incidents.

These factors together have seen the resilience of our wastewater network fall. This is reflected in the increasing annual number of chokes and wastewater overflow incidents we report to EPA each year. It can further be seen in our growing backlog of reactive work. Table 3-4 below shows our outstanding reactive job backlog over the current determination period.

Table 3-4 Outstanding reactive backlog for chokes, 2014–15 to 2018–19

	2014–15 Actual	2015–16 Actual	2016–17 Actual	2017–18 Actual	2018–19 Forecast
Outstanding reactive backlogs	49	95	86	164	251

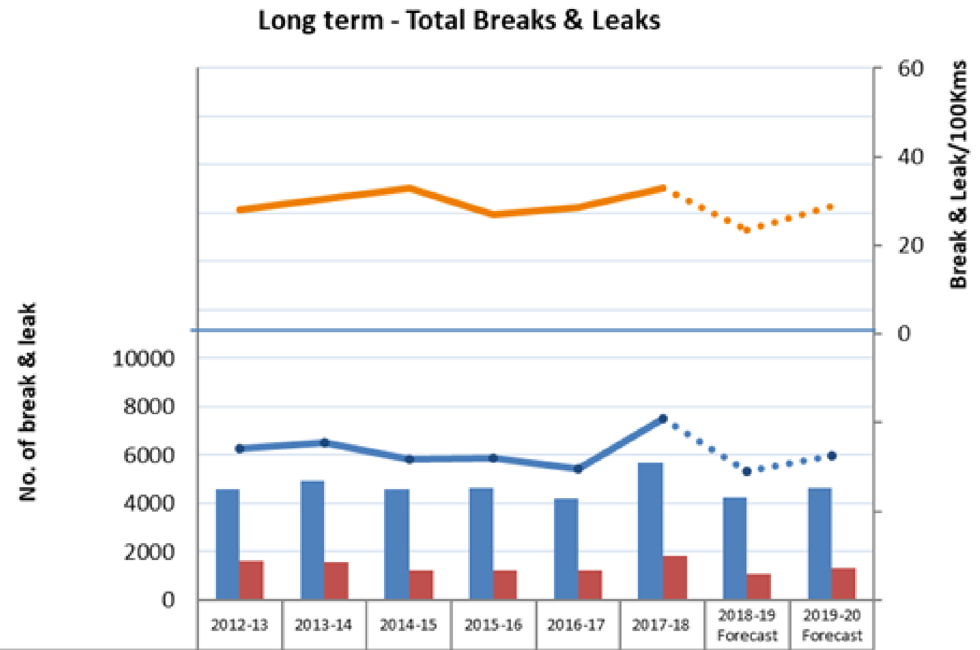
We need to re-evaluate the appropriate balance between preventative maintenance and reactive wastewater work going forward. In the interim, we have put in place a new asset strategy for reticulation sewers based on preventative maintenance. We are increasing our network maintenance workforce from 249 full-time employees in 2016–17 to 328 in 2019–20, a 32% increase in frontline manpower. Accordingly, there has been an increase in our wastewater preventative maintenance and repair expenditure over the period by a total of $27.7 million.

3.2.4 Our water network

In our water network, similar network resilience and performance issues have arisen following our reduction to preventative maintenance programs in 2012–13. In particular, the number of breaks and leaks on our water network and the Water Continuity Standard in our *Operating Licence 2015–20*[12] have become a concern in recent years.[13]

Figure 3-5 shows the annual number of water breaks and leaks, alongside the number of properties affected by unplanned water interruptions over the 2012–2016 and 2016–20 price periods.

Figure 3-6 shows total water breaks and leaks and the number of properties affected by unplanned interruptions over five hours, 2012–13 to 2019–20.



	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19 Forecast	2019-20 Forecast
Break	4,603	4,958	4,576	4,627	4,203	5,654	4250	4662
Leak	1,648	1,557	1,251	1,255	1,214	1,839	1105	1333
Break & Leak	6,251	6,515	5,827	5,882	5,417	7,493	5355	5995
B&L/100km(12 MRA*)	28	31	33	27	29	33	23	29

Figure 3-5 Long term – total breaks and leaks

[12] IPART, *Sydney Water Corporation Operating Licence 2015–20*, clause 4.2.2(a).
[13] Water breaks and leaks are closely linked to Water Continuity Standard performance. Major breaks on a water main can cause a large number of properties to experience sudden interruptions to water supply, while smaller leaks may still require water supply to be turned off in some properties for the duration of a leak repair. This means that significant and unexpected water interruptions can occur, whenever there is a break or leak on our water network.

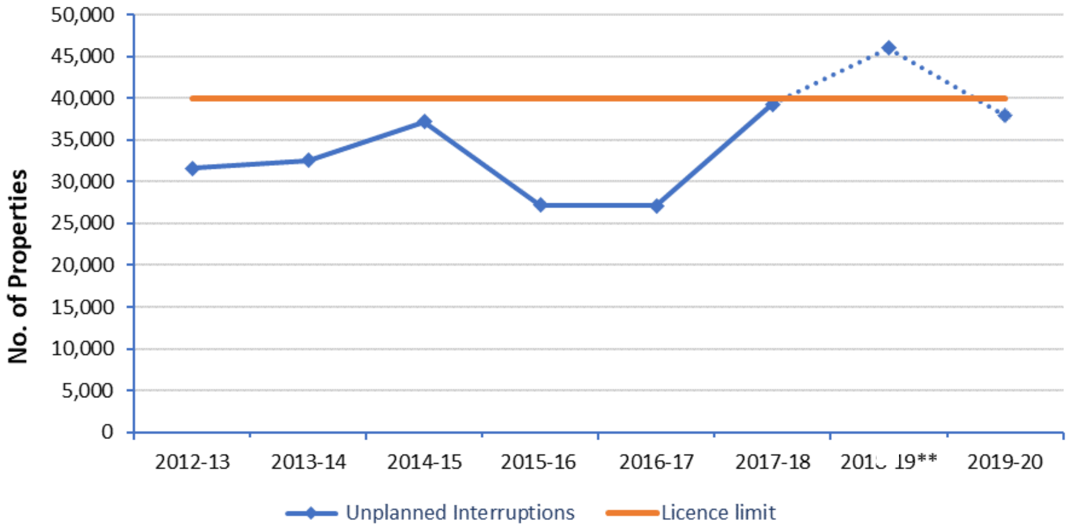


Figure 3-6 Number of properties affected by unplanned interruptions > 5 hours

In 2016–20, annual water breaks and leaks have risen by over 38% from 5,417 in 2016–17 to 7,493 in 2017–18. At the same time, our water continuity standard performance has declined. While we met the Operating Licence limit for the first two years of 2016–20, we expect to breach the 2018–19 limit. A single, large fault event in April 2019 alone caused some 15,000 properties to experience water interruptions of more than five hours.

3.2.5 Prolonged dry weather

Water breaks and leaks are influenced by weather conditions, with significant increases during extended periods of dry weather. Dry weather increases soil movement, which leads to more breaks and leaks.[14] Since 2017, Sydney has been experiencing unprecedented hot and dry weather as a result of the drought (as described in section 3.1).

3.2.6 Urban density and high impact breaks

The number of properties affected and the time it takes to repair a break/leak is further influenced by urban density and growth (as described in section 3.4). While urban density may not affect the number of breaks and leaks that occur, it can cause the number of properties affected by a single break/leak to increase substantially.

High population growth concentrated around existing water mains means that when a break or leak occurs, a large group of properties will experience unplanned water interruptions (a ‘high impact’ break). This can be seen in high growth areas like Western Sydney, where a single water main break in Asquith resulted in water interruptions to 2,500 properties in 2017–18.

Figure 3-7 shows the average number of properties we affect in a shutdown. In 2017–18, the average number of properties per water interruption rose to an all-time high of 78.

[14] An example of this occurred during the Millennium drought, which brought prolonged dry weather to Sydney from 2001 to 2007 and an increase in water breaks and leaks. The number of properties affected by unplanned water interruptions spiked shortly afterwards in 2007–08.

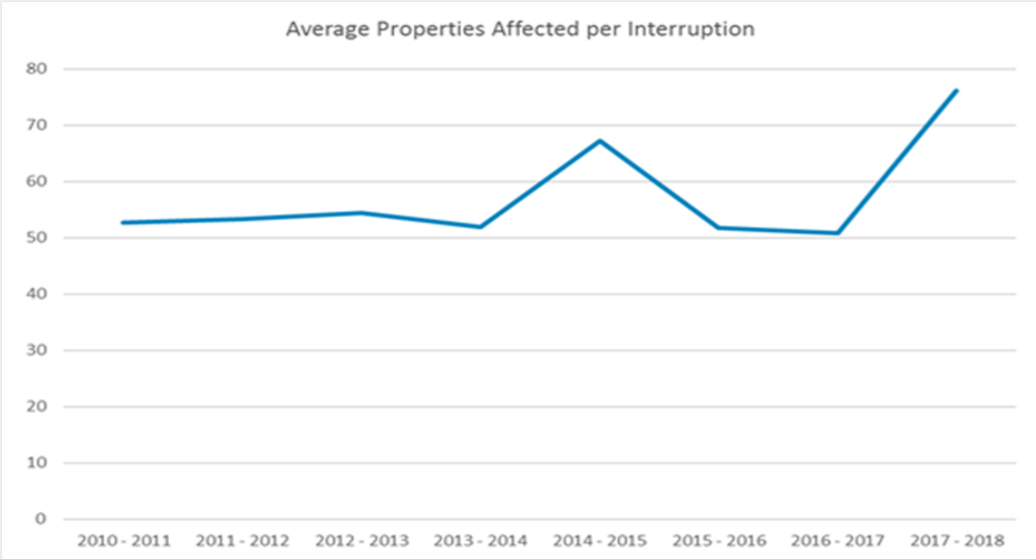


Figure 3-7 Average properties affected per interruption

Together, these factors mean we are now experiencing greater water breaks, with a higher impact. This has seen our break and leak repair work grow.

It is crucial that we redress the balance between our preventative maintenance and repair work. The process has already been started. Accordingly, we will spend an additional $21.3 million on water network maintenance and repairs and conservation activities in the current determination period. Of this spend, $8 million reflects the costs of meeting the ELWC.

3.2.7 Economic Level of Water Conservation

In December 2016, we met our Operating Licence requirement to develop and obtain IPART's approval of a methodology known as the ELWC. The ELWC methodology is based on a marginal value framework and states that investment in water conservation should be set, where the cost of saving an extra volume of water is just equal to the cost of supplying an extra volume of water. The methodology extends to all our water conservation spending related to water efficiency, leakage management and recycled water programs.

These new requirements mean we are currently in a transitionary period, increasing expenditure in line with the economic level of investment, rather than looking to achieve a commercial return on water conservation activities.[15] Before the ELWC method, we had been meeting our Water Conservation Operating Licence target of 329 litres per capita per day, while achieving a commercial return on a number of water conservation activities.

We estimate that a baseline expenditure of $8 million will be required for water conservation in 2019–20. This baseline expenditure will endure into the next regulatory period. This P50 estimate does not consider current drought conditions, which will likely justify and require higher expenditure.

[15] The new requirement means that we are in a position where we are now subsidising the water conversation programs we design.

The expenditure in 2019–20 is likely to involve investing in programs, such as:

- WaterFix (strata, residential, commercial)
- Business to Business audit and repair programs
- New and optimised recycled water schemes
- enhanced leak management programs
- other water efficiency awareness campaigns.

The baseline programs will change from year to year depending on the maturity and success of individual programs, as set out in our annual Water Conservation Plan and Reports.

Our water conservation programs in 2017–18 led to savings of 10,462 million litres of water, for example through supporting 10,000 customers to improve their water efficiency. The projects also support the NSW Government's 2017 Metropolitan Water Plan, which aims to better balance water supply and demand in Greater Sydney.[16] We expect the water conservation programs we invest in under the ELWC methodology will achieve similar or greater benefits.

3.3 Electricity

Energy plays a critical part in our operations, with electricity being the dominant energy source over gas and other fuels. Each year, we purchase about 350 GWh of electricity to pump and treat water and wastewater across 1,200 sites.

A further 16-20% of demand is now met by onsite self-generation. In total, we have 11 gas cogeneration assets, 3 hydro-generation assets, and 8 solar PV assets. Over the 2016–20 price period, we completed the following energy efficiency projects:

- **Wollongong Cogen upgrade** – upgraded from a 530 kW unit to a 630 kW unit, at a cost of $1.09 million, to save 720 MWh/year in usage
- **Shellharbour Blower Upgrade** – upgraded from a positive displacement blower to a turbo blower, at a cost of $171,000, with estimated savings of $28,000 per year.

To date, our annual grid purchases have not exceeded 1998 levels of 370,000 MWh. This is despite growth of approximately 30% in the number of connected properties. This has been enabled through our efficient energy management, and self-generation through hydro, solar and co-generation assets.

For 2016–20, self-generation is forecast to total 297,582 MWh, and for the 2020–24 period, 335,182 MWh. This generation is notionally worth a total of $97 million over the 2016–20 and 2020–24 periods, which reflects a net benefit to customers.

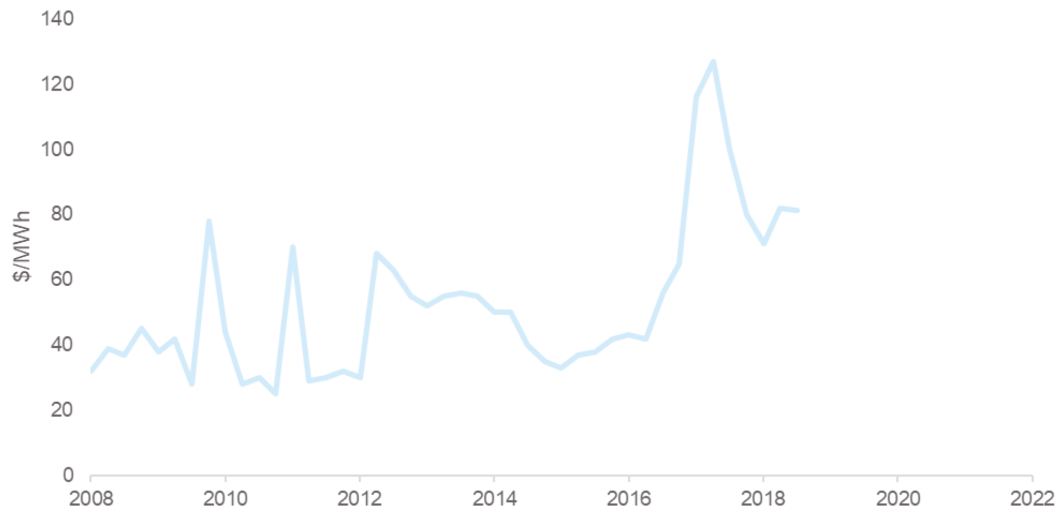
While we are increasing our level of self-generation, we still continue to purchase a large part of our electricity from the grid. Therefore, electricity has remained a significant portion of our core operating expenditure over 2016–20. In 2017–18 electricity comprised just under 6% of our core operating expenditure.

[16] NSW Government 2017, *2017 Metropolitan Water Plan*, NSW.

We have looked to change and improve the way we manage our electricity costs. In the previous regulatory period, 2012–16, we reviewed our energy efficiency and electricity procurement strategy. This led to a series of initiatives to reduce energy use across all sources and better management of electricity contracts, focussed on load savings and limiting our exposure to changes in the short-term electricity market. During 2012–16, in combination with favourable market prices, these initiatives resulted in a reduction in our total electricity demand by 82 GWh and achievement of a total cost saving of $86.6 million (in $2015–16).

These efficiency initiatives, our self-generation of electricity, and our management of electricity contracts have continued to form an important part of our Energy Master Plan going into the current determination period. While we have realised further energy efficiencies, a number of external factors have led to unavoidable increases in our electricity costs over the period. From 2016–17 to 2018–19, our electricity costs were $41.3 million or 37% higher than that allowed by IPART in the 2016 determination. This has been mainly driven by large increases in electricity prices from significant structural changes in the wholesale electricity market, but also to a lesser extent by increases in Ausgrid and Endeavour Energy network prices in 2016–18.

The wholesale electricity market was impacted in 2017–18 by the unexpected closure of the large baseload Hazelwood power station in March 2017 (1,600 MW). Alongside rising gas prices for gas-fired generation, this has resulted in wholesale electricity prices being well above the $40/MWh forecast in the 2016 Determination. Wholesale electricity prices were as high as $130/MWh in April 2017. Figure 3-8 shows the rising trend in NSW of wholesale quarterly baseload electricity contract prices over the current determination period.



Source: AEMO (2018) *Historical prices quarterly closing price at end of period*.

Figure 3-8 NSW Wholesale Electricity Contract Price to December 2018

In relation to network tariffs, the highest year-on-year increases were from 2016–17 to 2017–18 period, involving:

- an increase of 7% on average for Ausgrid access charges
- an increase of 6% on average for Ausgrid capacity charges
- an increase of 2% on average for Endeavour access charges.

While we were initially able to insulate ourselves from some of the higher electricity prices through our electricity contract management strategy and self-generation, wholesale prices have remained high and it has become increasingly difficult to limit our exposure to price volatility in the market.

As a result, in 2017–18 our expenditure on electricity increased by 47% and was $21.8 million or 57% higher than in IPART's 2016 Determination. As noted in section 2.5, our electricity costs in 2018–19 and 2019–20 will exceed the allowance provided by IPART by $17.2 million and $13.3 million respectively. Overall, this means that our electricity costs will be $54.6 million or 37% higher than the amount provided for in the IPART Determination over 2016–20.

While some decline in wholesale electricity prices are forecast with additional generation beyond 2019–20, they are not expected to go back to the levels prior to 2016–17. As a result, while there is slight decline in wholesale prices expected in the years beyond 2019–20, our estimated operating expenditure is still expected to be higher than IPART's 2016 allowance.

3.4 Growth and water demand

There has been growth in customer volumetric demand for water, driven in part by climate conditions, but also higher than anticipated growth in the Greater Sydney area over 2016–20. This has led to a corresponding increase in our underlying core operating expenditure.

Higher than expected growth puts upward pressure on operating costs for water and wastewater networks, particularly in:

- **chemical costs** – as there is more water and wastewater that needs to be treated
- **electricity (supply) costs** – to pump the water to customer locations or wastewater for disposal
- **repair and maintenance costs** – to respond to increased failures in the network due to soil movement and tree roots
- **biosolids –** increased contractors to deal with transport and disposal of biosolids.

Population in Greater Sydney grew by over 100,000 (2%) between 2016 and 2017, and by about 93,000 (1.8%) between 2017 and 2018.[17] Growth in water demand and the customer base has previously been largely due to infill growth in Sydney, which increases population density. New growth is now also being partially fueled by priority growth areas in Sydney. For example, Western Sydney is expected to grow from a current population of 1.9 million to 3 million in 2036.[18]

Where growth is met by using an increasingly limited amount of existing capacity of water or wastewater mains in the network (as occurs under infill growth), the marginal cost to operate the network for every additional unit of water or wastewater supplied and treated will tend to increase. This is an uncontrollable increase in our water and wastewater costs. Further, in 2018–19, the drought has meant that some water treatment plants and pumping stations have not achieved scale efficiency on a per unit cost basis, due to a reduction in the surface water supplied.

[17] https://www.abs.gov.au/ausstats/abs@.nsf/mf/3218.0, https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/3218.0main+features952016-17.
[18] https://www.westernsydney.edu.au/rcegws/rcegws/About/about_greater_western_sydney.

Drought makes it harder to respond to higher consumer demand. During drought it is typically anticipated that due to poorer water quality, there will be higher per unit costs to pre-treat the greater amount of bulk water supplied by WaterNSW. However, over the first three years of the current period there has actually been better water quality than anticipated, and actual costs to treat water from WaterNSW have been lower than IPART's allowance. Current forecasts are based on P50 estimates, which assume bulk water quality returns to a seven-year average in 2019–20. This drives higher costs from 2019–20 into the next period.

The recent growth in water demand is evident in the increase in bulk water expected to be supplied in 2018–19 and 2019–20 compared to that set by IPART. Our WaterNSW bulk water purchase costs are $13.8 million above the IPART allowance due to increases in volumes purchased. Further, the per property costs over 2016–20 show evidence of the higher growth and drought costs leading to increased core operating expenditure, in particular in 2018–19. The change in per property costs is depicted in Figure 3-9, where annual property growth is 1.8% on average from 2018–19 onwards.

Total water use is also expected to increase over the 2020–24 price period, with growth in customer numbers. This will necessitate corresponding incremental increases in core operating expenditure.

[a]Does not include the additional $78 million that we may spend to help manage the onset of drought.

Figure 3-9 Core operating costs per property 2016–20 ($2019–20)[a]

3.5 City planning

Sydney is one of the fastest growing cities in Australia. Current population projections show that our city of five million is expected to increase by a further one million people by 2028.[19] That is, an additional 20% increase in population over the next decade. With this future population growth and a massive greenfield growth area in Western Sydney, it is vital that we manage our city planning and infrastructure in an integrated manner. This will help realise the needs of a productive, sustainable and liveable city.

[19] NSW Government Department of Planning and Environment, *Population Projections*, accessed 17 June 2019 https://www.planning.nsw.gov.au/Research-and-Demography/Demography/Population-projections.

Under the NSW Government's direction, government agencies, local councils and the community are currently working together to develop integrated plans for future waterway health, flooding and recreational space provision. We will play a central role in ensuring waterway health is achieved alongside outcomes in growth, liveability, sustainability and affordability. As part of this role, we are incurring an unbudgeted $10 million in operating expenditure in 2019–20. We also intend to fulfil this role over the 2020–24 price period.

3.6 Land tax

Land tax is a statutory expenditure that is outside of our control. Under current NSW law, land tax is calculated as a rate on the combined value of all taxable land owned above a set threshold.

While land tax rates have remained unchanged over the current determination period, land value in the Sydney region has been increasing, particularly for commercial, industrial and rural properties – the key land holdings of our business. Since 2016, average land value for commercial, industrial and rural properties has increased by between 13% and 17% p.a.[20]

These increases have been particularly concentrated in the Sydney West region,[21] where major infrastructure projects and future development potential has seen average commercial, industrial and rural land value grow by much as 30% a year over the past few years.[22] With many of our existing water and wastewater systems and current projects based in Western Sydney, our operating expenditure on land taxes has uncontrollably increased over the current determination period. In total, we have incurred an additional unbudgeted operating cost of $14 million relating to land taxes, over the current determination period.

As land value continues to trend upwards and we look to acquire more land across Western Sydney to facilitate and service new growth areas (as described in section 3.5), we expect these higher operating costs from land tax to endure into the future determination period.

[20] NSW Government 'Valuer General's report on NSW Land Values at 1 July 2016' (13 January 2017) http://www.valuergeneral.nsw.gov.au/__data/assets/pdf_file/0020/218063/Valuer_Generals_Report_on_NSW_Land_Values_at_1_July_2016.pdf; NSW Government 'Valuer General's report on NSW Land Values at 1 July 2017' (12 January 2018) http://www.valuergeneral.nsw.gov.au/__data/assets/pdf_file/0003/218064/Valuer_Generals_Report_on_NSW_Land_Values_at_1_July_2017.pdf; NSW Government 'Valuer General's report on NSW Land Values at 1 July 2018' (8 January 2019) http://www.valuergeneral.nsw.gov.au/__data/assets/pdf_file/0004/220639/Report_on_NSW_Land_Values_at_1_July_2018.pdf.

[21] The Sydney West region here refers to the local government areas of Blacktown, Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith, The Hills, and the Shire.

[22] NSW Government 'Valuer General's report on NSW Land Values at 1 July 2016' (13 January 2017) http://www.valuergeneral.nsw.gov.au/__data/assets/pdf_file/0020/218063/Valuer_Generals_Report_on_NSW_Land_Values_at_1_July_2016.pdf; NSW Government 'Valuer General's report on NSW Land Values at 1 July 2017' (12 January 2018) http://www.valuergeneral.nsw.gov.au/__data/assets/pdf_file/0003/218064/Valuer_Generals_Report_on_NSW_Land_Values_at_1_July_2017.pdf; NSW Government 'Valuer General's report on NSW Land Values at 1 July 2018' (8 January 2019) http://www.valuergeneral.nsw.gov.au/__data/assets/pdf_file/0004/220639/Report_on_NSW_Land_Values_at_1_July_2018.pdf.

3.7 Defined benefit

In 2019–20, we have incurred unbudgeted additional contributions of $5.5 million to fund additional required contributions for defined benefit superannuation scheme liabilities.

On 30 June 2015, the schemes' administrator, SAS Trustee Corporation (STC), was advised of an underfunding position in the defined benefit schemes, of which we are a contributor. Following a meeting between management and STC in April 2017, we committed to addressing the funding shortfall by 30 June 2030. In February 2019, following receipt of the actuarial review of the fund position in 2018, the Board approved an increase in contributions to the schemes of $5.5 million per year from 1 July 2019 to 30 June 2030. This results in an additional operating expenditure in the 2020–24 period.

3.8 Digital technology, security and resilience

Four categories of digital operating expenditure result in a $30 million digital overspend in 2016–20:

- $7.4 million to manage greatly increased cyber security risks over 2018–20. This included protection of critical systems, network resilience, disaster testing recovery, Australian Signals Directorate compliance requirements and enterprise service and business implementations
- moving from our own existing Tier 1 facilities to the Tier 4 GovDC Data Centres. This initially involves the cost of hosting CxP – the new billing system and customer management system – but will over time host and maintain all of our other applications. This involves a total cost of $13 million over 2018–20
- ongoing CxP cost of $8.5 million incurred in 2019–20, which involves a managed services provider operating and maintaining the CxP applications
- other expenditure of $1 million on additional data management in 2018–19 – software, hardware and cloud.

3.8.1 Cyber security

Utilities are increasingly transitioning to becoming smart or digital utilities taking advantage of cloud-based customer functionality and IOT technologies, to promote efficiencies in operations and benefits for consumers. Such technologies require improvements to security in parallel in order to manage greatly increased cyber security risks.

Cyber security is becoming increasingly important for large infrastructure services, with a growing number of breaches of large payment systems and confidential information. CERT Australia, an Australian Government body focused on cyber threats to national infrastructure and systems, identifies a strong relationship between the use of the internet and information and communication technology (ICT) in critical infrastructure delivery, and the risk and impact of a cyber security incident.[23]

[23] CERT Australia, *Critical infrastructure & big business* (2019) https://www.cert.gov.au/critical-infrastructure-big-business.

The broader water network has experienced a rise in cyber-attacks in line with increased digitalisation. In 2016, Water Corporation's CFO noted that he observes 1.2 million connection attempts to the Water Corporation per day, with 7,000 of these malicious. A recent attempt overseas saw hackers breach a water utility's control system and alter chemical systems for treatment. Breaches like these have large negative impacts including physical damage and the potential for risks to water quality for customers.[24] It has been estimated that a cyber-attack costs an Australian business approximately $419,000 on average.[25]

Further, the increasing concern around cyber security for critical infrastructure more generally was reflected in the 2017 Finkel Review of the energy sector. This highlighted the trade-off between the innovation benefits of adopting digital technologies and the risk of cyber security threats. To improve preparedness of electricity infrastructure to such threats, the review recommended the publication of an annual report into cyber security preparedness of the National Electricity Market. This is to assess and action any issues related to the cyber maturity of energy market participants.[26]

A data breach incident potentially has implications for public health, employee and contractor safety, and our reputation. Further, there are now specific requirements from the Australian Signals Directorate that we must meet. Therefore, over the current period we have undertaken higher operating expenditure to protect customer data and improve network resilience. This amounts to $7.5 million in 2018–20, with $1.5 million of operating expenditure in 2018–19 and $6 million in 2019–20. This will be an ongoing cost that needs to be maintained in future years.

3.8.2 Data centre relocation

Another aspect of our broader IT security strategy is the relocation from our existing Tier 1 data centres at Homebush and Parramatta to the GovDC Tier 4 data centres which house all NSW government department services. This is detailed in **Attachment 9: Capital expenditure**.

The first part of our transition involves the move of the billing and customer management systems, CxP, followed by all of our other applications. The operating lease for using the facilities will involve new digital operating expenditure of $6.3 million in 2018–19 and $7.3 million in 2019–20.

The higher level of operating expenditure associated with these leases will need to be maintained in future years. On top of this there will also be an additional operating expenditure that needs to be incurred in the coming years to manage the complete relocation of IT facilities out of the existing Homebush facility.

While there may be higher operating costs from operating out of the new facilities, there will also be a resulting decrease digital capital costs in future, as there were ongoing expenditures associated with maintaining the current Tier 1 data centre facility that no longer need to be made.

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[24] Thea Cowle, 'Caught in the network', *The Australian Water Association Magazine* (online), November 2016 https://issuu.com/australianwater/docs/current_november_2016/1?ff&e=32264009/57258143.

[25] Deloitte Access Economics, *Australia's Digital Pulse: Policy priorities to fuel Australia's digital workforce boom* (2017) https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-economics-australias-digital-pulse-2017-010617.pdf.

[26] Commonwealth of Australia 'Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future' (2017) https://www.energy.gov.au/sites/default/files/independent-review-future-nem-blueprint-for-the-future-2017.pdf.

3.8.3 CxP

We will incur ongoing operating expenditure of $8.5 million related to the managed services provider operating and maintaining the CxP applications. This will need to be maintained beyond 2019–20.

While the enterprise resource planning (ERP) tool in the form of a business experience platform (BxP) – a new finance and procurement system – was originally intended to be deployed with CxP, it was delayed. We prioritised the successful deployment of CxP and managing technical challenges for CxP, which was more urgently required to replace a 32-year-old billing system. As only a minimum viable ERP system is being put in place, the efficiency gains in operating expenditure projected by IPART from the ERP implementation in the 2016 Determination, will now not be realised by the end of 2020.

3.9 Efficiency and customer improvement initiatives

Despite the external pressure resulting in largely unavoidable increases in our core operating expenditure over the period, we have remained committed to reducing cost, increasing productivity and improving customer outcomes.

In total, efficiency initiatives have driven $47.3 million in cost savings over the 2016–20 period. Some of the most significant initiatives that have driven cost savings in this period include:

- Production Improvement Program ($32.9 million)
- Civil Operating Model ($1.3 million)
- the Multi-Function Business Centre ($9.4 million).

The introduction of the Customer Hub has been a further key driver of improvement in customer outcomes. Outside of these major efficiency and customer initiatives, we have also achieved savings in operating expenditure through the:

- re-organisation of the Networks business to reduce management overhead ($1.6 million)[27]
- supply chain efficiencies in labour and materials, plant and equipment ($2.1 million)
- self-generation from our hydro, solar and co-generation assets (as discussed in section 3.3).

3.9.1 Production Improvement Program

During the 2016–20 period, we initiated a Production Improvement Program to align all significant changes occurring within the Production business (largely related to our water and wastewater treatment functions) to achieve long-term world class performance.[28] The Production Improvement Program enables the production business to:

- align with the new customer centric operating model by, for instance, restructuring the business to align around product streams, ensuring a clear line of sight to customers

[27] The full saving from management reductions was $3 million, however, $1.4 million was reinvested in 10 additional frontline staff to address the increased workload. The saving being claimed reflects the net amount.
[28] The production business was formerly known as the treatment business. Accordingly, this Program was formerly referred to as the Treatment Change Program.

- be a successful, efficient and competitive business with a high performing, flexible workforce that can respond quickly to growth and change
- be technology focused and ready
- enhance performance by operating safer and more efficiently for the benefit of our staff and customers.

The Production Improvement Program is forecast to deliver operating expenditure efficiencies of $32.9 million over the 2016–20 period (see Table 3-5). Savings are being delivered in:

- labour, through reduction in management overheads, restructure of support and technical areas, implementation of process standardisation at plants, and reduction in shift structures at plants
- service contractors, materials, plant and equipment through improved maintenance planning, increased operational maintenance performed by plant staff, frontline efficiency initiatives, improvements to planning and efficiency of Major Periodic Maintenance (MPM) program, biosolid cost reduction through reclassification of grade and improved volatile solids at Malabar, and electricity usage through process improvements and efficiencies.

These savings will endure in the future.

Table 3-5 Production Improvement Program operating expenditure savings 2016–20 ($2019–20 million)

	2016–17	2017–18	2018–19	2019–20	Total
Savings	0	8.8	8.9	15.2	32.9

In addition to the financial savings, the Program has also delivered non-financial benefits including:

- **improved safety for staff** – since the implementation of a Safety Improvement Plan across the production business, there has been a significant reduction in the number of injuries. In the 12 months to January 2017, the production business had a Total Recordable Injury Frequency Rate equivalent to 14 people being injured. In 2017–18, the Plan was introduced and subsequently, in the 12 months to December 2018, the rate had decreased to an equivalent of 5 people being injured
- **building staff capability** – through creating personal development opportunities, a clear understanding of position descriptions and responsibilities, and rolling out leadership development opportunities.

3.9.2 Multi-Function Business Centre (Business Connect)

The Multi-Function Business Centre (MFBC), now known as Business Connect, was established in 2017 to centralise transactional and operational activities in an enabling or support area. It provides transactional and operational services for core functions including finance, supply chain, digital services, people and culture, property, fleet, information management, document logistics, and business support services. Benefits include:

- financial benefits of $9.4 million in labour savings over the 2016–20 period

- **scalability** – enables the business to focus on core capabilities and strategic imperatives
- **customer experience** – centralises transactional activity into a single point of contact that can fulfil cross-functional requests and ensures the quality of services delivered internally is equivalent with what is provided externally
- **manager experience and benefits** – through having single points of contact, it reduces effort on day-to-day activities
- **recruitment model and contingent workers** – engaging a recruitment service provider enables a level of business partnering that supports managers to locate the best candidates for roles in the company.

3.9.3 Civil Operating Model

The Civil Operating Model will deliver operating expenditure efficiencies of $1.3 million in labour costs in 2019–20 through:

- a rebalancing of the workforce involving a transition of about 60 staff into retirement, a shift of remaining staff into other work teams, and use of contractors for peak and planned works
- changes to pay, conditions and working arrangements such as hours of work, loadings, competency-based pay allowances and travel.

The Civil Operating Model builds on our ‘Meet and Beat the Market’ program, which followed benchmarking carried out in 2012 between our civil maintenance business unit and five Victorian water authorities. The benchmarking indicated that we are, on average, 18.5% more expensive than the two most efficient Victorian water authorities.

In the three years to June 2015, under Meet and Beat the Market, we achieved a unit cost reduction of 18.3% or $29.5 million. Through the initiatives of the Civil Operating Model, we set a target to achieve an additional 10% (or $1.3 million per annum) unit cost reduction by July 2020. The expected efficiencies reported for the 2016–20 period reflect the achievement of this target. The efficiencies are forecast to be carried into the next period (see section 4).

3.9.4 Customer outcomes – the Customer Hub

The Customer Hub is a key initiative enabling our transformation to a customer centric organisation. It enhances the capability of people, processes and technology required to deliver an enhanced customer experience, by providing frontline customer facing staff with the right information in the right form at the right time. This enables better decision making and enhanced customer outcomes. While the Hub is not anticipated to deliver any financial benefits over the 2016–20 period, it has provided our customers with an enhanced experience, as outlined below.

There are two objectives of the Customer Hub. The first is to improve the customer experience for anyone either experiencing a service fault or a service interruption, for example through:

- providing customers with additional web channels to report leaks, view current water outages and register to receive notifications online
- proactive SMS/email communications and case management
- seeking and acting on customer feedback in real time.

The second is to be more proactive in the way that we manage our assets to reduce the number of customers affected by service interruptions. A pilot was commenced in September 2017, covering the western operational area of approximately one million people. In the first 12 months of operation, the pilot delivered the following results:

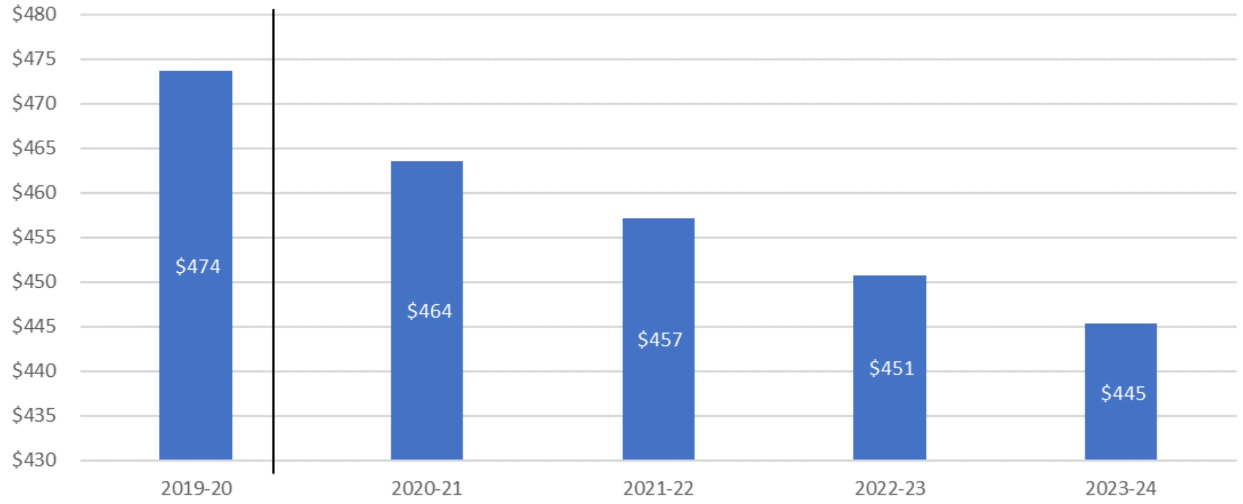
- over 100,000 properties had water interruptions avoided or mitigated, which equates to around a 30% reduction in customer impact
- over 50,000 customers were informed of water interruptions in advance
- over 21,000 customers were kept informed of progress on faults reported, and over 80% of customers were satisfied or extremely satisfied they were kept informed
- a significantly improved customer experience, with the Net Promoter Score up from 21 to 48.

Following the success of the pilot, it was decided to extend the Customer Hub to the full area of operation and include the Systems Operation Centre.

4 Forecast operating expenditure 2020–24

We forecast total operating expenditure for the 2020–24 period of $5.4 billion. Of this, $3.9 billion will be core operating expenditure and the remaining $1.5 billion will be WaterNSW and SDP costs.

Total proposed operating expenditure in 2020–24 is 2.4% below the total operating expenditure in 2016–20 and $83 million a year lower (on average) than what we expect to spend in the 2019–20 base year. Further, in 2020–24, there is an expected decrease in the core operating cost per property by 1.3% per year, as shown in Figure 4-1.



[a]Does not include the additional $78 million that we may spend to help manage the onset of drought.

Figure 4-1 Core operating expenditure per property, 2019–20 to 2020–24 ($2019–20)[a]

4.1 Approach to forecasting operating expenditure

The forecasting process begins with identifying key cost drivers and then making assumptions about how these key costs will evolve over 2020–24.

4.1.1 Maintenance and operations work

In 2019–20, maintenance and operations expenditure represents about 60% of our core operating expenditure and 35% of the total expenditure. Operations and maintenance costs are driven by:

- the scope and volume of planned work to be delivered over the period
- the volumes of faults and other emergency response tasks in the period
- our maintenance delivery approach, which is influenced by procurement processes and labour and contract market conditions.

The scope and volume of maintenance and operations repair work required is informed by the asset management plan (described in section 3.2, Table 3-2). In forecasting the amount of reactive work required, we make assumptions on the average weather conditions and an average level of reactive work to respond to leaks, and failures and the use of average volumes of chemicals. Sustained dry weather will increase the number of pipe breaks and blockages, whereas very wet weather increases water and wastewater treatment needs, leading to higher chemical and electricity costs and higher load based licensed fees for treated wastewater. These volume forecasts are then used as an input to the expenditure forecast.

The maintenance delivery approach takes account of labour market conditions and procurement processes to engage service contractors. For 2016–20, we assumed a stable contract market and a labour rate which is constant in real terms. Although the customer and demand growth expected over the period has actually created more maintenance work, we assume that this will be managed through delivery efficiencies. These include further procurement scope optimisation and leveraging competitive pressure both internally (through productivity tracking) and externally (through the panel of providers).

For the 2020–24 period, we have applied a similar assumption. Costs could be higher than forecast if the impact of growth on work volumes is more than expected. Costs can also be affected by external events such as weather and changes to service standards. These can lead to changes in plant operation regimes and materials costs (for example, chemicals).

4.1.2 Detailed assumptions in forecasting operating expenditure

After considering costs required to maintain and operate our regulated assets based on the asset management plan, we identify factors within our control, making assumptions regarding factors outside of our control.

4.1.3 Market testing of costs

Over 2016–20 around 65% of our forecast total operating expenditure was largely dependent on external factors or related to services that have been tested in the market place.

Costs of water from WaterNSW, SDP and the BOO water filtration plants are examples of the largest costs that are generally outside of our control. Over the course of 2016–20, these in combination accounted for around 37% of total operating expenditure.

The remaining operating expenditure outside of our control are contested in the market regularly, through contractor rates and procurement activities including competitive tender processes. These include contractor, materials and electricity procurement costs. Combined over 2016–20 they accounted for around 28% of our operating expenditure.

4.1.4 Bulk water and BOO forecast expenditure

The key drivers of expenditure on WaterNSW, SDP and BOO water filtration, and our assumptions for each year in the 2020–24 price period, are:

- **SDP** – only a fixed charge is assumed, reflecting that SDP is assumed to be in water security shutdown mode throughout the period.
- **BOO water filtration costs** – are higher than the current determination period driven by a forecast return to longer term averages for water quality agreed with WaterNSW. They remain largely flat during the period with small volume driven increases.

- **WaterNSW –** we assume that IPART will set WaterNSW's prices based on our forecast demand and its annual revenue requirement.

4.1.5 SDP

We assume that SDP will operate in water security shutdown mode with no water production for the duration of the next determination period. Our cost forecast therefore only includes fixed charges including a residual membrane service charge.

SDP fixed charges after the completion of the current determination period in 2021–22 have been forecast as flat. We have forecast no usage or incremental service charges for SDP despite the plant commencing operation on 27 January 2019.

4.1.6 Build Own Operate water filtration plant costs

In forecasting costs for the four BOO water filtration plants we assume we buy enough water to meet our forecast demand at contracted rates. We also consider that some of our water filtration plants are not designed to meet Australian Drinking Water Guidelines for filter turbidity and chlorination contact time requirements. The costs to upgrade the plants are assumed to be funded through finance leases.

4.1.7 Core operating expenditure forecast (excluding BOO costs)

The core operating expenditure forecast is an outcome of our annual budgeting process. We consider our operating environment and how it could affect costs going forward. The major cost categories within core operating expenditure are labour and service contractors, energy, materials and other costs.

4.1.8 Labour

We have indexed labour rates to nominal dollars at 2.5% in line with expected inflation. This is also in line with NSW Government policy that caps wage increases to 2.5% plus quantifiable productivity improvements (that is, pay rates remain constant in real terms).

We have committed to working with the Australian Services Union to build a positive working relationship to jointly improve organisational performance. This will contribute to the organisation achieving labour efficiencies over time.

We also have plans to improve how we track productivity in specific areas. This extends the 'meet and beat the market' approach we used for civil maintenance.

4.1.9 Energy

We engaged external experts to develop a long-term pricing model. It is based on the current information regarding the generation mix, forecasted capital works, generator costs, market bidding and market demand across the National Electricity Market. The long-term pricing model takes account of demand-supply balance, generation mix and market price. This model was used as a basis for determining the retail price forecasts used in the budget.

While there has been a slight decrease in the wholesale electricity price since 2017–18 and expected declines in wholesale costs with increased renewable generation capacity (9,000 MW of new utility-scale renewables generation capacity and battery storage),[29] there is still an expectation in the coming years that costs will be more than 50% above the $40/MWh used in the 2016 Determination. Compared with 2019–20, electricity prices are expected to slightly decline in real terms over the next four years. However, it is still expected that wholesale electricity prices will remain well above the $40/MWh estimated in IPART's 2016 Determination.

We estimate our total volume of purchased electricity will fall by 4% over 2020–24, with our energy efficiency and renewable generation programs cost-effectively accounting for most load growth from new and amplified assets.

We manage our retail rates through a progressive purchasing contract. This allows us to minimise our exposure to high prices by purchasing blocks of electricity when forward prices are below historical levels and considered to offer fair market value (based on external expert advice). Network price forecasts are based on published data from regulatory proposals submitted by the network operators. There will be flat or lower network costs over the period.

We manage our environmental certificate costs by either purchasing certificates under our contract, or directly transferring certificates we create to the retailer in place of environmental charges. We meet the volume for all large-scale generation credits from our renewable generators and have a natural hedge against any wholesale market price rises. We supply a proportion on small scale technology credits and energy saving certificates and buy the balance. Our forecasts assume no major changes to environmental schemes.

4.1.10 Materials

Chemicals required for treating water and wastewater constitute a significant part of the material costs. A range of chemicals are used in different parts of the water and wastewater supply chain to disinfect, optimise pH and to remove particles, other chemical odors and tastes. Chemical prices can fluctuate due to local and global market forces, so we need prudent procurement arrangements.

The volume of chemicals needed depends upon plant operating regimes and weather conditions. For example, while poor raw water quality increases the need for some chemicals, we have assumed in our forecast that this impact subsides due to a return to average weather conditions. We forecast chemical volumes at levels needed for average weather.

We will continue to be proactive in managing chemical costs. The chemical procurement strategy is reviewed regularly and considers:

- ways to optimise chemical use and operational performance achieved, as in the case of polymers used in the treatment processes for water and wastewater
- market developments that impact availability of chemicals for our use

[29] Australian Energy Market Commission 'Final Report 2018 Residential Electricity Price Trends Review' (21 December 2018), https://www.aemc.gov.au/sites/default/files/2018-12/2018%20Price%20Trends%20-%20Final%20Report%20-%20CLEAN.PDF

- initiatives to improve security of supply of chemicals, including the development of multiple suppliers for operationally critical chemicals. For example, ferric chloride, hydrated lime, fluoride, aluminium sulphate, and sodium hypochlorite
- the use of most cost-effective chemicals where differentials exist
- collaboration with the privately-owned water filtration plants for chemical procurement to achieve volume discounts
- long term supply contracts to achieve cost and strategic benefits
- how to create greater competitive tension in a market where we have more limited supply options.

4.1.11 Contractor services

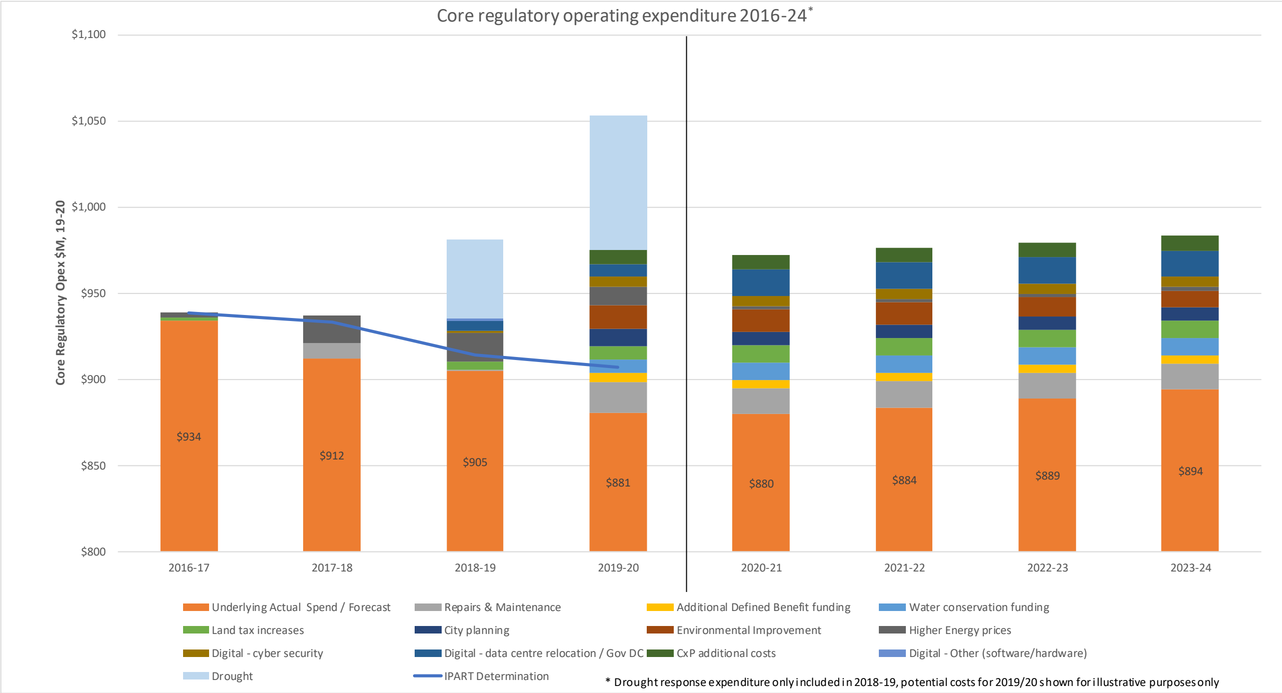
For the 2020–24 period we have forecast efficiency improvements in the contractor services area. We will drive these savings through procurement management with improved procurement planning, consolidated contracts and active contractor management, including:

- long term integrated, enterprise-wide approach for procurement and delivery of asset related goods and services under the Partnering for Success initiative
- establishing a shared purchasing where we, together with our major contract service providers, can consolidate our sourcing requirements for sub-contracted services and goods for achieving volume benefits
- putting in place category management approach and processes for the range of goods and services we require
- improving overall efficiency of supply chain system and processes
- enhancing contract performance management and supplier relationship management via system improvements and improve engagement with key suppliers.

4.2 Operating expenditure 2020–24 – variations in operating costs and efficiencies driving 2020–24 cost re-baselining

A number of factors driving variations to operating expenditure (both up and down) in the 2016–20 period, in particular variations occurring in 2019–20, will persist in the 2020–24 period. This is highlighted in Figure 4-2 below. On this basis, we seek a transitional re-baseline upward of operating costs. The changes in costs, in particular those driving increases in cost that are anticipated to endure, are outlined in Table 4-1 below.

Further, it is anticipated that customer growth will increase by 1.7% annually over the 2020–24 period. This growth places increased cost pressures on us to supply services to customers, as outlined in section 3.4. Despite these cost pressures, we are still looking to achieve self-imposed productivity gains and have targeted a further $83 million of efficiencies. All other things being equal, this amounts to a reduction in costs equivalent to 0.8% a year on core operating expenditure over 2020–24.



Note: Electricity cost and land tax increased variances are both based on comparing the forecast expenditure in 2020–24 with the IPART allowance in 2016–20 and annualising the cost difference.

Figure 4-2 Core regulatory operating expenditure 2016–24 $2019–20 million)

Table 4-1 2016–20 core operating cost variations that occur in 2020–24 ($2019–20 million)

Category	Impact on expenditure over 2016–20	Impact on forecast costs 2020–24	Comments on variance
Prolonged drought	$19m proactive expenditure 2018–19 $27.1m reactive expenditure 2018–19 $78m set aside if drought persists in 2019–20	None	See section 3.1
Network strategy – wastewater	$14.5m preventative maintenance for 2017–18 and 2019–20 $13.2m reactive environmental improvement 2019–20	Annual average cost increase of $27m/year based on continuing preventative maintenance ($15m/year) and environmental improvement (annual average expenditure of $12m/year)	See section 3.2. New approach to managing wastewater networks – move from plan to fail to preventative Aim to stabilise deteriorating environmental performance
Network strategy – water and ELWC	$13.3m for preventative maintenance from 2017–18 to 2019–20 $8m in water conservation spending to meet new ELWC requirements in 2019–20	$10m a year for water conservation $4.8m/year for preventative maintenance	Operating Licence requirement. May be under-budgeted if drought continues. See section 3.2.
Electricity	$45.8m higher cost than allowed by IPART 2016–20 due to higher energy prices Slight price decrease 2019–20, but not at 2016 level	Prices expected to decrease slightly, but not revert back to 2016–17 level Decrease in usage anticipated, flat or decreasing wholesale and networks costs, decreases in green renewable energy certificate costs	Higher market rates than the IPART 2016 Determination, but lower than actual costs in 2016–20. See section 3.3 Self-generation notionally worth a total of $97 million over the 2016–20 and 2020–24 period, which reflects a net benefit to customers
Growth and water demand	Growth higher than expected has led to higher water demand increasing operating costs in three areas: • chemicals – to treat the water and wastewater • electricity (supply) – to pump and treat water and wastewater • repair and maintenance – to respond to increased wear in the network • other operating costs including biosolids, grit and screenings	Annual property growth rate at around 1.7%. The costs can no longer be absorbed. Operating expenditure needs to increase to service growth	The annual growth rate of 1.7% is higher than forecast in the 2016 Determination. While we expect to achieve ongoing efficiencies in future years, overall there is a net increase required in operating expenditure. See section 3.4

Table 4-1 2016–20 core operating cost variations that occur in 2020–24 ($2019–20 million)

Category	Impact on expenditure over 2016–20	Impact on forecast costs 2020–24	Comments on variance
City planning	Planning work to facilitate growth in Western Sydney $10m in 2019–20	$8m a year ongoing work	Expenditure required to support new developments and growth areas, in particular in Western Sydney. See section 3.5
Land tax	$14m 2016–20	$10m a year 2020–24	Land Tax over 2020–24 is impacted by high growth in industrial land values in Sydney's West, and new infrastructure projects based in Western Sydney, such as the South Creek Western Sydney Airport and Greater Parramatta Olympic Park Camellia Treatment. See section 3.6.
Additional defined benefit funding	$5.5m 2019–20	$5.5m a year	See section 3.7
Digital expenditure	$30m 2016–20 Cost of cyber security of $7.5m in 2018–20 Data centre GovDC (Enterprise costs, CxP hosting) $13m from 2018–20 Ongoing CxP costs of $8.5m from 2019–20 Additional data management costs of $1m in 2018–19	$29.7m a year 2020–24 Cyber security – $6m a year Data centre relocation – $8m a year CxP costs – $8.5m a year GovDC lease costs (CxP and other applications) – $7.2m a year	Increased cyber security, network resilience, and critical system support. See section 3.8.
Net combined savings to BAU	Including Overall efficiencies of $47.3m PIP – $32.9m Business Connect – $9.4m Civil operating model – $1.3m Supply chain improvement – $2.1m Network reorganisation – $1.6m in 2019–20	Overall efficiencies $83m Production Improvement Program $49.1m 2020–24 Business Connect – $11.4m Supply chain improvement – $14.1m Network reorganisation – $4.8m Civil operating model – $3.9m	Productivity reforms and efficiency initiatives carrying over from 2016–20. See section 3.9.

4.2.1 Growth and water demand

In the past, we have had the capacity to absorb the costs of growth. However, with the current annual growth rate at around 1.7%, there will now need to be some costs related to growth included in our operating expenditure forecasts.

While we still expect to achieve efficiencies on operating expenditure in future years, overall an increase in operating expenditure is required over the 2020–24 period.

4.2.2 Network strategy

The allowance we have proposed is challenging. We may well be required to spend more than we have requested in our proposed allowances to meet our commitments.

We cannot be sure that the level of expenditure proposed will return our wastewater network to satisfactory environmental performance level, but we will do what is necessary to transform our performance. Further, if drought persists and dam levels are significantly lower, then the current proposed funding to meet the ELWC may well be too low.

Any reduction in our proposed allowance will increase risks that we will be unable to comply with our licence conditions and may put at risk the long term resilience of the network.

4.2.3 Water conservation

To meet new requirements over 2020–24, we have budgeted for a water conservation expenditure of $10 million each year.

This represents the higher water conservation expenditure we are undertaking to meet the economic level of investment. It is expenditure over and above the commercial return on water conservation activities that we undertook under our previous Operating Licence target of 329 litres per capita. It is a P50 estimate. If drought conditions persist into the future and dam levels get lower, additional expenditure on water conservation activities is likely to be required.

4.2.4 Efficiency gain

Over 2020–24, through the continuation of programs established in 2016–20 and described in section 3.9, we expect to achieve further productivity improvements and realise a total of $83 million in efficiency gains, made up of:

- Production Improvement Program – we expect to achieve $49 million of cost savings
- Business Connect – we expect to achieve efficiencies of $11 million
- Supply chain improvement – by establishing programs across the business to continuously drive supply chain efficiencies in labour and materials, plant and equipment, we will achieve $14 million of cost savings
- Network reorganisation – the continued re-organisation of the Networks business will reduce management overhead and deliver $4.8 million of cost savings
- Civil operating model – we expect to further reduce costs by $3.9 million.

The efficiencies, and savings to operating expenditure by year, are summarised in Table 4-2.

Table 4-2 Efficiency gains expected in 2020–24 by program ($2019–20 million)

	2020–21	2021–22	2022–23	2023–24	2020–24	Percentage of total
Production Improvement Program	12.3	12.3	12.3	12.2	**49.1**	**58%**
Business Connect	2.9	2.9	2.8	2.8	**11.4**	**14%**
Supply chain improvement	3.6	3.5	3.5	3.5	**14.1**	**17%**
Network reorganisation	1.2	1.2	1.2	1.2	**4.8**	**6%**
Civil operating model	0.9	1.0	1.0	1.0	**3.9**	**5%**
Total	**20.9**	**20.9**	**20.8**	**20.7**	**83.3**	**100%**

4.3 Operating expenditure by product and category

A breakdown of our forecast total regulatory operating expenditure over 2020–24 by service, shows that of the proposed $5.4 billion costs:

- water operating expenditure is $3.3 billion (or 61% of opex), of which $1.9 billion (or 57% of the total water operating costs) relates to costs associated with WaterNSW, SDP and BOO plants
- wastewater operating expenditure makes up $1.9 billion (or 35%)
- stormwater operating expenditure makes up $60 million (or just over 1%)
- Section 16A recycled water operating expenditure make up $130 million (or just over 2%).

While the forecast total operating expenditure by product for 2020–24 is slightly higher than in the early years of 2016–20, Table 4-3 shows they are comparable to the average total operating expenditure over and slightly lower than what we forecast in 2019–20.

Table 4-3 Forecast total operating expenditure 2020–24 by product ($2019–20 million)

	2016–20 Average	2019–20 Forecast	2020–21 Forecast	2021–22 Forecast	2022–23 Forecast	2023–24 Forecast	Total
Total regulatory opex	1,386.2	1,436.7	1,342.1	1,348.9	1,357.8	1,364.9	**5,413.7**
Water	797.0	836.5	818.4	824.3	834.9	841.1	**3,318.8**
BOO water filtration costs	91.7	93.7	97.9	98.7	98.9	99.5	**395.1**
*WaterNSW costs**	217.2	220.3	189.2	193.7	199.6	202.8	**785.3**
SDP costs	210.9	241.1	180.6	178.8	178.8	178.8	**717.1**
Water delivery	277.3	281.4	350.6	352.9	357.5	359.8	**1,420.8**
Wastewater	548.4	557.2	476.1	476.9	475.7	476.2	**1,904.9**
Stormwater	14.8	16.4	14.7	14.9	15.2	15.5	**60.3**
Section 16A Recycled water	25.9	26.6	33.0	32.9	32.1	32.3	**130.3**

4.4 Operating expenditure by category

Table 4-4 summarises our forecast total operating expenditure by category for 2020–24, compared with the average for 2016–20 and our forecast 2019–20 expenditure. It shows that:

- with the exception of property costs, which steadily increased, most expenditure categories remain relatively flat over the period from 2019–20 to 2020–24
- electricity expenditure is expected to decrease slightly from 2019–20 to 2020–24 (see section 4.2), but expenditure is not expected to be as low as the levels in 2016–17. Compared to the average expenditure over 2016–20, electricity expenditure is expected to be 19% lower on average over 2016–20
- compared with the average expenditure over 2016–20, the average labour costs over 2020–24 are forecast to be 0.6% higher; the average contractor costs over 2020–24 are forecast to be 2.8% higher; and the average property costs over 2020–24 are forecast to be 24% higher

- of the cost categories listed above, approximately 50% of these costs are market tested via tender processes (contractors, materials and BOO filtration) or external market prices (property and electricity).

Table 4-4 Core operating expenditure 2020–2024 by category ($2019–20 million)

$19–20 '000	**2016–20** Average	**2019–20** Forecast	**2020–21** Forecast	**2021–22** Forecast	**2022–23** Forecast	**2023–24** Forecast	Total
Total regulated core opex	958.1	975.4	972.3	976.4	979.5	983.3	3,911.4
Labour (after capitalisation)	326.5	327.2	326.7	328.6	328.9	330.1	1,314.3
Contractors	314.9	326.4	324.3	323.4	324.2	323.7	1,295.6
Materials	37.1	38.6	40.1	40.2	39.9	39.9	160.1
Property	46.1	49.1	52.4	56.3	58.4	61.0	228.1
Administration	16.3	15.5	14.3	14.5	15.0	15.1	58.9
Transport	17.1	16.7	16.6	16.6	16.6	16.5	66.3
Data management	25.3	27.1	26.4	26.1	26.1	26.1	104.7
Electricity	50.4	47.6	40.9	39.5	39.1	38.9	158.4
Other Core Opex	32.7	33.6	32.8	32.5	32.3	32.5	130.1
BOO Filtration	91.7	93.7	97.9	98.7	98.9	99.5	395.1

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Attachment 11
Proposed revenue requirement

Price proposal 2020–24

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Proposed revenue requirement

Key messages

- We propose an average revenue of $2.675 billion ($2019–20) a year over 2020–24. This is about $62 million higher than the yearly target in the 2016 Determination.
- We expect to serve an increased number of customers in 2020–24. In combination with lower interest costs, efficiency measures and benefits of previous investment, this means we propose lower prices and customer bills in real terms for our water and wastewater services.
- Forecast capital expenditure over 2020–24 (including the amount for finance leases) is $4.7 billion ($2019–20). This will increase our Regulated Asset Base (RAB) from $19.2 billion in 2019–20 to $22.2 billion by 2023–24, an increase of 15.7%.
- The forecast RAB drives $5 billion ($2019–20) (46.8%) of our proposed notional revenue requirement over 2020–24 through leveraging a return on and a return of (that is, a depreciation allowance) the asset base.
- Our forecast operating expenditure of $5.4 billion ($2019–20) drives 50.2% of our proposed notional revenue requirement over 2020–24.
- We propose to align our cost allocation approach for common corporate shared costs to services under retail pricing with the approach that we adopted for the Cost Allocation Methodology (CAM) for our declared network access services. These costs constitute about 11% of the forecast operating expenditure. Our proposed approach results in a re-distribution of the common costs, largely from wastewater to water services.
- The regulatory values for finance leases, asset disposals, working capital and tax allowances for our building block revenue estimation have been prepared using the most recent policies or guidelines issued by IPART.
- Our tax allowance proposal for 2020–24 has incorporated $37.3 million of allowable holding costs over the 2016–20 determination period, a provision determined by IPART in 2016. This holding cost is to compensate Sydney Water for funding the tax for the higher actual amount of assets free of charge (AFOC). Actual AFOC was 63% higher than the allowance used by IPART in the 2016 Determination.
- Our proposed revenue requirement is based on a no-drought scenario (assuming the Sydney Desalination Plant and Shoalhaven transfers are not operating) and operating expenditure is set for average weather. If further drought costs are needed, we will make these investments. Funding for these additional costs is not included in our proposal.

1 Proposed revenue requirement

1.1 Overview – 2016–20 revenue

For 2016-20, we are forecasting to recover $10.8 billion in regulated income (revenue), which is $429 million (4%) more than that allowed by IPART in its 2016 Determination. Table 1-1 analyses this difference:

Table 1-1 Regulated target revenue for 2016–20 ($2019–20, million)

Regulated income	2016–17	2017–18	2018–19*	2019–20*	Total
IPART allowance	2,552	2,582	2,612	2,644	10,391
Actual / forecast	2,623	2,738	2,661	2,798	10,820
Variance	71	156	49	153	429
Variance %	3%	6%	2%	6%	4%

Note: Figures in this table excludes Rouse Hill Land Charge income but includes revenue relating to section 16A recycled water schemes. The annual escalation applied is based on Mar quarter to Mar quarter rates with a forecast rate of 2.2% to escalate from 2018–19 dollars to 2019–20 dollars.
* 2018–19 and 2019–20 revenue are forecast amounts

The increase in revenue is largely due to water demand which was higher than forecast at the 2016 Determination (totalling 105 GL, about 5.5% of metered water sales over four years), an increase in the number of customers and the SDP pass through of income (forecast to be $71 million in 2019–20).

Higher water demand is due to:

- mostly above average temperatures and some prolonged dry weather periods, resulting in customers using more water
- an increasing number of connections due to higher property growth, resulting in more customers using water.

Higher growth in customer numbers is due to:

- state government housing acceleration programs and infrastructure funds, precinct acceleration, and city centre and urban reactivation programs
- new policies increasing the number of affordable rental housing, dual occupancy smaller lots, secondary dwellings, boarding houses, group homes, and senior living options
- an increasing number of residential development applications.

For more details, refer to **Attachment 8: Water demand and customer numbers**.

1.1.1 Over or under-recovery of revenue in 2016–20 – demand volatility adjustment

To account for uncertainty in our water sales forecasts, IPART introduced a demand volatility adjustment mechanism. This mechanism can be used to adjust Sydney Water's revenue requirement in subsequent determination periods if the difference between actual and determined water sales exceeds a 'dead band' of ±5%.

Based on our actual/forecast water sales over the current determination period, we forecast that this demand volatility adjustment mechanism may be triggered (as water sales actuals/forecasts are currently estimated to be +5.5% from the determined level). However, the size of the adjustment to the revenue requirement in 2020–24 depends on actual sales in 2018–19 and 2019–20, and if and how IPART determines to apply the mechanism.

Attachment 7: Regulatory framework and application, section 2.4, includes our proposal of how this mechanism could be applied to our 2020–24 revenue requirement. Given that the nature and level of the adjustment relating to this mechanism is still uncertain, we have excluded any demand volatility adjustment from the calculation of our proposed 2020–24 revenue requirement.

1.2 Overview – 2020–24 revenue requirement

We have calculated our Annual Revenue Requirement (ARR) based on a four-year determination for 2020–24.

Our proposed revenue requirement is based on a 'business as usual', no-drought scenario, assuming average weather. It does not include costs incurred when the Sydney Desalination Plant and Shoalhaven transfers are operating. We propose to continue to recover these costs through the established cost pass-through mechanisms determined by IPART in 2016.

If further drought costs prove essential, we will make these investments. Funding for these additional costs, whether it be capital investment to improve network resilience or operational expenditure to manage water restrictions and implement water conservation, is not included in our proposal.

We have also assumed a 'business as usual' demand forecast, with no adjustment for lower water use due to restrictions. Again, this is because the length of restrictions is uncertain.

Our baseline revenue and price proposals are outlined in this attachment and **Attachment 4: Proposed prices**.

1.2.1 Building block approach

We establish the notional ARR for standard regulated services using the 'building block' approach as determined by IPART.[1] Details of each element of the building block modelling are discussed in section 3. We have established our target revenues by smoothing the notional ARR on an NPV-

[1] IPART publishes a generic building block and pricing model, https://www.ipart.nsw.gov.au/Home/Industries/Special-Reviews/Regulatory-policy/IPART-cost-building-block-and-pricing-model. Sydney Water has built our own model to accommodate our complex and extensive costs structures. Sydney Water's building block model aligns with IPART's building block framework.

neutral basis. The principles and methods we have used to calculate our target revenue are discussed in section 2.1.

Our infrastructure and operating costs are complex and extensive, and it is difficult to accurately allocate costs to some of our minor regulated services (for example, trade waste services and other ancillary services). We include costs associated with these services in our ARR, and, in parallel, deduct the revenue from these sources from the ARR to determine our revenue from water, wastewater and stormwater charges. This process is explained in section 4.

To derive the ARR for our regulated services, we exclude costs of unregulated services from the cost base used in the building block calculations.

1.2.2 Building block revenue

Despite higher investment and operating costs compared to 2016–20, we propose a total target revenue of $10.7 billion over 2020–24, which is only marginally higher ($249 million) than the level set in the 2016 Determination (see Figure 1-1). This is due to the lower cost of funding (that is, the weighted average cost of capital, WACC), our efficiency gains and the long-lived nature of our new assets.

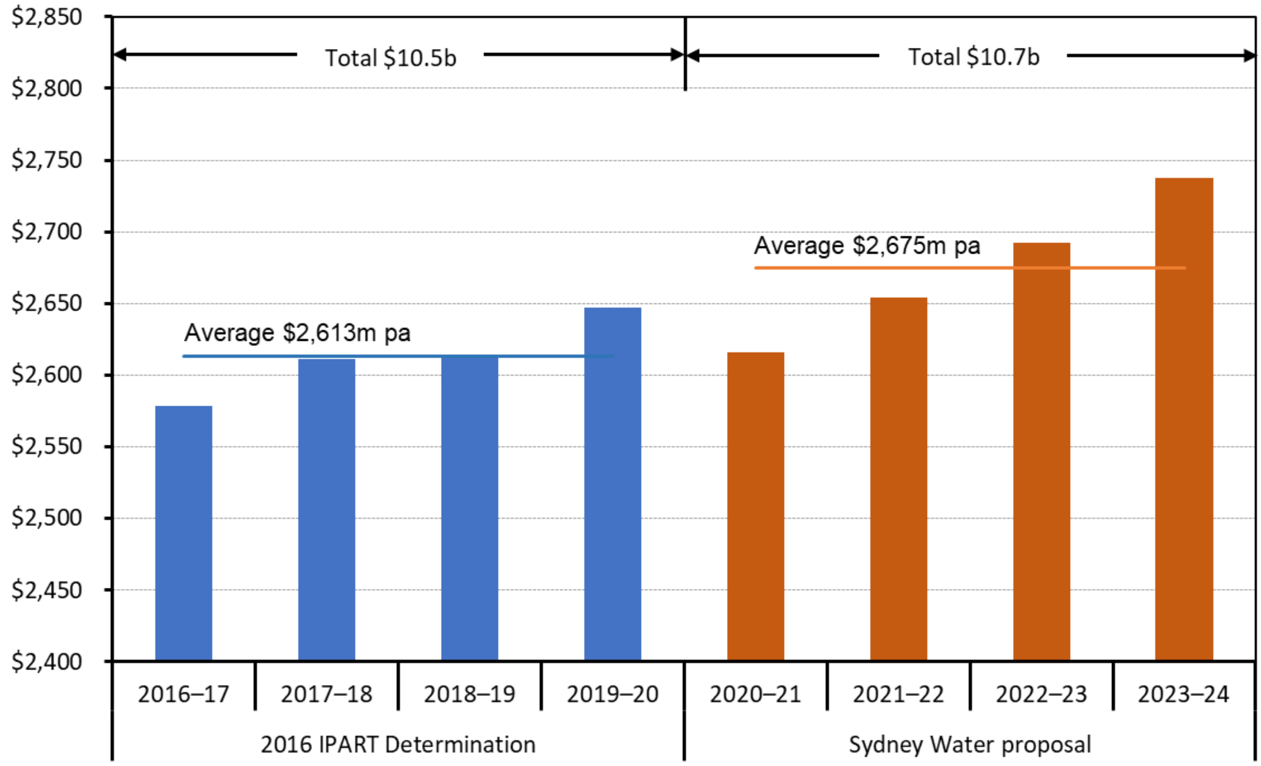

Figure 1-1 Target revenue ($2019–20, million)[2]

[2] The total $10.5 billion target revenue IPART allowed in 2016 in Figure 1-1 and Figure 1-3 are slightly different from the total of $10.4 billion reported in Table 1-1 as we have used different sets of CPIs to escalate from $2015-16 to $2019-20 to facilitate 'fit for purpose' comparisons on the same basis. For Table 1-1 we have applied the March to March CPIs as the table compares revenues between the IPART allowed and Sydney Water's actuals/forecast. For Figure 1-1 and Figure 1-3 which compare target revenue based on costs, June to June CPIs were used.

With a four-year price determination, the target revenue for water, wastewater and stormwater services (see Figure 1-2) in 2023–24 (the final year of this proposal) is 3.4% or $91 million (in real terms) higher than the determined target revenue for 2019–20 (the final year of the 2016 Determination).

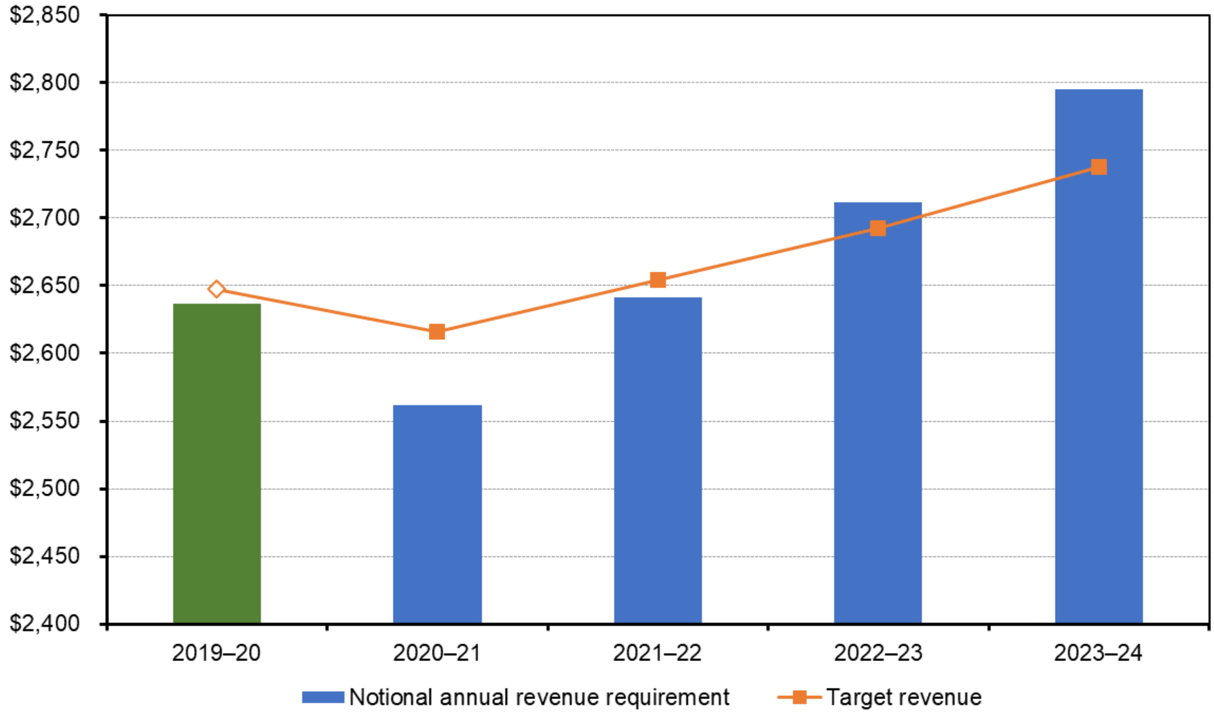

Figure 1-2 Notional ARR and target revenues ($2019–20, million)

Figure 1-3 shows Sydney Water's proposed revenue requirement, represented by the key elements of the 'building block' approach to price setting.

Revenue Requirement

		Determined 2016–2020	Proposal 2020–2024
	Opex Total	$5,330	$5,380
	– Core opex	3,297	$3,507
	– Water purchase and treatment	$2,033	$1,872
Plus	Return on Assets	$3,510	$3,342
	Real post-tax WACC	*@ 4.9%*	*@ 4.1%*
Plus	Regulatory Depreciation	$1,339	$1,665
Plus	Return on Working Capital	$29	$45
Plus	Tax Allowance	$241	$278
	Notional Revenue (including tax)	**$10,450**	**$10,709**
Minus	Other Revenue (TW/Ancillary/Rent etc)	$223	$155
	Notional Revenue from W/WW/SW	**$10,228**	**$10,554**
	Target Revenue from W/WW/SW	**$10,229**	**$10,545**

Notes:
1. The values are the sum of four years' costs for 2016–20 and 2020–24.
2. The return on assets, depreciation and return on working capital are mid-year values.
3. Totals may not add due to rounding.

Figure 1-3 Building block revenue for 2020–24 price proposal ($2019–20 million)

2 Proposed target revenue

Our proposed notional ARR represents our view of the total efficient costs of providing regulated services in each year of the determination period.

We have used the building block approach to calculate our notional ARR for water, wastewater and stormwater drainage services in each year of the price path. For these services, we have proposed target revenues for each year on an NPV-neutral basis, aiming to balance the interests of Sydney Water and customers.

Our forecast costs, and thus the notional ARR, vary from year to year. We propose a revenue recovery profile that averages out these costs and avoids large annual shifts in customer bills. We refer to this process as ‘smoothing’.

2.1 Smoothing of the price path

In designing our preferred path for prices, bills and revenue, we considered the key principles shown in Table 2-1. These principles took account of our understanding of customers’ preferences, our priorities, and existing regulatory guidelines.

Table 2-1 Key factors in smoothing of price path

Key factors	Principles
Customers	No real average bill increase Immediate savings preferred Steady prices over time
Sydney Water	Revenue stability Ability to manage customer bills beyond 2020 to avoid large swings Maintain key financeability ratios
Regulatory guidelines/practice	NPV neutral over 4–year price path[3] No cross–subsidy between products

We are proposing price levels for water, wastewater and stormwater services based on our revenue requirement and the impact on customers’ bills.

Our proposed price path is:

- water and wastewater – a bill drop in 2020–21 for water and wastewater customers, followed by flat bills (in real terms) for the remaining three years
- stormwater – a bill increase in 2020–21 (though only between $2-6), followed by flat bills (in real terms) for the remaining three years.

[3] We note there are exceptions to this principle. For example, the 2012-16 price path was set in an NPV positive manner to allow for the large tariff changes imposed.

This is based on a NPV-neutral revenue requirement over four years, and closely reflects our expected cost profile (see Figure 1-2).

When considering price levels and profiles over time, we have looked at how we can maintain steady price or bill profiles in the longer term, over the 2020–24, 2024–28 and longer price periods. We are mindful of the current low interest rate environment, and the risk that this environment may not continue in the long term. If rates revert to higher levels, and so WACC for future regulatory periods is higher, this will put upward pressure on prices for all services. We have attempted to mitigate this risk by only including certain costs in our baseline price proposal.

2.2 Yearly target revenue requirement

Table 2-2 shows our proposed notional ARR (by each of the building block elements) and our proposed target revenue requirement. Under our proposed price path, target revenue would drop marginally in the first year from $2.65 billion in 2019–20 to $2.62 billion in 2020–21, and then gradually increase to $2.74 billion in 2023–24. This is an increase of 3.4% or $91 million from the level in 2019–20.

Table 2-2 The elements of notional annual revenue requirement ($2019–20 million)

	2019–20	2020–21	2021–22	2022–23	2023–24
Operating expenditure		1,314.9	1,346.7	1,355.6	1,362.6
Allowance for return on assets		790.5	818.0	849.5	883.6
Allowance for regulatory depreciation		371.2	402.0	432.2	459.7
Allowance for tax obligation		73.9	62.9	63.5	77.9
Allowance for return on working capital		11.0	11.5	10.8	11.3
Total notional revenue requirement		**2,561.5**	**2,641.0**	**2,711.5**	**2,795.1**
Total target revenue	**2,647.4**	**2,615.7**	**2,654.2**	**2,692.4**	**2,737.9**
Real post-tax WACC	4.9%	4.1%	4.1%	4.1%	4.1%

Note: The June to June CPIs as advised by IPART in the *Submission Information Package* are used to escalate to $2019–20.

3 Elements of building block allowance

Attachment 10: Operating expenditure details our proposed operating expenditure allowance. This expenditure contributes 50.2% of our proposed notional revenue requirement.

One of the elements of operating expenditure is the costs Sydney Water pays to the Sydney Desalination Plant (SDP). Our proposal only includes fixed SDP costs that we pay to SDP when the desalination plant is in 'shutdown mode'. As noted above, even though SDP is currently in 'operating mode', our proposed revenue and prices for 2020–24 assume that SDP is in 'shutdown' mode. If it continues operating beyond July 2020, any costs associated with operating the plant will be passed on to customers under the established cost pass-through mechanism. A similar mechanism exists for the cost of Shoalhaven transfers when these are in operation. This means that customers only pay for the additional costs associated with these water supply options when they are needed.

Further detail on our proposed operating expenditure for water, wastewater and stormwater is provided in section 3.1. We have not included any Efficiency Carryover Mechanism (ECM) benefits for our controllable operating expenditure in our proposed revenue and prices for 2020–24. Further detail on ECM operating cost analysis can be found in **Attachment 10: Operating expenditure**, section 1.2. **Attachment 9: Capital expenditure** details our proposed capital expenditure for 2020–24.

During extended drought, Sydney Water could also incur other additional operating or capital costs. These are not included in our proposed operating or capital expenditure allowances.

We have calculated the proposed allowance for a return on assets by multiplying the rate of return by the sum of the RAB and half the net capital expenditure and disposals in each year of the period. Section 3.2 provides more details.

The appropriate rate of return on our RAB is an important variable in setting our notional revenue requirement. We have used a real post-tax WACC of 4.1% to calculate our ARR. Further details on our proposed WACC can be found in **Attachment 6: Weighted average cost of capital**.

The allowance for regulatory depreciation (that is, a return of assets) is estimated by using a straight-line methodology. Adjustments for asset changes through the year are also required in estimating depreciation. In section 3.3, we set out our calculation of regulatory depreciation.

Our proposed allowance for tax obligations is estimated based on IPART's post-tax framework as published in December 2011. Section 3.6 contains details of how we calculate the allowance.

Our proposed allowance for return on working capital (see section 3.7) is based on IPART's updated Working Capital Policy and our key input parameters (especially in relation to receivables) to the calculation.[4] Further detail on our working capital proposal is shown in Appendix 11A.

[4] IPART, *Working Capital Allowance*, Policy Paper, final report, November 2018.

3.1 Operating expenditure by water, wastewater and stormwater services

The proposed operating expenditure represents our estimate of the efficient level forecast operating, maintenance and administration costs. Table 3-1 below shows our proposed operating expenditure by water, wastewater and stormwater services.

Table 3-1 Operating expenditure by services ($2019–20, million)

	2020–21	2021–22	2022–23	2023–24
General O&M costs				
Water[1]	288.6	289.9	292.7	293.9
Wastewater	424.3	424.9	423.8	423.9
Stormwater	13.0	13.3	13.6	13.8
Total general opex	725.9	728.1	730.1	731.7
Water purchase				
BOO costs	97.9	98.7	98.9	99.5
WaterNSW	189.2	193.7	199.6	202.8
SDP[2]	180.6	178.8	178.8	178.8
SDP adjustment of 2019–20[2,3]	-24.9			
Total water purchase	442.8	471.3	477.3	481.1
Corporate common costs				
Water	92.8	93.6	94.7	95.8
Wastewater	51.9	52.1	52.0	52.3
Stormwater	1.6	1.6	1.7	1.7
Total corporate common costs	146.2	147.2	148.3	149.8
Total opex by products				
Water	824.2	854.8	864.6	870.9
Wastewater	476.1	476.9	475.7	476.2
Stormwater	14.6	15.0	15.2	15.5
Total regulatory opex	**1,314.9**	**1,346.7**	**1,355.6**	**1,362.6**

Notes: Totals may not add due to rounding. Core opex includes general O&M costs and corporate common costs.
[1] Water general O&M costs include section 16A recycled water scheme costs net of revenues.
[2] SDP forecast assumes that SDP plant is not in operation.
[3] In calculating the SDP adjustment of 2019-20, we used pre-tax WACC of 5.9% and forecast CPI of 2.2%.

To date, we have used a regulatory cost model (RCM) to attribute proposed operating expenditure and an allocation of common corporate overheads to each of our regulated services. Under the RCM allocation process, direct costs include those costs that can be directly linked or have traceable cause and effect relationship to providing the services. These are allocated to the relevant services. In respect of common corporate overhead costs, the RCM cost model allocates these costs to all services in proportion to their direct costs. In the past, the basis of the direct costs used by the RCM for this allocation has excluded bulk water costs incurred by us.

We propose to re-allocate common corporate costs to services using an operating cost base that includes all direct costs. This proposed approach will bring our cost allocation method for common costs in line with our proposed Cost Allocation Methodology (CAM) for declared wastewater services. We have also considered IPART's approach used in the 2016 Determination for allocating common corporate costs to trade waste and ancillary services. This envisages recovering a share of corporate overheads from these services, to ensure consistent allocation, encourage economies of scope and provide positive incentives for competition.

Further details on our proposed allocation of common costs can be found in **Attachment 4: Proposed prices**, section 5.4.

3.2 Setting and adjusting the Regulatory Asset Base (RAB)

To calculate the allowance for a return on assets and the allowance for regulatory depreciation, we have calculated the forecast opening RAB as at 1 July 2020 and rolled forward the RAB to the end of the determination period.

The method for rolling forward the RAB considers capital expenditure, asset disposals, depreciation and an adjustment for inflation. In overview, capital expenditure and the inflation adjustment are added to the opening RAB, and asset disposals and depreciation are subtracted. This provides a closing RAB position. The opening RAB position for any year is equal to the closing RAB position of the previous year. This process is followed each year for which the RAB is rolled forward. The initial RAB was established by IPART in 2000 (this is known as 'the line in the sand') and it has been rolled forward using this method since then.

3.2.1 Forecast opening RAB as at 1 July 2020

The opening RAB for the next determination period (1 July 2020) was established by rolling forward the RAB from 1 July 2015 with the following adjustments.

- Add the actual capital expenditure to 31 January 2019 and forecast spend for the remaining 17 months to the opening value of the RAB each year. The capital expenditure included in RAB is shown in Table 3-4.
- Deduct IPART's allowed regulatory depreciation for the current determination period, adjusted with actual CPIs.
- Deduct actual or latest forecast assets disposals values, in line with the proposal in our submission, as described in section 3.5.
- Index the allowance for actual and forecast inflation, based on a combination of indexing the annual opening RAB and half the capital expenditure and disposals.
- Adjust the opening RAB at 2016–17 by $24.3 million to fully recover the costs of Rouse Hill stormwater, in line with provisions in the 2016 pricing determination, where IPART allowed 50% of total capital costs of Rouse Hill stormwater (on NPV basis) to be recovered from

Rouse Hill land drainage charges, and another 50% from wastewater charges. These figures have been updated with the latest actual and revised forecasts of capital costs for civil works and land acquisition.

- Roll the separate RABs (three water and one wastewater) for finance lease assets with actuals civil, electrical, mechanical, electronic and non-depreciating (CEMLND) asset class values and latest proposal for Prospect and Macarthur upgrades. See section 3.4 for details of our proposed regulatory RAB for the finance leases.

With all the above-mentioned adjustments, the closing RAB in 2015–16 of $15.4 billion is expected to grow to a closing RAB of $19.2 billion by 2019–20.

Table 3-2 shows that the total opening RAB value as at 1 July 2019 (that is the closing value as at 30 June 2019), this includes $555.1 million of finance leases RAB.

We have also shown the opening RAB value by services (see Table 3-3) for water, wastewater, stormwater and corporate assets over 2016–17 to 2019–20.

Table 3-2 Annual value of the RAB for 2016–20 ($ nominal, million)

	2015–16	2016–17	2017–18	2018–19	2019–20
Opening RAB					
RAB excluding finance leases	14,825.9	15,360.0	15,995.8	16,770.6	17,674.3
RAB of finance leases	-	500.8	500.6	504.6	510.3
Adjustment[1]	-	24.3	-	-	-
Total opening RAB	14,825.9	15,885.0	16,496.4	17,275.2	18,184.7
Capital expenditure					
Capex excluding finance leases	674.7	604.6	776.1	856.1	828.5
Capex of finance leases	-	2.3	5.6	7.1	44.8
Total capital expenditure	674.7	606.9	781.7	863.1	873.4
Cash capital contribution	0.0	0.6	1.0	-	-
Asset disposals[2,3]	15.4	8.5	39.0	1.7	0.8
Regulatory depreciation (allowed)					
Depreciation excl finance leases	276.6	281.9	305.0	329.0	354.9
Depreciation of finance leases	-	12.0	12.2	12.5	12.8
Total depreciation	276.6	293.9	317.2	341.5	367.7
Indexation					
Indexation excl finance leases	151.6	298.0	343.6	378.4	452.2
Indexation of finance leases		9.5	10.6	11.2	13.3
Total indexation	151.6	307.5	354.2	389.5	465.5
Closing RAB	**15,360.0**	**16,496.4**	**17,275.2**	**18,184.7**	**19,155.1**

Notes:
[1] The adjustment is for Rouse Hill stormwater.
[2] The asset disposals are the amount deducted from RAB as per Sydney Water's proposal.
[3] The asset disposal of 2017–18 includes $25.8 million (in nominal) write-off of redundant IT assets arising from replacing the existing Customer Management System.[5]

[5] IPART 2016, *Review of prices for Sydney Water Corporation, Final Report*, page 120.

Table 3-3 Annual opening RAB values by services for 2016–20 ($nominal, million)

	2016–17	2017–18	2018–19	2019–20
Water	4,763.9	4,962.6	5,128.0	5,311.0
Wastewater	9,689.8	10,040.1	10,554.0	11,167.7
Stormwater	312.2	340.7	373.8	394.9
Corporate	618.4	652.5	714.9	800.7
Finance leases				
Water	367.9	366.9	369.7	374.2
Wastewater	132.9	133.7	134.9	136.1
Total water	5,131.8	5,329.4	5,497.7	5,685.2
Total wastewater	9,822.7	10,173.8	10,688.9	11,303.8
Total stormwater	312.2	340.7	373.8	394.9
Total corporate	618.4	652.5	714.9	800.7
Total opening RAB	**15,885.0**	**16,496.4**	**17,275.2**	**18,184.7**

Table 3-4 Regulatory capital expenditure and adjustments for 2016–20 period ($nominal, million)

	2015–16	2016–17	2017–18	2018–19	2019–20
Capital investment programs					
Water	181.0	178.5	143.4	147.8	149.3
Wastewater	342.4	313.6	461.6	547.1	550.9
Stormwater	49.4	26.0	28.5	15.8	18.5
Rouse Hill drainage					
Land acquisition	2.9	-5.2	1.6	4.3	0.0
Civil projects	0.6	0.7	7.5	4.2	0.4
Corporate	100.3	82.0	141.6	145.4	109.8
Total capital investment programs	676.6	595.7	784.1	864.5	828.9
Finance leases upgrade					
Water – Macarthur		0.0	0.3	4.1	16.7
Water – Prospect		2.3	5.3	3.0	28.2
Total finance leases upgrade		2.3	5.6	7.1	44.8
Commercial agreement adjustment					
Water	0.6	1.8	0.4	0.0	0.0
Wastewater	0.9	2.7	0.7	0.0	0.0
Rouse Hill drainage adjustment					
Land acquisition	-2.9	5.2	-1.6	-4.3	0.0
Civil projects	-0.6	-0.7	-7.5	-4.2	-0.4
Capital expenditure in RAB					
Water	181.6	182.6	149.4	154.9	194.1
Wastewater	343.3	316.3	462.2	547.1	550.9
Stormwater	49.4	26.0	28.5	15.8	18.5
Corporate	100.3	82.0	141.6	145.4	109.8
Total capital expenditure in RAB	**674.7**	**606.9**	**781.7**	**863.1**	**873.4**

Note: The 2015–16 forecast in IPART’s 2016 Determination is replaced by the actual efficient capital expenditure.

3.2.2 RAB roll forward to the end of 2020–24

To establish the value of the RAB as at the end of the next price period, we have rolled forward the 1 July 2020 RAB to 30 June 2024, as shown in Table 3-5 (by cost categories) and Table 3-6 (by services). Further details of capital expenditure in relation to finance leases are in section 3.4 and details of our forecast asset disposals are found in section 3.5.

Table 3-5 Annual value of the RAB by cost categories for 2020–24 ($2019–20, million)

	2020–21	2021–22	2022–23	2023–24
Opening RAB				
RAB excluding finance leases	18,599.5	19,221.2	19,834.9	20,653.2
RAB of finance leases	555.7	590.5	653.5	697.6
Total opening RAB	19,155.1	19,811.8	20,488.4	21,350.8
Capital expenditure				
Capex excluding finance leases	989.9	1,011.9	1,245.8	1,256.7
Capex of finance leases	47.4	76.9	59.5	18.5
Total capital expenditure	1,037.3	1,088.7	1,305.2	1,275.2
Cash capital contribution	0.0	0.0	0.0	0.0
Asset disposals	1.9	1.9	1.9	1.9
Regulatory depreciation				
Depreciation excl finance leases	366.2	396.3	425.5	452.8
Depreciation of finance leases	12.5	13.9	15.4	16.3
Total depreciation	378.7	410.1	440.9	469.1
Closing RAB	**19,811.8**	**20,488.4**	**21,350.8**	**22,155.0**

Table 3-6 Annual opening RAB values by services for 2020–24 ($2019–20, million)

	2020–21	2021–22	2022–23	2023–24
Water	5,511.2	5,628.6	5,767.2	5,909.8
Wastewater	11,823.0	12,247.4	12,660.9	13,315.0
Stormwater	420.2	449.3	492.0	531.4
Corporate	845.1	895.8	914.8	897.0
Finance leases				
Water	417.9	454.6	519.4	565.2
Wastewater	137.7	135.9	134.2	132.4
Total water	5,929.1	6,083.2	6,286.6	6,475.0
Total wastewater	11,960.8	12,383.4	12,795.0	13,447.4
Total stormwater	420.2	449.3	492.0	531.4
Total corporate	845.1	895.8	914.8	897.0
Total opening RAB	**19,155.1**	**19,811.8**	**20,488.4**	**21,350.8**

3.3 Regulatory depreciation

We estimate depreciation on a straight-line basis, consistent with IPART's method in previous price determinations. Our estimates of regulatory depreciation by services are shown in Table 3-7.

Table 3-7 Regulatory depreciation by services ($2019–20, million)

	2020–21	2021–22	2022–23	2023–24	Total
Water	79.7	82.1	84.8	87.6	334.2
Wastewater	197.2	212.0	228.8	248.3	886.4
Stormwater	2.7	3.7	4.0	4.3	14.7
Corporate	86.6	98.5	107.9	112.6	405.5
Subtotal	366.2	396.3	425.5	452.8	1,640.8
Finance leases					
Water	10.7	12.1	13.6	14.5	50.9
Wastewater	1.8	1.8	1.8	1.8	7.1
Total finance leases	12.5	13.9	15.4	16.3	58.0
Total regulatory depreciation	378.7	410.1	440.9	469.1	1,698.8
Total regulatory depreciation mid-year	371.2	402.0	432.2	459.7	1,665.0

During previous price determinations, IPART decided that Sydney Water's three regulated services assets, together with corporate assets should be divided into civil, electrical, mechanical, electronic and non-depreciating (CEMLND) asset classes. This assists in setting depreciation estimates that reflect assets' likely economic lives, so that their costs can be recovered over their useful lives from the benefit generated by their output.

In the 2016 Determination, IPART supported our proposal to have separate RABs and useful lives for water and wastewater finance lease assets, with subclasses of CEMLND for each finance lease.

With the modelling on a CEMLND basis, Sydney Water effectively has 30 RABs. There are five RABs for each of the water, wastewater and stormwater services, five for the corporate RAB, and another 10 for leased assets. Table 3-8 shows the opening asset value for each RAB, and our estimate of the remaining life for each.

For this proposal, we have allocated the corporate RAB to water, wastewater and stormwater services using the same fixed percentage that IPART has previously used. This may change in the future, as we have commenced work with IPART on a component cost project that could reconsider the drivers used to allocate the corporate RAB to services.

Table 3-8 Opening RAB ($2019–20, million) and remaining economic lives at 1 July 2020

	Civil	Electronic	Mechanical	Electrical	Non–depreciating	Total
Water						
Opening value	4,937.3	94.5	234.0	71.8	173.6	5,511.2
Remaining life	94.2	6.4	30.1	20.5		
Wastewater						
Opening value	6,636.7	220.6	805.9	571.0	3,588.9	11,823.0
Remaining life	78.5	10.3	16.0	16.8		
Stormwater						
Opening value	402.3	0.0	-0.8	0.0	18.7	420.2
Remaining life	120.7	0.0	0.0	0.0		
Corporate						
Opening value	256.7	449.4	14.3	0.0	124.6	845.1
Remaining life	59.6	6.3	3.3	8.4		
RAB subtotal	12,232.9	764.5	1,053.5	642.8	3,905.7	18,599.5
Finance leases						
Water						
Opening value	315.1	21.8	42.1	25.8	13.3	417.9
Remaining life[a]	75.0	12.0	16.9	16.7		
Wastewater						
Opening value	135.0	0.0	0.0	0.0	2.7	137.7
Remaining life	76.0	0.0	0.0	0.0		
Total finance leases	450.1	21.8	42.1	25.8	16.0	555.7
Total opening RAB	12,683.0	786.2	1,095.6	668.6	3,921.7	19,155.1

Note:
[a] The remaining life is the weighted average of the three water finance leases (Macarthur, Prospect and Wyuna)

Further cost breakdown of the capital expenditures used in RAB rolling forward to 2023-24 are set out in Table 3-9.

The capital expenditures in the RAB are adjusted to exclude Rouse Hill stormwater drainage capex, the Rouse Hill stormwater capital expenditure that is recovered partially (50%) through Rouse Hill drainage land charges and the remainder through a RAB adjustment to wastewater RAB. We have revised the total actual and forecast efficient capital expenses for Rouse Hill stormwater drainage system to $53 million (in net present value terms at $2019–20); this figure is slightly less than the equivalent $57 million that was allowed by IPART in the 2016 Determination.

Further details on the Rouse Hill adjustment and its price implications are found in **Attachment 4: Proposed prices**, section 2.1.4.

Table 3-9 Regulatory capital expenditure and adjustments for 2020–24 ($2019–20, million)

	2020–21	2021–22	2022–23	2023–24
Capital investment programs				
Water	197.9	221.4	228.2	209.5
Wastewater	622.8	626.6	884.1	917.4
Stormwater	31.8	46.5	43.3	48.0
Rouse Hill drainage				
Land acquisition	0.0	0.0	0.0	0.0
Civil projects	8.3	7.3	0.0	0.0
Corporate	137.4	117.4	90.1	81.7
Total capital investment programs	998.2	1,019.1	1,245.8	1,256.7
Finance leases upgrade				
Water – Macarthur	1.2	0.0	0.0	0.1
Water – Prospect	46.1	76.9	59.5	18.5
Total finance leases upgrade	47.4	76.9	59.5	18.5
Commercial agreement adjustment				
Water	0.0	0.0	0.0	0.0
Wastewater	0.0	0.0	0.0	0.0
Rouse Hill drainage adjustment				
Land acquisition	0.0	0.0	0.0	0.0
Civil projects	-8.3	-7.3	0.0	0.0
Capital expenditure in RAB				
Water	245.3	298.3	287.7	228.0
Wastewater	622.8	626.6	884.1	917.4
Stormwater	31.8	46.5	43.3	48.0
Corporate	137.4	117.4	90.1	81.7
Total capital expenditure in RAB	**1,037.3**	**1,088.7**	**1,305.2**	**1,275.2**

3.4 Finance lease assets

We currently have four contracts that include finance lease components:

- the Blue Mountains Tunnel Agreement (BMT) includes a finance lease for the Blue Mountain Wastewater Tunnel
- the Macarthur Water Filtration Agreement (WFA) includes a finance lease for the Macarthur Water Filtration Plant (WFP)

- the Wyuna WFA includes finance leases for the Woronora and Illawarra WFPs
- the Prospect WFA includes a finance lease for Prospect WFP.

These assets are owned and operated by third parties under long term Build, Own, Operate and Transfer (BOOT) performance-based contracts.

In the 2016 Determination, IPART changed the regulatory treatment for finance leases to recognise them as assets. A value was added to the RAB at a value equating to the PV of future lease payments. In total, the finance lease assets were valued at $605.8 million ($2015–16) by IPART. This comprised of $587.1 million ($2015–16) PV for future interest and principle payments, as well as $18.7 million ($2015–16) PV of efficient risk premium payments for risks related to asset performance and condition.

The $605.8 million ($2015–16) was added to the RAB so we could earn an appropriate return on the assets and a recover a depreciation allowance that reflects the economic value and life of the assets. This amount included an estimate of $105 million ($2015–16) for planned upgrades at the Macarthur and Prospect WFPs.[6]

Since the 2016 Determination, IPART has released draft guidance recommending that the upgrade costs be treated as actual and future prudent and efficient capital expenditure which is added to the RAB, as opposed to capitalising the streams of future lease payments via an adjustment to the RAB.[7] We have reflected these latest treatments to WFP upgrade costs in our RAB for 2020–24.

We have also revised the value of upgrades at the Macarthur and Prospect WFPs to a total of $265.2 million (inclusive of Sydney Water's project development costs as well as renewal and refurbishment costs), with the bulk of the costs occurring in 2020-24 (refer to Appendix 9B). We have updated the WFPs' upgrade costs and included $262.7 million ($2019–20) of prudent and efficient capital costs in the RAB for the period between 2016-17 to 2023-24. To ensure no duplication, we have removed the $105 million ($2015–16) initial estimated upgrade costs allowed by IPART in 2016 from the 2016-17 opening RAB balance.

3.5 Asset disposals

We manage an extensive portfolio of land assets within our fixed asset register (FAR). We categorise these properties as either non-surplus or surplus land assets. Surplus land assets are assets which we own but are not integral to the delivery of our services. We identify these surplus land assets as being available for sale, primarily to be added to the Sydney housing market, or dedicated for community use through an extensive governance program.

The current preferred regulatory treatment of surplus land which was introduced by IPART in the 2016 Determination (and subsequent Asset Disposal Policy February 2018)[8] is to deduct the asset's identifiable regulatory value from the Sydney Water RAB when the asset is sold or disposed of. However, identifying the value of individual assets in the RAB is problematic due to

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[6] To comply with the filter turbidity and chlorination contact time requirements under the *2011 Australian Drinking Water Guidelines* (ADWG)
[7] IPART, *Letter providing guidance from the Tribunal on the regulatory treatment of upgrade works*, 20 December 2017.
[8] IPART, *Asset Disposal Policy paper, February 2018,* page 22.

the limited data available to estimate the value. IPART, as part of its policy guidelines, has prescribed certain methodologies to estimate the regulatory value of assets when the original regulatory cost is unknown, depending on when the assets being disposed entered the RAB (that is, pre or post 2000, or the line in the sand).

We have generally adopted the methodologies prescribed by IPART. These are as follows:

- For disposal of significant[9] operational pre-line in the sand assets, the estimated RAB value to be deducted from the RAB is to be based on the ratio of the RAB to the depreciated replacement cost depreciated replacement cost (DRC) of Sydney Water's assets at the time the RAB was established multiplied by the net sale value of the asset which is gross sales value net of sale and remediation costs.[10] The ratio specified by IPART in the 2016 Determination was 42%.
- If the business can make a convincing case that the asset was clearly non-operational, then, on an exception basis, IPART will not deduct the RAB for that asset sale.[11]
- For the disposal of assets that are significant post-line in the sand, the estimate regulatory value will be based on a "best estimate" indexed depreciated and indexed original costs.[12]

In its published Asset Disposal Policy in February 2018, IPART mentioned that it will consider alternative methods on a case-by-case basis, such as the Cost Allocation Method which was proposed by Sydney Water.[13] In this proposal, we adopted the principles of the Cost Allocation Method where possible to estimate regulatory values to be deducted from the RAB. We carried out a comprehensive exercise as part of a component cost project,[14] to allocate the aggregated RAB that IPART has determined into individual regulatory values for each asset across our geographic systems and services using detailed asset information contained in the FAR. Specifically, assets that were acquired post 2000 are valued in the FAR at their historical indexed prudent and efficient capex value allowed by IPART under the relevant determination.

3.5.1 2016–20 RAB adjustment for asset disposals

Currently, Sydney Water is on track to sell up to $118 million (gross sales proceeds in $nominal) of surplus land from 2015–16 to 2019–20. Out of this $118 million:

- $117 million ($nominal) relate to pre-line in the sand assets of which:
  - $99 million ($nominal) relates to operational pre-line in the sand assets
  - $18 million (27 properties) relate to properties that are non-operational as at the line in the sand and not deductible from the RAB. Details to substantiate the exclusion of these sales from RAB adjustments can be made available upon request
- $1 million relates to post-line in the sand assets.

[9] Book value of disposed asset accounts for more than 0.5% of the opening value of the RAB in the years in which the asset is disposed ref IPART, Asset Disposal Policy paper, February 2018.
[10] IPART, Asset Disposal Policy paper, February 2018, page 23.
[11] IPART, Asset Disposal Policy paper, February 2018, page 24.
[12] IPART, Asset Disposal Policy paper, February 2018, pages 25 and 26.
[13] IPART, Asset Disposal Policy paper, February 2018, page 25.
[14] Sydney Water, Cost Allocation Manual, July 2018, pages 15-16.

Table 3-10 Property disposal forecasts for 2016–20 ($ nominal, thousand)

	2015–16	2016–17	2017–18	2018–19	2019–20
Land sales					
Significant operational as at pre 2000 assets					
Gross sales proceeds	36,511	23,168	29,658	3,930	5,125
Net sales value	34,736	19,575	26,467	3,367	4,577
Value applied	42% Net proceeds (net of sales & remediation costs)	42% Net proceeds (net of sales & remediation costs)	CAM derived RAB value	CAM derived RAB value	CAM derived RAB value
Value deducted from RAB	14,589	8,221	13,168	1,722	753
Significant post line-in-the-sand assets					
Gross sales proceeds	1,061	45	66	-	-
Net sales value	1,042	44	66	-	-
Value applied	Indexed historical cost	Indexed historical cost	CAM derived RAB value	CAM derived RAB value	CAM derived RAB value
Value deducted from RAB	596	2	5	-	-
Total value deducted from RAB (land sales)	15,185	8,224	13,172	1,722	753
Add asset write-offs	265	304	CMS write-off 25,802	-	-
Total asset disposals/write-offs deducted from RAB	15,450	8,528	38,974	1,722	753

Note: Figures in the above table exclude values relating to disposal of properties that are non-operational as at the line in the sand and not deductible from the RAB.

Table 3-10 shows a total of $65.4 million ($nominal) over 2016–20[15] that we propose to be deducted from the RAB in relation to asset disposals including asset write-offs (refer also to Table 3-2). For the property sales in 2017–18, 2018–19 and 2019–20, where detailed property data in the disposal program and disaggregated regulatory asset value is available, we have used the individual regulatory values approach for our RAB deduction calculation. For all other years where the individual regulatory value approach could not be used, we have applied the relevant IPART's methodologies.

3.5.2 2020–24 RAB adjustment for asset disposals

We believe that 2016–20 sees the last substantial batch of our surplus property sales, as most if not all of our surplus properties are expected to be sold by July 2020. In 2020–24, we have made a general forecast for property disposal of $5 million ($nominal, or $4.6 million in $2019–20) per year, where we assume some of our operational assets will become surplus and available for sale.

Table 3-11 shows a total of $7.8 million ($2019–20) over 2020–24 that we propose to be deducted from the RAB in relation to asset disposals (refer also to Table 3-5). At this stage, as we do not have a detailed property disposal program for these years, we have applied IPART's relevant

[15] The $65.4 million includes the disposals in year 2015-16, as part of the RAB roll-over process.

methodologies as discussed earlier for RAB adjustment. Further adjustments can be made on the RAB rollover process in the following period, once the actual property disposals are known.

Table 3-11 Property disposal forecast for 2020–24 ($2019–20, thousand)

	2020–21	2021–22	2022–23	2023–24
Land sales				
Significant operational as at pre 2000 assets				
Gross sales proceeds	5,125	5,125	5,125	5,125
Net sales value	4,613	4,613	4,613	4,613
Value applied	42% Net proceeds (net of sales & remediation costs)	42% Net proceeds (net of sales & remediation costs)	42% Net proceeds (net of sales & remediation costs)	42% Net proceeds (net of sales & remediation costs)
Value deducted from RAB	1,937	1,937	1,937	1,937
Significant post line-in-the-sand assets				
Gross sales proceeds	-	-	-	-
Net sales value	-	-	-	-
Value applied	Forecast proceeds (net of sales and remediation costs)	Forecast proceeds (net of sales and remediation costs)	Forecast proceeds (net of sales and remediation costs)	Forecast proceeds (net of sales and remediation costs)
Value deducted from RAB	-	-	-	-
Total value deducted from RAB (land sales)	1,937	1,937	1,937	1,937
Add asset write-offs	-	-	-	-
Total asset disposals/write-offs deducted from RAB	1,937	1,937	1,937	1,937

Note: As the 2020–21 to 2023–24 values are estimates, we have treated them as disposal of “significant operational” pre- line in the sand assets in that 42% of the net proceeds from the sale of the assets will be deducted from the RAB.

3.6 Allowance for tax obligations

In the 2012 Determination, IPART adopted a post-tax framework using a separate building block to calculate the tax allowance. This framework provides for an explicit allowance for tax. Sydney Water has adopted the framework in calculating the tax allowance for this proposal.

Table 3-12 shows the elements of Sydney Water’s proposed year-on-year tax allowance.

Table 3-12 Regulatory tax allowance ($nominal, million)

	2020–21	2021–22	2022–23	2023–24
Income				
Regulated notional revenue (excluding tax)	2,547.3	2,703.3	2,843.4	2,987.6
Non-cash contribution / AFOC	190.1	194.7	199.4	204.2
Non-cash contribution holding costs	38.2			
Total income	2,775.7	2,898.1	3,042.7	3,191.8
Expenditure				
Operating expenditure	1,346.5	1,412.1	1,455.6	1,498.2
Interest expense allowance	656.6	694.4	736.5	784.4
Tax depreciation	512.1	564.5	616.0	614.4
Total expenses	2,515.2	2,670.9	2,808.0	2,896.9
Accumulated tax losses	0.0	0.0	0.0	0.0
Taxable income after tax losses	**260.5**	**227.2**	**234.7**	**294.9**
Total tax allowance with γ = 0.25	**75.6**	**66.0**	**68.1**	**85.6**
Tax allowance ($2019–20)	**73.9**	**62.9**	**63.5**	**77.9**

Note: The conversion of $ nominal to $2019-20 and vice versa in the tax allowance calculation has used the inflation rate in the WACC calculation. This is consistent with IPART's published generic building block model.

3.6.1 Approach – tax allowance calculation

The nominal tax liabilities (as shown in Table 3-12) are calculated using the corporate statutory tax rate multiplied by taxable income and adjusted for the value of franking credits. These are then converted into a real amount for inclusion in the ARR.

Our approach for key 'income elements', including non-cash contributions/AFOC is as follows:

- The 'annual revenue requirement before tax' figures are converted to nominal terms for tax block calculations.
- For our asset free of charge (AFOC) forecast for 2020–24, we continue to use a 4-year historical average approach as determined by IPART in 2016 Determination. For regulatory tax allowance calculation, this average value is then indexed annually over the determination period. Table 3-13 sets out Sydney Water's actuals for 2015–16 to 2018–19 which are used for the forecast.

  Sydney Water's AFOC actuals are higher than IPART's allowed values, by a total of $223 million ($2019–20) for the three years between 2016–17 to 2018–19. With a rate of return of 5.9% (which is the pre-tax WACC used in 2016 Determination), we have added $38.2 million holding costs to 2020-21 for tax allowance calculation purpose (see Table 3-13).

This treatment is in line with IPART's decision in 2016 to allow for a pass-through of AFOC holding costs to account for the AFOC differences between forecast and actuals.[16]

In total, Sydney Water's actual/forecast AFOC for 2016–20 is $810.3 million, which is $314.7 million (63.5%) higher than IPART's determined AFOC forecast based on a historical average approach.

Table 3-13 Asset free of charge (AFOC) actuals and forecast ($2019–20, million)

	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
IPART forecast in 2016 Determination		123.9	123.9	123.9	123.9				
Sydney Water actuals/forecast	148.1	155.9	212.8	226.0	215.6	185.7	185.7	185.7	185.7
Difference		32.0	88.8	102.0					
Holding costs to pass through		8.2	16.7	12.4					

Our approach for other 'expenditure elements' (shown in Table 3-12) used in the tax block calculations are discussed below:

- Interest expense allowance – A notional capital structure of 60:40 (debt:equity) is applied to average of opening and closing RAB each year. This results in a higher interest expense used in the regulatory tax block calculation than the actual interest paid by Sydney Water.

  We have excluded the RAB of finance leases from the RAB values used for the interest expense in the tax block calculation, on the basis that finance leases have contractual arrangement for interest payments.

- Tax depreciation – Tax depreciation was calculated using the straight-line method and using self-assessed asset lives until June 2012. From July 2012, Sydney Water moved to adopt the diminishing value method to front load tax depreciation as well as to adopt shorter useful lives set out in the effective life of depreciating assets ruling, for all new assets. The impact of this move under the current regulatory framework is that higher tax depreciation can be claimed upfront. This lowers the regulatory tax allowance in earlier years but increases it in later years. While the tax legislation allows the selection of the diminishing value method for new assets, it does not allow for the adjustment of the depreciation method for existing assets. Useful lives of existing assets can only be changed if the use of those assets change.

  Our tax depreciation forecast excludes assets and capital expenditure related to water filtration plant finance leases. We cannot claim tax depreciation on these assets as Sydney Water neither owns nor controls these assets. We can only start claiming depreciation for tax when the assets are transferred to us at the end of their leases.

[16] IPART, *Review of prices for Sydney Water Corporation, Final Report*, June 2016, page 136.

Using the combined methodology above, we forecast tax depreciation for the next determination to increase from $512 million in 2020–21 to $614 million in 2023–24. This is, on average, $124 million higher than regulatory depreciation in nominal terms.

We have assumed a gamma value (the value currently used by IPART in the tax allowance calculation to adjust for franking credits)[17] of 0.25. It is also published in IPART's latest market update.[18] The figure was also determined by the Australian Competition Tribunal decision in 2011.[19] A higher gamma results in a lower tax allowance.

3.7 Allowance for return on working capital

The allowance for return on working capital represents the holding cost of our net current assets. In calculating the amount for this proposal, we have adopted the new Working Capital Allowance policy as released by IPART in November 2018.[20] Appendix 11A elaborates on our working capital estimate based on this new approach. Table 3-14 shows the elements that we used in the calculation and estimate of return on working capitals to be added to the ARR.

Table 3-14 Elements for calculation of working capital allowance ($ million)

	2020–21	2021–22	2022–23	2023–24
Receivables	335.5	347.7	357.1	366.4
Payables	189.4	193.9	213.8	215.3
Inventory	16.6	16.6	16.6	16.6
Prepayments	9.6	9.6	9.6	9.6
Net working capital	172.2	180.0	169.4	177.3
Rate of return	6.6%	6.6%	6.6%	6.6%
Return on working capitals[1]	**11.0**	**11.5**	**10.8**	**11.3**

[1] This is a mid-year value.

[17] IPART, *Review of Imputation Credits (gamma), Research – Final Decision,* March 2012.
[18] IPART, Bi-annual update addendum, 28 February 2019.
[19] Australian Competition Tribunal, 'Application by Energex Limited (Gamma)' (No 5) [2011] ACompT, 9 May 2011.
[20] IPART, *Working Capital Allowance – Policy Paper,* November 2018.

4 Post building block adjustments

Sydney Water's overall revenue requirement includes revenue from water, wastewater and stormwater services. It also includes some revenue for 'other fees and charges', such as trade waste charges and ancillary and miscellaneous customer service charges. As part of the process to derive revenue for water, wastewater and stormwater only, we have forecast the amount of revenue that we will generate from these ancillary services separately. We then deducted this revenue from our notional revenue requirement.

Similarly, revenue from the Blue Mountains Septic Pump Out (BMSPO) scheme, where costs are included in the ARR, is removed from the overall revenue requirement. We receive revenue for the scheme from the NSW Government as a Community Service Obligation (CSO).

We have also deducted a proportion of the forecast rental income and biobanking income from notional revenue requirement, in line with IPART's benefit sharing of non-regulated revenue between Sydney Water and customers (see Table 4-2 for figures).

Table 4-1 shows the forecast annual revenue requirements and adjustments to get the revenues from water, wastewater and stormwater charges.

Table 4-1 ARR and post building block adjustment ($2019–20, million)

	2020–21	2021–22	2022–23	2023–24
Return on assets	790.5	818.0	849.5	883.6
Return of assets (depreciation)	371.2	402.0	432.2	459.7
Operating expenditure	1,314.9	1,346.7	1,355.6	1,362.6
Return on working capitals	11.0	11.5	10.8	11.3
Tax allowance	73.9	62.9	63.5	77.9
Total revenue requirement (pre-adjustments)	2,561.5	2,641.0	2,711.5	2,795.1
Less adjustments:				
Ancillary services	12.4	12.5	12.7	12.9
Trade waste	23.6	23.9	24.2	24.6
Wastesafe	0.5	0.6	0.6	0.6
Blue Mountains CSO	0.1	0.1	0.1	0.1
Rental income (10%)	1.0	0.9	0.9	0.9
BioBanking (10%)	1.0	0.5	0.2	0.5
Total adjustments	38.5	38.4	38.6	39.5
Total notional revenue from tariffs	**2,523.0**	**2,602.6**	**2,672.9**	**2,755.6**

4.1 Other adjustments

4.1.1 Blue Mountains septic pump-out

In 1988, at the direction of the then NSW Government, Sydney Water began subsidising septic pump-out services for certain un-sewered urban properties in the Blue Mountains to relieve the cost burden on households and to help protect the environment. Sydney Water would not have provided the subsidy on commercial grounds. In November 2012, we proposed to transfer the pump-out service to the Blue Mountains City Council from 1 July 2013 and to phase out the subsidy.

However, in January 2015, the NSW Government reinstated the subsidised pump-out service, with the remaining pump-out customers to be reimbursed by Sydney Water for most of their paid pump-out fees. The cost of reimbursing the pump-out customers is recorded as an expense in our accounts, and regulatory operating expenditure.

We estimate that the average subsidy will be about $4,000 a customer and that the subsidy will be indexed annually to CPI. From 2019–20, we estimate that about 12 to 15 customers will receive the subsidy. The subsidy amount will be reimbursed to us from the NSW State Budget as a Community Service Obligation (CSO) and will be recorded as income in our accounts.

The forecast subsidy cost should equate to the projected subsidy from the government. Because we have included the cost in our regulated operating expenditure, we have deducted the income in the building block adjustment as shown in Table 4-1. The CSO amount for this service has reduced significantly in the recent years to about $0.1 million per year.

4.1.2 Rental income and BioBanking income

Table 4-2 Biodiversity offset revenue and rental income for revenue sharing ($2019–20, million)

	Revenue sharing %		2020–21	2021–22	2022–23	2023–24
	Sydney Water	Customer				
Biodiversity offset revenue	90%	10%	9.9	4.5	1.8	4.6
Rental income	90%	10%	10.0	9.4	8.9	8.9

In our proposal, we have included the Biodiversity Offset (BO) opportunities that Sydney Water is pursuing as one of the ways to improve the way we manage and utilise our portfolio of land assets. The aim of BO is to efficiently generate market driven conservation outcomes through the creation of a market which brings together landowners who create biodiversity credits by establishing a BO site, and purchasers who buy the credits created.

In its consideration of our proposal for the regulatory treatment of Biobanking revenue [21], IPART came to a preliminary view that businesses undertaking Biodiversity Offsetting could retain 90% of the revenue from credit sales and customers would benefit from the remaining share of 10%.[22] We

[21] Sydney Water, *Proposed regulatory treatment of participation in the Biodiversity Offset Scheme,* 26 March 2018.

[22] IPART, Letter re Proposed Regulatory Treatment of Biodiversity Offset Scheme, 16 May 2018.

have included IPART's recommended 90:10 revenue sharing ratio in our calculation of the post building block adjustments.

We have included a total of $20.8 million forecast revenue from the Biodiversity Offset Scheme across 2020–24, with forecast revenue of approximately $10 million ($2019–20) in 2020–21 decreasing to between $2 to $5 million ($2019–20) for the subsequent three years. Proceeds from Biodiversity credits generally vary year-on-year as they depend on the quantity, size and biodiversity of offset sites that Sydney Water establishes each year.

Rental income is made up of non-regulated activities on Sydney Water sites, such as third parties installing telecommunications tower). In determining prices, IPART historically deducts 50% of rental income earned from Sydney Water's notional revenue requirement to be shared with its customers.

For the 2020 Determination, we propose that a 90:10 (Sydney Water:customers) revenue sharing ratio be applied for rental income. This proposed treatment will be consistent with the allowable revenue sharing percentages for Biodiversity Offset recommended by IPART. A higher revenue sharing ratio could also incentivise Sydney Water to pursue further opportunities.

Sydney Water currently receives approximately $14 million a year ($2019–20) in rental income (before any benefit sharing). We project this to decrease to $10 million in 2019–20 ($2019–20) and drop even further to an average of $9 million ($2019–20) per annum during 2020–24. This projected decrease is due to the recent renegotiation of our master lease agreements with third parties that has resulted in longer duration contracts at reduced rates, which is a practice reflective of the current market.

4.1.3 Government contributions for Priority Sewerage Program (PSP) schemes

There is no government contribution expected for PSP schemes over 2020–24, so we have not made any adjustment relating to this item.

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Attachment 12
Financeability

Price proposal 2020–24

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Figures

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Financeability

Key messages

- To ensure that Sydney Water can serve its customers, it must remain a financially viable business.
- Our financial position over the current 2016–20 regulatory period has remained strong, largely due to the achieved operating and capital expenditure efficiencies, higher revenue from higher than expected water demand and low interest rates.
- In August 2016, NSW Treasury released an update to its Capital Structure Policy. The policy set a target credit rating for government businesses of Baa2/BBB (Moody's standard & Poor's). We agreed to undertake a re-gearing of the balance sheet to move to a capital structure consistent with a Baa2 credit rating.
- Under the methodology adopted by Moody's in its credit rating assessment of regulated water utilities, the capital structure underpinning this submission is consistent with a Baa2 credit rating in all years of the submission.
- We have also assessed our financeability with IPART's financeability test. The results of this indicate minor breaches of one of the three ratios due to the re-gearing initiatives referred to above. We consider that these minor breaches are acceptable as we are forecast to retain our Moody's Baa2 rating. We also note IPART's guidance that a business does not need to meet the target for every ratio in each year of the regulatory period.
- Sydney Water has identified some risks to its financial position. The main short-term risks include increased expenditure and lower water sales, both due to the current drought. The mid-term and long-term term risks include a possible increase of interest rates, a lower regulatory WACC than 4.1% and an increase in capital expenditure to serve growth while meeting our service obligations. Sydney Water will monitor and manage or mitigate such risks.

1 Financial performance

Financial sustainability, also known as financeability, may be defined as the capacity of a business to finance its activities, including:

- day-to-day operations
- replacing, renewing and expanding its infrastructure
- servicing its debt and providing an appropriate return to equity holders.

1.1 The role of the financial sustainability test

When making price determinations for regulated businesses, IPART uses financeability tests to assess how its pricing decisions are likely to affect the business's financial sustainability and ability to raise funds to manage its activity over the regulatory period.

In 2018, IPART completed a review of its financeability tests that apply to the current Sydney Water price period. IPART decided to continue to:

- conduct a quantitative assessment of financeability
- conduct a financeability test if:
    - the prices it regulates determine the revenues of the business, and
    - the business has, or is part of an entity with, a distinct capital structure[1]
- conduct the test on the regulated portion of the business, as a default, and[2]
- retain a BBB target credit rating.[3]

IPART also decided to include a benchmark test (assuming a real cost of debt), and an actual test (using the business's actual cost of debt) and set a single target ratio for each financial metric.[4]

1.2 Our financial performance over the current determination period

Over the 2016–20 period, our financial performance has been impacted by the following factors:

- Higher revenue driven by:
    - Higher than expected property growth
    - Higher volumes of water sales (see **Attachment 8: Water demand and customer numbers**)

[1] IPART, Review of our financeability test, November 2018, p 20.
[2] Ibid. p 22.
[3] Ibid. p 35.
[4] Ibid.

- Higher developer activity leading to higher receipts of assets free of charge (see **Attachment 11: Proposed revenue requirement**)

- Cost savings from business efficiencies driving lower core opex, more than offset by one-off costs resulting from the drought and other external impacts (see **Attachment 10: Operating expenditure**)
- Higher capex, mostly to service the higher than expected growth (see **Attachment 9: Capital expenditure**)
- Lower interest rates and finance charges partially offset by the increased debt level
- Re-gearing of the balance sheet consistent with NSW Treasury's capital structure policy and target credit rating.

Figure 1-1 below shows the ratio of adjusted earnings on the regulated asset base (RAB) compared with the regulated WACC from 2012 to 2020. In this ratio, breakeven is equal to 1.0. The drop in the return in 2018–19 reflects the additional costs incurred in responding to drought conditions. We forecast that this position will improve in 2019–20. However, this is contingent on climatic conditions improving. If drought conditions continue and further expenditure is needed, it is not likely to improve.

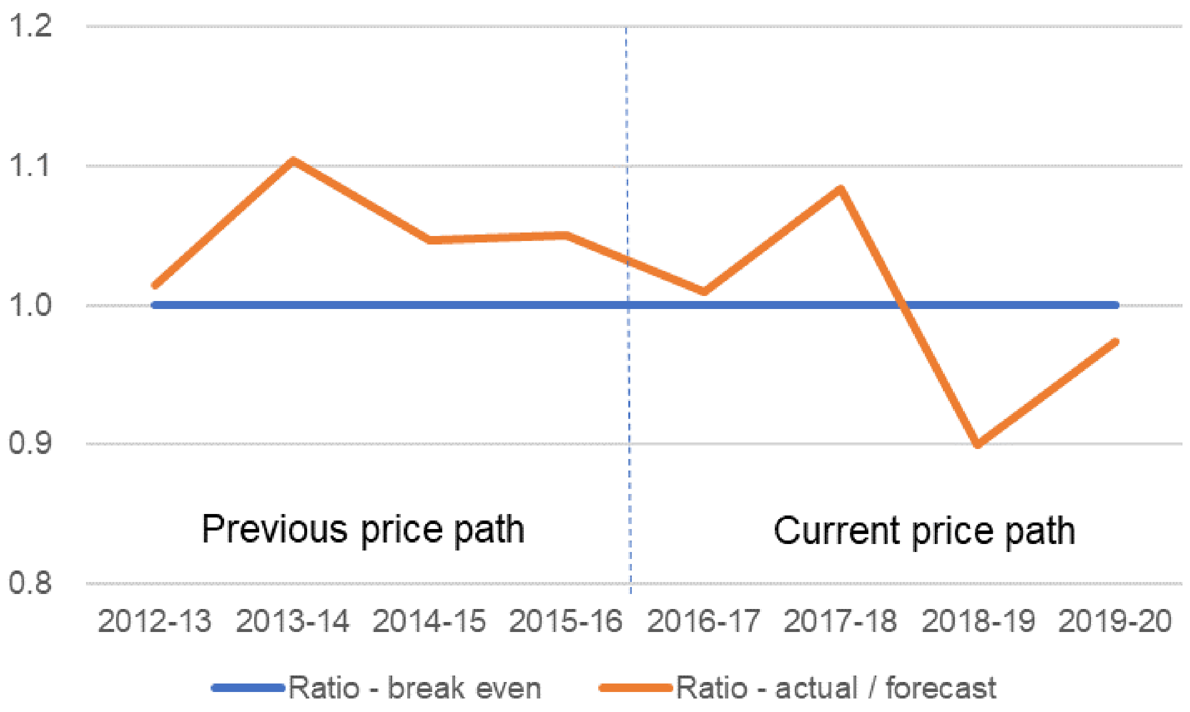

Figure 1-1 Adjusted return on RAB

1.2.1 Assessment using Moody's methodology

Moody's credit rating assessment methodology and calculation of credit rating ratios differs from IPART's financeability tests. For example, Moody's:

- Uses consolidated financial statements, not separating unregulated products and services
- Considers qualitative factors including the regulatory environment, operational considerations, business model and financial structure.

The actual and projected values of Moody's credit rating ratios over the current pricing period to 30 June 2020 are shown in Table 1-1 below.

Moody's current standalone or baseline credit assessment (BCA) of Sydney Water is Baa2 with a stable outlook.

Table 1-1 Moody's credit rating ratios (single year) – current price path

Ratio	2015–16	2016–17	2017–18	2018–19 forecast	2019–20 forecast
FFO Interest Coverage	2.4x	2.6x	3.2x	2.7x	2.7x
Net Debt/RAB	57.7%	56.1%	54.4%	58.7%	61.2%
FFO/Net Debt	7.8%	7.0%	9.3%	6.5%	7.0%
RCF/Net Debt	0.7%	2.9%	3.6%	-1.8%	-0.6%
Rating	**Baa1**	**Baa1**	**Baa1**	**Baa2**	**Baa2**

Note: FFO means funds from operations, RCF means retained cash flow

Our current standalone rating or BCA is Baa2 with a stable outlook. This was downgraded from the previous Baa1 rating in Moody's credit opinion issued in December 2018. In the published opinion Moody's stated an "*expectation that Sydney Water's financial leverage will weaken as a result of debt-funded capital management activities, reflecting the corporation's implementation of the state's financial policy for state owned companies as set out in the Capital Structure Policy for Government Businesses*".[5]

As previously noted, the Baa2 credit rating is consistent with NSW Treasury's target rating under its Capital Structure Policy for Government Businesses.

[5] Moody's Credit Opinion: Sydney Water Corporation, 20 December 2018.

1.3 Projected financial performance

Under our proposed revenue, prices, costs and debt structure we expect our financial position to remain consistent with a Baa2 Moody's credit rating over the remainder of the current determination period and over the next determination period. Using IPART's measure of financeability, there are some minor breaches IPART's metrics.

As we are forecast to retain our current credit rating of Baa2, we do not consider there to be a need for any financeability adjustment by IPART over the 2020–24 determination period if current conditions continue. However, if drought continues and if financial market conditions produce a WACC below 4.1%, there may be financeability implications.

1.3.1 Financeability using IPART's test

The following tables summarise the results of IPART's benchmark test. As noted above, there are minor breaches in IPART's metrics.

Under the benchmark test, FFO / Net Debt falls under the target due to our re-gearing initiatives (see Table 1-2). As the other two metrics remain well above target, the overall position remains consistent with the target rating.

Table 1-2 IPART benchmark financeability test results

Ratio	Target	2020–21	2021–22	2022–23	2023–24
Real interest coverage ratio	>2.2x	3.3x	3.2x	3.2x	3.1x
Net Debt/RAB	<70%	60%	60%	60%	60%
FFO/Net Debt	>7%	7.1%	6.9%	6.7%	6.5%

Similarly, under the actual test, FFO / Net Debt falls under the target for reasons previously discussed (see Table 1-3). As the other two metrics remain well above target, the overall position remains consistent with the target rating of Baa2 under Moody's methodology as discussed below.

Table 1-3 IPART actual financeability test results

Ratio	Target	2020–21	2021–22	2022–23	2023–24
FFO Interest Coverage	>1.8x	2.3x	2.3x	2.3x	2.2x
Net Debt/RAB	<70%	59%	59%	59%	59%
FFO/Net Debt	>6%	5.9%	5.8%	5.7%	5.5%

1.3.2 Sydney Water's position under Moody's methodology

Sydney Water's estimated impact of its pricing proposal on its financial position and credit rating ratios is shown in Table 1-4.

Table 1-4 Projections of Moody's credit rating ratios (3-year average) for the next pricing period

Ratio	2020–21	2021–22	2022–23	2023–24
FFO Interest Coverage	2.4x	2.4x	2.3x	2.3x
Net Debt/RAB	62.7%	62.7%	62.7%	62.3%
FFO/Net Debt	5.9%	5.9%	5.9%	6.0%
RCF/Net Debt	4.0%	4.3%	4.2%	4.2%
Rating	**Baa2**	**Baa2**	**Baa2**	**Baa2**

It is important to note that Moody's weighs 40% of their assessment using these metrics and 60% weight on qualitative factors, such as business profile and financial policy.[6]

1.3.3 Sydney Water's projected financial statements

Underlying these forecast metrics are projected consolidated profit and loss statements and balance sheets to 2024 (shown in Table 1-5 and Table 1-6 respectively).

[6] Moody's, Rating methodology – Regulated water utilities, December 2015.

Table 1-5 Sydney Water's forecast consolidated profit and loss ($ nominal, million)

	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
INCOME						
Regulated Income						
Usage Revenue	1,149	1,241	1,195	1,240	1,286	1,337
Service Revenue	1,432	1,532	1,491	1,535	1,600	1,670
Other	26	27	26	26	27	28
Total Regulated Income	2,606	2,801	2,712	2,801	2,913	3,035
Unregulated Income						
Grants, Subsidies etc	31	40	44	39	38	43
Capital Contributions	213	218	224	223	216	218
Other	5	4	2	2	2	2
Total Unregulated Income	249	262	269	264	256	263
TOTAL INCOME	2,855	3,063	2,981	3,065	3,168	3,298
EXPENDITURE						
Operations						
Bulk Water Purchases - WaterNSW	217	220	194	204	215	224
Bulk Water Purchases - SDP	211	241	185	188	193	197
BOO Water Filtration Tariffs	87	94	100	104	106	110
Employee-related expenses	367	369	378	390	400	411
Other Operating Expenses	563	517	524	539	555	572
Total Operations	1,445	1,441	1,381	1,424	1,469	1,515
EBITDA	**1,410**	**1,622**	**1,599**	**1,641**	**1,699**	**1,784**
WIP Writeoffs and Impairments	8	7	7	8	8	8
Loss on Disposals	11	17	17	18	18	18
Depreciation and Amortisation	280	369	384	417	453	487
EBIT	**1,111**	**1,229**	**1,191**	**1,200**	**1,220**	**1,270**
Interest Expense	455	498	523	584	650	732
Profit Before Tax	**655**	**731**	**668**	**615**	**571**	**539**
Tax Expense	197	219	200	185	171	162
PROFIT AFTER TAX	458	511	468	431	399	377

Table 1-6 Sydney Water's forecast consolidated balance sheet ($ nominal, million)

	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
CURRENT ASSETS						
Net Debtors and Prepayments	344	369	358	369	384	400
Other Current Assets	24	25	25	25	25	25
Total Current Assets	368	394	383	394	408	425
NON-CURRENT ASSETS						
Investments	-	-	-	-	-	-
Property, Plant & Equipment	19,229	20,509	21,654	22,907	24,513	26,083
Intangible Assets	335	373	441	474	467	445
Total Non-Current Assets	19,564	20,882	22,095	23,381	24,980	26,528
TOTAL ASSETS	19,931	21,276	22,478	23,775	25,388	26,953
CURRENT LIABILITIES						
Borrowings	-	-	-	-	-	-
Creditors	629	647	677	717	793	847
Other Financial Liabilities	18	52	53	55	66	77
Provisions	177	180	185	190	195	201
Tax Payable	8	14	11	10	8	8
Dividend Payable	321	358	327	258	240	264
Total Current Liabilities	1,153	1,250	1,254	1,230	1,302	1,397
NON-CURRENT LIABILITIES						
Borrowings	8,985	10,061	11,144	11,882	12,729	13,622
Other Non-Current Liabilities	385	736	712	667	655	828
Provisions	714	749	787	827	867	912
Deferred Tax Liability	1,290	1,389	1,515	1,688	1,890	2,006
Total Non-Current Liabilities	11,374	12,935	14,158	15,063	16,140	17,369
TOTAL LIABILITIES	12,526	14,186	15,412	16,294	17,442	18,766
NET ASSETS	7,405	7,090	7,066	7,481	7,946	8,187
EQUITY						
Reserves	2,298	2,406	2,552	2,795	3,100	3,227
Retained Earnings	1,946	1,523	1,352	1,525	1,684	1,797
Share Capital	3,162	3,162	3,162	3,162	3,162	3,162
TOTAL EQUITY	7,405	7,090	7,066	7,481	7,946	8,187

SW231 06/19

Attachment 13

Confidential

Price Proposal 2020–24

SW231 06/19

Attachment 14
Recycled water

Price Proposal 2020–24

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Tables

Recycled water

Key messages

- Sydney Water produces around 43 gigalitres of recycled water each year and enabled a further 1,300 megalitres to be delivered by private sewer mining schemes.
- We welcome the changes IPART has proposed for recycled water pricing in their draft report and draft determination released in April this year. These changes should allow full recovery of the efficient cost of recycled water schemes going forward and could assist in the delivery of future opportunities.
- This price proposal is based on the existing (that is, 2006) IPART determination for recycled water, as the final determination was not available in time to be considered.
- Sydney Water is proposing no change to recycled water pricing for mandatory schemes, that is, usage charges to continue at 90% of the drinking water charge and for recycled services to be provided with no additional water service charge.
- Changes to recycled water pricing will be considered progressively over the next few years as, for example, the Development Servicing Plans (DSPs) for each scheme become due for review.
- Sydney Water is meeting its commitments to deliver recycled water services to Hoxton Park, Oran Park and Turner Road, Colebee and Ropes Crossing which will all begin operation during the next five years.
- We are continuing to investigate future recycled water opportunities, including several large-scale integrated water solutions for growth areas. These schemes could benefit our customers and the community through the economic opportunities and benefits they create.

1 Recycled water

Our 23 recycled water schemes now deliver over 43 gigalitres of recycled water each year. We also enabled a further 1,300 megalitres to be delivered by private sewer mining schemes. These projects play a vital role in securing the water supply of Sydney, including increasing our long-term resilience to drought. It is likely recycled water will become increasingly prominent in delivering integrated water management in the context of:

- high population growth
- climate change, and
- technological change.

We will continue to seek out opportunities to reuse resources in a sustainable way wherever it is economically efficient. We are investigating several large-scale integrated water solutions that include a recycled water component. These schemes have the potential to benefit our customers and the community at large through the economic opportunities and benefits they create.

1.1 New funding framework for recycled water

In 2018 IPART started a review into pricing for water recycling services. In undertaking their review, IPART sought to address concerns that the regulatory framework may be inhibiting the uptake of water recycling. We support the overall direction taken by IPART, including IPART's draft decisions to:

- remove the requirement for ring-fencing for least cost servicing solutions, allowing all costs to be recovered from the wider customer base
- remove the post-adjustment mechanism for avoided and deferred cost claims, noting that claims will still be assessed for prudency and efficiency at the time they are claimed
- provide flexibility in the estimation of key assumptions, such as demand per property
- allow utilities greater flexibility to set price levels and structures to better balance demand and supply
- allow voluntary agreements with developers and other co-funding arrangements
- recognise that water recycling covers both wastewater and stormwater recycling
- align developer charges methodologies across all products.[1]

[1] IPART, *Draft Report on pricing arrangements for recycled water and related services* and *Draft Determination for recycled water developer charges*, April 2019, henceforth IPART, *2019 Draft Recycled Water Report and 2019 Draft Recycled Water Determination* respectively.

Greater certainty for full cost recovery going forward

IPART's previous recycled water determination was made over a decade ago,[2] and the 2019 Draft Recycled Water Determination proposes many important changes. Two of these changes will address the following cost recovery issues inherent in their previous determination:

- The recycled water usage forecast needs to reflect the total demand that properties will place on the recycled water system: IPART's methodology requires a forecast of expected revenue based on assumed usage per dwelling. In the 2006 Determination, this was fixed at 110 kL/year. Our experience of recycled water sales over the last 13 years has been that usage can be less than half this amount.
- Tax payable on assets free of charge is a valid component of efficient total scheme costs: The 2006 Determination did not explicitly include an allowance for the tax liability utilities incur when they receive assets free of charge (AFOC).

We estimate these two anomalies have resulted in us being unable to recover around 10% of the efficient costs of our recycled water schemes. IPART's draft decisions to address these issues should allow full cost recovery for potential new schemes going forward.

As the final determination was not available to inform the preparation of this price proposal, we have continued to apply the 2006 determination requirements. We anticipate revising our Development Servicing Plans (DSPs) as they come up for review and will reassess avoided costs for our current and potential future schemes at that time.

1.2 Overview of current schemes

In 2017–18 we operated 23 schemes which supplied 43 gigalitres of recycled water to residential and non-residential customers and for environmental flows. Each scheme has been funded in line with IPART's 2006 Recycled Water Determination[3]:

- Section 16A schemes – The NSW Government can issue directions to Sydney Water to complete projects in the public interest. Under section 16A of the IPART Act, IPART (with the Premier's approval) must include the efficient cost of these projects in the prices paid by all customers.
- Mandatory schemes – These are schemes to service new development in growth areas are primarily funded through a combination of contributions from developers (developer charges) and customer usage charges. Some schemes are also partly funded from a contribution from the general customer base, where IPART has determined the scheme results in an avoided cost that benefits all customers.
- Voluntary schemes – These are schemes funded directly by the scheme customers under negotiated contracts, and are generally for agricultural, commercial or industrial use.

Further detail on each of these categories is provided in the rest of this section.

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[2] IPART, *Pricing arrangements for recycled water and sewer mining – Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council - Final Report*, September 2006. Henceforth, IPART, *2006 Recycled Water Determination*

[3] IPART, *2006 Recycled Water Determination*. IPART's *2019 Draft Determination* remains essentially consistent with this categorisation.

Sydney Water also has two recycling schemes at Picton and Gerringong-Geroa, each of which was delivered as part of the least cost servicing strategy. As recycled water was part of the least cost strategy, the cost is borne by the wider customer base and not considered further in this attachment.

1.2.1 Mandated schemes

The two largest schemes are at Rouse Hill and Hoxton Park. We began construction of the Rouse Hill scheme in 1992. We are currently investigating the scale of further growth and whether work might be needed to avoid potable water top up exceeding 20% in the future. IPART's final 2019 Recycled Water Determination is also likely to significantly change how costs are recovered from 1 July.[4] As such, all forecasts will be re-assessed when the DSP is reviewed in 2021.

We expect to begin recycled water production and distribution at Hoxton Park in 2020–21. Until that time, properties will continue to receive potable water in their recycled water pipes. Currently we do not expect significant change in the growth or expenditure for this scheme relative to that forecast in 2016. However, as with Rouse Hill, the Hoxton Park DSP is due for review in 2021 and all assumptions will be updated at that time.

Table 1-1 and Table 1-2 show the forecast growth in recycled water sales for these schemes.

Table 1-1 Rouse Hill recycled water scheme forecast costs and revenues ($2019–20 million)

	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
Capital costs	$4.0	$15.6	$10.1	$-	$-	$-
Operating costs	$1.5	$1.3	$1.3	$1.3	$1.3	$1.5
Operating revenue	$7.5	$8.2	$8.7	$8.9	$8.9	$8.9
Number of properties	30,854	31,822	32,994	34,078	35,149	35,978
Volume (ML)*	3,213	3,307	3,423	3,530	3,636	3,720
Volume growth	0%	3%	4%	3%	3%	2%

*Total volume available for sale

Table 1-2 Hoxton Park recycled water scheme forecast costs and revenues ($2019–20 million)

	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
Capital costs	$3.3	$12.8	$2.1	$-	$-	$-
Operating costs	$-	$-	$0.9	$0.7	$0.7	$0.7
Operating revenue	$0.3	$0.4	$0.4	$0.4	$0.4	$0.4
Number of properties	5,307	5,631	5,902	6,149	6,314	6,454
Volume (ML)*	272	300	356	386	416	447
Volume growth	21%	10%	19%	8%	8%	7%

*Total volume available for sale

[4] As proposed in IPART's 2019 Draft Recycled Water Report and Determination.

Our three smaller residential recycling schemes have all had their first DSPs registered with IPART since our last retail price review. Each of these schemes are forecast to begin recycled water production in 2021-22. Table 1-3, Table 1-4 and Table 1-5 show the forecast for these schemes.

Table 1-3 Oran Park and Turner Road recycled water scheme forecast costs and revenues ($2019–20 million)

	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
Capital costs	$1.2	$9.4	$9.3	$-	$-	$-
Operating costs	$-	$0.5	$0.5	$0.5	$0.5	$0.5
Operating revenue	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Number of properties	826	915	915	915	915	915
Volume (ML)*	56	62	62	62	62	62
Volume growth	(34%)	11%	-	-	-	-

*Total volume available for sale

Table 1-4 Colebee recycled water scheme forecast costs and revenues ($2019–20 million)

	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
Capital costs	$5.7	$ -	$ -	$ -	$ -	$ -
Operating costs	$ -	$0.2	$0.2	$0.2	$0.2	$0.2
Operating revenue	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Number of properties	183	183	183	183	183	183
Volume (ML)*	16	16	16	16	16	16
Volume growth	0%	0%	0%	0%	0%	0%

*Total volume available for sale

Table 1-5 Ropes Crossing recycled water scheme forecast costs and revenues ($2019–20 million)

	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
Capital costs	$1.0	$3.2	$3.2	$-	$-	$-
Operating costs	$-	$0.6	$0.6	$0.5	$0.5	$0.4
Operating revenue	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2
Number of properties	1,915	1,965	2,035	2,035	2,035	2,035
Volume (ML)*	88	88	88	88	88	88
Volume growth	4%	-	-	-	-	-

*Total volume available for sale

1.2.2 Voluntary schemes

The Wollongong recycled water scheme, our largest voluntary recycled water scheme, has been operating since 2006. We also provide treated effluent (re-use water) to many small irrigation schemes such as parks and golf courses that are located close to wastewater treatment plants. The costs of these schemes are recovered from the customers taking recycled water.

1.2.3 Government directions

In the 2006 Metropolitan Water Plan, the NSW Government committed to increasing the amount of recycled water in Sydney to 70 billion litres a year by 2015.

In support of this commitment, the NSW Government directed Sydney Water, under section 20P of the *State Owned Corporations Act 1989* (NSW), to complete two recycled water projects:

- the Rosehill-Camellia Recycled Water Scheme (formerly known as the Camellia Recycled Water Scheme)
- the St Marys Recycled Water Project (formerly known as the Replacement Flows Project).

At the same time, a Ministerial direction under section 16A of the Independent Pricing and Regulatory Tribunal Act 1992 (NSW) required IPART to include the efficient costs of complying with the section 20P directions in Sydney Water's prices. As a result, all Sydney Water customers pay the net costs of each of these schemes. Further detail is provided below.

Rosehill-Camellia recycled water scheme

The project is a privately financed partnership between Sydney Water and AquaNet Sydney Pty Ltd (AquaNet) to supply recycled water for industry and irrigation in Western Sydney. Sydney Water has a 20-year build own operate (BOO) agreement with AquaNet for the supply of recycled water. AquaNet own and operate a recycled water distribution network and source recycled water from a water recycling plant at Fairfield (the latter is owned and operated by Veolia). The project was the first to be delivered under the *Water Industry Competition Act 2006* (NSW) (WIC Act) and commenced on 19 October 2011.

Sydney Water purchases an agreed minimum quantity of recycled water from AquaNet, and on-sells recycled water to meet the level of demand from customers. The scheme originally consisted of six large non-residential customers, known as foundation customers. Unfortunately, three out of the original six foundation customers later closed or moved their operations, resulting in a substantial drop in recycled water demand and a shortfall of revenue required to cover the minimum payment to AquaNet.

Assessment of the ongoing economic case for the Rosehill-Camelia scheme

In the 2016 Determination, IPART recommended that the ongoing economic case for the Rosehill-Camelia scheme be reassessed and all options considered.

Over the last two years, we have explored options for achieving better economic and customer outcomes. Options included a potential termination of the agreement with AquaNet, different recycled water asset ownership and operating models, and opportunities to supply recycled water to new customers. The only way to reduce the cost for the wider customer base is to increase the level of demand.

Our investigations have shown any material expansion in demand would need to include a large proportion of residential customers. However, the current plant has been designed to suit industrial uses and has a higher mineral content than would be considered desirable for residential use. Therefore, costly new infrastructure would be required to supply increased recycled water from the Fairfield plant. Additionally, the conditions of the AquaNet recycled water contract do not support alternative options being commercially viable. Regardless, Sydney Water will continue to explore options to better utilise the plant capacity and reduce the cost impact on our customers.

Regulatory treatment of the 'cost gap' difference

The government direction requires IPART to allow Sydney Water to recover the difference between the cost of recycled water purchases from AquaNet, and revenues from the sale of recycled water from customers. The difference between revenue and costs is added to the annual revenue requirement and recovered from all water customers. The amount recovered via water prices has averaged $16.7 million (in $2019–20) a year over the 2016 price period, as shown in Table 1-6.

There has been a steady increase in net costs due to falling volume of recycled water sold from the scheme. As a result, the subsidy needed from water charges is now forecast to be $23.7 million a year for the 2020–24 period (Table 1-6).

Table 1-6 Rosehill-Camellia recycled water scheme actual and forecast net operating costs ($2019–20 million)

	2016–17	2017–18	2018–19	2019–20	Total	2020–21	2021–22	2022–23	2023–24	2024–25	Total
Operating Expenditure											
IPART	19.7	19.8	19.9	20.1	79.5						
Actual/ Forecast	19.2	17.8*	20.8	19.3	77.1	23.7	23.7	23.7	23.8	23.7	118.6
Variance	-0.5	-2.0	0.9	-0.8	-2.4						
Revenue											
IPART	3.4	1.9	1.9	1.9	9.1						
Actual/ Forecast	3.7**	2.4	2.0	2.3	10.4	2.3	2.3	2.3	2.3	2.3	11.5
Variance	0.3	0.5	0.1	0.4	1.3						
Net Operating Costs											
IPART	16.3	17.9	18.0	18.2	70.4						
Actual/Forecast	15.5	15.4	18.8	17.0	66.7	21.4	21.4	21.4	21.5	21.4	107.1
Variance	-0.8	-2.5	0.8	-1.2	-3.7						

* Veolia conducted maintenance in March 2018 which resulted in lower payments by Sydney Water during 2017–18.

** During 2017 one of the foundation customers ceased operations which resulted in a significant loss of revenue.

St Marys Recycled Water Scheme

The St Marys Recycled Water Scheme is Sydney's largest water recycling project. The scheme takes tertiary treated wastewater from the Penrith, St Marys and Quakers Hill water recycling plants and delivers it to an Advanced Water Treatment Plant (AWTP) at St Marys. The wastewater is further treated using ultrafiltration and reverse osmosis technologies and released into the Hawkesbury Nepean River below the Penrith Weir.

Since the quality of water discharged from the AWTP is very high, an extra 18 billion litres of raw water can be held in Warragamba Dam each year instead of being released as an environmental flow. This water can now be retained for drinking purposes, and the water helps contribute to the healthy flow and quality of the river. Compared to alternative solutions, the diversion of highly treated wastewater from St Marys and Quakers Hill also helps to reduce the nutrient load in South Creek and reduces the level of nutrients in the main Hawkesbury Nepean River.

The plant became fully operational in September 2010. It receives about 65 ML a day of tertiary treated wastewater from the three water recycling plants and produces up to 50 ML a day of highly treated water.

Regulatory treatment of costs

In line with the government direction, capital and operating costs are recovered through general prices. The capital investment for the scheme has been included in the regulated asset base since IPART's 2008 retail price determination. The costs of the St Marys recycled water scheme for the current and next determination periods are shown in Table 1-7.

Table 1-7 St Marys recycled water scheme net operating costs ($2019–20 million)

	2016–17	2017–18	2018–19	2019–20	Total	2020–21	2021–22	2022–23	2023–24	2024–25	Total
Operating Expenditure											
IPART	9.5	10.1	8.1	7.3	35.0						
Actual/ Forecast	6.6	5.2	6.7	7.1	25.6	9.6	9.6	8.9	8.9	8.8	45.8
Variance	-2.9	-4.9	-1.4	-0.2	-9.4						

1.3 Ring-fenced costs and revenue

As required by IPART, we have separately identified the revenues and costs of recycled water schemes. Revenues for each scheme are tracked separately in our billing system, with discrete codes in our general ledger to track total regulated and non-regulated recycled revenues for statutory and IPART reporting.

In the 2016 Determination, IPART asked Sydney Water to allocate corporate costs across all products and services. We use an allocation method that distributes corporate costs based on the share of total direct costs incurred for each service. For example, if recycled water costs are, say, 5% of total direct costs, we would allocate 5% of corporate costs to recycled water. The recycled water costs in this proposal include a share of pooled business support costs from 2020–21 onwards.

1.3.1 Fixed Asset Register review

In September 2018 Sydney Water embarked on a detailed check of the unregulated assets in our fixed assets register to ensure all our recycled water assets were correctly classified. This project involved researching archive files for over 2,000 individual linear assets (pipes) and around 500 facility asset records.

Linear assets represent almost 70% of all our unregulated assets. Our investigations showed that, in dollar terms, 98% of the linear assets were correctly classified as unregulated assets. There were also some minor discrepancies in relation to length of mains and material type.

Reservoirs, dosing plant, pumping stations and treatment works represent the remaining 30% of our unregulated assets. We have now checked around 40% of these assets and found they are all correctly classified. We are continuing to investigate the remaining assets but given the favourable results to date, do not anticipate any significant discrepancies.

We consider this exercise provides strong evidence that our recycled water costs are based on recently validated, high quality records.

1.4 Recycled water pricing proposal for mandatory schemes

IPART's 2006 Recycled Water Determination prescribed usage prices for recycled water which depend on the percentage of drinking water top-up needed at a scheme on average. In IPART's 2018–2019 review of recycled water pricing, IPART suggested this approach could be overly prescriptive and in their draft report have removed these restrictions.

We support this change as allowing utilities to set price levels and structures will enable them to better balance demand and supply. This flexibility will be particularly useful for schemes where encouraging higher use may enable lower storage costs.

1.4.1 Pricing proposal

Sydney Water proposes to maintain the current method to set recycled water usage prices for all our mandatory schemes. That is, our proposal is to continue to fix usage prices at 90% of the drinking water usage charge and continue to not charge any additional fixed service charges at any of our mandatory recycled water schemes:

- Rouse Hill
- Hoxton Park
- Oran Park & Turner Road
- Colebee
- Ropes Crossing.

In our 2015 price proposal, Sydney Water proposed a 13.9% reduction in the drinking water usage price. Given this large reduction in usage price, we also proposed, and IPART accepted, that the recycled water usage price would decrease, but move closer in percentage terms to the new drinking water charge. As we are proposing very little change to drinking water usage charges in this proposal, it is important that recycled water usage charges remain at 90% of the drinking water rate. This will ensure continued alignment of operating costs with ongoing revenues for our mandatory schemes going forward.

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Attachment 15
Asset management governance

Price proposal 2020–24

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Asset management governance

Key messages

- Our Asset Management System is now certified to ISO 55001.
- The AMS provides the leadership and assurance for sustaining and improving our asset management capability that underpins the delivery of our products and services.
- Our asset infrastructure and renewals planning continue to improve, becoming more integrated to optimise solutions and make better investment decisions.
- The 2020–24 investment program has been built from the bottom up while also being consistent with long-term strategic planning outcomes.
- Investment programs are managed through portfolios and programs to achieve best service and risk outcomes within funding envelopes.
- Our new, integrated approach to asset planning and the procurement of specialist goods and services will provide efficiencies, delivery certainty and continuing capability development.

1 Asset management system

Sydney Water has long had an Asset Management Framework which existed as part of a robust corporate management system. We have now applied tighter management around our practices to build an Asset Management System (AMS) that is certified to the international standard ISO 55001 – Asset Management. While certification was completed by June 2019 as required in SW's Operating Licence 2015–20, the principles and structure of the AMS has been consistent with ISO 55001 since June 2018. We have adopted the Institute of Asset Management's (IAM) model for our asset management framework, see Figure 1-1 below, so that we can benefit from the guidance it provides and that the model with its supporting documentation will be updated with contemporary practices.

The AMS provides discipline to our asset management practices through structured management review, auditing program, continuous improvement, and delivery and performance monitoring.

This discipline gives assurance to sustained performance and improvement where there is a direct impact for customer value:

- Sustained performance and consistent practice, including implementing improvements
- Identifying and developing improvements that bring value for our customers.

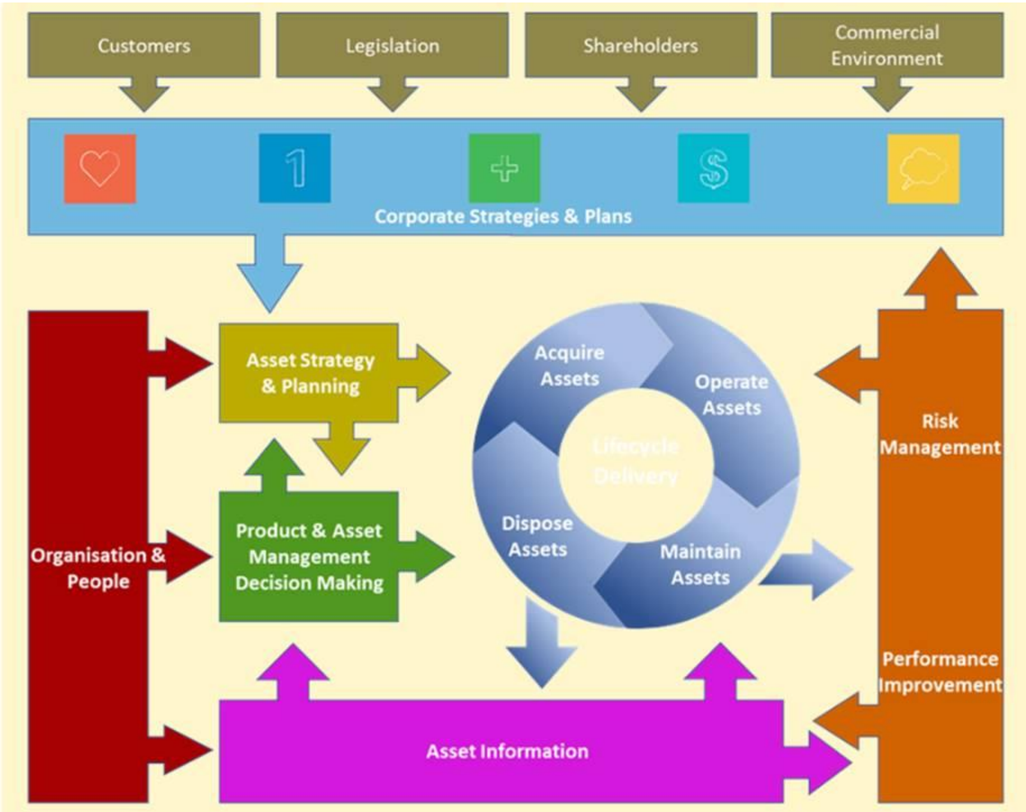

Figure 1-1 AMS asset management framework – based on IAM model

2 Asset strategy and planning overview

Three key documents (plans) are the foundation of Sydney Water's Asset Management System (AMS):

- Asset Management Policy (AM Policy)
- Strategic Asset Management Plan (SAMP)
- Asset Master Plans (AM Plans)

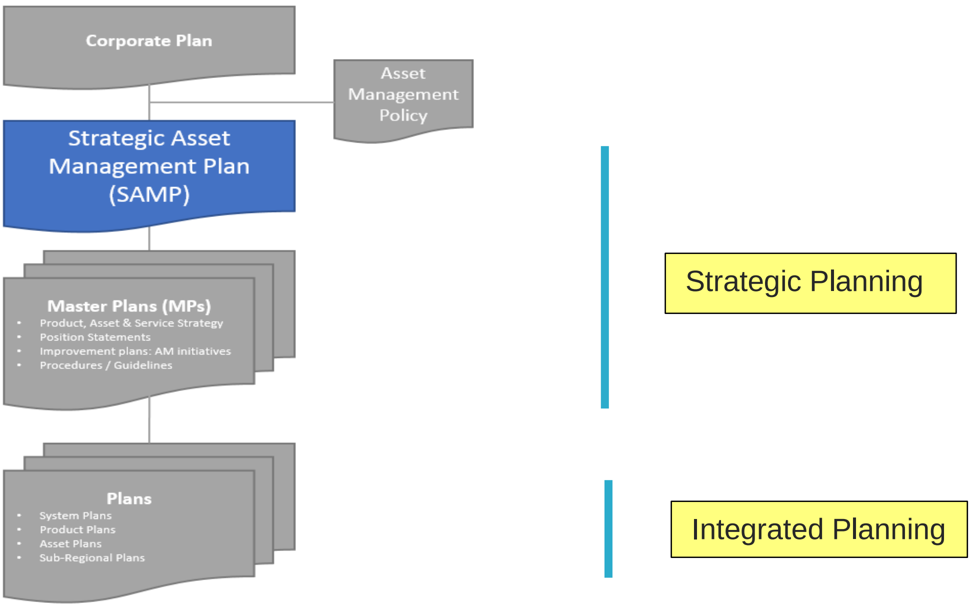

Figure 2-1 Plan hierarchy within the AMS

Sydney Water's AM Policy was recently revised and approved. Leadership for asset and product processes has also been established, aligned to the corporate process governance framework and meeting ISO requirements to manage the AMS and asset management objectives.

The Strategic Asset Management Plan (SAMP) is a high-level plan that specifies how our organisation objectives are used to set our asset management objectives, the approach for developing AM Plans and how the AMS supports achieving our asset management objectives. In preparing the SAMP, stakeholders were consulted to include their expectations and requirements and to correctly document the processes used for asset management decision making. In preparing a SAMP, we create the foundation for consistent practice, review and change, which are key principles for management systems.

The other piece of strategic planning, master plans, show how we manage our assets to achieve the required product and service objectives, providing specific guidance on issues for individual asset classes.

Integrated planning sets out how services are to be provided to an area and specifies the products and assets necessary for those services. System plans are the main type of integrated planning, but there are other plans (growth servicing, regional, asset, product – see Figure 3-2) prepared when needed to detail complex assets or to answer specific servicing or product issues.

How we plan for and manage our infrastructure is shown in Figure 2-2 below. We plan in an integrated manner so there is a clear direction and the most efficient options are selected to achieve our service objectives.

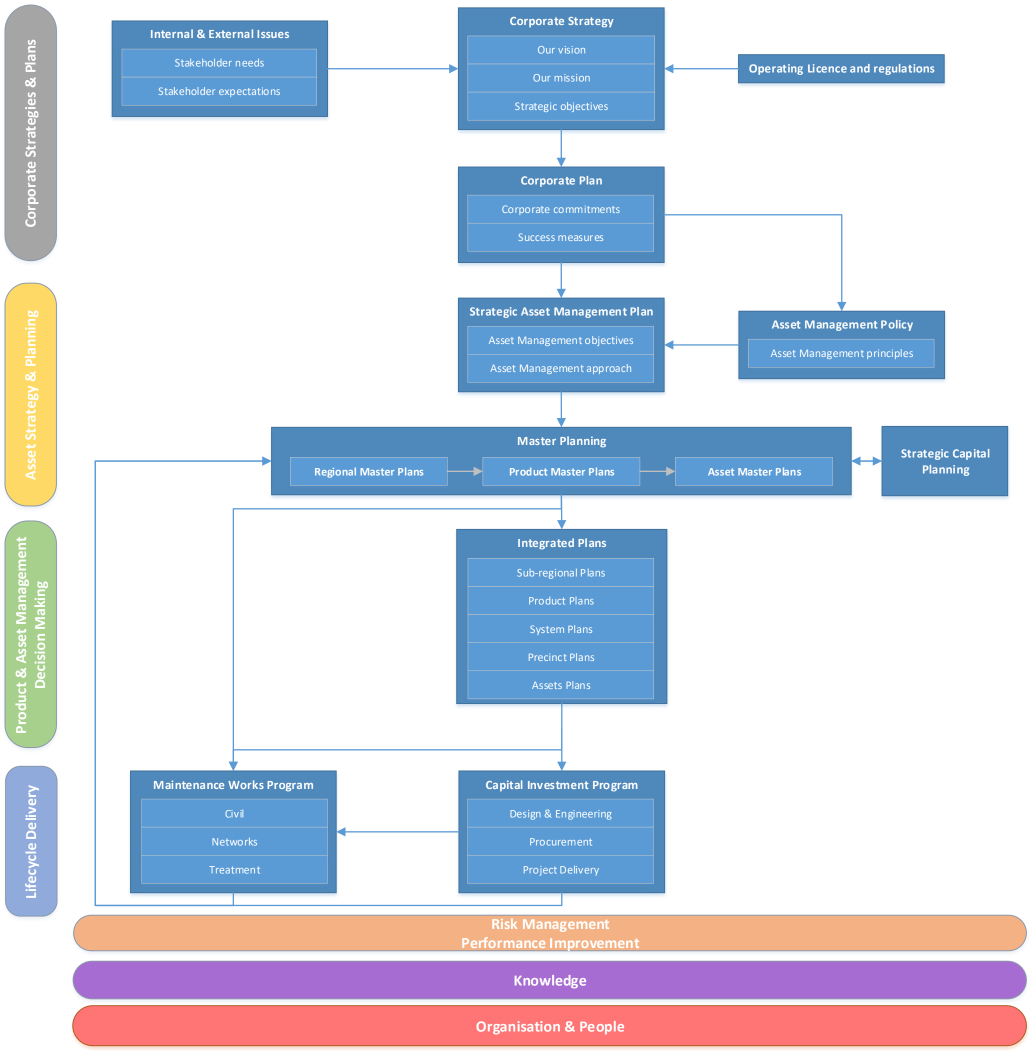

Figure 2-2 Asset planning in Sydney Water

The plans produced at the master planning and integrated planning levels are living documents that are reviewed as assumptions or criteria change. Outputs from these plans include capital investment programs; a detailed five year program and longer-term forecasts, and maintenance works programs that capture key investments to maintain and enhance our services for customers.

3 Asset management improvement

3.1 Recent improvements

We continue to improve our asset management practices to provide better value services. In the current regulatory period, we have made improvements in the key areas of infrastructure planning, program management, and renewals planning.

3.1.1 Infrastructure planning

Continued development of our infrastructure planning capability is producing long-term strategic plans and integrated plans that improve our integrated service solutions for our customers. This piece of work, while being extensive, will allow us to make better investment decisions based on sound planning. Planning has been thorough, and plans have been developed working collaboratively with internal business groups and key stakeholders.

Master plans

Master plans are the strategic plans setting out the top down long-term strategies for the management of products, assets and regional services. Master plans are part of the asset management planning structure set out in Sydney Water's Strategic Asset Management Plan; a master plan is a group of high-level customer-centric strategic planning activities for a specific context (asset, product, or regional) over the long-term. A master plan anticipates Sydney Water's investment needs responding to multiple drivers and sets the direction for planning, delivery, operations and maintenance.

Master plans consist of a suite of documents including a vision, position statements, planning needs, specifications, and decision frameworks. They anticipate Sydney Water's investment needs by responding to possible futures for growth, asset renewal and reliability, environmental improvements, and regulatory drivers.

There are currently Asset Management Plans for all key asset classes that will be replaced by new asset Master plans when they are completed. Product and Regional Services master plans are being prepared that in combination with asset MPs set the strategic direction and investment for services and infrastructure over the next 30 years and beyond. All new asset master plans and Product master plans will be completed by December 2019 and all Regional Servicing master plans by December 2020.

System plans

System plans are the integrated plans defining the investment needs (growth, renewal and enhancements) for a product system over a 30-year horizon, eg Bondi wastewater system. These plans are now complete for all but a few systems, with those systems being small or low risk. The system plans allow us to rationalise (integrate) our investment needs within a system to specify time efficient investment. Each system plan includes a detailed 5-year investment plan, which are used in our pricing submission.

System plans are a bottom up planning approach for all systems where synergies between multiple current/future drivers are identified and flagged in advance. This includes consideration of issues including customer expectations, asset condition, system and/or process capability, demand growth, changes to climate, emerging technology, and regulatory changes. This approach provides the opportunity for improved system performance and optimisation across various drivers and allows greater transparency of strategic risks, issues and opportunities within a system, including the adjacent systems.

Traditionally, projects for the different systems were largely initiated by an individual driver, such as growth, renewals, reliability or business efficiency. Instances where these drivers overlap within a system were not previously identified and flagged in advance, creating the potential for missed optimisation opportunities and sub-optimal outcomes in delivery. Our integrated system plans significantly improve on this outdated traditional approach.

Our system plans will be reviewed on a four-year cycle or as key short or long-term planning assumptions change.

3.1.2 Strategic capital planning

Provides a long-term outlook on water, wastewater and stormwater infrastructure requirements, and establishes a foundational decision making framework needed to ensure we efficiently meet the needs of new and existing customers by sound analysis of optimal servicing solutions, extending out 25 years.

Investment drivers including population growth, enhancements to service and environmental standards, asset renewals and continuously evolving customer expectations to 2044 are considered to evaluate strategic investment options. These investment drivers are considered under three potential servicing solutions:

1. **Traditional water servicing** – this represent a 'one use' of water philosophy, delivering raw water from traditional bulk water sources and desalination before treating and distributing to customers, after which the wastewater is collected and treated before discharging into the rivers and oceans.
2. **Localised water servicing** – supplementing traditional water servicing with greater adoption of recycled water schemes and promoting greater recycling of our valuable water resources. This approach will also see a greater volume of high-quality water being released into inland waterways
3. **Resilient city** – supplementing traditional water servicing with an alternative integrated water management scenario which allows for a larger proportion of water to be re-used to meet the city's water and wastewater management needs.

Strategic capital planning has been key to setting the long-term strategic context for Sydney Water's 2020–24 price proposal to IPART. Particularly, it provides the strategic decision-making framework for the bottom-up investment needs identified in the Price proposal for that period, ensuring these investment needs remain consistent with the long-term top-down planning investment pathways.

3.1.3 Program management

We manage our infrastructure capital investment in portfolios and programs, eg our water network portfolio has reticulation water mains, reservoirs and water pumping station programs. Each program has a business case which sets out the drivers for and funding needs (projects) for that program.

Available funding can be prioritised across or within portfolios. When funds become constrained, which can be due to a range of reasons, including introduction of new projects or higher project costs, projects are actively managed based on the risk or opportunity impact of their deferral.

Projects are actively managed through risk-based options assessments, according to their risk ranking and the opportunity cost of their deferral, when they are approaching their next approval gateway. This process ensures that the highest risk projects are always identified and prioritised and therefore the best value is delivered from the program and available funds.

Programs continue to be monitored and managed; if program outcomes are significantly compromised then funding allocation across portfolios can be reviewed.

3.1.4 Renewals planning

Project See was implemented initially in treatment plants applying the following to all assets:

- a consequence of failure rating (not changing with time)
- a condition assessment grading.

This information is recorded against each treatment plant asset in our asset and works management system (Maximo). Annually each asset has its condition assessed, these assessments are scheduled in Maximo to occur progressively through the year. The consequence of failure rating is based on the corporate risk management framework to give a risk rating which, as outlined above, means there can be prioritisation across investment programs.

Based on an asset’s consequence of failure and assessed condition, a renewal planning action is specified, ie renew within 24 months or continue to monitor. Using these renewal planning actions, a renewal plan for each treatment plant is prepared. The Treatment Renewals Planning Standard sets out the activities and tools used to assure consistency within the plan.

Renewal of assets still must meet the criteria for renewal set out in the relevant decision framework, ie Facilities Decision Framework, before they are renewed.

3.2 Continuous improvement

The recent improvements identified above are now embedded in our practices and continue to be leveraged for further benefits. We have now identified other improvement initiatives that are being worked on to bring efficiencies and/or better decisions in the 2020–24 price path.

3.2.1 Project estimates

Tighter controls have recently been introduced for the estimation of costs in:

- service planning costs for infrastructure investment
- renewal planning for the replacement of existing assets.

Estimation of service planning options now follow a standard procedure for all infrastructure planning work, while the approval of any asset replacement does not proceed without assessment of future capacity and functionality needs to optimise any project scope.

Our design and construction business, Delivery Management, now have their estimators checking service and renewal planning estimates. Taking this approach applies consistency to the assessment of new services and renewals. Based on actual cost data, this practice provides both cost and approval time savings for projects. Further cost estimating benefits will evolve from the new procurement strategy as unit rates for work are used more widely and competition between the three delivery alliances assures cost efficiencies.

3.2.2 Procurement

Our contracts for maintenance, project management services and renewals are due to expire in 2020. This has given us an opportunity to develop and implement a new integrated, enterprise-wide approach for procurement of asset related goods and services.

We considered all available contracting and commercial options for procurement. We consulted with comparator organisations globally and engaged industry in a structured manner to develop our new procurement model. The approach involves the long-term engagement (10 years) of three consortia for the integrated services of design, construct and maintain across a given region. An overarching 'Enterprise Framework' contract jointly binds the consortia to collaborate and share knowledge to sustain improved performance.

The design, construct and maintenance functions provided by the consortia are co-located with Sydney Water's maintenance and operations staff to improve management of service infrastructure through its life cycle. Infrastructure planning, delivery program, and contract management and technical assurance functions are remaining with us to effectively prioritise investment and assure work delivery. Having three regionally based consortia provides a definable workflow for each consortia but competitive tensions are integrated to achieve cost efficiency and identify practices so collaborative improvements can occur. Specifically, work is initially allocated by region, but this can be changed based on the individual consortiums's performance.

The benefits from this procurement model are:

- **efficiency benefits leading to customer benefits –** greater integration of the design, construct and maintain stages of infrastructure life will reduced the cost of services
- **cost savings through incentivised performance –** between the three delivery consortia
- **increased certainty of resource availability –** while there is high demand for skilled and technical resources contracts lock in resources
- **industry capability development –** long-term engagement of consortia will allow for investment in resources and the building of skills and knowledge.

Our procurement model is a proven one. Implementation is supported by a detailed transition plan, managing the significant change actions that includes a transition period from January to June 2020 for the design, construction and maintain consortia to mobilise into our business.

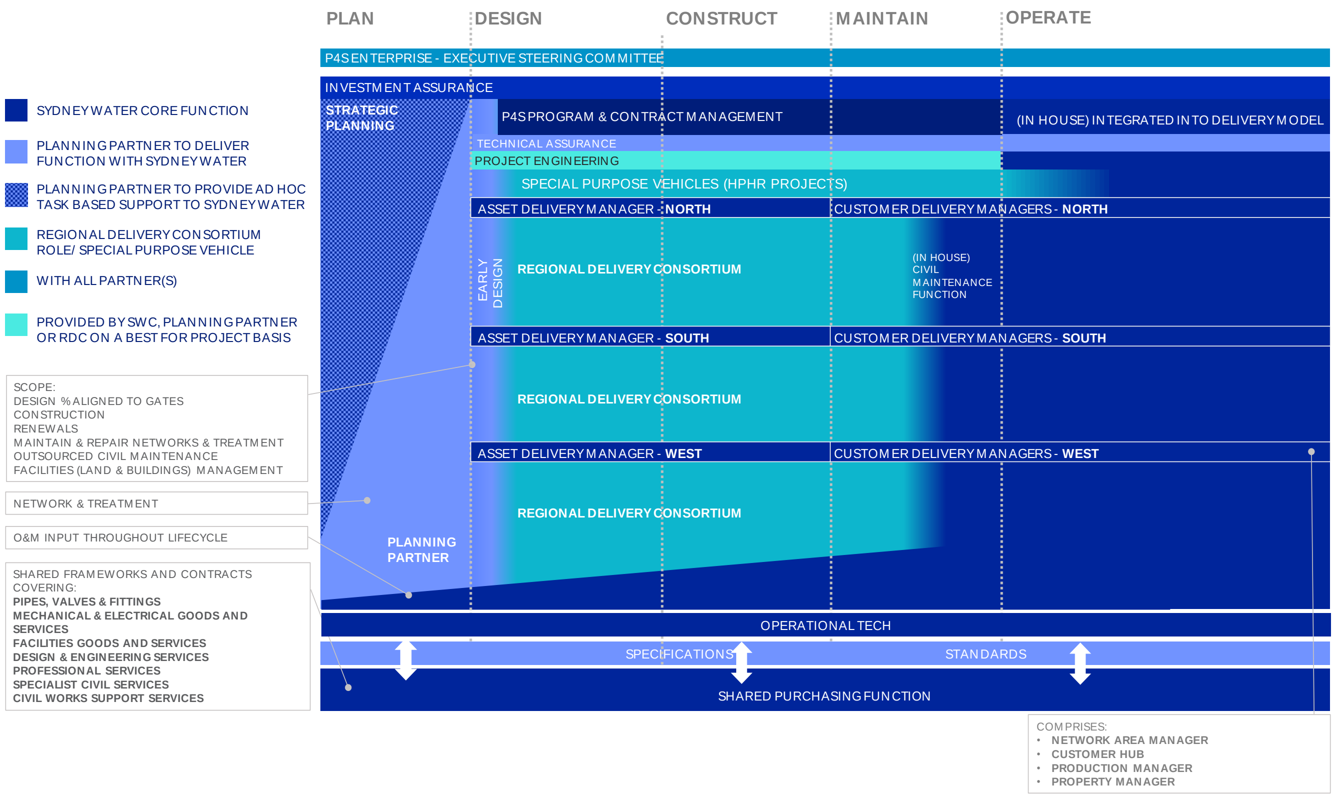

Figure 3-1 Procurement model for asset related goods and services

3.2.3 Extending renewal planning

The renewals planning process developed under Project See is now being extended to network assets – wastewater and water pumping stations, reservoirs, wastewater mains, water mains and stormwater.

This work will apply the same principles and rigour to network assets to be identified and prioritised for renewal through the relevant renewal decision framework.

3.2.4 Alignment of master (strategic level) and system (integrated level) plans

System plans are completed and only a few regional servicing master plans remain to be completed by September 2020. The strategic direction from the master plans necessary for the investments planned in the 2020–24 price period has been completed and incorporated.

Master plans are interdependent, many requiring strategic direction from peer plans before they are complete. With the completion of all strategic and integrated plans there is the opportunity to align both across the cohort of master plans and between the master and system plans to optimize our investment planning by bringing all needs together. It will also set the platform from which to continue to review our strategic and integrated planning as assumptions, regulations, service standards, customer expectations and technologies change. The process is outlined in Figure 3-2 below.

Once plans have been aligned there is greater confidence in proposed investments knowing the planning platform is in place and can remain contemporary through ongoing review.

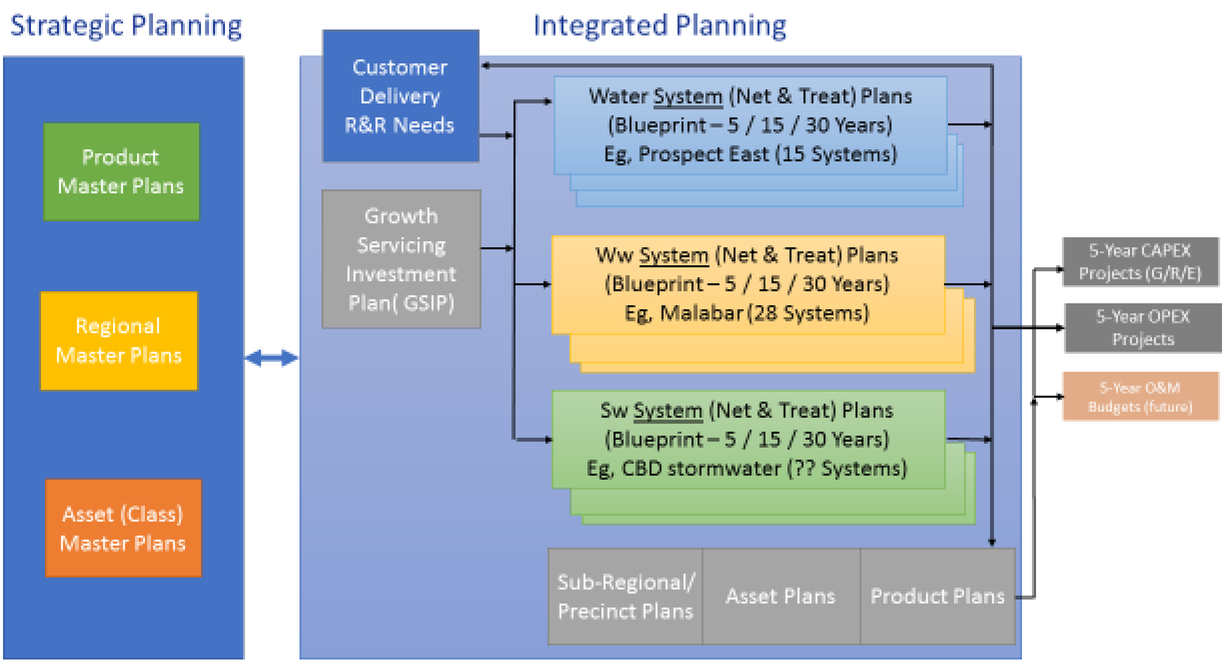

Figure 3-2 Integrated planning for infrastructure

4 Investment programs

The 2020–24 capital investment program is based on bottom-up plans which are informed by:

- a range of strategic plans (regional, system, etc)
- considering interactions between drivers.

This process ensures our infrastructure has the capability to meet its service objectives. Figure 4-1 below shows how the process is done.

In simplest terms we invest in infrastructure for three reasons:

- **growth** – to provide the new services
- **renewal –** to replace assets when they reach the end of their economic life (the point at which the cost of maintenance outweighs the cost of replacement)
- **enhancement** – to meet a new service standard or be more efficient.

Our capital investment program is composed of a series of program business cases. These program business cases have greater certainty of their investment needs and costs from the improvements in our asset management and planning practices.

The program is consistent with the outcomes from our long-term top down strategic planning. Future price paths will see the introduction of projects to meet the medium to long-term service needs specified by the strategic plans and optimised through integration.

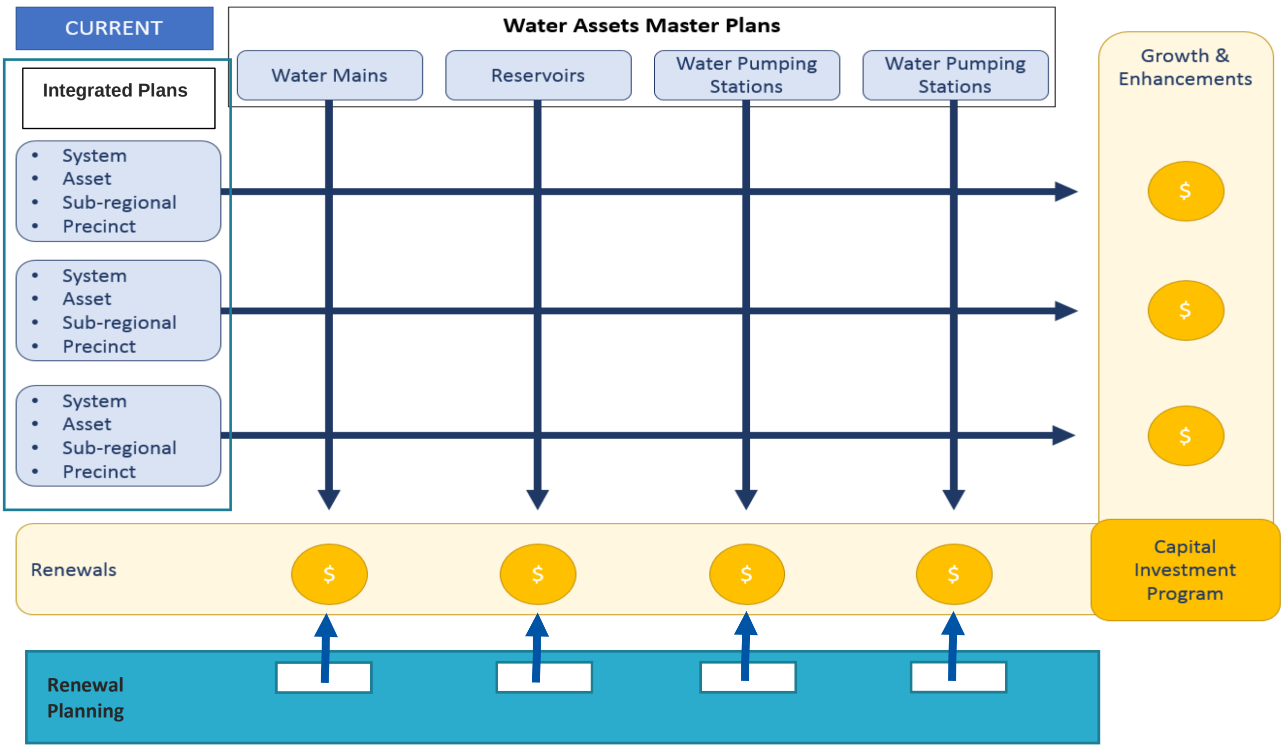

Figure 4-1 Capital investment program development

Examples of how some of the 2020–24 investment programs have been prepared are described in the following sections.

4.1 Treatment plants renewal programs

As a renewal's program this investment is mostly like-for-like replacement of assets that have reached the end of their service life (now cost efficient to renew). This is formally assessed before a project is approved through the Facilities Decision Framework.

Preparation and execution of the program follows the renewals planning standard. Condition of assets are updated annually to then be able to assess a renewal priority score which determines their renewal planning action. This collects all assets which are expected to require a renewal in the next five years. Renewals are a rolling program, rigor of annual condition assessment with known consequence of failure for each asset provides the basis to scope a realistic program, while allowing prioritisation within the funding envelope.

System plans are used to check where there may be planned concurrent investment for another need, so that all investment needs are combined into an optimised solution. This is done in both developing the program business case and during execution of the program.

Where there are significant renewal needs required at a treatment plant this work is packaged into a single project that allows for cost efficiency through integrated planning and delivery of renewal work, while minimising the impact on the operation of the plant.

4.2 Water main renewal programs

There are two capital investment programs that support the implementation of the Water Main Asset master plan and they are critical water main (300mm diameter and above) and reticulation (smaller diameter) renewal capital programs. Both programs renew mains assessed as reaching the end of their economic life – based on risk and condition.

As the reticulation water mains are generally smaller size and directly connect to customers, their renewals are largely like for like with no hydraulic assessment required. However, critical water main renewals are an integral part of water network system coupled with pumping stations and reservoirs. Every critical water main renewal candidate has a hydraulic assessment to define its capacity requirements and decide if replacement, upgrade or disuse is the project scope. This procedure is documented in the critical water main renewal decision framework.

4.3 Network growth

Network growth capital investment program is based upon integrated planning output – the Growth Servicing Investment Plan (GSIP) which sets the planning needs based on the proposed urban development across our networks and knowledge from the developing strategic Regional master plans when available. Projects can include the necessary work on water services to support the delivery of other infrastructure essential to urban growth.

Then more detailed plans for specific sub-regions or precincts are prepared which include servicing option assessment and then detailing the infrastructure to be provided. Examples of projects included in the 2020–24 network growth program for which planning is underway include:

- Greater Parramatta to Olympic Peninsula (GPOP)
- Western Sydney Airport Growth Area.

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