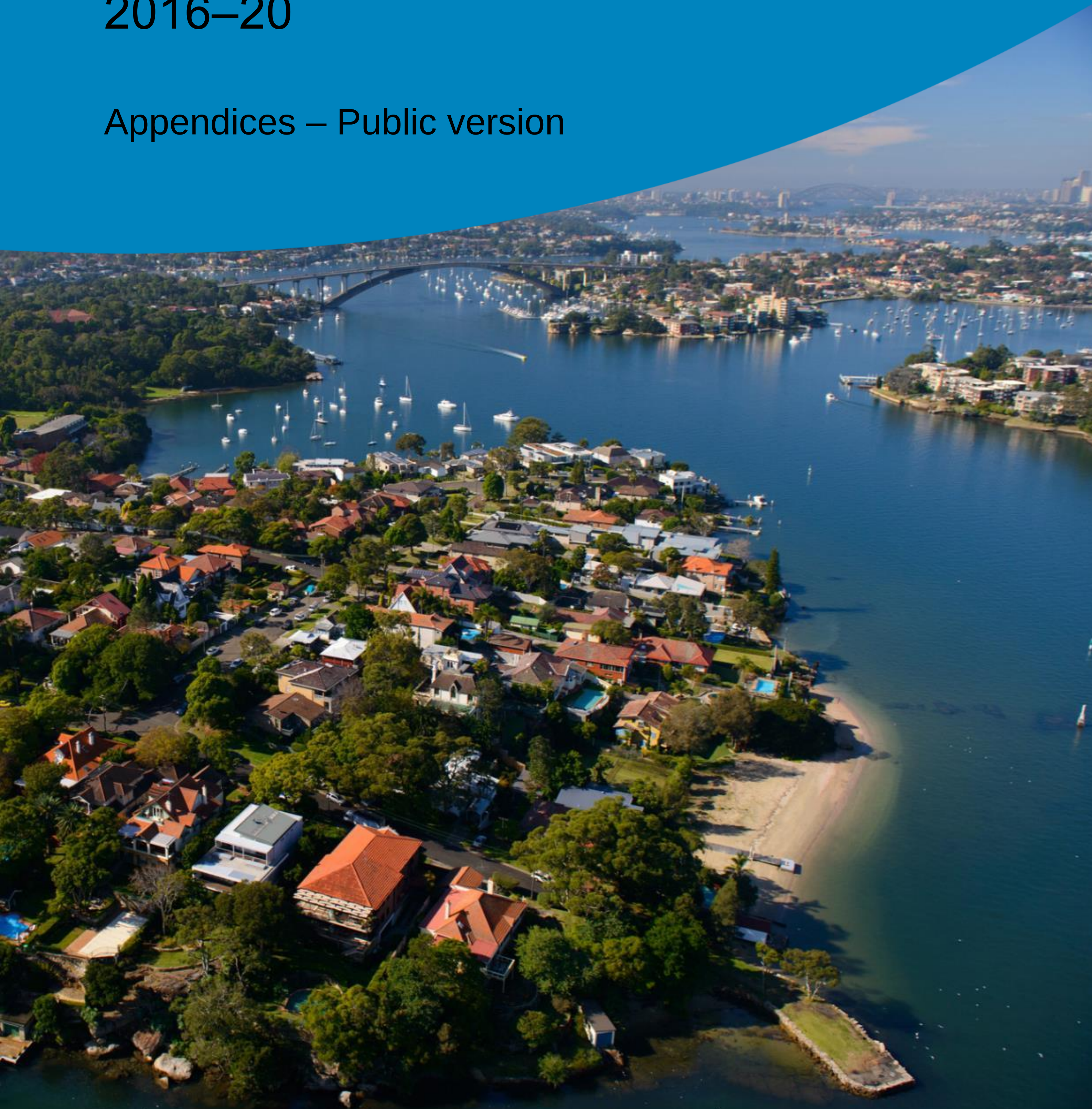
Our plan for the future: Sydney Water's prices for 2016–20

Appendices – Public version



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Appendix 1 – Proposed prices – Water, Wastewater and Stormwater charges (including Rouse Hill)

Sydney Water proposes lower prices for water, wastewater and stormwater services for the next determination period. Water and wastewater charges will decrease immediately on 2016-17 with no further change afterwards in real terms. Stormwater service charges will reduce each year and be 11% lower by the end of 2019–20. The water use charge will reduce by 13.9%. Water and wastewater service charges for residential properties and dwellings will reduce by 4.9%. Some meter-size based charge for non-residential properties will have a greater reduction. There are no changes in real terms to Rouse Hill drainage and land charges.

The prices quoted here are all in constant $2015–16. We have assumed an inflation rate of 2.5% to convert $2014–15 into $2015–16 values.

1.1 Water supply services

Table A1-1 Water service charge for individually metered residential properties, dwellings within a residential multi premises with a common meter, and properties within mixed multi premises with a common meter ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Water service charge	98.52	98.52	98.52	98.52

Table A1-2 Water service charge for individually metered non-residential properties, non-residential multi premises with a common meter, and metered standpipes ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Meter size				
20mm	98.52	98.52	98.52	98.52
25mm	153.93	153.93	153.93	153.93
30mm	221.66	221.66	221.66	221.66
32mm	252.20	252.20	252.20	252.20
40mm	394.06	394.06	394.06	394.06
50mm	615.72	615.72	615.72	615.72
65mm	1,040.58	1,040.58	1,040.58	1,040.58
80mm	1,576.26	1,576.26	1,576.26	1,576.26
100mm	2,462.90	2,462.90	2,462.90	2,462.90
150mm	5,541.52	5,541.52	5,541.52	5,541.52
200mm	9,851.60	9,851.60	9,851.60	9,851.60
For meter sizes not specified above, the following formula applies	(Meter size)^2 x 20mm charge/400			

Table A1-3 Water usage charge for filtered water to metered properties ($2015–16)

Charge	Commencement Date to 30 June 2017 ($/kL)	1 July 2017 to 30 June 2018 ($/kL)	1 July 2018 to 30 June 2019 ($/kL)	1 July 2019 to 30 June 2020 ($/kL)
Filtered Water – water usage charge	1.97	1.97	1.97	1.97

Table A1-4 Water usage charge for unfiltered water to metered properties ($2015–16)

Charge	Commencement Date to 30 June 2017 ($/kL)	1 July 2017 to 30 June 2018 ($/kL)	1 July 2018 to 30 June 2019 ($/kL)	1 July 2019 to 30 June 2020 ($/kL)
Unfiltered Water – water usage charge	1.67	1.67	1.67	1.67

Table A1-5 Water service charge for unmetered properties ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Water service charge	452.96	452.96	452.96	452.96

1.2 Wastewater services

Table A1-6 Wastewater service charge for residential dwellings, properties within a mixed multi premises, and unmetered properties ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Wastewater service charge	582.34	582.34	582.34	582.34

Table A1-7 Wastewater service charge for individually metered non-residential properties, and non-residential multi premises with a common meter ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Meter size				
20mm	582.34	582.34	582.34	582.34
25mm	909.91	909.91	909.91	909.91
30mm	1,310.27	1,310.27	1,310.27	1,310.27
32mm	1,490.80	1,490.80	1,490.80	1,490.80
40mm	2,329.37	2,329.37	2,329.37	2,329.37
50mm	3,639.65	3,639.65	3,639.65	3,639.65
65mm	6,151.00	6,151.00	6,151.00	6,151.00
80mm	9,317.49	9,317.49	9,317.49	9,317.49
100mm	14,558.58	14,558.58	14,558.58	14,558.58
150mm	32,756.81	32,756.81	32,756.81	32,756.81
200mm	58,234.32	58,234.32	58,234.32	58,234.32
For meter sizes not specified above, the following formula applies	(Meter size)^2 x 20mm charge/400			

Note: The prices in Table A1-7 assume the application of a Discharge Factor of 100%. The relevant Discharge Factor may vary from case to case, as determined by Sydney Water. A pro rata adjustment shall be made where the Discharge Factor percentage is less than or greater than 100%.

Note: The minimum charge applies, ie the higher of (meter size charge x Discharge Factor) or 20mm charge.

Table A1-8 Wastewater usage charge for metered non-residential properties, and non-residential multi premises with a common meter ($2015–16)

Charge	Commencement Date to 30 June 2017 ($/kL)	1 July 2017 to 30 June 2018 ($/kL)	1 July 2018 to 30 June 2019 ($/kL)	1 July 2019 to 30 June 2020 ($/kL)
Wastewater usage charge where:				
volume of wastewater discharge ≤ discharge allowance	0.00	0.00	0.00	0.00
volume of wastewater discharge > discharge allowance	1.10	1.10	1.10	1.10

Note: The discharge allowance = 0.822 kL per day.

1.3 Stormwater drainage services

Table A1-9 Stormwater service charge for dwellings within a residential multi premises or properties within a mixed multi premises ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Stormwater service charge	30.79	29.90	29.04	28.21

Table A1-10 Stormwater service charge for residential dwellings which are not within a multi premises, and vacant land ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Stormwater service charge	83.96	81.54	79.20	76.92

Table A1-11 Stormwater service charge for non-residential properties which are not within a multi premises ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Non–residential property – small (200m^2 or less)	30.79	29.90	29.04	28.21
Non–residential property – medium (201m^2 to 1,000 m^2) or low impact	83.96	81.54	79.20	76.92
Non–residential property – large (1,001m^2 to 10,000m^2)	419.80	407.73	396.01	384.63
Non–residential property – very large (10,001m^2 to 45,000m^2)	1,865.75	1,812.12	1,760.04	1,709.45
Non–residential roperty – largest (45,001m^2 or greater)	4,664.40	4,530.32	4,400.10	4,273.63

Table A1-12 Stormwater service charge for non-residential properties within a non-residential multi premises ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Non–residential property within non–residential multi premises	30.79	29.90	29.04	28.21

1.4 Rouse Hill Recycled Water and Stormwater service

Table A1-13 Recycled water usage charge ($2015–16)

Charge	Commencement Date to 30 June 2017 ($/kL)	1 July 2017 to 30 June 2018 ($/kL)	1 July 2018 to 30 June 2019 ($/kL)	1 July 2019 to 30 June 2020 ($/kL)
Recycled water usage charge	1.77	1.77	1.77	1.77

Table A1-14 Rouse Hill stormwater charge ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Rouse Hill stormwater charge for residential properties, vacant land and non–residential properties with land size ≤ 1,000m^2	140.33	140.33	140.33	140.33
Rouse Hill stormwater charge for non–residential properties with land size > 1,000m^2	140.33 x ((land area in m^2)/1000)	140.33 x ((land area in m^2)/1000)	140.33 x ((land area in m^2)/1000)	140.33 x ((land area in m^2)/1000)

Table A1-15 Rouse Hill land charge for new properties in the Rouse Hill Development Area ($2015–16)

Charge	Commencement Date to 30 June 2017 ($)	1 July 2017 to 30 June 2018 ($)	1 July 2018 to 30 June 2019 ($)	1 July 2019 to 30 June 2020 ($)
Rouse Hill land charge	249.97	249.97	249.97	249.97

Appendix 2 – Proposed prices – Trade waste services & Ancillary and miscellaneous customer services

2.1 Trade waste services

There are two groups of trade waste costs:

- Cost associated with treatment (pollutant charges)
- Cost associated with managing trade waste discharges (agreement fees).

Table A2-1 Trade waste costs

Cost	Charge
Treatment cost	Pollutant charges for industrial customers
	Corrosive substance charge for industrial customers in corrosion impacted catchments
	Substance charges for commercial customers
Management cost	Trade waste industrial agreement charges for industrial customers by risk index
	Commercial agreement charges for commercial customers
	Liquid waste trap charges for commercial customers
	Trade waste ancillary charges

Sydney Water conducted a comprehensive review of trade waste costs and charges in 2011. This resulted in significant changes in our trade waste charges and price structure in the current (2012–16) price path.

Sydney Water proposes to keep charges flat in real terms for 2016–20. In addition, we propose the following four very minor changes to the current charges structure:

- a reduction in the industrial agreement charge for Risk Index 6 and 7 industrial customers to reflect a reduction in Sydney Water audit inspections from four inspections/year to two inspections/year (risk index 6 customers) and to one inspection/year (risk index 7) (Table A2-4)
- replace the foot-note in the “substance charges for commercial customers” table with a commercial activity code “pre-treatment not maintained in accordance with requirements” (Table A2-5)
- reduce the substance charge for the commercial activity ship to shore to $0.00 (Table A2-5)
- Shopping centres with sophisticated centralised onsite pre-treatment (treatment other than grease traps or grease trap equivalents) will be managed as industrial customers (Risk

Index 6) and receive site-specific substance charges (this will recognise improvements in performance beyond that provided by grease traps).

Table A2-2 Pollutant charges for industrial customers discharging to a primary WWTP ($2015–16)

Pollutant	Acceptance standard (mg/L)	Domestic equivalent	2015–16 ($/kg) #	2016–17 ($/kg) #
BOD – primary WWTP	See note 1	230	0.277+[0.120 x (BOD mg/L/600)]	0.277+[0.120 x (BOD mg/L/600)]
BOD – secondary and tertiary WWTP	See note 1	230	1.800+[0.120 x (BOD mg/L/600)]	1.800+[0.120 x (BOD mg/L/600])
Suspended solids – primary WWTP	600	200	0.503	0.503
Suspended solids – secondary and tertiary WWTP	600	200	1.457	1.457
Grease – primary WWTP	110	50	0.453	0.453
Grease – secondary and tertiary WWTP	110	50	1.391	1.391
Nitrogen*	150	50	1.650	1.650
Phosphorus*	50	10	5.917	5.917

Note 1 BOD acceptance standards will be set only for wastewater systems declared as being affected by accelerated odour and corrosion. Where a customer is committed to and complying with an effluent improvement program the customer will not incur doubling of the BOD charging rate

* nitrogen and phosphorus charges do not apply to trade wastewater discharges to wastewater treatment plants that discharge directly to the ocean.

per kg of mass above domestic equivalent

The mass of any substance discharged at a concentration that exceeds the nominated acceptance standard will be charged at double the rate.

Table A2-3 Corrosive substance charge for industrial customers in catchments affected by corrosion ($2015–16)

Pollutant	Units	2015–16 ($)	2016–17 ($)
pH	Per ML of wastewater where pH<7 #	62.691	62.691
Temperature	Per ML of wastewater with temperature >25 ^{0}C *	6.941	6.941

the charge is applied for each unit of pH less than pH7 eg if the pH is pH5 then the charge will be multiplied by two

* the charge is applied for each degree by which the temperature per ML of wastewater is greater than 25 degrees.

Table A2-4 Trade waste inspections and agreement charge for industrial customers by Risk Index ($2015–16)

Risk level	Inspections per year current	Inspections per year proposed	2015–16 ($/quarter)	2016–17 ($/quarter)
1	13	13	1,968	1,968
2	13	13	1,968	1,968
3	13	13	1,968	1,968
4	6	6	908	908
5	4	4	606	606
6	4	2	606	303
7	4	1	606	151

Table A2-5 Substance charge for commercial customers ($2015–16)

Process	Units	2015–16 ($/kL)	2016–17 ($/kL)
Low strength BOD food	Per kL	2.136	2.136
Higher strength BOD food	Per kL	3.510	3.510
Automotive	Per kL	0.697	0.697
Laundry	Per kL	0.435	0.435
Lithographic	Per kL	0.335	0.335
Photographic	Per kL	nil	nil
Equipment hire wash	Per kL	3.183	3.183
Ship to shore	Per kL	1.51	nil
Shopping centres with centralised pretreatment (DAF, biological treatment)	Per kL	2.136	Propose to manage as an industrial customer
Miscellaneous	Per kL	nil	nil
Other	Per kL	nil	nil
Pretreatment not maintained in accordance with requirements #	Per kL	10.966	10.966

this item was previously a note to this table. It is proposed that it is a process within the table.

Table A2-6 Commercial agreement charges for commercial customers ($2015–16)

Service	Units	2015–16 ($)	2016–17 ($)
Commercial agreement charge	first process	35.569	35.569
Commercial agreement charge	each additional process	12.210	12.210

Table A2-7 Fixed liquid waste charges ($2015–16)

Service	Units	2015-16 ($)	2016-17 ($)
Fixed liquid waste trap	per liquid waste trap	25.301	25.301
Missed service (pump out) inspection charge for liquid waste traps ≤ 2,000 litres	per event	278.808	278.808
Missed service (pump out) inspection charge for liquid waste traps > 2,000 litres	per event	557.61	557.61

Table A2-8 Trade waste ancillary charges ($2015–16)

Service	Units	2015–16 ($)	2016–17 ($)
Additional inspection	per inspection	189.588	189.588
Application – standard	per inspection	457.655	457.655
Application – non standard	per hour	140.198	140.198
Application fee – variation	per inspection	550.234	550.234
Sale of data	per hour	131.26	131.26

2.2 Ancillary and miscellaneous customer services

Sydney Water currently offers 45 ancillary and miscellaneous customer services. Only 23 of these services attract a charge. The estimated revenue for 2015–16 is $10.7 million.

Ancillary and miscellaneous customer services are the additional (non-core) services that Sydney Water provides in addition to water, wastewater, stormwater and trade waste services. Some of these services are available only via Sydney Water whereas others are available from Sydney Water and third party providers. Where Sydney Water requires a customer to use the service (or obtain a piece of information), regardless of it being provided by a third party, it is considered to be regulated service as it is a condition of being connected to Sydney Water's services.

In 2012, Sydney Water reviewed its miscellaneous services, analysing customer requirements and calculating the cost of providing the services in line with the Independent Pricing and Regulatory Tribunal's (IPART's) Pricing Principles for Miscellaneous Charges[1]. Sydney Water simplified its

[1] Inter-Agency Working Group, *Appendix A: IPART's Miscellaneous Charges Pricing Principals*, February 2011.

charging arrangements for the services, and reduced the number of chargeable services from 55 to 23.

Sydney Water is only proposing a number of small adjustments to prices and structures of the existing ancillary and miscellaneous services. These adjustments reflect changes in our operating environment or changes to our business processes. These include:

1. changing the provision of property sewerage diagrams from a regulated service to a non-regulated service
2. discontinuing a number of plumbing-related services
3. introducing a new delivery method for a group of services
4. modifying applications for asset adjustment, sewer extension and development
5. introducing four new services
6. introducing a late payment fee.

Sydney Water also offers a number of services that are not price regulated by IPART. Accessing these services is not a condition of being connected to our services and these services are also available from third parties.

1. Property sewerage diagrams: an unregulated service

Sydney Water is proposing to supply property sewerage diagrams as a commercial product instead of being treated (as is currently the case) as a regulated ancillary service under Schedule 6 of Sydney Water's pricing schedules. Property sewerage diagrams show the building structure, private wastewater pipes (drainage) and where these private pipes connect to Sydney Water's sewer system. Sydney Water provides approximately 28,000 property sewerage diagrams each year.

Sydney Water believes that the Conveyancing Act requires us to provide a diagram that shows the location of the sewer in relation to the property boundaries and the connection point to the sewer. Service Location Diagrams (a regulated service) provide this information.

Thus, the provision of Property Sewerage Diagrams is, as we considered, an additional service that customers are seeking, which Sydney Water could provide commercially.

Table A2-9 Reclassification as a non-regulated service

Current item no.	Ancillary and miscellaneous service
2	Property Sewerage Diagram

If property sewerage diagrams are defined as an unregulated service we may need to adjust our ancillary revenue and costs accordingly by approximately $1.26 million. We ask IPART to confirm our proposal to make this an unregulated product.

2. Discontinued services

The Plumbing Code of Australia (PCA) is the technical standard for all plumbing and drainage work in NSW. NSW Fair Trading regulates plumbing and drainage work and licenses plumbers in NSW. Sydney Water is no longer providing services to NSW Fair Trading on an agency basis. NSW Fair Trading now provides these services through their own online system. We propose these discontinued services are deleted from the ancillary and miscellaneous services schedule.

Table A2-10 Discontinued services

Current item no.	Ancillary and miscellaneous service
31	Plumbing and drainage inspection fee
32	Plumbing and drainage re–inspection fee
39	Cancel plumber's permit
40	Plumbing and drainage audit inspection
41	Alternate water inspection

3. New delivery method – online trade

Sydney Water uses a network of agents (Quick Check Agents) to deliver a range of ancillary and miscellaneous customer services. These services include providing property service diagrams, service location diagrams and lodging development applications. This arrangement has been in place since 2000. It will be discontinued by 2016.

From 1 July 2016, Sydney Water will be providing these services directly to customers online. This will provide customers with an online portal that is convenient, and easy to access and use. Online trade offers our customers flexibility in where and when to access the services. It also means a small decrease in the cost and this is reflected in a reduction in price.

As a result of the change, the proposed prices for the products have marginally reduced; in particular the cost of Quick Check Agent fees included as part of the ancillary charge calculations, have now been replaced by the costs relating to the provision for online trade service (Table A2-11).

Table A2-11 New delivery method – online trade

Current item no.	Ancillary and miscellaneous service
2	Property sewerage diagram – over the counter to be (considered as non regulated service)
3	Service location print– over the counter
9	Water service disconnection application
10	Water service connection installation application
11	Water service connection approval application (32–65mm)
12	Water service connection approval application (80mm or greater)
20	Statement of available pressure and flow
21	Request for asset construction details
22	Supply system diagram
23	Building plan approval application
25	Water main fitting adjustment application
26	Water pump application
27	Extended private service application
28	Wastewater connection installation application
29	Wastewater ventshaft relocation application
30	Disuse of wastewater pipe or structure
33	Stormwater connection approval application

4. Change to supporting process

We have identified that asset adjustment applications and water and sewer extension applications are more complex and take longer to process than originally estimated in 2010. We are proposing a small increase in price to better reflect our costs.

Aligning with IPART's cost reflective pricing principles and reflecting changes in the connection process, Sydney Water is proposing to modify its current single Development Requirements Application charge into two separate charges; one lower charge for dealing with applications through a simpler assessment process and another higher charge for administrating all other more complex development requirement applications. This is a result of process change that has improved the level of service provided to developers.

We are proposing to split the current Development Requirements Application (item 35) into two discrete services:

- Development Requirements Application – complying
- Development Application.

Table A2-12 Change to supporting process

Current item no.	Ancillary service	Reason for change
24	Asset adjustment application	small increase in price
37	Water and sewer extension	small increase in price
35	Development requirements application	Replace with two discrete charges: Development requirements application – complying development Development requirements application

5. New services

We are proposing four new services:

a. Remote reading of meter – new property (a regulated service)

b. Remote reading of meter – existing property made inaccessible (a regulated service)

c. Inaccessible meter fee (a regulated service)

d. Hot water meter read for multi-level individually metered properties only (an unregulated service)

In the 2012 pricing submission, Sydney Water proposed capital expenditure for the installation of 12,000 meters that can be read remotely to be fitted to 12,000 properties that are difficult to access. The proposal was rejected by IPART, on the recommendation put forward by its consultants (Atkins Cardno) that there was no clear link between the expenditure and possible improvements to overall efficiency and meeting customer service targets. The consultants also indicated that IPART has not considered regulating the level of estimated meter readings.

We propose to introduce a new remote reading service as part of the regulated ancillary and miscellaneous service, where the user of the service will pay. The service provision will enhance our continuous improvement in service delivery, and provide our customers (in certain circumstances) with an alternative service option. It will also reduce the need to average or estimate water usage for inaccessible meters, leading to more accurate customer meter readings, better detection of concealed leaks and more accurate bills. This will bring Sydney Water closer to best practice in this area.

a. Remote read meter – new property (a regulated service)

Sydney Water installs approximately 17,000 meters each year. Approximately 2% (340) of these are installed in inaccessible locations. We want to prevent further growth in the number of inaccessible meters. Properties that connect to our system after 1 July 2016 and have advised that the meter will be installed in an inaccessible location will be fitted with an automatic meter read (AMR) meter that can be read from outside the property. We propose a small quarterly fee to recover the additional costs of fitting an AMR meter.

b. Remote read meter – existing property (a regulated service)

Each year approximately 800 properties become inaccessible to our meter readers. This may be due to the installation of locked gates, security systems or the introduction of a dog to a yard. We want to fit an AMR meter and apply a charge to properties that make their meter inaccessible (when it was previously accessible), so that we can read the meter from outside the property. The charge will recover the additional cost of fitting an AMR. Customers will be given the option of making their meter accessible or having an AMR installed, at their cost.

We propose a quarterly charge that is linked to meter size to recover the additional costs.

c. Inaccessible meter – new or existing property (a regulated service)

This charge will apply to new or existing properties that have inaccessible meters. The charge will recover the costs for attempted readings and managing estimated accounts.

It will be applied where a customer has:

- installed a meter (on a new connection) in an inaccessible location after 1 July 2016
- made an existing meter inaccessible after 1 July 2016
- failed to respond to repeated contact regarding a meter that was inaccessible before 1 July 2016.

The charge would apply to properties that have received 4 consecutive estimated bills and have not responded to other contact.

d. Hot water meter read – multi level individually metered properties only (an unregulated service)

Sydney Water receives numerous enquiries from developers and Owner's Corporations who want to ensure that residents are directly billed for all of their actual water consumption, inclusive of hot water. Sydney Water does not currently provide this service.

Sydney Water proposes this new service is an unregulated service because customers have alternative private metering options available. The service will allow Owners' Corporations to install individual hot water meters for each apartment. For a nominal monthly fee Sydney Water will own, operate and maintain each meter. This will be offered to multi-level individual metered (MLIM) compliant buildings only. It allows Owner's Corporations to fully meter and bill each individual apartment for their actual water usage.

For properties installing multi- level individual metering, the infrastructure required within each building is readily expandable to accommodate hot water meters. As a result, a relatively simple and cost efficient hot water metering solution can be offered to customers for a nominal quarterly fee.

Costs and revenue associated with this additional service are not included in regulated costs and revenue.

Customers will continue to receive one standard quarterly bill showing a single amount owing. The bill will identify two meter readings (hot water meter and drinking water meter).

We seek confirmation from IPART in relation to our understanding that this is an unregulated service.

6. Late payment fee

Sydney Water proposes the introduction of a late payment fee. The intent of the fee is to encourage on time payment. The proposed fee of $4.10 is smaller than the equivalent fees levied by most other utilities (refer to Table A2-13) and will be partly offset by not charging interest, except where the interest charge exceeds the late payment fee.

Table A2-13 Late payment fees levied by other utilities

Company	Late Payment Fee
AGL – electricity	$14.00 (inc GST)
AGL – gas	$13.12 (inc GST)
Origin/Integral	$7.00 (no GST applies)
Energy Australia	$12.00
Optus More than $50 but less than $100	$15.00 (no GST applies)
Optus $100 or more	$15.00 plus 2% above the prime lending rate charged to us by our principal bank calculated daily on the unpaid amount above $100

A significant number of customers pay late

Typically, 32% of Sydney Water's customers have not paid their bills by the due date, despite having 21 days to pay. About half of these customers pay over the next 7 days (day 22 to day 28), leaving around 15% of customers who allow their payments to become significantly overdue. Many of these customers are not in financial hardship.

Late payment drives up costs for all customers

Late payment drives up operating cost for Sydney Water. Costs include printing and posting reminder bills and overdue notices, phone calls and other follow up actions as well as the increased borrowing cost that comes from the delay in collecting revenue. Last year (2013–14), late payments cost Sydney Water and its customers approximately an additional $2.5 million in interest on borrowings.

Having customers pay on time reduces Sydney Water's costs and improves operational efficiency.

The costs of late payment are borne by all customers. Those customers who pay on time are subsidising those who don't. Sydney Water understands that some customers find it extremely difficult to pay their utility bills. We have a comprehensive package of measures to assist these customers including:

- agreed deferral of due date and agreed instalment plans for customers who may be in financial difficulty
- Payment Assistance Scheme, providing direct financial assistance to customers who are in financial difficulty and can't pay their bill
- BillAssist® program in which our qualified community service staff help customers with longer term payment difficulties
- substantial concessions for pensioners
- PlumbAssist® service for customers in financial difficulty who need essential or emergency plumbing work.

We communicate these assistance measures with bills, on our website and through many other means including through partnering with community agencies.

The number of customers in financial difficulty is clearly much lower than the number of customers who pay late.

We have made it easy for customers to pay on time.

- We allow 21 days to pay. (Many utilities allow 14 days).
- Customers can pay by Direct debit, and can elect to have the debits taken in monthly instalments.
- We encourage use of Centrepay by eligible customers, enabling customers to pay their bills with regular automatic deductions from their Centrelink payments.

Almost all utilities have late payment fees

Almost all other organisations that our customers deal with have either a late payment fee or some other incentive for on–time payment. This includes most telecommunication and energy companies. Sydney Water is a notable exception to this.

Interest charges are not sufficiently effective

Sydney Water is able to charge interest on overdue amounts. The interest rate is determined by the court and varies from time to time based on changes to the Reserve Bank's cash rate.

We propose to have a small late payment fee that provides a threshold before interest charges become sufficient to be effective. We would not charge both a late payment fee and interest to a particular bill. Rather, we propose to charge the late payment fee OR interest, whichever is the greater.

Keeping the interest charge for bills that are significantly overdue or are very high, (for example for business customers) allows us to keep the late payment fee quite low, helping to avoid it creating additional hardship.

A discount for earlier payment is not a preferred option

An alternative approach to applying a late payment fee is to provide a discount for on-time payment. Energy retailers who have done this operate in a competitive retail market and use these discounts to add to the attractiveness of their offers, with total retail discounts amounting to 15% or more. It would appear that their customers who do not enter into optional contracts are effectively paying significantly more to accommodate these discounts.

Sydney Water's regulated prices do not include sufficient retail margin to allow a significant discount for on-time payment.

Safeguards for vulnerable customers

We would be careful to ensure that the fee does not unfairly affect customers who are in financial difficulty and cannot pay their bill. We will apply the same exclusions contained in the National Energy Consumer Framework (NECF) plus some additional exclusions. We will not apply a late payment fee to customers where:

- there is a billing matter being considered by Energy and Water Ombudsman NSW (EWON)
- the customer has made an arrangement to pay by instalments or other payment plan including an agreed payment deferral
- part of the bill is being paid using our payment assistance scheme
- we are aware that the customer has sought assistance from a community welfare organisation that is part of the payment assistance scheme
- the customer is registered with our BillAssist program
- the customers has been identified as being in hardship
- the customer pays by Direct debit
- EWON has asked us to waive the fee.

Applying the fee

We would charge either the late payment fee or interest, whichever is the greater.

Although residential bills are due for payment 21 days after issue, we plan to allow an additional period of seven days grace before a late payment fee would be charged.

We will be very explicit about the fee, making it clear on the bill and in other communications that a fee applies for late payment. The intent is to encourage on-time payment, not to collect additional revenue.

We estimate 600,000 instances of late payment in 2016–17 with a 10% reduction in year 2017–18 and 2018–19. We estimate that each year 10% of late payments will be waived under our provisions for vulnerable customers, ie we will apply the same exclusions contained in the NECF, plus some additional exclusions. In addition, a proportion of the late payments events will be addressed through our applying interest rather than the late payment fee.

For our price modelling, this expected revenue from late payment fees has been treated a part of the ancillary revenue and deducted as part of the post building block adjustment.

With the introduction of the late payment fees and the change of policy in relation to interest to be charged on customer overdue account, it is forecast that interest received on the overdue customer accounts will reduce from the current level of about $2 million a year. Note that the expected interest received on overdue customer accounts is forecast to reduce by $1.4 million a year with this new proposal.

The overall expected income from late payments (late payment fees and applied interest) is identified below.

Table A2-14 Estimated fees and interest charged from late payments ($2015–16)

	2016-17	2017-18	2018-19	2019-20
Late payment fee	1,890,000	1,701,000	1,530,900	1,530,900
Interest on overdue accounts	608,000	597,000	587,000	587,000
Total Revenue	**2,498,000**	**2,298,000**	**2,117,900**	**2,117,900**

2.2.1 Summary table of proposed prices for ancillary and miscellaneous services

Table A2-15 Sydney Water's proposed prices and pricing structure ($2015–16)

Item	Service	2015–16 ($)	2016–17 ($)
1	**Conveyancing Certificate Electronic**	6.16	6.16
2	**Property Sewerage Diagram**		
	over the counter	26.24	n/a
	electronic#	10.14	10.14
	online	n/a	25.66
3	**Service Location Diagram**		
	over the counter	17.94	n/a
	electronic#	6.16	6.16
	online	n/a	17.36
4	**Special Meter Reading Statement**	26.24	26.24
5	**Billing Record Search Statement** up to and including 5 years	26.24	26.24
6	**Building over/Adjacent to Asset Advice**	44.09	44.09
7	**Water Reconnection**	26.24	26.24
8	**Workshop Test of Water Meter**		
	20mm	222.57	222.57
	25mm	222.57	222.57
	32mm	222.57	222.57
	40mm	309.12	309.12
	50mm light	309.12	309.12
	50mm	505.85	505.85
	60mm	n/a	n/a
	80mm	505.85	505.85
	100mm	505.85	505.85
	150mm	505.85	505.85
	200mm	1,124.12	1,124.12
	250mm	1,124.12	1,124.12
	300mm	1,124.12	1,124.12
9	**Water Service Disconnection Application***	nil	nil
10	**Water Service Connection Installation Application ***	nil	nil
11	**Water Service Connection Approval Application – (32–65mm)**	222.57	222.57
12	**Water Service Connection Approval Application – (80mm or greater)**	222.57	222.57

Item	Service	2015–16 ($)	2016–17 ($)
13	Application to assess a Water Main Adjustment	n/a	n/a
14	Standpipe Hire – Security Bond	n/a	n/a
15	Standpipe Hire – Annual Fee	n/a	n/a
16	Standpipe Water Usage Fee	n/a	n/a
17	Backflow Prevention Device Application and Registration Fee	n/a	n/a
18	Backflow prevention Application Device Annual Administration Fee	n/a	n/a
19	Major Works Inspection Fee	n/a	n/a
20	Statement of Available Pressure and Flow	125.89	125.31
21	Request for Asset Construction Details	44.09	43.52
22	Supply System Diagram	125.89	125.31
23	Building Plan Approval Application	17.94	17.37
24	Asset Adjustment Application	222.57	244.77
25	Water main Fitting Adjustment Application	nil	nil
26	Water Pump Application	125.89	125.31
27	Extended Private Service Application	nil	nil
28	Wastewater Connection Installation Application	nil	nil
29	Wastewater Ventshaft Relocation Application	nil	nil
30	Disuse of Wastewater Pipe or Structure	nil	nil
31	Plumbing and Drainage Inspection Application	93.96	n/a
32	Plumbing and Drainage Re–inspection Fee	93.96	n/a
33	Stormwater Connection Approval Application	nil	nil
34	Application for inspection of Stormwater Connection	nil	nil

Item	Service	2015–16 ($)	2016–17 ($)
35	**Development Requirements Application**	403.54	n/a
	Development requirements – complying development	new	$168.61
	Development requirements – other	new	445.87
36	**Road Closure Application**	nil	nil
37	**Water and Sewer Extension Application**	403.54	445.87
38	**Dishonoured or Declined Payment Fee**	12.33	12.33
39	**Cancel Plumbers Permit**		
	both parties sign	67.76	delete
	one party signs	0	delete
40	**Plumbing and Drainage Audit Inspection Application**	195.07	delete
41	**Alternate Water Inspection**	273.60	delete
42	**Monthly Meter Reading request by Customer**	10.14	10.14
43	**Replacement of Meter Damaged by Customer / Customer's Agent**		
	20mm	125.89	125.89
	25mm	268.90	268.90
	30mm	268.90	268.90
	40mm	268.90	268.90
44	**Integrated Service Connection Application**	222.57	222.57
45	**Sydney Water Hourly Rate**	127.02	127.02
new	**Remote read meter – new property (quarterly charge)**	new	4.61

Item	Service	2015–16 ($)	2016–17 ($)
new	**Remote read meter – existing property made inaccessible (quarterly charge)**		
	20mm	new	5.12
	25mm	new	5.63
	32mm	new	6.66
	40mm	new	6.91
	50mm (light)	new	9.73
new	**Inaccessible meter fee**	new	8.45
new	**Hot water meter read quarterly charge * (multi level individually metered properties only)**	new	6.15 (plus GST)
new	**Late payment fee**	new	4.10

services provided via a network of conveyance brokers

* proposed to be an unregulated product

Appendix 3 Overview of Sydney Water

This appendix provides additional information on Sydney Water's operating environment to what is included in Chapter 2 and Chapter 4.

3.1 Sydney Water's legislative framework

This section details the legislative framework in which Sydney Water operates, including key legislative requirements, objectives and determinants of performance.

Sydney Water is established under two pieces of legislation, the *Sydney Water Act 1994* and the *State Owned Corporations Act 1989*.

3.1.1 *Sydney Water Act 1994*

- The *Sydney Water Act 1994* establishes Sydney Water Corporation as a statutory State Owned Corporation (SOC) with the objectives of being a successful business, protecting the environment, and protecting public health by supplying safe drinking water.
- Sydney Water's area of operations is defined in Section 10 of the Act and comprises the greater Sydney area, the Illawarra, and the Blue Mountains, as shown in Figure A3-1.
- Sydney Water's 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. Sydney Water may also provide ancillary services and undertake any other activity it considers will further its objectives.
- Sydney Water must have an Operating Licence that includes its customer contract.
- The *Sydney Water Regulation 2011* governs access to Sydney Water land around Prospect Reservoir, regulates specified plumbing and drainage work, and prescribes the Minister's powers to impose water restrictions.

3.1.2 *State Owned Corporations (SOC) Act 1989*

- As a statutory SOC, Sydney Water is subject to Part 3 of the SOC Act.
- Sydney Water has two voting shareholders who appoint the Board of Directors (the Board). The voting shareholders are currently the Treasurer and the Premier.
- Sydney Water also has a Portfolio Minister who, with the Treasurer's approval, can direct the Board to undertake non-commercial activities. Sydney Water may be reimbursed for the net cost of doing so, including the cost of capital. The Portfolio Minister is currently the Minister for Primary Industries, Lands and Water.
- The Chief Executive Officer of Sydney Water is responsible for Sydney Water's day-to-day management in line with Board policies and directions.

- As a SOC, Sydney Water 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.

Two other relevant pieces of legislation for the legislative framework Sydney Water operates within are, the *Water NSW Act 2014* and the *Water Industry Competition Act 2006*.

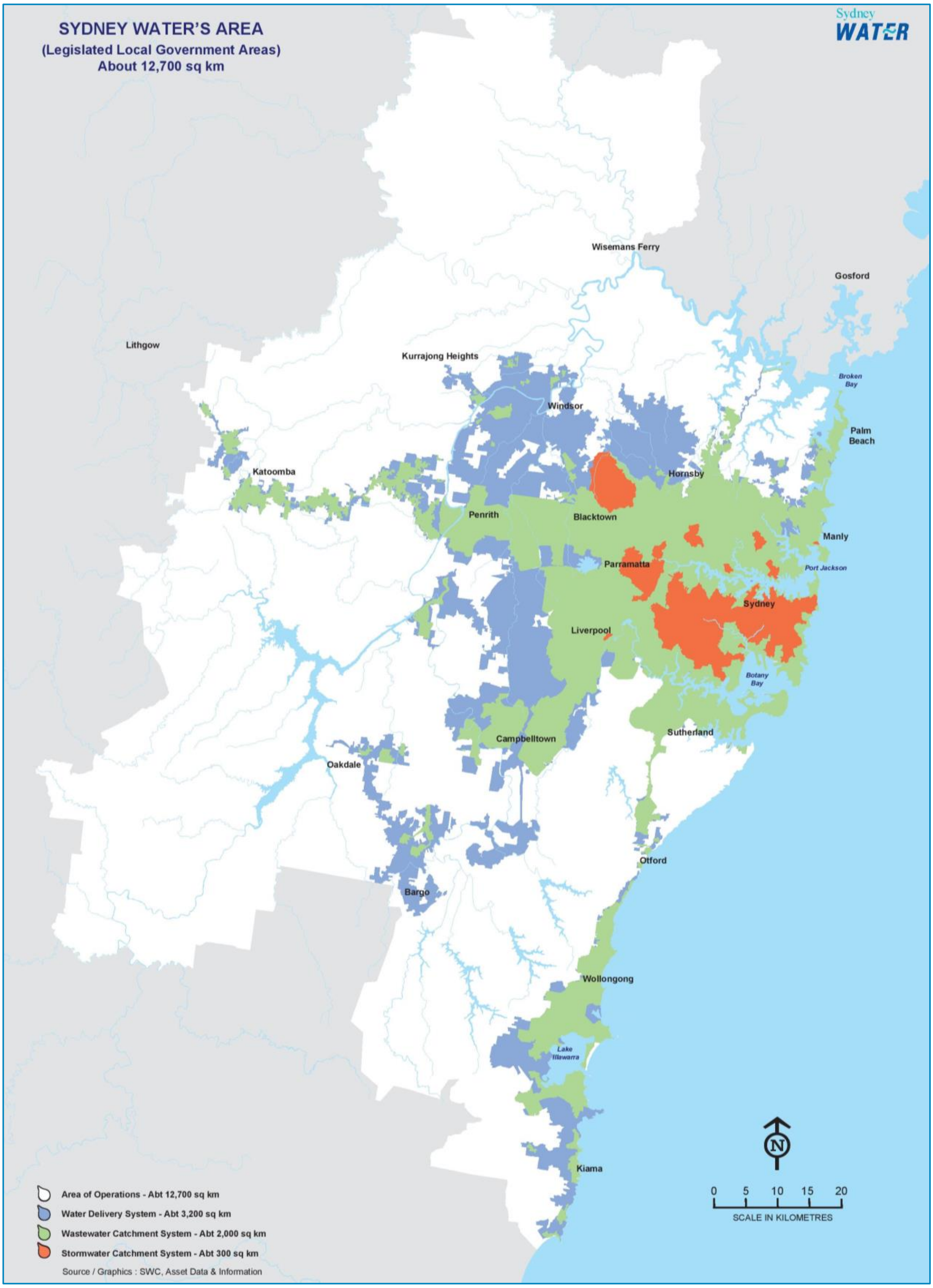
3.1.3 *The Water NSW Act 2014*

- The *Water NSW Act 2014* established the integration of Sydney Catchment Authority (SCA) and State Water Corporation. Water NSW is now responsible, among other things, for the management of Sydney's storage dams and catchment areas.
- Water NSW's role is to manage and protect the catchment areas and catchment infrastructure, to be a supplier of raw water, and to regulate certain activities affecting the catchment areas.
- Sydney Water purchases bulk water from Water NSW, and is Water NSW's major customer. IPART sets the price Water NSW can charge Sydney Water for bulk water.

3.1.4 *The Water Industry Competition Act 2006*

- The *Water Industry Competition Act 2006* (WIC Act) was established to encourage competition in the water sector and facilitate recycling.
- The WIC Act primarily regulates the activities and operations of other water utilities. However, obligations for Sydney Water do arise from the WIC Act, particularly in relation to third party access, the retailer and operator of last resort regime, and requirements for codes of conduct where other utilities interconnect with Sydney Water's assets.
- Sydney Water works closely with a number of current and prospective private water utilities licensed under the WIC Act, on schemes that variously involve wastewater, recycled water, potable water, stormwater and desalinated drinking water.
- The WIC Act itself has been subject to several reviews and amendments and is continuing to evolve with the contestable emerging market for the water sector.

Figure A3-1 Sydney Water's area of operations



3.2 Sydney Water's regulatory framework

Boxout A3-1 Sydney Water's regulators

- IPART – sets prices, audits and reviews Operating Licence
- NSW Treasury – sets requirements for tax equivalent payments, share dividend schemes, and an annual Statement of Corporate Intent (SCI)
- NSW Health – regulates drinking water quality, recycled water quality
- NSW Environment Protection Authority – regulates Sydney Water's activities that pollute the environment, administers licences for the wastewater treatment plants
- NSW Office of Environment and Heritage – regulates Sydney Water's activities that impact the natural environment, especially threatened flora and fauna, heritage and National Parks and reserves
- NSW Department of Planning and Infrastructure – provides information on the location and timing of future growth in Sydney, assesses proposals that have significant impacts on the environment
- Water Administration Ministerial Corporation – regulates Sydney Water's extractions from the Hawkesbury–Nepean River and structures at Botany Wetlands, Manly Dam and Busby's Bore for water management purposes
- Other – Sydney Water is also regulated by Workcover NSW and the Australian Competition and Consumer Commission (ACCC).

3.2.1 Independent Pricing and Regulatory Tribunal (IPART)

IPART's regulatory roles are to set Sydney Water's prices and to audit Sydney Water's compliance with its Operating Licence. It also conducts regular reviews of the Operating Licence.

Pricing for monopoly services

IPART has a standing reference to investigate and report to the Premier on prices for 'government monopoly services'[2] supplied by Sydney Water. The following Sydney Water services have been declared to be government monopoly services for which IPART determines the maximum price[3]:

- water supply services
- wastewater services
- stormwater drainage services

[2] A service can be declared to be a government monopoly service if the Minister certifies that it is a service for which there are no other suppliers to provide competition in the part of the market concerned, and for which there is no contestable market by potential suppliers in the short term in that part of the market.
[3] *IPART (Water, Sewerage and Drainage Services) Order 1997* (Gazette No. 18, 14 February, 1997, page 558).

- trade waste services
- services supplied for new developments
- ancillary and miscellaneous customer services for which no alternative supply exists and which relate to the supply of services of a kind referred to above
- other water supply, sewerage and drainage services for which no alternative supply exists.

IPART typically conducts pricing reviews and makes price determinations every three to five years. The most recent determination applied from 1 July 2012 to 30 June 2016. This price determination will take effect on 1 July 2016.

Operating Licence

Sydney Water's key regulatory instrument is its Operating Licence. The Governor may grant an operating licence for up to five years. Each year, IPART reviews and reports to the Minister on Sydney Water's compliance with and performance against the licence. IPART is also responsible for undertaking an end-of-term review, and recommending whether the licence should be renewed, amended, or cancelled.

The Operating Licence 2010–2015 will expire on 30 June 2015 and has been under review since mid-2014. A draft version of the new licence was released by IPART in February 2015. Following Ministerial and Governor Approval, the new licence will apply from 1 July 2015 to 30 June 2020. Likely key provisions of the new licence can be seen in Boxout A3-2.

Boxout A3-2 Sydney Water's Operating Licence 2015–2020 key provisions

Sydney Water's overarching intent is for the Operating Licence to focus on setting minimum guaranteed levels of service for Sydney Water's general customer base, as part of a broader regulatory framework that also includes financial incentives for Sydney Water to provide superior performance.

As part of the end of term review, we have sought changes that will allow us to provide better value to customers and the community, minimise impacts on customer bills and align with our longer term goals for regulatory reform. Key provisions of the new Operating Licence include:

- **Water quality**: new requirements to maintain management systems for drinking water and recycled water that are consistent with, respectively, the Australian Drinking Water Guidelines and the Australian Guidelines for Recycled Water. This will result in minimal changes to our existing systems and processes for managing water quality.
- **Water quantity (formerly, water conservation)**: new requirement to develop a methodology for determining the economically efficient level of water conservation activity, including water leakage, water recycling and water efficiency. Sydney Water must report to IPART by 1 November 2015 on its approach to and principles for developing the methodology. We will then develop the methodology, which must be

approved by IPART, by 31 December 2016. We are also required to develop a Roles and Responsibilities Protocol with Metropolitan Water Directorate for the development and implementation of the Metropolitan Water Plan. This will formalise our current role in metropolitan water planning.

- **Assets**: new requirement to develop a certified asset management system by 30 June 2018. Until then, Sydney Water must continue to maintain and implement our existing Asset Management Framework. The licence will continue to set system performance standards for water pressure failures, water continuity and wastewater overflows. There has been no change to the system performance standard limits. Response times for leaks and breaks are no longer a licence standard, but a performance indicator only.
- **Priority Sewerage Program**: Sydney Water must cooperate, participate and comply with any outcomes of a potential Government review of the Priority Sewerage Program. There are no specific delivery or planning requirements.
- **Customer rights and complaint/dispute handling**: no major changes to the customer contract, hardship procedures, complaint and dispute handling provisions or requirement to maintain Sydney Water's Customer Council.
- **Environment**: continued requirements to maintain a certified environmental management system and report on environmental performance.
- **Pricing**: no changes to requirements for Sydney Water to set fees and charges in line with the operating licence, the *Sydney Water Act 1994* and the maximum prices or methodology for fixing prices determined by IPART.
- **Reporting**: continued requirements for reporting and providing information requested by IPART or NSW Health. Some reporting requirements have been updated to align with new licence provisions.
- **Memoranda of understanding (MoUs)**: continued requirements to maintain MOUs with NSW Health, the Environment Protection Authority, and the Water Administration Ministerial Corporation (the NSW Office of Water) and a new requirement to develop and comply with a MoU with Fire & Rescue NSW and establish a working group.
- **Compliance audits**: IPART will continue to audit Sydney Water's compliance with its Operating Licence and report to the portfolio Minister annually.

3.2.2 NSW Treasury

Treasury administers the Commercial Policy Framework which applies to all statutory SOCs like Sydney Water. Each year, Sydney Water must enter into an agreement with its shareholders, known as the SCI. This details the objectives and strategic directions of the business, along with financial performance targets and other related matters, such as risk management. The SCI is tabled in Parliament. Sydney Water must report to its shareholding Ministers quarterly on its actual performance against the targets in the SCI. In addition, Treasury monitors dividend payments and tax equivalents. Sydney Water must also produce an Annual Report, and its financial statements are subject to audit by the Auditor-General. The Public Accounts Committee of Parliament examines reports by the Auditor-General and reports to the Legislative Assembly on any issues of concern.

3.2.3 NSW Health

NSW Health primarily regulates Sydney Water under the *Public Health Act 2010* and advises the government on drinking water quality standards. As required by Section 35 of the Sydney Water Act, there is a MoU between Sydney Water and NSW Health which commits Sydney Water to ensuring that all drinking water it supplies is safe to drink and that it is supplied in accordance with its Operating Licence. NSW Health reports to IPART on Sydney Water's compliance with the MoU and on any public health matters related to Sydney Water's operations, as required. The Operating Licence 2010–15 requires Sydney Water to:

- manage drinking water quality to the satisfaction of NSW Health in accordance with the Australian Drinking Water Guidelines
- comply with guidelines for pH, true colour, turbidity, aluminium, iron and zinc
- comply with the fluoridation plant operating targets set out in the Fluoridation Code
- develop and implement a five-year Drinking Water Quality Management Plan.

Recycled water must be managed in accordance with the Australian Guidelines for Water Recycling to the satisfaction of NSW Health.

3.2.4 Environment Protection Authority

The NSW Environment Protection Authority (EPA) is the primary environmental regulator for NSW. Its role is to regulate activities that could have an impact on the health of the NSW environment and its people. The EPA has issued Environment Protection Licences (EPLs) under the *Protection of the Environment Operations Act 1997* for all of Sydney Water's wastewater treatment systems. These EPLs regulate the discharges from Sydney Water's wastewater treatment plants and reticulation systems.

There is a MoU between Sydney Water and the EPA, as required by Section 35 of the Sydney Water Act. The MoU recognises the role of the EPA as primary regulator for NSW and aligns Sydney Water's commitments to ongoing environmental improvements with the EPA's broader environmental protection charter.

3.2.5 Office of Environment and Heritage

The Office of Environment and Heritage (OEH) is also a key environmental regulator for Sydney Water. The OEH works to protect and conserve the NSW environment, including the natural environment, Aboriginal country, culture and heritage and NSW's built heritage, and manages NSW national parks and reserves. Sydney Water requires approvals (with conditions) from OEH to carry out works and activities that impact on threatened flora and fauna, heritage and National Parks and reserves.

Although not required under Section 35 of the Sydney Water Act, Sydney Water is currently negotiating a MoU with OEH. The purpose of this MoU is to recognise OEH's role in protecting the environment and promote a collaborative relationship to facilitate data sharing (one example includes GIS information for Biobanking Agreements) and collaboration on research and science projects, particularly in respect to climate change adaptation and water quality.

3.2.6 Department of Planning and Infrastructure

The role of the Department of Planning and Infrastructure (DP&I) is to support sustainable growth in NSW. It aims to deliver strategies and decisions which balance planning and environmental issues with the goal of facilitating growth and employment. The DP&I carries out long-term planning for the State's regions, drives the location and timing of housing and employment land, and assesses State significant development proposals under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Sydney Water's decisions about how and when to service new developments are based on the information provided by DP&I. Any of Sydney Water's proposals that are considered to have significant impacts (such as servicing the growth areas in western Sydney and major amplification of wastewater treatment plants) need to be assessed by the DP&I under the EP&A Act. Approvals for these projects are granted by the Minister for the Environment, usually with conditions recommended by DP&I.

3.2.7 Water Administration Ministerial Corporation

The Water Administration Ministerial Corporation (WAMC) regulates water access, use and management in NSW. It is represented by the NSW Office of Water which administers key water management legislation, such as the Water Management Act 2000. There is a MoU between WAMC and Sydney Water as required under Section 35 of the Sydney Water Act.

WAMC regulates Sydney Water's extractions from the Hawkesbury–Nepean River at North Richmond and authorises structures at Botany Wetlands, Manly Dam and Busby's Bore for water management purposes.

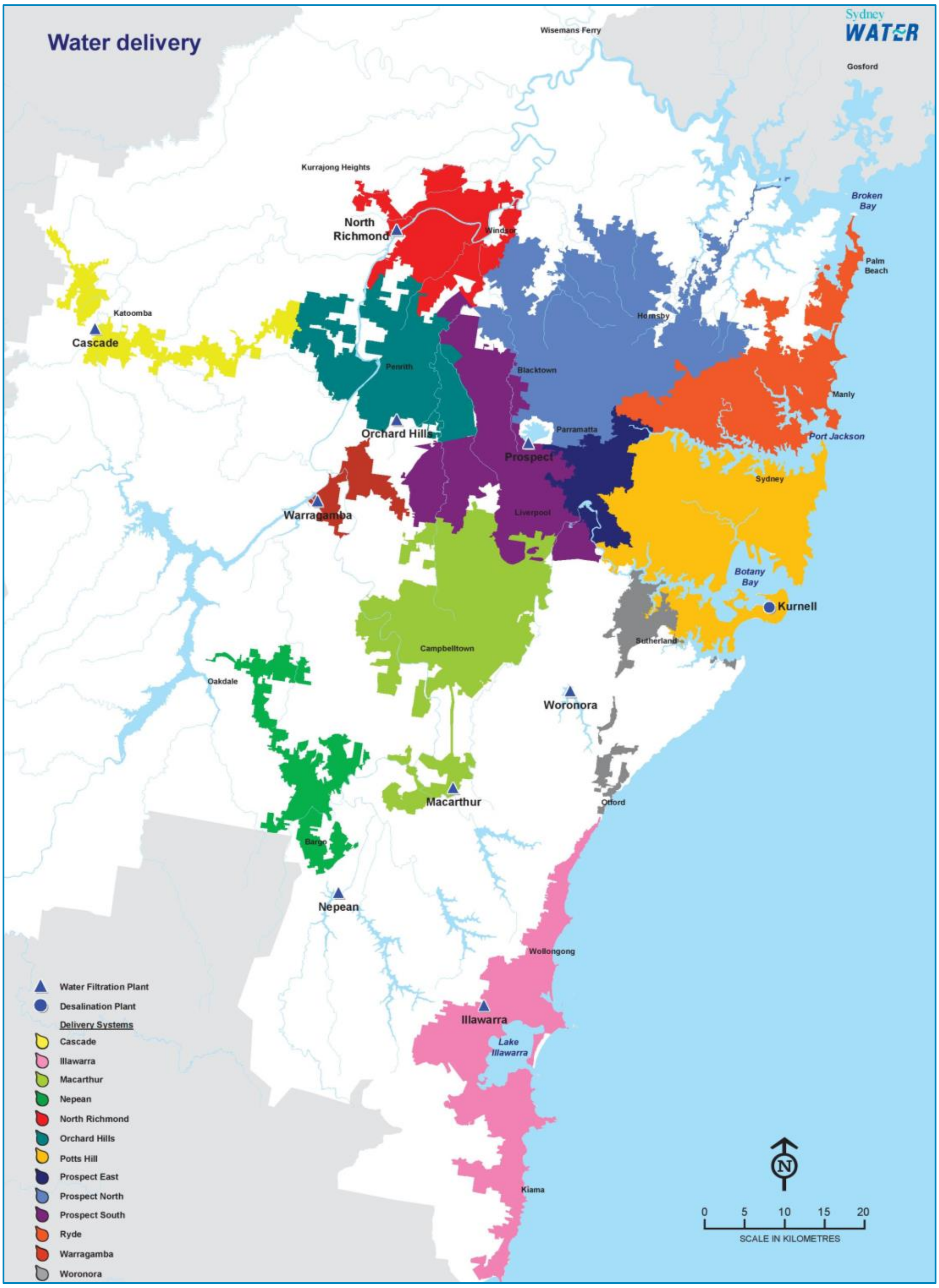
3.3 Sydney Water's products and services

Sydney Water supplies water, wastewater, recycled water and some stormwater services, as well as providing infrastructure for development in new growth areas, and a range of ancillary services.

3.3.1 Water supply services

Every day, Sydney Water supplies over 1.7 billion litres (1.7 Gigalitres, GL) of drinking water to over 1.8 million homes and businesses. Households use about 70% of the water supplied; businesses use about 30%. About 80% of Sydney's water supply comes from Warragamba Dam, while currently the Sydney Desalination Plant (SDP) is turned off due to plentiful surface water storage, it can supply up to 15% of Sydney's water needs. Dam water is treated at nine water treatment plants. The SDP when running treats water onsite at Kurnell. Treated water is delivered to customers through a network of 21,000 km of water pipes, 251 reservoirs and 164 pumping stations. The water supply system is shown in Figure A3-2. Customers pay a fixed service charge and a variable usage charge for drinking water.

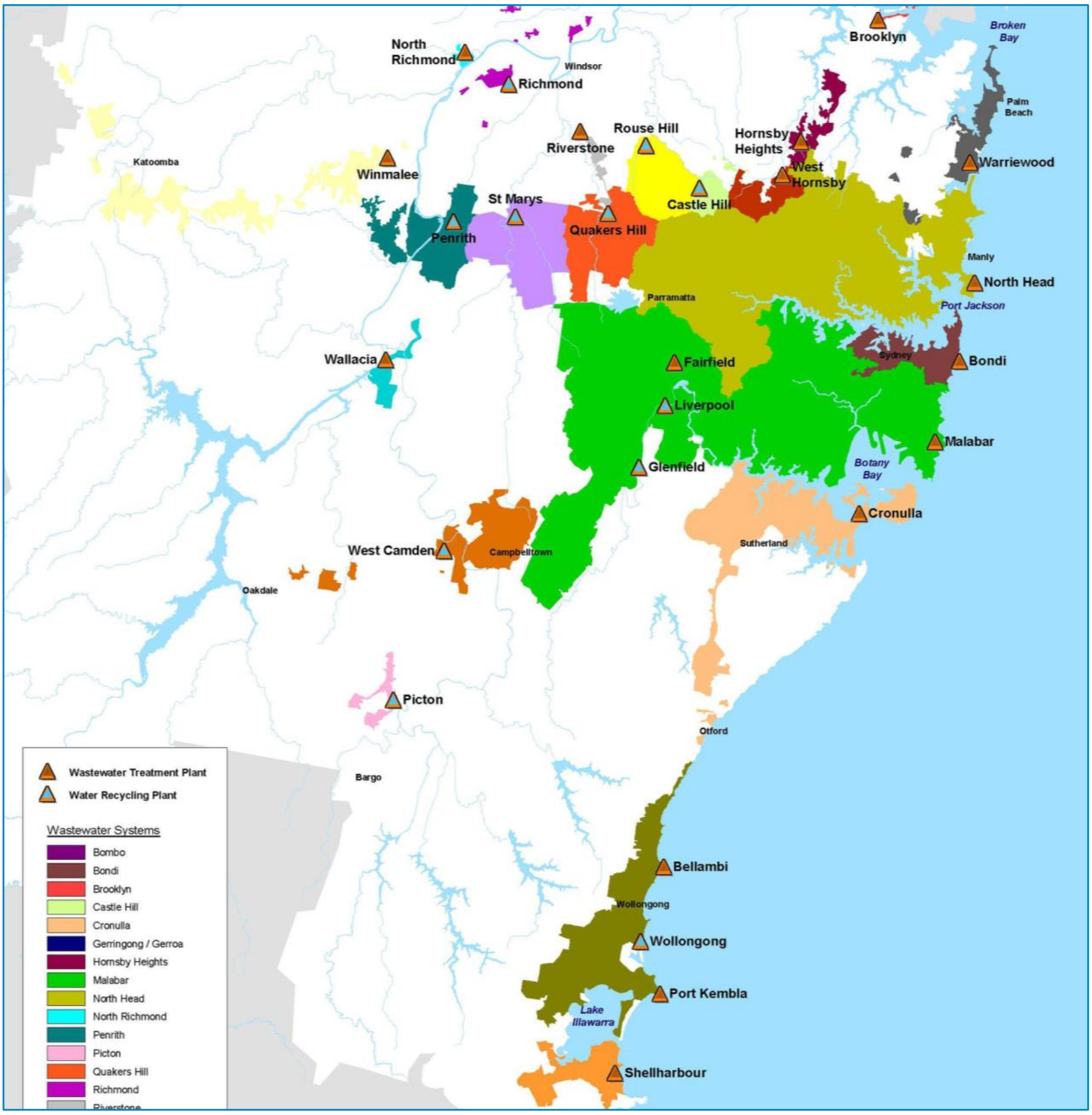
Figure A3-2 Sydney Water's water supply system



3.3.2 Wastewater services

Sydney Water collects and treats over 1.6 billion litres (1.6 GL) of wastewater a day through a network of 24,000 km of sewers, 680 wastewater pumping stations, 28 water treatment and water recycling plants. After treatment, the wastewater is reused or discharged to rivers or the ocean under environmental licence conditions. Inland plants discharging to the rivers treat waste to high levels. Three of the treatment plants are storm wastewater treatment plants (Fairfield, Bellambi and Port Kembla) that are used only during major storms. The wastewater system is shown in Figure A3-3. 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 a threshold set by IPART.

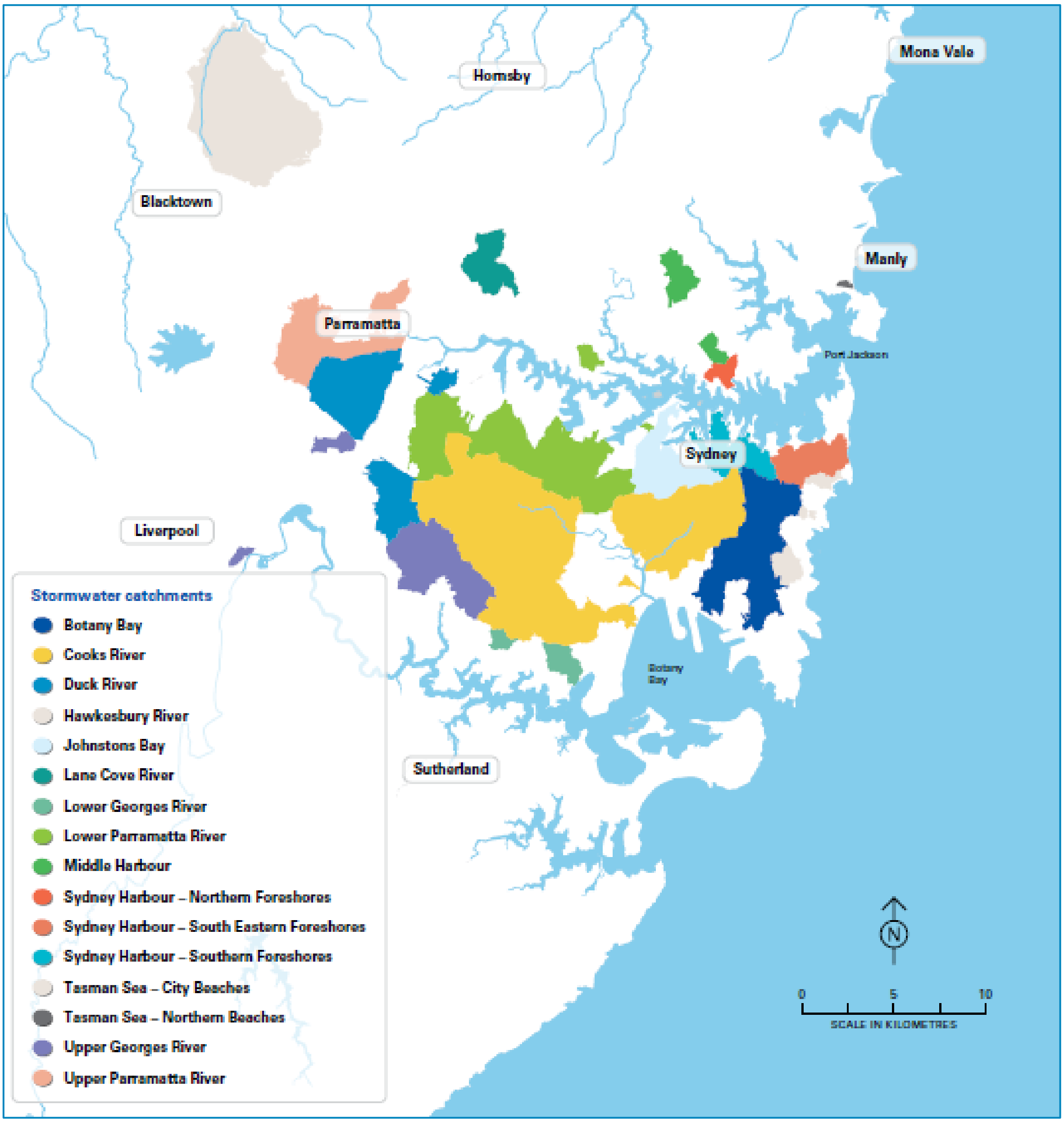
Figure A3-3 Sydney Water's wastewater system



3.3.3 Stormwater drainage services

Most stormwater channels and drains are the responsibility of local councils. However, Sydney Water manages 440 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 A3-4). By length, this is less than five per cent of the total metropolitan stormwater network and discharges about 25% of runoff. The NSW Government is funding 70 stormwater schemes to capture and reuse stormwater and save over 1.3 billion litres of water a year. Stormwater reuse projects contribute to the recycling target of supplying 70 GL a year by 2015. Stormwater charges are applied to properties within declared stormwater drainage areas. There is a separate charge for residential properties/vacant land and non-residential properties, which is set by IPART.

Figure A3-4 Sydney Water's stormwater drainage system



3.3.4 Recycled water

There are a number of water recycling schemes in Sydney, including Rouse Hill, East St Marys, Camellia, Colebee and Bonnyrigg. Sydney Water recycles about 50 billion litres of water a year of which about 32 billion litres is supplied to customers or used for environmental flows. IPART categorises schemes as 'mandated' or 'voluntary' depending on the degree of choice customers have in connecting to them.

Mandated recycling schemes

Mandated recycling schemes are (mainly residential) recycling schemes to which customers must connect due to a government policy, such as the Building Sustainability Index (BASIX). IPART does not determine prices for these schemes (except for Rouse Hill) but issued pricing guidelines in 2006 which cover:

- the maximum cost that should be recovered from a recycled water scheme
- any offsets to the cost of a recycling scheme, such as subsidies, government directives to recover costs from all Sydney water customers, or the avoided costs of infrastructure
- the total cost that can be recovered from recycled water customers
- how costs should be recovered using different price structures.

IPART does determine prices for recycled water in Rouse Hill.

Voluntary recycling schemes

Voluntary schemes are those where customers can connect at their own 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 to be used when the price is being negotiated between the customer and Sydney Water.

3.3.5 Developer charges

Developer charges were a mechanism by which the costs of providing infrastructure to new developments could be recovered from developers. The NSW Government set the charges for water and wastewater to zero in December 2008. Recycled water developer charges are still levied.

Sydney Water is not proposing any change to this policy but believes there is merit in maintaining discussions of 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 charges were set to zero for water, wastewater and stormwater, Sydney Water now funds all water, wastewater, and stormwater works in growth areas except for minimum-sized reticulation.

3.3.6 Trade waste

Trade waste is any liquid (and substances contained in that liquid) produced by an industrial or commercial activity at a business premises. Trade waste typically involves much higher strength wastewater than domestic wastewater and therefore has an impact on downstream wastewater systems and treatment plants. The presence of toxic substances can adversely affect the biological processes within the wastewater treatment plant, damage wastewater infrastructure and present a significant safety risk to wastewater system personnel. To keep these harmful or hard-to-treat substances out of the wastewater system, Sydney Water's Trade Waste Requirements outline the terms and conditions under which Sydney Water will accept trade waste discharges, as well as the fees and charges for doing so. Commercial and industrial customers who want to discharge trade waste must obtain permission from Sydney Water through an application process. If approved, an agreement is established which sets ongoing requirements based on the type of contaminants generated by the customer and describes the conditions under which Sydney Water will accept the trade waste. IPART determines a maximum charge for trade waste services for industrial customers and for commercial customers. The charges reflect the cost of:

- transporting the wastewater
- treating the wastewater
- maintaining the transport and treatment infrastructure
- minimising any public or environmental nuisance, including preventing overflows and reducing odours
- implementing risk and hazard identification programs to maintain a safe working environment for operations and maintenance personnel and to minimise any damage to systems
- implementing wastewater monitoring programs to ensure compliance with licence agreements.

3.3.7 Ancillary charges

Sydney Water currently provides a number of ancillary services, such as developer compliance certificates, system diagrams and plans, network connections and disconnections, system inspections and technical services. In 2015–16 these services will account for around 350,000 transactions and generate $10.7 million in revenue. IPART determines the fees for these services on a cost-recovery basis.

3.4 Sydney Water's customer numbers

Table A3-1 gives a summary of estimated customer numbers by water, wastewater and stormwater over the current determination period and forecast numbers for the next pricing determination period. Table A3-2, Table A3-3 and Table A3-4 break down these numbers by property type for water, wastewater and stormwater respectively.

Table A3-1 Dwelling numbers for water supply, wastewater and stormwater services overall

	Current determination period				Next determination period			
	2012–13	**2013–14**	**2014–15**	**2015–16**	**2016–17**	**2017–18**	**2018–19**	**2019–20**
Water[4]	1,845,597	1,867,269	1,892,727	1,916,351	1,927,382	1,952,226	1,977,657	2,003,464
Wastewater[4]	1,786,386	1,807,292	1,832,559	1,856,133	1,867,117	1,891,924	1,917,322	1,943,096
Stormwater[5]	517,773	530,465	539,707	547,794	552,572	560,639	568,706	576,871

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

Table A3-2 Customer numbers for water supply services broken down by customer type

	Current determination period				Next Determination Period			
	2012–13	**2013–14**	**2014–15**	**2015–16**	**2016–17**	**2017–18**	**2018–19**	**2019–20**
Residential								
Houses	1,045,227	1,052,953	1,060,887	1,069,408	1,079,042	1,088,802	1,099,041	1,109,552
Strata common meters	418,072	429,899	440,223	446,664	451,124	453,376	454,541	455,178
Strata individual meters	100,308	101,256	106,078	113,939	123,676	135,576	148,657	162,400
Flats	129,271	129,956	130,587	130,587	116,971	116,971	116,971	116,971
Mixed developments	12,788	12,800	13,427	13,427	13,427	13,427	13,427	13,427
Total residential	1,705,666	1,726,864	1,751,202	1,774,025	1,784,240	1,808,152	1,832,637	1,857,528
Non-residential								
Stand alone	75,572	75717	76,097	76,153	76,209	76,265	76,321	76,377
Strata common meter	35,535	35734	35,877	35,883	35,889	35,895	35,901	35,907
Strata individual meter	15,049	15242	15,776	16,515	17,269	18,139	19,023	19,877
Total non-residential	126,156	126,693	127,750	128,551	129,367	130,299	131,245	132,161
Unmetered (res + non res)	13,775	13,712	13,775	13,775	13,775	13,775	13,775	13,775
Total	1,845,597	1,867,269	1,892,727	1,916,351	1,927,382	1,952,226	1,977,657	2,003,464

Table A3-3 Customer numbers for wastewater services broken down by customer type

	Current determination period				Next Determination Period			
	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20
Residential								
Houses	1,014,167	1,021,560	1,029,532	1,038,143	1,047,869	1,057,732	1,068,080	1,078,701
Strata common meters	417,916	429,757	440,042	446,422	450,840	453,071	454,225	454,856
Strata individual meters	99,322	100,271	105,043	112,825	122,465	134,246	147,196	160,802
Flats	126,090	126,747	127,345	127,345	113,729	113,729	113,729	113,729
Mixed developments	12,421	12,529	13,156	13,156	13,156	13,156	13,156	13,156
Total residential	1,669,916	1,690864	1,715,118	1,737,891	1,748,059	1,771,934	1,796,386	1,821,244
Non-residential								
Stand alone	63,626	63371	63,727	63,783	63,839	63,895	63,951	64,007
Strata common meters	35,094	35275	35,440	35,446	35,452	35,458	35,464	35,470
Strata individual meters	14,750	14873	15,482	16,221	16,975	17,845	18,729	19,583
Total non-residential	113,470	113519	114,649	115,450	116,266	117,198	118,144	119,060
Unmetered (res + non res)	3,000	2,909	2,792	2,792	2,792	2,792	2,792	2,792
Total	1,786,386	1,807,292	1,832,559	1,856,133	1,867,117	1,891,924	1,917,322	1,943,096

Table A3-4 Customer numbers for stormwater services broken down by customer type

	Current determination period				Next Determination Period			
	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19	2019–20
Residential								
Dwelling not in multi premises	197,979	199,200	199,588	199,976	200,358	200,730	201,101	201,463
Multi premise	269,781	272,747	280,968	287,964	291,677	298,714	305,786	313,002
Mixed multi premise	7,709	7,669	7,909	8,021	8,096	8,133	8,152	8,162
Total residential	475,469	479,616	488,465	495,961	500,131	507,577	515,039	522,627
Non-residential								
Small (200m^2 or less)	21,473	27,794	8,767	8,783	8,799	8,815	8,831	8,847
Medium (201–1,000m^2)	14,318	15,012	14,941	14,973	15,005	15,037	15,069	15,101
Large (1,001 – 10,000m^2)	3,931	5,284	5,288	5,296	5,304	5,312	5,320	5,328
Very large (10,001 – 45,000m^2)	614	754	752	752	752	752	752	752
Largest property (45,001m^2 or greater)	118	133	134	134	134	134	134	134
Non-residential property within non-residential multi premises			19,452	19,985	20,535	21,098	21,645	22,164
Total non-residential	40,454	48,977	49,334	49,923	50,529	51,148	51,751	52,326
Vacant land and exempt properties	1,850	1,872	1,908	1,910	1,912	1,914	1,916	1,918
Total	517,773	530,465	539,707	547,794	552,572	560,639	568,706	576,871

3.5 Sydney Water's service levels

This section details the service levels forecast in the 2012 Price Determination and actual service levels achieved over this period. If standards of service have not been achieved, the reasons why are explained.

Sydney Water's service levels are set out in its Operating Licence 2010–15. IPART appoints an independent auditor to audit Sydney Water's compliance with the licence each year. Sydney Water has achieved full or high compliance with its Operating Licence obligations during the determination period.

The current pricing determination falls across two Operating Licence terms – the Operating Licence 2010–15 and the Operating Licence 2015–20. This section reports how Sydney Water delivered on IPART service levels for the current determination period, up to the financial year ending 2013–14. The service levels in the 2015–20 Operating Licence are unchanged.

3.5.1 Drinking water quality

Service level

Operating Licence Clause 2.1(a):

Sydney Water must manage drinking water quality to the satisfaction of NSW Health in accordance with the 2011 *Australian Drinking Water Guidelines* (ADWG) (unless NSW Health specifies otherwise).

Operating Licence Clause 2.1(e):

Sydney Water must comply with the fluoridation plant operating targets set out in the Fluoridation Code.

Performance

Compliance with the values in the 2011 ADWG is assessed on an annual basis for each of Sydney Water's 13 water delivery systems. The water quality characteristics assessed are agreed between Sydney Water and NSW Health, and are documented in the Annual Drinking Water Quality Monitoring Plan.

For the determination period each of Sydney Water's water delivery systems complied with the Operating Licence requirements for drinking water quality stipulated in Clause 2.1(a). This was achieved by managing the Health guideline values and the Aesthetic guideline values in accordance with the ADWG to the satisfaction of NSW Health. As required by Operating Licence Clause 2.1(e), Sydney Water also complied with the fluoridation plant operating targets set out in the *Fluoridation of Public Water Supplies Code of Practice*.

3.5.2 Recycled water quality

Service level

Sydney Water must manage recycled water quality in accordance with:

(a) the 2006 *Australian Guidelines for Water Recycling* (unless NSW Health specifies otherwise) to the satisfaction of NSW Health

(b) any other guidelines specified by NSW Health to the satisfaction of IPART.

Performance

Sydney Water manages recycled water in accordance with the 2006 *Australian Guidelines for Water Recycling* (AGWR) for the Rouse Hill residential scheme, Wollongong Stage 1 and Stage 2 industrial scheme, Western Sydney Recycled Water Initiative, Hoxton Park residential and industrial scheme and 9 other irrigation schemes.

Sydney Water has transitioned to meet the requirements of the AGWR with individual/dedicated water recycling plant (WRP) Recycled Water Quality Management Plans (RWQMPs) endorsed by NSW Health for the schemes listed above.

Annual Recycled Water Quality Monitoring Plans use these operating targets to assess performance against the individual RWQMPs. We report the performance of recycled water schemes, including details of all exceptions, to NSW Health every quarter. Performance and details of exceptions are discussed, as required, with NSW Health and any concerns or actions required by NSW Health identified.

Compliance against the Operating Licence is assessed based on the annual recycled water report to NSW Health and the responses of NSW Health with regard to measured exceptions to the operating targets in the RWQMPs over that period.

Independent Operating Licence audits over the term of the current licence have determined that Sydney Water has complied with the Operating Licence requirements for recycled water quality.

Sydney Water continues to comply with the minimum requirements outlined in AGWR to the satisfaction of NSW Health for specific end uses of recycled water and any specific requirements determined by NSW Health and/or the EPA. Sydney Water also considers any additional customer specific requirements relating to the use of recycled water and/or site conditions as specified in customer agreements.

3.5.3 Water Pressure Standard

Service level

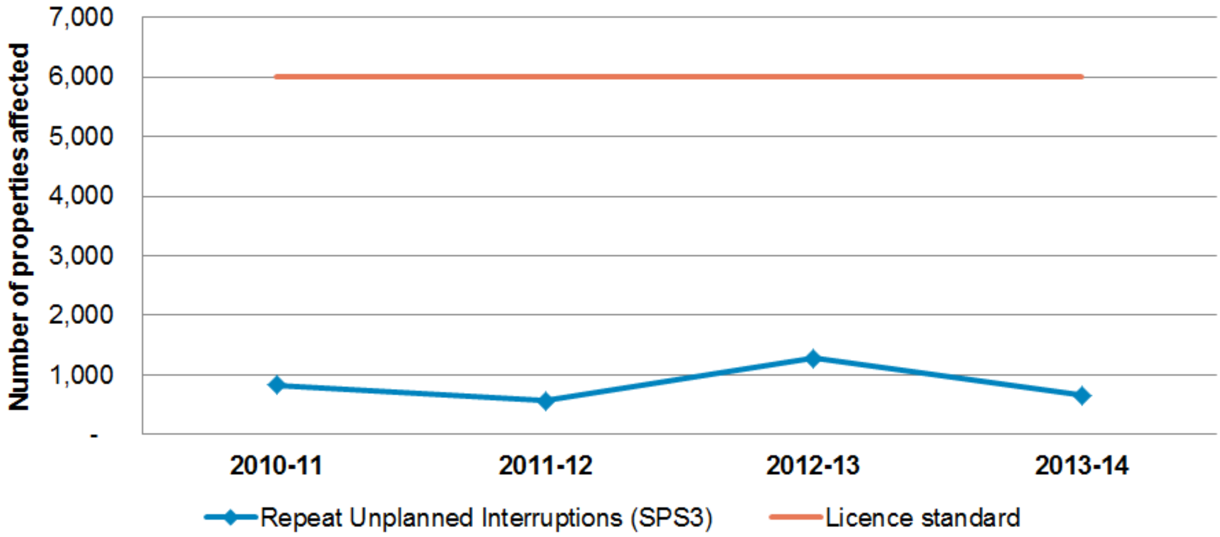
Sydney Water must ensure that no more than 6,000 properties experience a water pressure failure in a financial year in its drinking water supply system.

Performance

Sydney Water continues to comply with the water pressure standard as required by the Operating Licence 2010–15 (Figure A3-5).

The number of properties affected by low water pressure has been consistently well below the Operating Licence standard of 6,000 properties and has trended downwards since 2004–05. This is mainly due to the implementation of the Pressure Improvement Program to address the more intractable system problems affecting properties. In addition, the Active Leak Detection program and the Water Mains Renewal program have indirectly helped in reducing the number of pressure failure events.

Figure A3-5 Water pressure standard performance



3.5.4 Water Continuity Standard

Service level

In its drinking water supply system, Sydney Water must ensure that:

(a) no more than 40,000 properties experience an unplanned water interruption exceeding 5 hours in a financial year

(b) no more than 14,000 properties experience three or more unplanned water interruptions of more than one hour's duration in a financial year.

Performance

Sydney Water complied with the water continuity standard for, unplanned (Figure A3-6) and repeat unplanned (Figure A3-7) interruptions as required by the Operating Licence.

The number of properties affected by unplanned water discontinuity events greater than five hours is associated with the need to isolate broken water mains to enable their repair. The emphasis on isolating water main breaks earlier in order to meet the response time for water main breaks required by the Operating Licence, places upward pressure on the number of properties affected by unplanned water discontinuity events greater than five hours.

Figure A3-6 Water continuity: unplanned interruptions

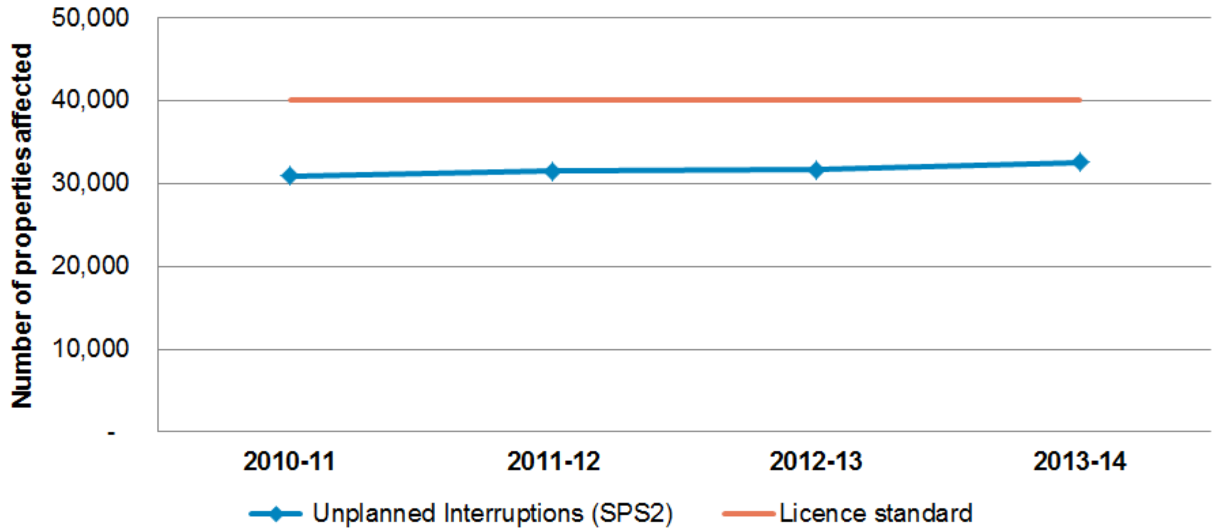
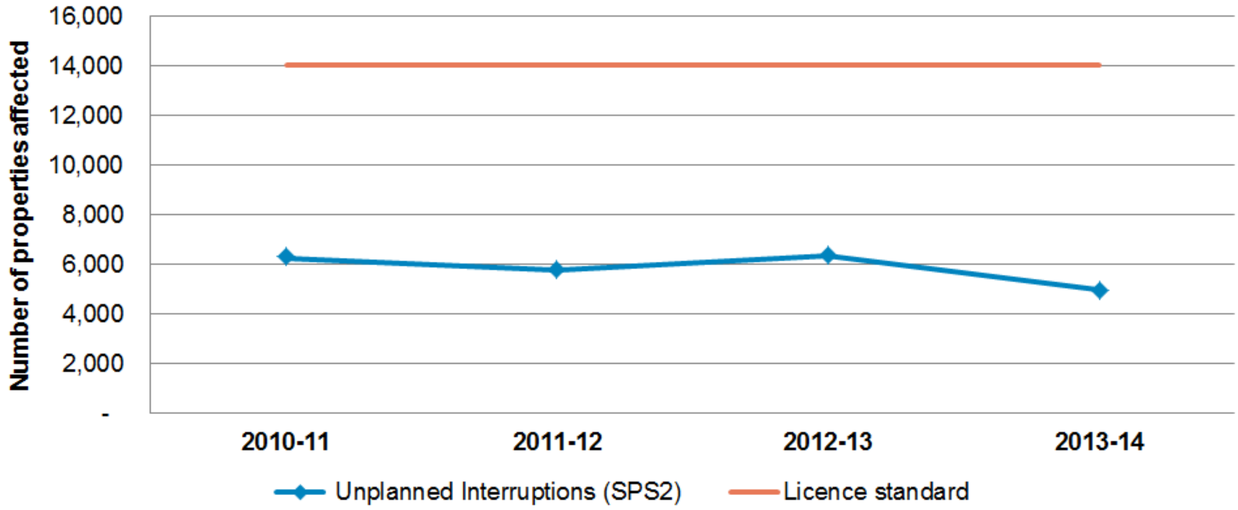


Figure A3-7 Water continuity: repeat unplanned interruptions



3.5.5 Response time for water main breaks

Service level

Sydney Water's response to water main breaks and leaks (in the trunk and reticulation components of Sydney Water's drinking water supply system between water treatment plants and a property), as measured from the time Sydney Water receives notification of a break or leak to the time Sydney Water stops the loss of water, will be as follows:

- Priority 6 breaks/leaks 90% of jobs within 3 hours
- Priority 5 breaks/leaks 90% of jobs within 6 hours
- Priority 4 breaks/leaks 90% of jobs within 5 days

Performance

Sydney Water continues to meet the required response time levels in the Operating Licence. Table A3-5 shows performance against the response time levels for the current Operating Licence period.

Table A3-5 Performance against response time levels

Priority	Level	Response Times	Compliance 2010–11	Compliance 2011–12	Compliance 2012–13	Compliance 2013–14
6	90%	<=3hrs	91%	92%	93%	92%
5	90%	<=6hrs	91%	93%	93%	91%
4	90%	<=5 days	94%	92%	91%	94%

3.5.6 Water leakage level

Service level

Sydney Water is required to ensure that water leakage is maintained between 99 and 121 megalitres a day (within one standard deviation of the target 105 ML/day), measured at 30 June each year.

Performance

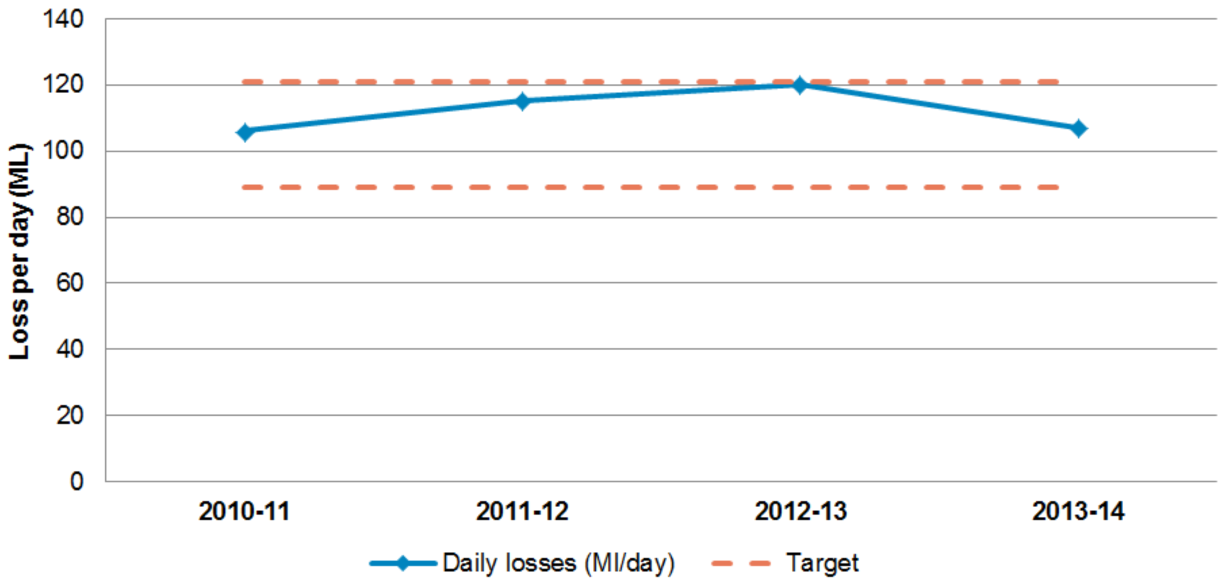
Sydney Water continues to meet the water use level required by the Operating Licence. Figure A3-8 shows performance against the 2010–15 Operating Licence leakage target.

Sydney Water manages its leakage program to keep leakage within the required range whilst ensuring the level of investment continues to deliver value to customers. The level of leakage is determined quarterly, and is based on the water balance method over a rolling 12-month period. The main factors that have contributed to managing the leakage level include;

- the survey of water mains for leaks as part of the Active Leak Detection program
- improvement in data-governance to ensure better accuracy of the information used for water balance calculations
- the realisation of benefits from the Pressure Management Program implemented over the last five years.

Many factors affect leakage including climate and customer behaviours. Changes to these factors and the leakage program take many months to show through in the water balance result. Sydney Water expects that leakage will remain within the range required by the Operating Licence. Sydney Water's *Water Efficiency Report 2013–14* provides further detail on performance against the Operating Licence water leakage level.

Figure A3-8 Water leakage performance



3.5.7 Water conservation target

Service level

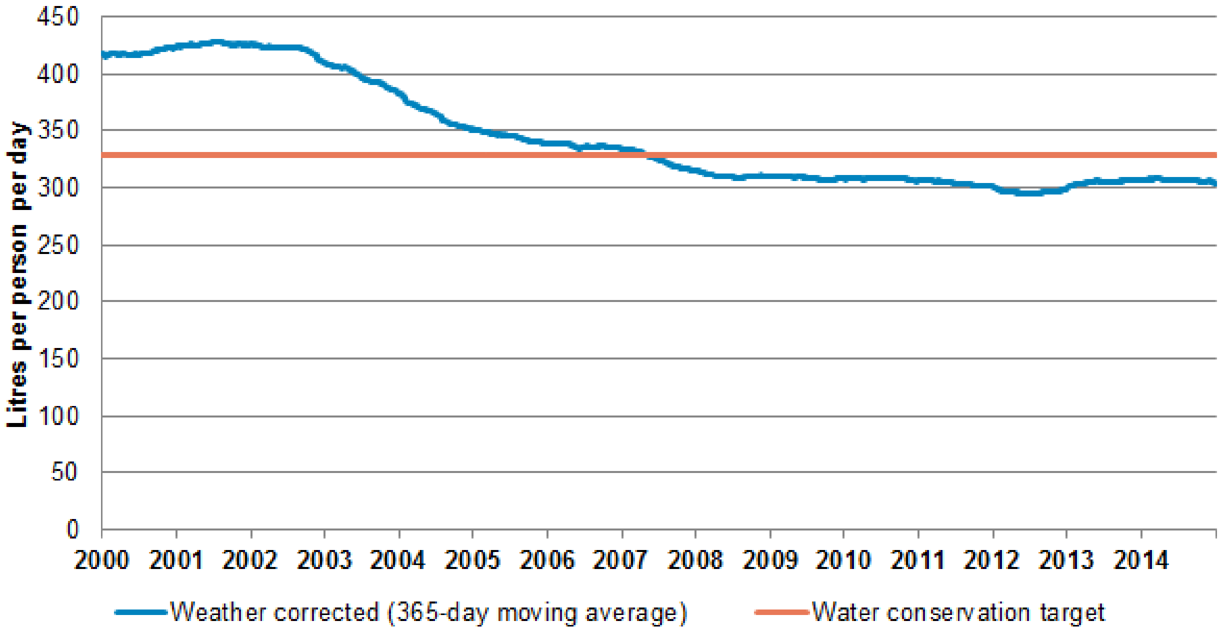
It is required that Sydney Water will maintain drinking water demand (weather corrected) to less than 329 litres a person a day to 2015.

Performance

Sydney Water is required to maintain water use at less than 329 litres per person per day (LPD) (weather corrected). In 2013–14, total demand was 310 litres a person a day and weather corrected demand was 307 LPD (Figure A3-9). Results indicate that as Sydney Water's customer base grows, water efficient behaviour established during the last drought has been maintained.

It is expected that Sydney Water will maintain drinking water demand (under average weather conditions) to less than 329 LPD to 2015 as required by the Operating Licence. Further information on specific water saving initiatives can be found in the *Water Efficiency Report* 2013–14.

Figure A3-9 Water conservation target



3.5.8 Sewage Overflow Standard

Service level

Sydney Water must ensure that:

(a) no more than 14,000 properties (other than public properties) experience an uncontrolled wastewater overflow in dry weather in a financial year

(b) no more than 175 properties (other than public properties) experience 3 or more uncontrolled wastewater overflows in dry weather in a financial year.

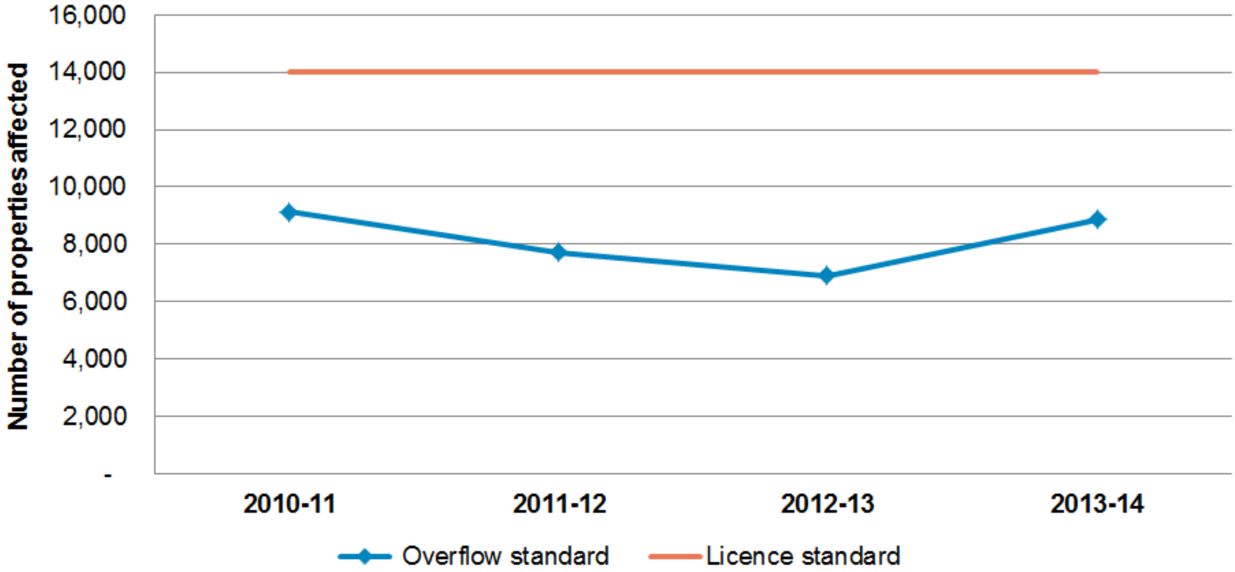
Performance

Sydney Water has complied with the wastewater overflow standard during the 2010–15 Operating Licence period, up to the financial year ending 2013–2014.

Sydney Water's choke management strategy has been effective at keeping wastewater overflow incidents below the standard set in the Operating Licence. Key components of the strategy include the inspection and repair of sewers that have not blocked but have a high consequence if they do, sewers that block three or more times in five years, and sewers that discharge to a waterway or inside a home.

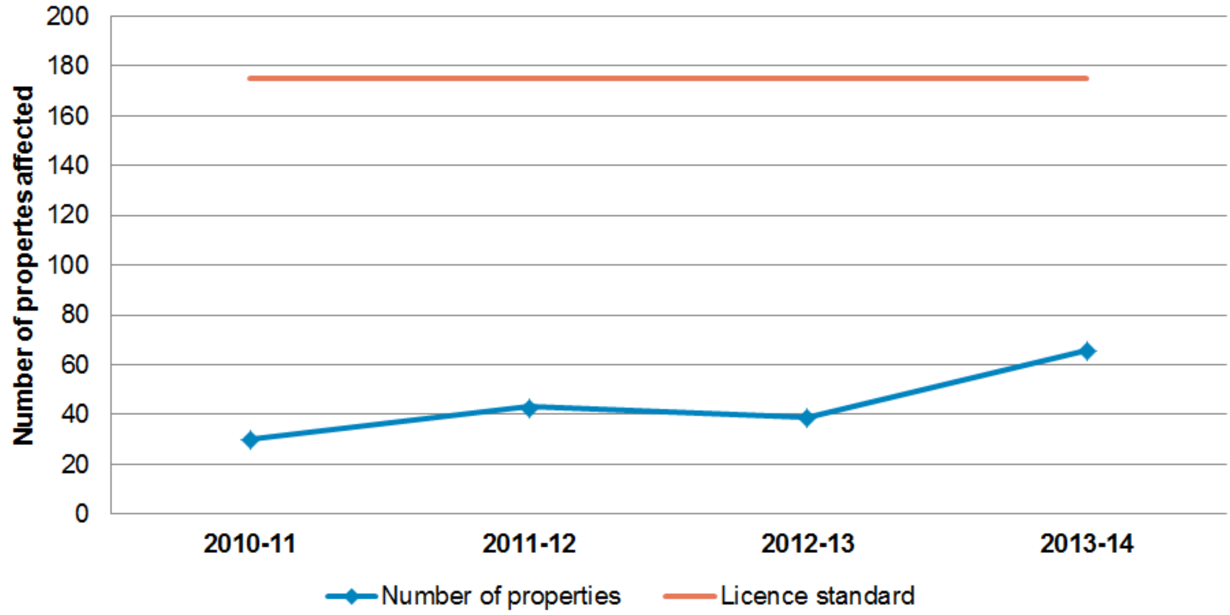
Figure A3-10 shows performance over the current licence period. The trend is in line with long-term seasonal variations in weather conditions. The choke program is continually reviewed and appropriately adjusted to ensure proper and efficient management of chokes across the wastewater system.

Figure A3-10 Sewage overflows: performance comparison



Performance against the repeat overflow standard has been relatively stable over the Operating Licence period (Figure A3-11).

Figure A3-11 Repeat Sewage overflows: performance comparison



3.5.9 Priority Sewerage Program (PSP)

IPART set targets in the 2010–15 Operating Licence for the construction of PSP schemes.

Service level

Clause 3.6 (Boxout A3-3) of the Operating Licence sets out the following requirements for the Priority Sewerage Program:

Boxout A3-3 Clause 3.6 of the *Operating Licence 2010–2015*

(a) Sydney Water must continue with the planning and delivery of the Priority Sewerage Program such that wastewater services are provided to the number of lots detailed in Schedule 4 in the following areas by the dates specified below:

(1) Agnes Banks and Londonderry by 31 December 2012

(2) Glossodia, Freeman's Reach and Wilberforce by 31 December 2012

(3) Yellow Rock and Hawkesbury Heights by 31 December 2012

(4) Appin by 30 June 2015

(5) Wilton and Douglas Park by 30 June 2014

(6) West Hoxton by 30 June 2014

(7) Bargo and Buxton by 30 June 2014

(8) Cowan by 30 June 2014

(9) Galston and Glenorie by 30 June 2015

(b) Sydney Water will commence planning for Yanderra by 30 June 2015

(c) If either Sydney Water or a licensee under the Water Industry Competition Act 2006 provides wastewater services to a significant development (as determined by the Minister) in an adjoining area to one of the following areas in the Priority Sewerage Program:

(1) Austral

(2) Menangle and Menangle Park

Then Sydney Water must deliver the Priority Sewerage Program in that area such that wastewater services are made available to customers within 24 months of wastewater services being available to service the significant development.

(d) Clause 3.6 (b) does not apply where a licensee under the Water Industry Competition Act 2006 provides wastewater services to the relevant area of the Priority Sewerage Program.

(e) Should delays caused by consent authorities impair Sydney Water's ability to meet the timeframes set out in the clause 3.6, Sydney Water must write to the Minister to advise of the reasons for the delay.

Sydney Water must provide an annual report on its progress in implementing the Priority Sewerage Program to IPART in accordance with the Reporting Manual.

Performance

Sydney Water met all PSP targets during the determination period.

PSP schemes completed during Operating Licence period include:

- Agnes Banks and Londonderry Sewerage Scheme
- Glossodia, Freemans Reach and Wilberforce Sewerage Scheme
- Yellow Rock and Hawkesbury Heights Sewerage Scheme
- Appin Sewerage Scheme
- Wilton and Douglas Park Sewerage Schemes
- West Hoxton Sewerage Scheme
- Bargo and Buxton Sewerage Schemes
- Cowan Sewerage Scheme.

PSP schemes under construction

- Galston and Glenorie Sewerage Schemes.

Wastewater services for the Galston and Glenorie schemes are required by 30 June 2015. Detailed planning for the schemes was completed in August 2014. Construction commenced in late October 2014 and by the end of June 2015, eligible properties will be able to connect to the schemes.

Planning for Yanderra

Sydney Water has met its requirement in the Operating Licence to commence planning for Yanderra by 30 June 2015.

3.5.10 Maintenance of stormwater drainage system

Service level

The *Sydney Water Act 1994* and the *Operating Licence 2010–15* requires Sydney Water to provide, operate, manage and maintain a stormwater drainage system except to the extent that the Minister is satisfied that satisfactory arrangements have been made for the service to be provided by another appropriate body, including a council.

Performance

Sydney Water is the asset owner for major trunk stormwater drains across 73 catchment areas, providing trunk drainage for 525,564 properties. As of 30 June 2014, Sydney Water's stormwater assets consisted of 440 km of channels and conduits, 3 pumping stations, 16 retarding basins, 69 stormwater quality improvement devices and 4 wetlands. The extent, state and management of these assets are set out in Sydney Water's *Stormwater Asset Management Plan*, and the State of the Assets Report.

3.6 Other drivers of Sydney Water’s activities

Sydney Water’s service level obligations are primarily set in its Operating Licence, but other drivers include:

- Ministerial requirements: these are specific actions imposed by the Portfolio Minister in relation to Sydney Water’s performance against the Operating Licence, such as enforcing recommendations arising from Operating Licence audits.
- Directions under the SOC Act: these can compel Sydney Water to undertake actions that are deemed necessary for the public good and/or that Sydney Water’s Board considers are not in Sydney Water’s commercial interest. Examples of directions given to Sydney Water include the Sydney Desalination Plant and the Rosehill Recycled Water project.
- The Environment Protection Authority issues Environment Protection Licences that govern the operation of Sydney Water’s water and wastewater systems.
- IPART regulation under the *Water Industry Competition Act 2006* (WIC Act): certain obligations for Sydney Water arise under the WIC Act, such as in regard to the retailer and operator of last resort regime.

The EPA is the primary environmental regulator for NSW. Its role is to regulate activities that could have an impact on the health of the NSW environment and its people. The EPA has issued EPLs under the *Protection of the Environment Operations Act 1997* for all of Sydney Water's wastewater treatment systems. These EPLs regulate the discharges from Sydney Water's wastewater treatment plants and reticulation systems.

There is a MoU between Sydney Water and the EPA, as required by Section 35 of the Sydney Water Act. The MoU recognises the role of the EPA as primary regulator for NSW and aligns Sydney Water’s commitments to ongoing environmental improvements with the EPA’s broader environmental protection charter.

3.7 Customer complaints over the determination period

This section details of the number and type of complaints that Sydney Water has received in relation to its IPART regulated services and charges over the determination period. This information can be seen in Table A3-6.

In 2013–14 Sydney Water received the lowest number of complaints for 9 years and rates well among the lowest (per 1,000 properties) of Australian water utilities of its size. Complaints made to Sydney Water have remained low throughout the pricing determination period.

This reflects well on the improvements Sydney Water has made through its focus on root causes of complaints and avoidable contacts.

Sydney Water continues to focus on improving business performance to ensure customer satisfaction with our products and services.

The results of recent surveys also confirm that customers are very satisfied with our water and wastewater services. For instance:

- satisfaction with the quality of drinking water was 8.4 out of 10
- satisfaction with the wastewater system rated 7.7 out of 10
- the overall quality of service rated 7.7 out of 10.

Table A3-6 Summary of complaints by type and comparative period

Complaint types	Number of complaints			
	2010–11	2011–12	2012–13	2013–14
Account – Meter Adjustment	2,395	2,912	3,356	2,405
Account	862	789	1,474	1,062
Allegations (handled by Group Audit)	3	4	3	0
Ancillary Products and Services	10	8	13	11
Backflow Prevention	4	6	3	2
Community Education	1	1	0	1
Customer Service	131	206	177	139
Developer	16	22	29	14
Drought/Water Restrictions	2	0	0	0
Environmental Issues	18	6	5	6
Field Staff	109	77	83	108
Liability Claims	56	67	45	24
Meters	349	320	199	207
Noise	83	64	68	50
Odour	333	330	291	365
Policies	13	18	7	3
Private Sewer Repair	0	0	0	0
Request for information	0	0	0	3

Residential Products/Services	0	0	0	21
Restoration (Site Rehabilitation)	191	135	83	79
Safety	3	5	7	4
Stormwater – Flooding	2	0	0	0
Stormwater/ Drainage	17	65	30	28
Sydney Water Property	33	39	32	73
Trade Waste	7	12	18	16
Wastewater – Other	99	92	47	96
Wastewater Overflow	346	381	372	424
Water – Other	89	77	71	126
Water Conservation and Recycling	169	112	43	5
Water Continuity – Drinking	310	187	198	244
Water Continuity – Recycled	2	1	1	0
Water Pressure – Drinking	61	49	40	57
Water Pressure – Recycled	0	0	0	0
Water Quality – Drinking	1,089	839	886	636
Water Quality – Recycled	2	0	0	2
Water Wise Rules	0	1	0	1
EWON[6]	593	702	671	723
Total	**7,398**	**7,527**	**8,252**	**6,935**

[6] Energy and Water Ombudsman of New South Wales (EWON)

Appendix 4 Customer engagement on water and stormwater pricing

This appendix relates to the discussion in Chapter 3 on pricing customer engagement and provides supporting information to Chapter 10 for changing tariff structures.

4.1 Introduction

Sydney Water has been investigating two research areas: **water pricing** and **stormwater pricing**. As part of water pricing research, we have looked at tariff structures, service standards and demand management. The water pricing research is complete and findings on tariff structures have been used to support our proposals for water tariff structures, set out in Chapter 10. Research on service standards and demand management has provided valuable customer insights for Sydney Water, which we will use as the basis for more in-depth research.

Stormwater pricing engagement is ongoing. This research looks to understand customers' overall knowledge of Sydney Water's role in stormwater management, as well as their views on current and potential charging scenarios. This information is important, because stormwater services provided by Sydney Water benefit a wide section of the community, but are only paid for by a smaller group of customers. We expect substantial increases in future expenditure and this research looks to understand the wider community's views on the scale of investment, and how it will be funded. More extensive customer engagement will be conducted to guide our future decisions. See Table A4-1 for a summary of engagement and progress of these two research areas.

Table A4-1 Types of engagement undertaken or to be undertaken for the three pricing research areas

Engagement	Water Pricing			Stormwater pricing
	Tariff levels	Service standards	Demand management	
Focus groups	✓ Complete	✓ Complete	✓ Complete	✓ Complete
Online survey	✓ Complete	✓ Complete	✓ Complete	2015
Deliberative Democracy	✗	✗	✗	2015

4.2 Research areas

Key research questions that this engagement seeks to answer are detailed below.

4.2.1 Water pricing

Tariff Levels

1) What are the perceptions of water pricing?
2) How aware are customers of water pricing?
3) How important is the ability to control bills (usage charge)?
4) Which is more important – fixed service charge or usage charge?

Service Standards

1) Are customers willing to pay additional charges for improved network performance and/or higher service standards?
2) Are customers willing to accept compensation for reduced network performance and/or lower service standards?

Demand Management

1) What are customer views on stronger price signals for water during times of water scarcity with respect to desalination, increasing usage price and water restrictions?

4.2.2 Stormwater pricing

1) Would customers support a more equitable (user-pays) approach to stormwater pricing?
2) Do customers consider the price increases related to different service charge scenarios to be too high, too low, or about right in the context of stormwater services provided?

4.3 Methodology

Sydney Water worked with the Australian Centre of Excellence for Local Government (ACELG) at the University of Technology Sydney to conduct research into customer and community attitudes on water and stormwater pricing. ACELG has highly relevant prior experience, having worked with various NSW Government departments and local Councils on strategic planning and policy issues.

4.3.1 Establishing knowledge requirements

The ability of Sydney Water customers to adequately participate in assessing tariff structures partly depends on their understanding of this topic. ACELG provided factual information on pricing, to help customers arrive at an informed response to the survey.

Detailed information was provided by Sydney Water to ACELG for each research topic and this was communicated to research participants to ensure they had adequate knowledge of issues being evaluated. This included information about Sydney Water's services, prices and potential price deviations.

We were aware from existing sentiment monitors and surveys that water charging is generally not well understood by customers. Our survey material was therefore developed to help customers understand Sydney Water's bills and services better. For example, we said water charges were like phone charges – a fixed charge is like paying for your connection to the network, and phone call minutes were like litres of water used. We also provided material so customers could understand the likely financial impact choices had on their bills.

4.3.2 Engagement methodology

This research uses three forms of engagement:

- focus groups
- online panel surveys
- deliberative democracy.

A summary of their application across the research topics can be seen in Table A4-1.

Preliminary review

Before undertaking engagement, a literature and data review was conducted on water and stormwater pricing. Key aims of this review were to:

- develop an understanding of Sydney Water customer research, data and educational information
- ensure ease of interface with the entire Sydney Water customer base
- establish key demographic, values, customer type and segment variables for each topic
- develop broad stormwater educational material and information packs for participants, including locally relevant case studies.

Focus groups

Focus groups were conducted for both pricing topics to understand participant viewpoints, by explaining issues and enabling discussion. We wanted to use focus groups to help us develop the online panel survey questions.

These groups were comprised of people drawn from different Sydney regions with a mix of demographics and attributes. We gave participants facts about relevant topics to help them make informed responses. Water pricing and stormwater pricing research questions (from Section 4.5) were addressed in these groups.

Online panel surveys

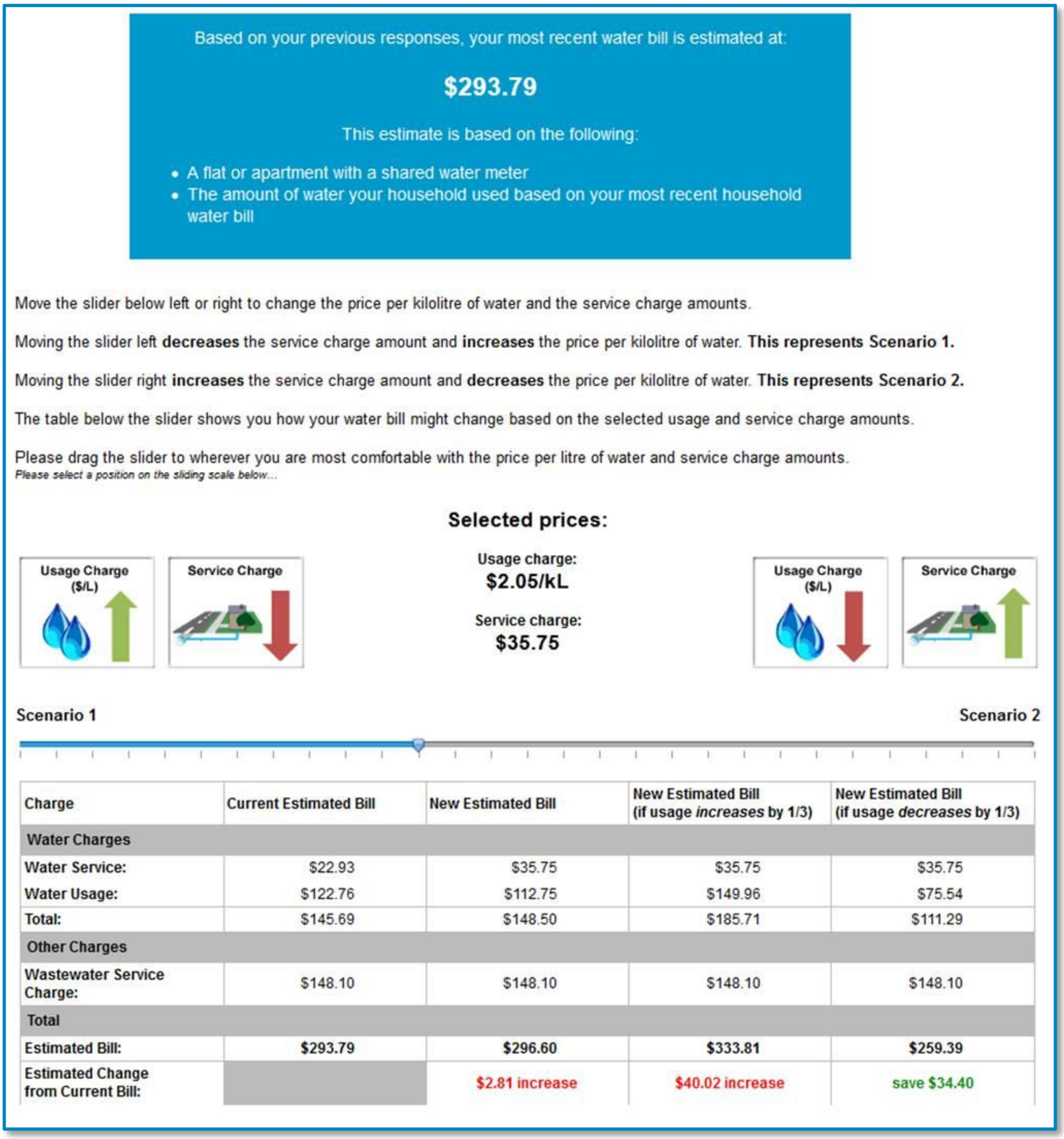
An online panel survey has been conducted for water pricing and is currently underway for stormwater pricing with target sample sizes of at least 1,500 participants. The sample was stratified to the Australian Bureau of Statistics (ABS) Census for the Greater Sydney Capital Statistical Area. To achieve a representative sample, hard quotas[7] were set for age, gender, education, dwelling type, tenure type, and household size, type and composition. Soft quotas[8] were set for Local Government Area (LGA) and family composition based on the Statistical Area.

We surveyed 1,684 people for the water pricing research. The survey was based on initial research questions, refined by focus group outcomes and adapted for an online platform. Surveys allow us to understand and develop evidence for levels of awareness around Sydney Water, its services and prices around services. In particular, online surveys can achieve a larger sample size at a lower cost meaning more customers can be represented across all locations, demographics and customer types. See Section 4.5 for a complete list of questions asked in the water pricing survey.

One innovation in the water pricing survey was a bill analyser tool that allowed customers to see the impact on their bill of changes in the water usage and fixed charges. From this, we were able to compare customers' stated preference for charging structures (before they were allowed to use the tool) and their revealed preferences (after they were allowed to use the tool). This was made possible by using a web-based format. See Figure A4-1 for a screenshot of the bill analyser tool showing what respondents would have seen when they answered tariff structure questions.

[7] A quota that must be filled for the survey to be considered complete.
[8] A quota where it is permissible for the survey to be considered complete even though the quota has not been filled, provided that there is not a large difference between the specified size of the soft quota and the achieved number of interviews in the sub-group.

Figure A4-1 Screenshot of bill analyser tool from the online water pricing panel survey



Based on your previous responses, your most recent water bill is estimated at:

$293.79

This estimate is based on the following:

- A flat or apartment with a shared water meter
- The amount of water your household used based on your most recent household water bill

Move the slider below left or right to change the price per kilolitre of water and the service charge amounts.

Moving the slider left **decreases** the service charge amount and **increases** the price per kilolitre of water. **This represents Scenario 1.**

Moving the slider right **increases** the service charge amount and **decreases** the price per kilolitre of water. **This represents Scenario 2.**

The table below the slider shows you how your water bill might change based on the selected usage and service charge amounts.

Please drag the slider to wherever you are most comfortable with the price per litre of water and service charge amounts.
Please select a position on the sliding scale below...

Selected prices:

Usage Charge ($/L) | Service Charge

Usage charge:
$2.05/kL

Service charge:
$35.75

Usage Charge ($/L) | Service Charge

Scenario 1 **Scenario 2**

Charge	Current Estimated Bill	New Estimated Bill	New Estimated Bill (if usage *increases* by 1/3)	New Estimated Bill (if usage *decreases* by 1/3)
Water Charges				
Water Service:	$22.93	$35.75	$35.75	$35.75
Water Usage:	$122.76	$112.75	$149.96	$75.54
Total:	$145.69	$148.50	$185.71	$111.29
Other Charges				
Wastewater Service Charge:	$148.10	$148.10	$148.10	$148.10
Total				
Estimated Bill:	**$293.79**	**$296.60**	**$333.81**	**$259.39**
Estimated Change from Current Bill:		$2.81 increase	$40.02 increase	save $34.40

A stormwater online panel survey is currently underway (June 2015). A key benefit of the stormwater panel is the development of an ongoing pool of Sydney Water customers to engage in future stormwater research. This is an important outcome for Sydney Water because we have undertaken limited sampling based on stormwater customers in the past and this can be used to inform sampling for future studies.

Deliberative democracy

Deliberative democracies helps customers or the community debate complex issues, in a structured and informed way. It is an in-depth engagement technique, which educates a representative sample of the community on the costs and benefits of alternative options. It allows them to then make informed decisions considering all the relevant trade-offs and to provide feedback on any alternative approaches or options. It reveals the preferred outcomes of the community and allows businesses to appropriately prioritise resources to where they are most valued by customers.

For stormwater research, we will conduct a deliberative democracy workshop in the second half of 2015. This is a new approach for Sydney Water and reflects our desire to move to more collaborative customer engagement. The engagement will involve a workshop with a number of Sydney Water stormwater customers, where we will assess their understanding of stormwater infrastructure and what they see as important in relation to stormwater charging. The content of the workshop will be informed by findings from the stormwater pricing forums and an online panel survey. The workshop will explore willingness to pay under different charging scenarios.

Within the deliberative democracy workshop, we will inform participants about the values and interest-based arguments for and against different stormwater service charge scenarios, with the aim of seeking customers' preferred stormwater service charge outcome. This form of engagement goes beyond what can be achieved in an online panel survey, because it allows us to develop a deep understanding of the reasons why customers prefer particular charging scenarios. To achieve a robust discussion at the workshop, the workshop will be informed by the results of the initial customer forums and the online panel survey.

4.4 Key findings

4.4.1 Water tariff structures

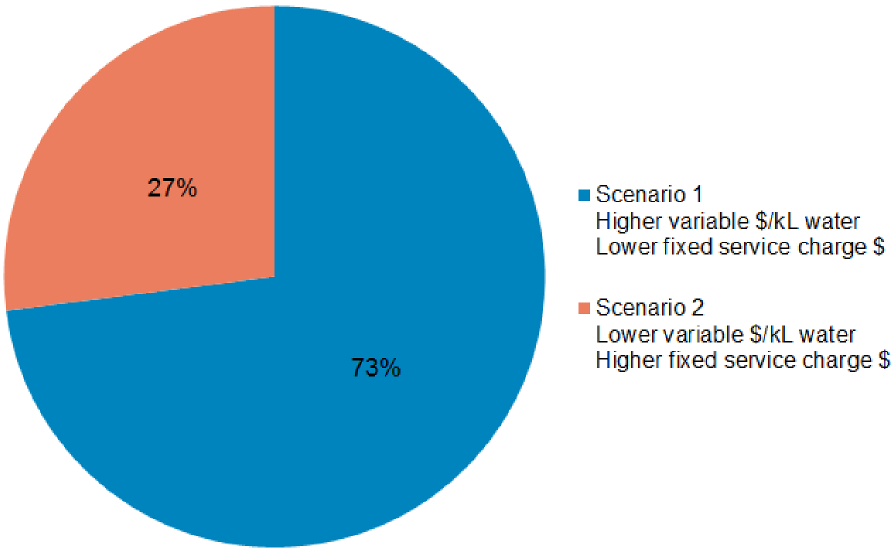
The bill analyser tool

Looking at the bill analyser component of the online survey, we can assess customer stated and revealed preferences on water tariff structures. This was evaluated using their preference of two scenarios:

- **Scenario One –** If my water use goes up or down each quarter, my bill amount should go up or down
- **Scenario Two –** If my water use goes up or down each quarter, my bill should stay about the same amount

Initially, 73% of respondents indicated a preference for scenario one (greater costs associated with the water usage charge) (Figure A4-2). Participants who chose this generally said this was because it gave them an incentive to conserve water.

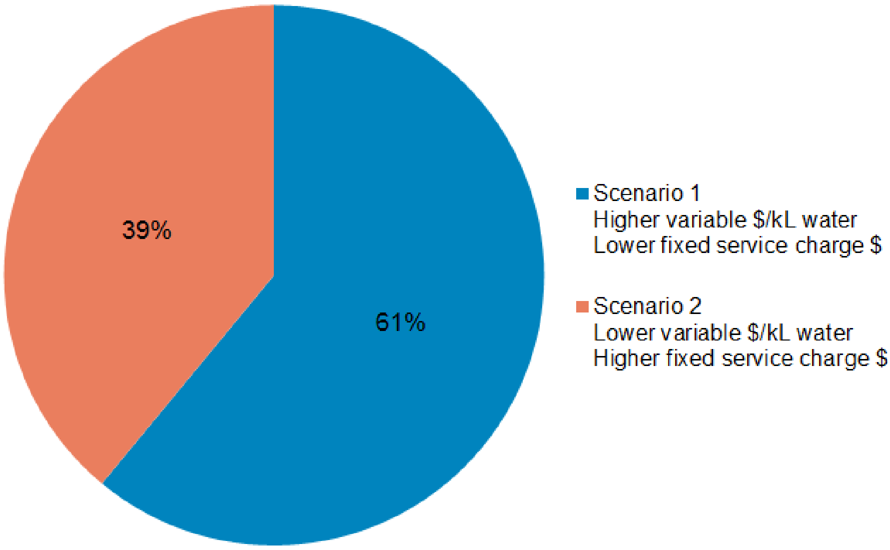
Figure A4-2 Stated preference before showing financial impact of preference using the bill analyser tool



Generally speaking, those selecting the preferred higher usage charge scenario were older, lived in Urban Coastal/North Shore/Inner Urban/Urban Fringe LGAs, were smaller households, the homeowner, had a higher education, were divorced or widowed, retired or unemployed, had an income less than $40,000/year, and noticed a bill decrease in the last 12 months. These people were associated with two customer segments: those who want to know about rebates, water tanks, and other water efficient appliances; and those who do not mind paying a bit more to ensure innovation in the use of water into the future. These segments represent people who want more than just a reliable water service.

Customers were then asked to use their latest bill to look at how changing the usage price (and consequently service charge) would directly affect their bill. If customers did not have access to their bill, they could provide an estimate or use a standard bill that was based on answers to prior questions. After customers were shown the impact of water tariffs on their existing bills, revealed preferences showed an overall shift from scenario one to scenario two, yet the majority (61%) still preferred scenario one (Figure A4-3). That is, the majority still preferred a higher usage charge and lower service charge as before, but support dropped by about 10%.

Figure A4-3 Revealed preference after showing financial impact of preference using the bill analyser tool



Interestingly, 37% of participants changed their initial stated responses but the shift was not unidirectional. Most people shifted from the preferred higher usage and lower fixed price tariff structure, compared with a lower usage and higher fixed price tariff structure. There was no difference in extent of shift based on whether respondent knew their bill or not.

Key demographic groups moving from higher variable/lower fixed prices were those aged 18–24 or 50–69 years, females, from outer suburb LGAs, larger households, renters, less educated, who noticed changes in bills, not concerned about the environment, earning $30,000–$60,000/year, unemployed, and widowed or divorced. A key customer segment that shifted from scenario one to scenario two were those who do not really think about the supply of water but want it to be as cheap as possible. Lowest cost was the main reason given by those who made this shift.

In contrast, key demographics moving from the lower variable/higher fixed prices scenario were those from 18–24 or 60–70+ years, North Shore and Northern Beaches LGAs, smaller or couple households, apartment dwellers, less educated and not responsible for paying household water bills. These respondents noticed constant bills, were not concerned about the environment, preferred water restrictions and increased usage charges to manage demand, earning $60,000–$80,000/year, self-employed/retired/ students, and widowed or divorced. In particular, the customer segment that is careful about water use and wants to be rewarded for use, contributed to the shift. Key reasons given for the shift are summarised in Table A4-2.

Table A4-2 Why people shifted between tariff scenarios

Key Themes	**Shift from:** Higher variable/lower fixed tariff **Shift to:** Lower variable/higher fixed tariff	**Shift from:** Lower variable/higher fixed tariff **Shift to:** Higher variable/lower fixed tariff
Normative	• Reasonable/fair price • 'Right balance' between bill components • What water is worth	• Reasonable/fair price • Right balance/seemed 'about right'
Personal/ household	• Price fits household/personal budget • Better/more equitable for families • 'Suits our situation' • Try to maximise savings on water use • Don't pay service charge • Financial impact	• Price fits household or personal budget • Affordable balance between bill components • 'Suits me and my family'
Financial	• Seemed like a better deal/cheaper • Maximum saving • No change from current bill • Minimise risk of 'bill shock' • Enables better household budgeting	• Saved the most/cheaper/better value • Use usage charge to manage bill
Service satisfaction	• Pay more for better services	• Water should be free/dissatisfied with service
Behavioural	–	• Encourage behaviour change in others • Incentivise self-behaviour change • Incentivise apartment dwellers • Better for everyone/conserves resources • Water pricing should be user pays

Distribution of preferred prices

Looking at the overall distribution of prices from the bill analyser tool, there are three distinct preferred prices – $1.20, $1.90 and $2.60/kL (Figure A4-4). While there is a substantial proportion who prefer $1.90, this group includes about a third of customers who chose 'the middle road', some because they remained confused about how water is charged despite education, others declined to answer, or were uninterested in pricing mechanisms. For those who consciously chose 'the middle road', they were still not concerned about the pricing mechanism, wanted a quality/reliable supply, wanted water priced as low as possible, or believed the amount was reasonable or fair. Two lesser peaks in prices were identified at $1.35 and $2.20/kL. A key reason participants chose a $2.20/kL (or $2.25/kL) usage price was because they wanted prices to remain the same (current usage price is $2.23/kL). There was no clear reason why preference spiked at $1.35/kL. Participants who selected this price mainly stated this was the lowest cost for them. See Table A4-3 for recurrent characteristics of those who chose specific prices.

Figure A4-4 Frequency distribution of preference for usage prices

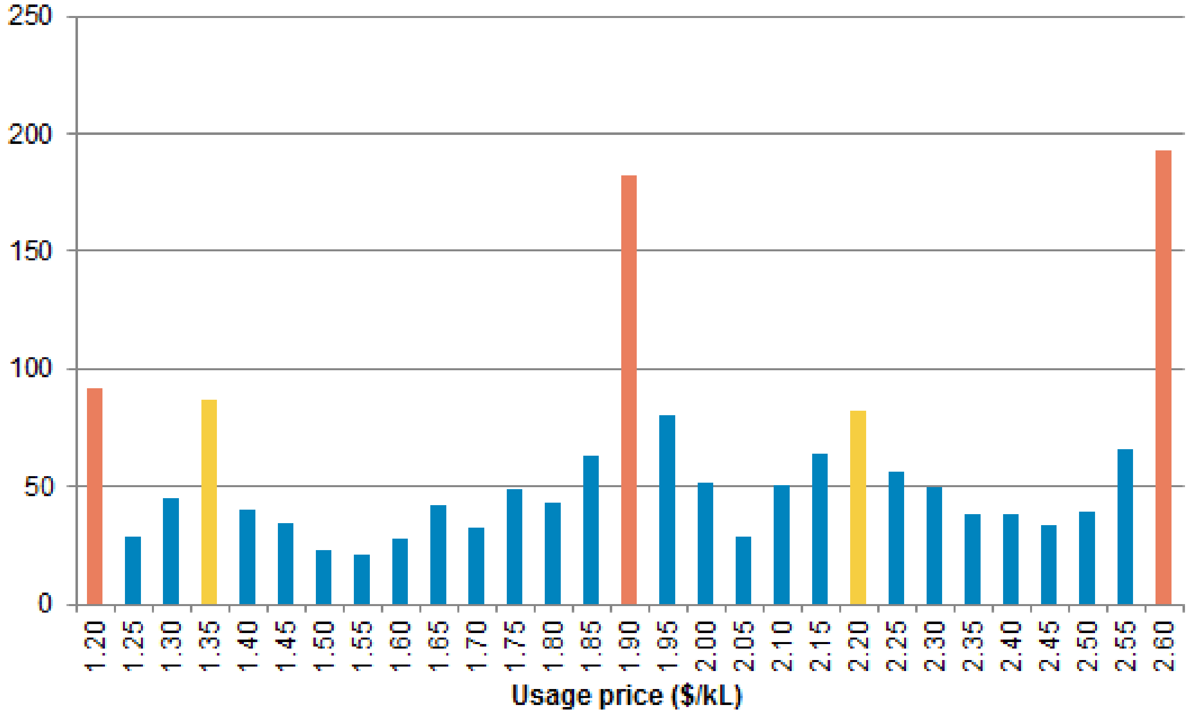


Table A4-3 Characteristics of people who chose specific price ranges

$1.20/kL	$1.90/kL	$2.20/kL	$2.60/kL
• Female • Middle-ring LGAs (Fairfield, Strathfield etc) • Very large households • Lower level of education • Prefer lower price per litre of water • Lower income	• Middle-aged, 70+ • Coastal/harbour side/Northern Beaches LGAs • Large and small households • Apartments • Renters • Trades • People who notice	• 60–70+ • Wollongong • People who notice their bill change a lot • Retired • Low water user • Medium water user	• Male • Younger, middle-aged • North shore/ Northern Beaches LGAs • Small/medium households • Share houses • Apartments • Don’t notice their bill change a lot • Not concerned about the

• Homemaker[9] • Unemployed • High water user • Medium water user	their bill change a lot • I really don’t think about the supply of water, I just want it to be as cheap as possible • High water user • Medium water user		environment • Prefer higher price per litre of water • Higher income • Single • Low water user • Medium water user

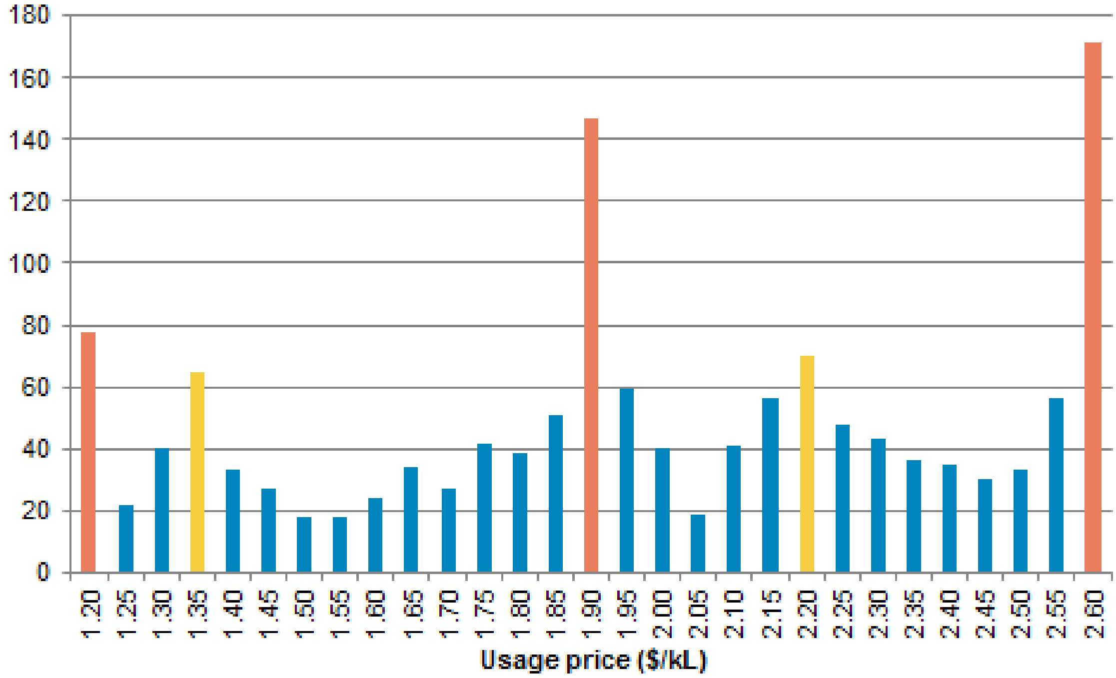
Accounting for errors in responses

After respondents selected their preferred usage price, they were asked why they chose this price. Some responses demonstrated that usage prices selected did not represent the price participants wanted to choose. Thus, these responses were excluded to ensure a robust analysis. This gave a final sample size of 1,402 responses for this question. The revised distribution of usage prices can be seen in Figure A4-5, which has the same distribution and peaks as the previous distribution. Responses were excluded when reasons for selecting a usage price fell in one of the following categories:

- comparing scenarios
- confused
- don't know
- don't pay for water directly
- don't understand
- error
- guessed
- no idea
- not interested
- pensioner rebate
- prefer none
- random
- to see results
- unrelated answer

[9] A homemaker is a person that manages a home.

Figure A4-5 Final frequency distribution of preference for usage prices using cleansed data

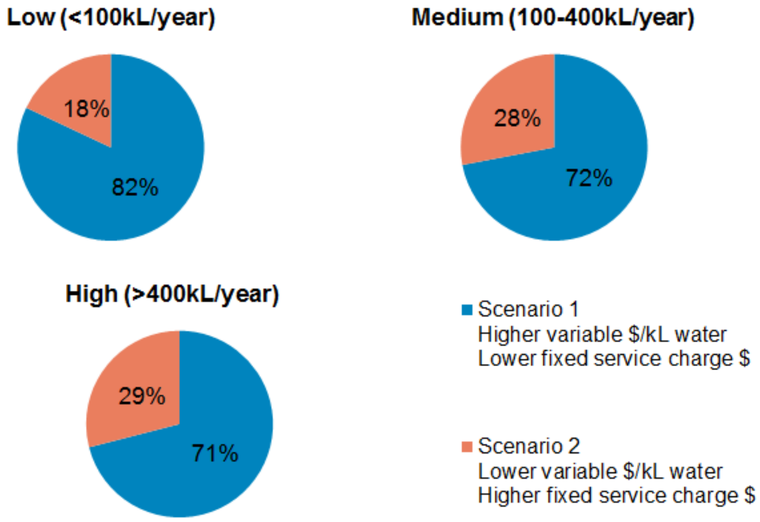


Low, medium and high water users

The same sets of analyses were conducted again, but this time responses were broken down by the amount of water participant's use. These classifications were defined as: low user (less than 100 kL a year), medium user (100–400 kL a year) and high user (more than 400 kL a year). This resulted in a sample size of 1,002, the reduction was primarily because responses were excluded when respondents did not have or could not estimate their water usage.

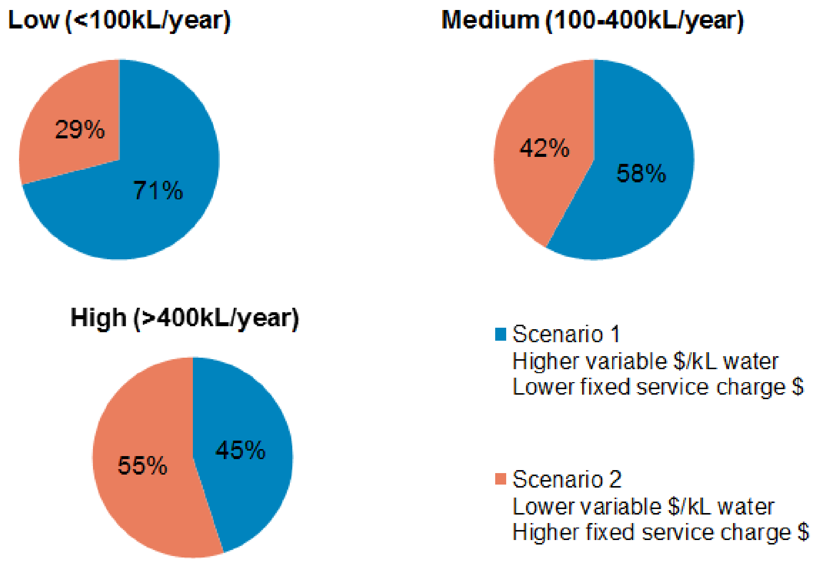
If we look at preferences of low, medium and high water users, before seeing their bill, 82% of low water users prefer scenario one, compared with 72% and 71% of medium and high water users respectively (Figure A4-6). This suggests participants want to be rewarded for usage reduction, especially low users who would benefit more.

Figure A4-6 Stated preference before showing financial impact of preference using the bill analyser tool for low, medium and high water users



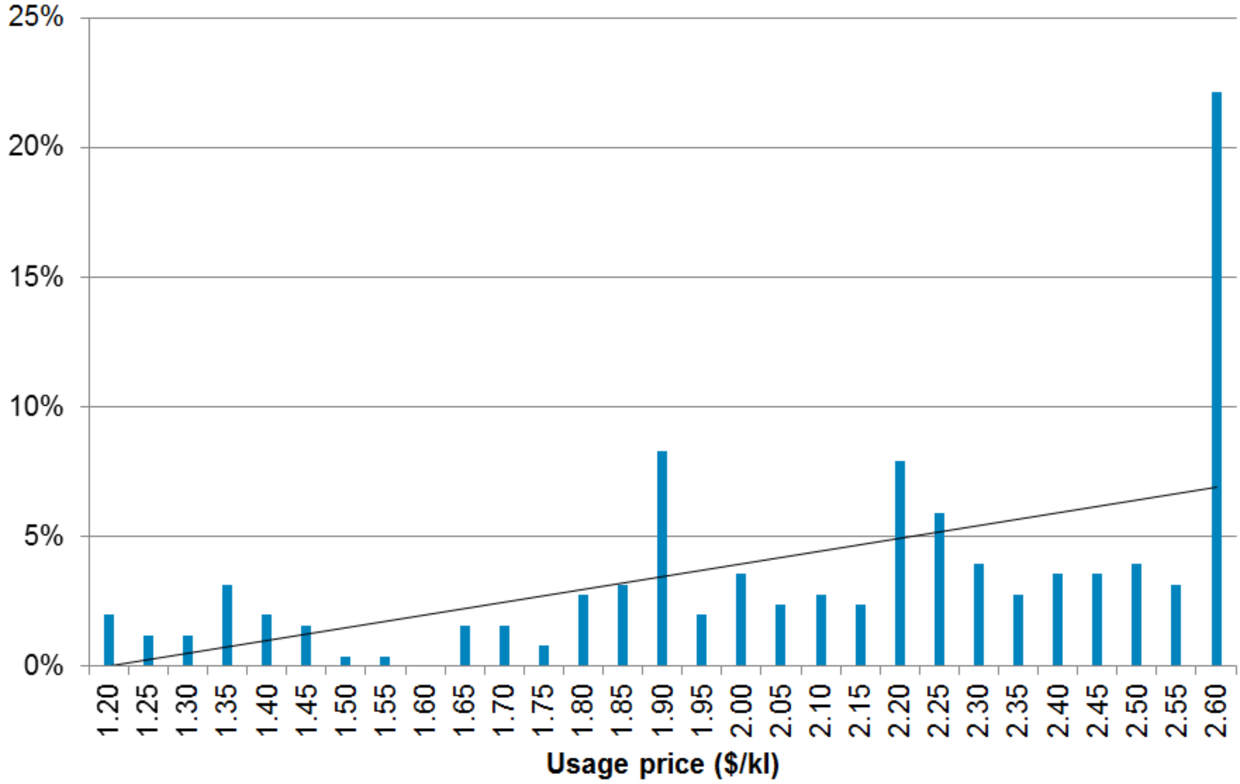
However, after seeing the impact changing tariff structures would have on their bills, the preference for a higher usage charge dropped for all three groups, especially for medium and high users (Figure A4-7). For high users, the high fixed and low usage charge tariff structure became the preferred scenario.

Figure A4-7 Revealed preference after showing financial impact of preference using the bill analyser tool for low, medium and high water users



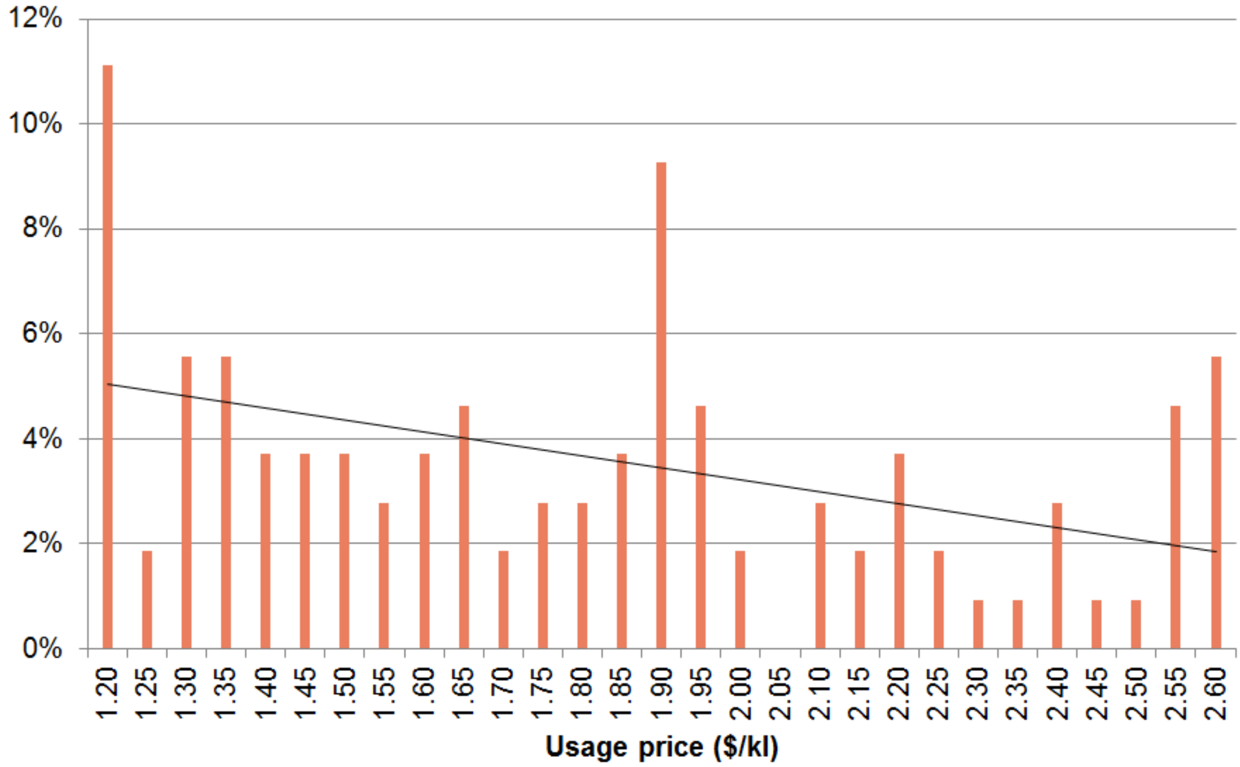
The distribution of preferred prices for low users increases over the usage price range (Figure A4-8), there is a higher preference for prices to vary based on how much water is used. This makes sense intuitively, as those who use less want to be rewarded for reducing their usage or keeping it constant. This slight upward trend was significant under an Ordinary Least Squares (OLS) regression analysis of usage price and frequency ($F_{1,27}=9.66$, $p<0.01$, $\beta_L=0.021$). As with the initial distribution, we can see peaks at $1.90, $2.23 and $2.60/kL. These low users do not contribute substantially to the preferences for $1.20 and $1.35 prices that were observed in the overall distribution Figure A4-5.

Figure A4-8 Distribution of percentage preference for usage prices for low users



In contrast, the distribution of preferred prices for high users decreases over the usage price range (Figure A4-9); these users prefer their bills to be constant regardless of usage. Those who use more water do not want to be penalised for usage. This slight downward trend was significant under an OLS regression analysis of usage price and frequency ($F_{1,27}=5.18$, $p=0.03$, $\beta_H=-0.066$). As with the initial distribution (Figure A4-5), we can see peaks at $1.20 and $1.90/kL. There is also a high preference for the $1.35/kL usage price but it is not a peak on this graph. These users do not contribute substantially to the preferences for $2.20 and $2.60 prices that were observed in the initial distribution.

Figure A4-9 Distribution of percentage preference for usage prices for high users



Accounting for errors in responses

As before, the dataset was cleansed to ensure only valid responses were included. As a result, 837 results were included in the cleansed dataset. The distribution of preferred prices for low users was very similar to the non-cleansed data (Figure A4-8) with the same peak and trend (Figure A4-10). The slight positive trend was again significant under an OLS regression analysis ($F_{1,27}$=9.16, p<0.01, β_L=0.023). The distribution of preferred prices for high users was also similar to the non-cleansed distribution (Figure A4-9) in terms of the slight negative trend and peaks (Figure A4-11). However, results were no longer significant ($F_{1,27}$=2.67, p=0.11, β_H=-0.053).

Figure A4-10 Final distribution of percentage preference for usage prices for low users using cleansed data

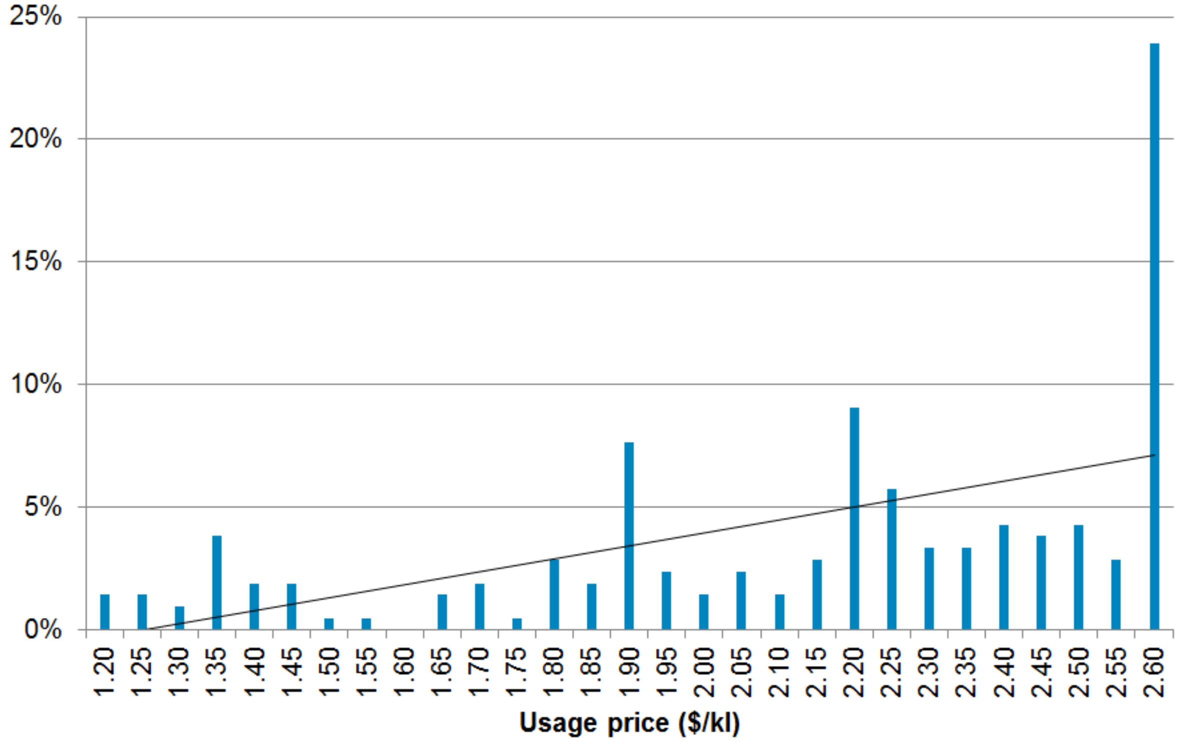
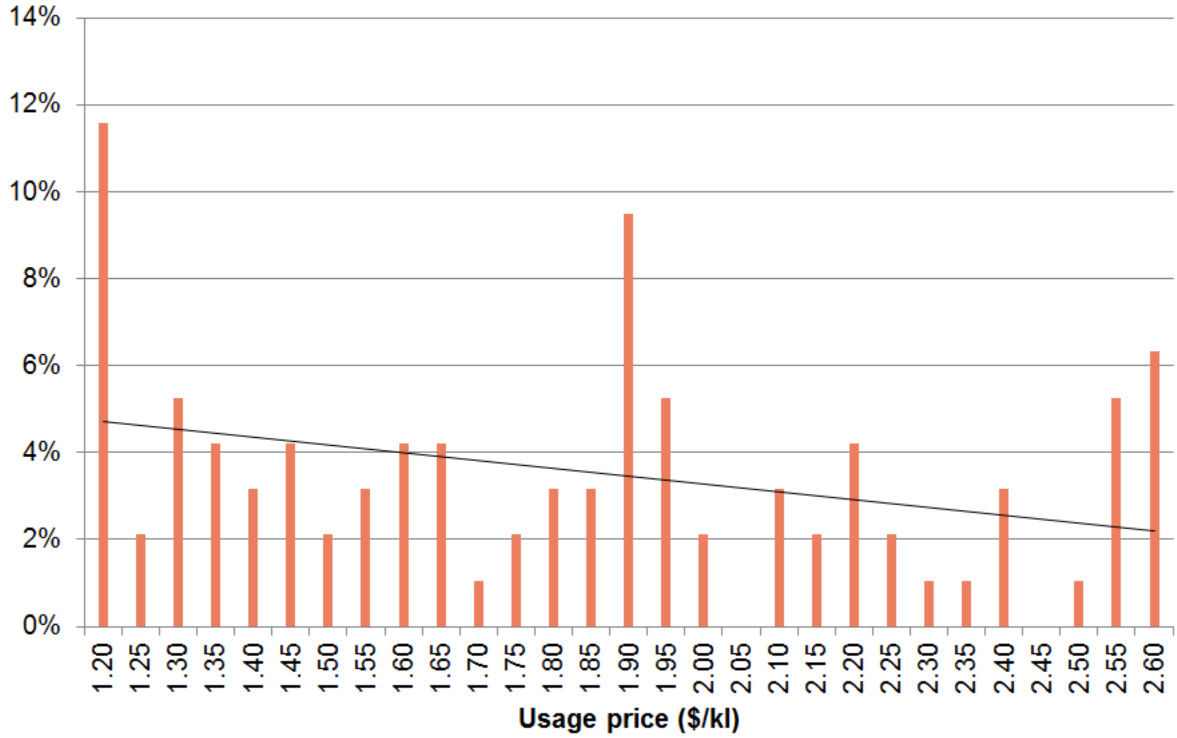


Figure A4-11 Final distribution of percentage preference for usage prices for high users using cleansed data



Misconceptions around the service charge

Some respondents expressed confusion at the meaning of a service charge, which may have influenced their choice of scenario. Common misconceptions when we asked respondents why they chose certain tariff structures were:

- They do not think they receive services from Sydney Water:

> “Because you need water, not services.”
> “Not a lot of servicing is done between the main line and my house.”
> “Man, that's a high service fee. We don't ever get serviced. Can I change my mind?”
> “Water is more precious than a bloomin’ service charge.”
> “Because I think there should be no service charge anyway. This is like an admin fee on top of something that you are already paying for.”

- Service charges relate to the products and services Sydney Water provides:

> “I don't believe the level of service currently is very good and therefore the price should not increase. They will try to increase this if people want the service charge higher – not fair, nor an equal way without a better service guaranteed.”
> “I believe (in) keeping water the best in the world, clean and healthy to drink (so) should make better sense to pay more for services.”
> “I'm happy to pay for a higher service charge if the money goes to upgrading the services.”
> “Expect better services.”
> “If service charges were to increase, maintenance would be better in the long run with infrastructure not being allowed to fall into disrepair.”
> “We shouldn't pay for water as it is a natural resource. The service itself and staff required to utilise water safely requires more payment.”
> “I believe if the service charges are decreased the service will not be maintained at that rate of funding.”

- Service charges are related to the supply of water:

> “The service charge should guarantee the supply of water and with a lower price per litre.”
> “Stable supply.”

- Service charges are independent of Sydney Water:

> “I think that a water company should not have a service charge as it is a fee that they pay.”

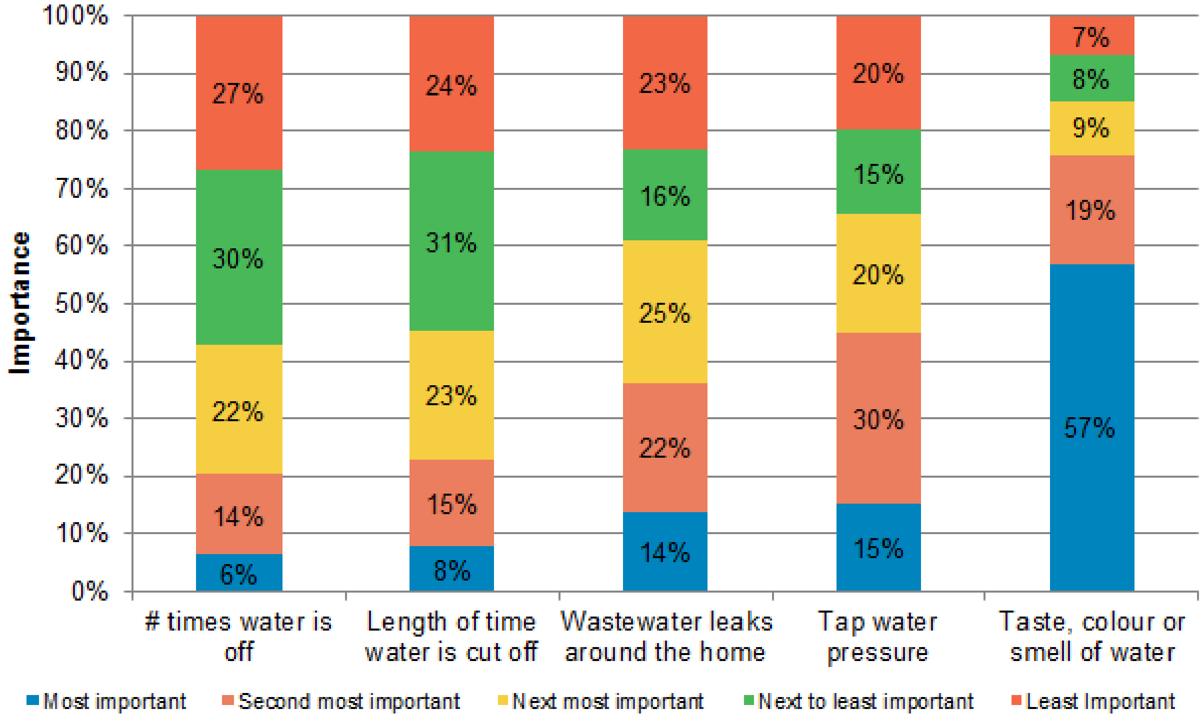
These types of responses indicate the low level of understanding of Sydney Water’s tariff structures. Many respondents, who did not provide a reason for their chosen tariff structures or provided an alternative reason, may have also held these views. Therefore, we are looking to educate our customers more in this area.

4.4.2 Service standards

Water quality and supply performance standards

The majority of respondents believe that the taste, colour or smell of water is the most important water quality and supply performance standard (Figure A4-12). People more likely to rate this standard higher are females, 50–59 years, couples, smaller households, and people who do not think Sydney's drinking water is of a high quality, or tastes good.

Figure A4-12 Importance of water quality and supply performance standards



Customer service performance standards

Three key customer service performance standards as rated by respondents as more important at least half the time were: length of time to fix broken pipes, fixing broken pipes properly and time to respond to a complaint (Figure A4-13). See Table A4-4 for a summary of characteristics of people who rated these three standards higher.

Figure A4-13 Importance of customer service performance standards

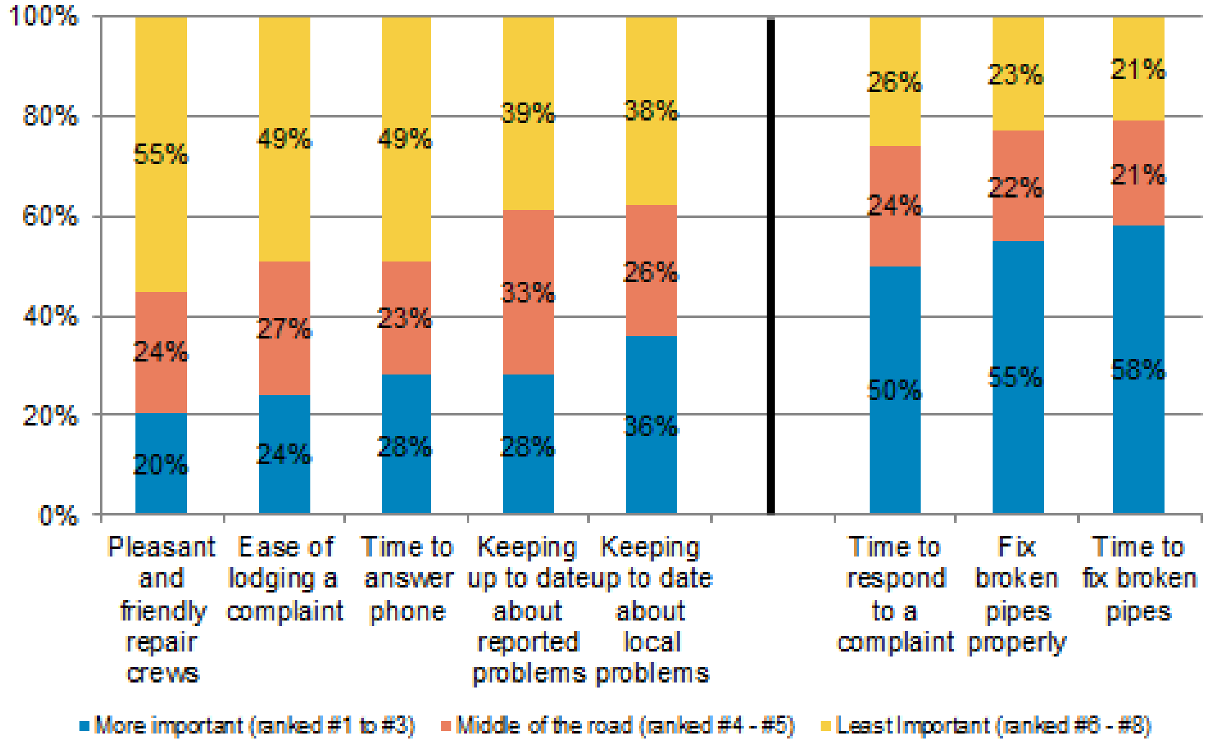


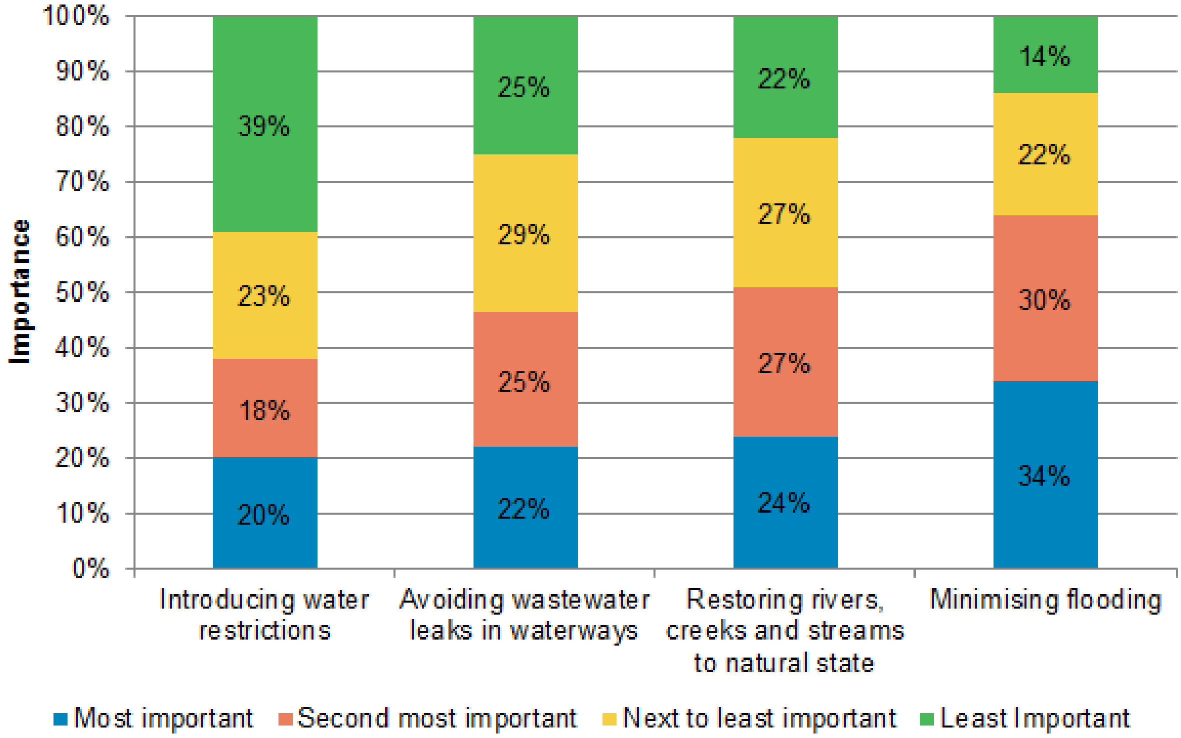
Table A4-4 Characteristics when rating customer service performance standards

Importance	Length of time to fix broken pipes	Fixing broken pipes properly the first time	Time to respond to a complaint
More important for:	• Larger households • Middle-aged persons • Those who have contacted Sydney Water • Those satisfied with pipe fixing job	• Younger people • Share or semidetached households • Those with broken pipes not fixed properly the first time • Those dissatisfied with pipe fixing	• Older persons • Larger households • Houses/ apartments • Contacted Sydney Water (especially if dissatisfied)
Less important for:			• Homemakers • Unemployed

Environmental performance standards

Four key environmental performance standards were tested with respondents rating minimising flooding highest at 34% (Figure A4-14). Those who had been affected by flooding were more likely to rate this standard higher.

Figure A4-14 Importance of environmental performance standards



4.4.3 Water demand management

Respondents' preference for different demand solutions were tested for three potential solutions. Customers were asked which one of the following options they preferred:

- Turn on the desalination plant and pay the extra $10 per quarter until dam levels return to 80%.
- Increase the price per litre of water used to encourage people to use less. The cost per litre of water would return to normal once dam levels return to 80%.
- Introduce water restrictions. The type of water restrictions may change depending on dam levels. Water restrictions would be removed once dam levels return to 80%.

The majority preferred the introduction of water restrictions (Figure A4-6). This was followed by turning on desalination, and then increasing the price of water per litre. Given the introduction of water restrictions has minimal bill impacts for customers and we have established that low cost is a key motivator, this is a likely reason why this option was preferred. There was a much higher preference for the fixed desalination charge than the variable increase in usage price; this is in contrast with the preference for a variable usage price found in the water tariff levels results. We will look to understand the reasons for this in more depth in the next period. See Table A4-5 for a summary of characteristics of those who chose different demand management solutions.

Figure A4-15 Preference for demand management if dam levels fell to 70%

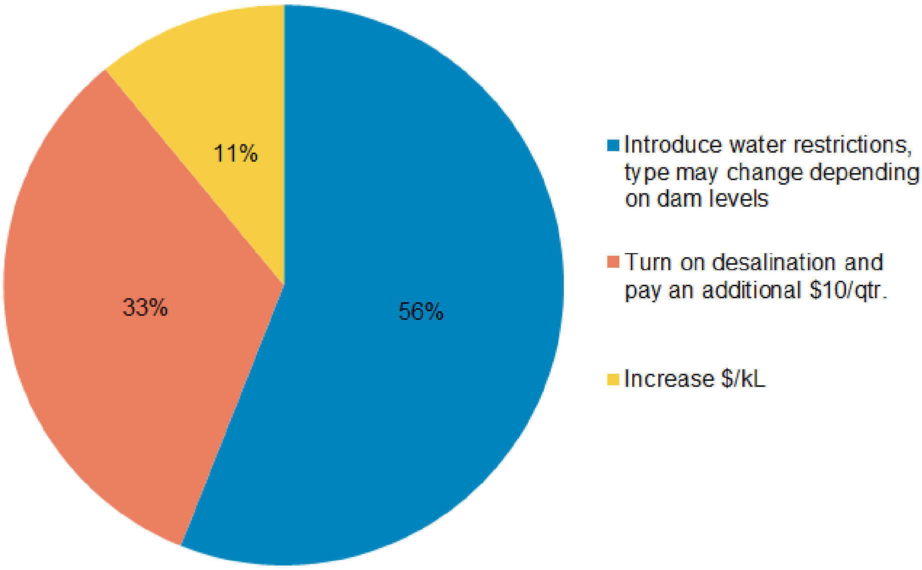


Table A4-5 Characteristics of respondents who preferred certain demand management solutions and correlating segments and value statements

Water restrictions	Turn on desalination, pay $10/qtr.	Increase $/kL
• Middle-aged • Female • Large family households with children between 6–11 years • Home duties, retired, unemployed • Free standing dwellings • Bill/usage monitors • Engage in bathing and cooking water saving actions • North Shore/Urban Fringe LGAs • Some secondary school • Earning <$40,000/year • Widowed/Divorced	• Older • Male • Employed/income earning/students • Inner Urban Coastal/ Middle-Ring LGAs • Small households (single or couple) • Trades/completed secondary school • Earning $50,000–$70,000/year	• Highly educated • Younger • Apartments or semidetached households • Inner Urban/Northern Beaches LGAs • Mid-sized family households • Earning $70,000–$100,000/year

Correlating Segments And Values **Statements**		
Sydney Water Segment • I am very careful about the amount of water I use **Strongly Agree** • These days the price of water makes you careful about how much you use **Strongly Disagree** • The price of water is too cheap • Water should be priced to encourage people to use less	**Sydney Water Segment** • Even if I have to pay a bit more, the future lies in more innovative use of water **Strongly Disagree** • These days the price of water makes you careful about how much you use	**Sydney Water Segment** • Even if I have to pay a bit more, the future lies in more innovative use of water **Strongly Agree** • The price of water is too cheap • Water should be priced to encourage people to use less

4.4.4 Stormwater pricing

To date, stormwater consultation has been conducted using focus groups. Results from these groups are presented in the following section. Given the interactive nature of these forums, results are mainly presented as quotes or descriptors.

Awareness of stormwater, how it is managed, and related charges

All groups initially exhibited very limited knowledge of stormwater, how it is paid for and the nature of the larger infrastructure that manages and treats it. Many were unaware of the difference between stormwater and wastewater infrastructure, and only a handful of participants made spontaneous mention of stormwater treatment or recycling.

> I don't know much about it.
> I don't think about it – I live on a hill.
> Once it hits the drain, I don't think about it anymore.

Many participants had not previously understood the link between well-maintained and improved stormwater infrastructure and outcomes they clearly value, such as reduced flooding of local roads, and reduced water pollution that might improve the aesthetics of favourite recreation spots.

> I didn't realise how important it is!
> So we're paying for the public space as well as stormwater related to our own property. I never thought of it that way before.

Very few participants initially understood the roles of local councils and Sydney Water in providing stormwater services. Only the few participants who had noticed an itemised stormwater charge on their Sydney Water bill knew Sydney Water was involved in stormwater management, although most of these participants did not know what the charge was for. Generally, they only checked their water usage, and looked to see whether or not the total bill had gone up. The small number of participants who did notice the charge were cost savers. They also noticed a large part of their Sydney Water bill was the wastewater service charge.

Owners of detached houses were more aware of stormwater infrastructure than were renters and apartment block dwellers, particularly if they had a stormwater outlet on their block. Also aware were those who live in floodplain areas (for example Penrith participants), and those living near coastal stormwater outlet pipes (for example residents of beach suburbs).

Many participants agreed that as most customers do not actually take much notice of the relatively small amount of any separately itemised stormwater charge, most would probably not notice if stormwater charges went up a few dollars per quarter.

Views on the existing stormwater charging system/charges

Among the small number of Sydney Water stormwater customers who correctly knew how much they paid Sydney Water for stormwater services per quarter, there was virtually no complaint about current stormwater charge amounts. Nevertheless, there is strong price sensitivity to the overall amount of Sydney Water's bills, and other user-pays charges, such as council rates, road tolls, public transport fares, and other utilities – particularly in some locations.

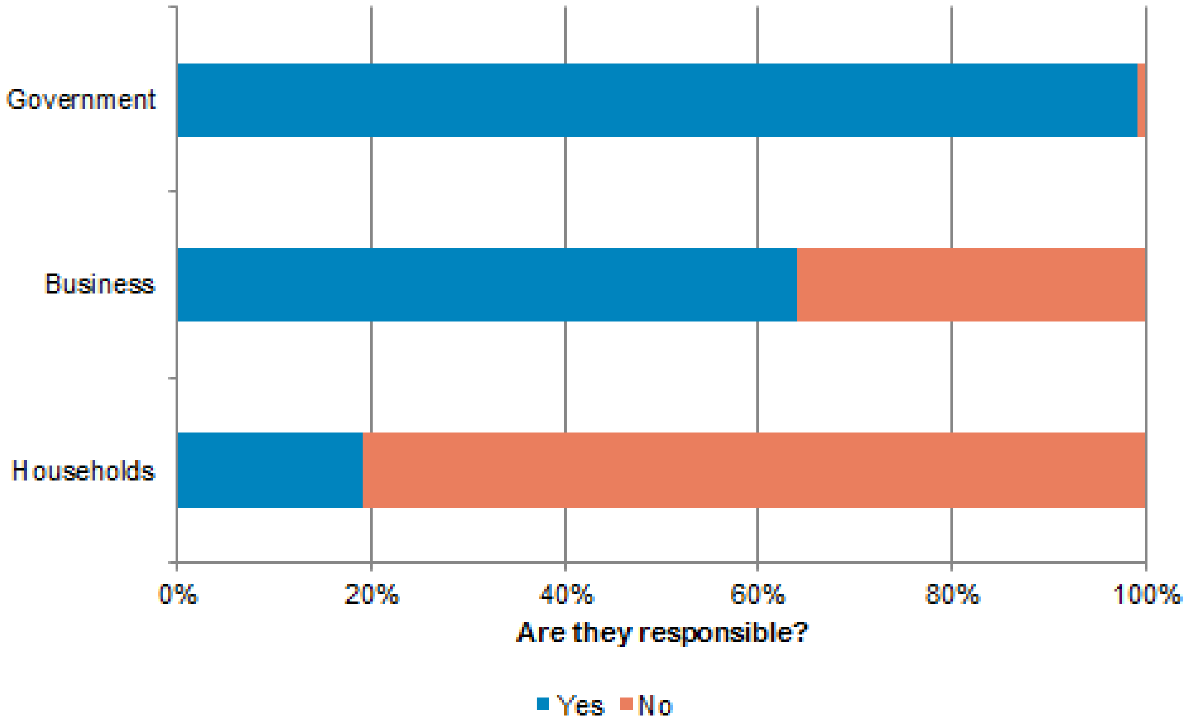
The strong majority view in all groups was that the current spread of stormwater service charges is inequitable. Many participants living outside designated stormwater area boundaries felt it was unfair that only some customers are charged for stormwater. Participants in all groups were surprised when they saw a map detailing current designated stormwater area boundaries. A large majority, that included customers currently billed for stormwater by Sydney Water and those not currently billed, felt it was unfair that only some customers are charged for stormwater.

> "There's no transparency about who is getting charged and who isn't."
> "I think it's completely wrong. It should be the same, not you in this little corner pay, while you in that corner pay nothing."
> "Why aren't they paying? Is there any logical reason behind it?"
> "It's a public thing – it shouldn't necessarily be paid just by property owners living there."
> "I feel a bit embarrassed [that I don't pay]. It would be fairer if there was a lower rate spread out amongst everyone."

Funding large stormwater infrastructure

In an ideal world, participants thought households should bear less responsibility for paying for the costs of large stormwater infrastructure. Government, and to a lesser extent business, should be primarily responsible (Figure A4-16).

Figure A4-16 Customer preference of funding for large stormwater infrastructure



Key consumer themes can be seen in the quotes below.

> “They're slugging us for everything. They can't expect the individual to pay for everything. It should be a division – Council, both governments and Sydney Water should all pay for it too.” (Parramatta participant)
>
> “There are a lot of people from Penrith that commute to the CBD. If we are a drain on their systems, then rather than hitting individuals, hit the businesses.” (Penrith participant)
>
> “We pay our taxes. If they need more investment then governments need to adjust budgets and shift the money away from something that’s not as significant as stormwater.”

Attitudes to alternative charging scenarios

Scenario A: Stormwater service charges are spread across the entire Sydney Water customer base

The majority of participants were in favour of Scenario A. They felt that the increased costs should be spread across the entire Sydney Water customer base, including residential and business customers, on the grounds of fairness. Since everyone gets some benefit from the prevention of flooding, and cleaner waterways around areas where they live, work or recreate, they should therefore share the costs.

Characteristics of those who preferred this scenario were existing Sydney Water stormwater customers, including renters who absorb charges billed to property owners through rent increases.

Others who also preferred Scenario A were many (if not all) who are not currently billed for stormwater by Sydney Water. For a majority of existing stormwater and non-stormwater customers, willingness to pay more was conditional on the introduction of Scenario A. Many others who were concerned with cost of living hoped that they personally could be charged less, or the same amount as they currently pay under Scenario A:

> "If you divided it by everyone, you could charge everyone a little bit less and still make more money out of it."

For some groups (for example the Inner West) and for some participants in other groups who pay Sydney Water for stormwater infrastructure, this position came down to a belief in fairness in principle, rather than an unwillingness to pay more:

> "It's not the amount, it's the principle."

For many other existing Sydney Water stormwater customers willingness to pay more was clearly conditional on a more equitable distribution of charges:

> "If it was spread out across more people, I'd be willing to pay a bit more."

Scenario B: Everyone in LGAs containing designated stormwater areas equally bear the costs of increased stormwater infrastructure investment

There was far less support for Scenario B, whereby everyone in LGAs containing designated stormwater areas equally bear the costs of increased stormwater infrastructure investment. Three key objections were identified with regards to fairness:

- The majority felt that while the equal sharing of costs by all those in designated stormwater areas was fair enough, this scenario did not go far enough, in that it did not extend charges to all Sydney Water customers.
- For the substantial minority who also agreed that the existing boundaries of designated stormwater areas should be redrawn to include all Sydney Water customers, the objection was

  > "Why should I pay for improved services that won't benefit my local area?"

- A small minority who are not currently charged by Sydney Water for stormwater services (mainly from Western Sydney focus groups), had two objections. First, they did not want to be charged for stormwater by Sydney Water – they were already paying their local Council. Second, they were averse for paying for improved services that would not benefit their local area. The key argument here was "you choose where you live". That is, if you have chosen to live in the more expensive inner Sydney or waterside suburbs, you should be prepared to pay more than those who have chosen to live further away for affordability reasons. These people feel they are already paying more for some things, for example road tolls.

Willingness to pay

Participants were asked about the relative priority they placed on stormwater investment in four different categories:

1. general maintenance
2. flood prevention
3. water quality
4. water-sensitive urban design.

They were also asked whether they would be willing to pay additional money for increased investment in these categories. Virtually everyone across all groups was willing to pay between $3 and $10 per quarter to cover additional investment across all of these categories. However, if they were going to be charged (or charged more than they are presently) participants wanted to be informed about where, and on what, the money was being spent, and to see evidence of tangible benefits.

Customers thought that greater investment of resources into consumer education (information provided with bills) or advertising (for example billboards placed near the sites of new works) on Sydney Water's part would most likely be money well spent, as it is likely to increase the willingness of potential and current customers to pay or pay a bit more for infrastructure. Results varied within and between groups.

1. Willingness to pay more for general maintenance

All participants saw general maintenance as a fundamental priority, in particular, flooding of roads after a few days of heavy rain was a key concern.

A large majority were willing to pay at least an extra $3 per quarter for general maintenance. Although for many, this willingness was conditional on charges being spread across the whole Sydney Water customer base.

However, support varied widely between individuals within groups, and between groups. For some groups, particularly the Inner West, Eastern Suburbs and Penrith, there was significant resistance to paying more for general maintenance. There was a perception that many councils do not clear street-level infrastructure frequently enough and that Sydney Water should be able to provide adequate maintenance with its existing revenues.

> “We’re already paying all this money and they still can’t manage stormwater?”

2. Willingness to pay more for flood prevention

Participants were asked about the relative priority they placed on investment for flood prevention, in the context of larger and/or newer infrastructure to ensure flood prevention capacity given a rising population. There was strong support for paying more for flood mitigation, although the cost threshold which support started to diminish, differed significantly between groups.

For example, virtually everyone in the Bankstown and Hurstville groups was willing to pay at least $3 a quarter extra, and around half of the Bankstown and Hurstville groups were willing to pay an extra $10. However, only two-thirds of the Parramatta group were willing to pay at least $3 extra, and support fell to half at the $6 price scenario and to a third at the $10 price scenario.

3. *Water quality*

Improving water quality matters more to many participants, than investment designed to increase resource use efficiency (for example stormwater recycling). Many participants enjoy walking, swimming and other activities around local rivers, beaches, or at parks with water features (for example Centennial Park). They are concerned to see litter in water and want pollutants reduced (for example E.coli affecting beaches after heavy rain).

4. *Water sensitive urban design (WSUD)*

The greatest variations in support between groups, and in the price threshold at which that support dropped off, was in relation to water sensitive urban design. Environmental sustainability was a lower priority than local amenity for many, but those participants who had visited attractive local examples of stormwater recycling (for example the Japanese Gardens in Auburn) were very enthusiastic, even if it was clear that they were otherwise income-constrained. For this reason, participants in the Parramatta and Bankstown groups, many of whom had seen such examples, gave this category very strong support: around half of each group was willing to pay an extra $10 per quarter, as opposed to only one-third of the Hurstville group – if it is spent locally. A few participants in each of the other groups were either neutral or not in support of increased investment in WSUD.

4.5 Online survey questions: Water pricing

Sydney Water tariff structure and service performance standard online panel survey

This survey has been designed with input gathered from three focus groups.

It includes 7 Sections:

- Section 1a – Water supply knowledge and usage and saving behaviour
- Section 1b – Water charging knowledge and bill awareness
- Section 2 – Environmental values
- Section 3 – Attitudes to water
- Section 4a – Education on how water is paid for
- Section 4b – Stated preferences for water charge scenario concepts
- Section 4c – Revealed preferences for water charge scenarios based on real dollar impacts
- Section 5 – Service performance standards
- Section 6 – Knowledge of Sydney Water
- Section 7 - Demographics

Rationale for the sections

The focus groups revealed:

Finding	Survey sections
Socio-demographic variables, levels of knowledge and awareness, and water usage habits and savings affect tariff preferences and arguments. These include: • household and family size and type; • large water user attributes (ie garden/pool); • knowledge of how water is supplied and the role of Sydney Water; • whether participants observed bill reductions following conscious water use savings; • awareness of how water is charged, household water bill amounts and involvement in household finances; • environmental values, attitudes about water as a natural resource	Quotas Section 1-3 Sections 6-7
Participants require plain English education about how water is supplied and	Section 4 - Intro

paid to enable them to articulate their tariff preferences. Participants understand the different tariff options in a similar way to their phone bill and capped-price phone plans.	Section 4a
To provide informed preferences, participants need to understand, in real dollar terms, how the scenarios might impact their personal situation. Some participants were keen to save whatever they could, for them, $1.74/Kl vs. $1.73/Kl could change their preference.	Section 1a-b Section 3 Section 4b Section 4c
Participant preferences for scarcity pricing were affected by: • environmental values and attitudes to water as a natural resource • personal financial costs of desalination	Section 3
Environmental values and prior experience of water supply issues affect service performance standard preferences.	Section 3 Section 5

Survey questions have further been designed to:

- provide evidence of variables that affect tariff and service standard preferences
- gather both stated (ie tariff scenario concepts - Section 4b) and revealed (ie financial impact of tariff scenarios - Section 4c) consumer tariff preferences
- test how educating consumers about the financial impact of tariff scenarios affects their preferences
- ensure informed consumer preferences, and identify real dollar optimum tariff/service charge combinations and ranges for different consumer types
- enable limited comparison of survey sample to environmental values of NSW population (ie benchmarking to Who Cares About the Environment in NSW?)

Sample

Target sample size of 1,500, stratified to ABS Census for Greater Sydney Capital Statistical Area.

Hard quotas

- Age
- Gender
- Education
- Dwelling type
- Tenure type
- Household size, type and composition

Soft quotas

- LGA
- Family composition

Survey introduction

The University of Technology, Sydney is undertaking research to understand how Sydneysiders prefer to pay for their water. This survey includes 7 sections and will take approximately 20 minutes to complete.

To begin with, please answer the following questions:

Qu1a Are you?
S/R
01 Male
02 Female

Qu1b What is your age group?
S/R
01 Under 18 (CLOSE)
02 18-24
03 25-29
04 30-39
05 40-49
06 50-59
07 60-69
08 70-and over

Qu1h In which of the following council areas do you live?
S/R

01 Ashfield	14 Hawkesbury	27 North Sydney	40 Woollahra
02 Auburn	15 Holroyd	28 Parramatta	41 Blue Mountains
03 Bankstown	16 Hornsby	29 Penrith	42 Hawkesbury
04 Baulkham Hills	17 Hunter's Hill	30 Pittwater	43 Kiama
05 Blacktown	18 Hurstville City	31 Randwick	44 Shellharbour
06 Blue Mountains	19 Kogarah	32 Rockdale	45 Wingecarribee
07 Botany	20 Ku-ring-gai	33 Ryde	46 Wollondilly
08 Burwood	21 Lane Cove	34 Sutherland	47 Wollongong
09 Camden	22 Leichhardt	35 Strathfield	48 Don't Know (ASK Qu1h1)
10 Campbelltown	23 Liverpool	36 Sydney	
11 Canada Bay	24 Manly	37 Warringah	
12 Canterbury	25 Marrickville	38 Waverly	
13 Fairfield	26 Mosman	39 Willoughby	

Qu1c How many people, including yourself, live in the household in which you live?
S/R
01 One
02 Two
03 Three
04 Four
05 Five
06 Six

07 Seven
08 Eight or more

Qu1d Which of the following best describes your household?
S/R
01 Single person
02 Two or more single adults
03 Couple no children
04 Family with children (ASK Qu1d1)
05 Other

Qu1d1 How old are the children living in your household? *Please tick all that apply*
M/R
01 Under 6 years
02 Between 6 and 11 years
03 Between 12 to 17 years
04 18 years or over
05 Prefer not to say

Qu1e Is the house in which you live a…
S/R
01 Separate house (ASK Q23a)
02 Semi-detached, row or terrace house, townhouse etc (ASKQ23a)
03 Flat, unit or apartment (SKIP Q3, Q23a)
04 Other dwelling

Qu1f Do you own or rent your home?
S/R
01 Own / paying off mortgage
02 Rent
03 Other (please specify):

Qu1g What is the highest level of education you have completed?
S/R
01 No formal schooling
02 Primary school
03 Some secondary school
04 Completed secondary school
05 Trade or technical qualification
06 University degree/post graduate

Qu1h1 What is the post code where you live?
OE[10] (# FIELD ONLY)

[10] OE indicates open-ended response.

Section 1a – Water knowledge and behaviour

Q1 In a few words, please briefly describe how your household water is provided?

OE

Q2 To your knowledge, which organisation provides the infrastructure that gets water to your house?

OE

Q3 Does your house have any of the following? *Please tick all that apply*
M/R

01 A garden
02 A lawn
03 A pool
04 A rainwater tank

Q4 In your view, what would you say your household uses the most water on? *Please pick one only*
S/R
RANDOMISE CODES 01 TO 11
ROOT CODE 12 AT BOTTOM

01 Watering the garden (SHOW IF Q3 01)
02 Watering the lawn (SHOW IF Q3 02)
03 Washing cars
04 Hosing down hard surfaces
05 Cooking
06 Washing clothes
07 Bathing (ie showers, brushing teeth)
08 Flushing the toilet
09 Drinking
10 Cleaning the house
11 Filling or topping up the pool (SHOW IF Q3 03)
12 Other (please specify):

Q5 Which of these, if any, have you done over the last seven days? *Please tick all that apply*
M/R
RANDOMISE CODES 01 to 12
ROOT CODE 13 AT BOTTOM

01 Cut short a shower, just to save water
02 Diverted or pumped out water from washing machine onto garden/lawn (HIDE IF Q3 02)
03 Re-used bath water
04 Washed the car on grass
05 Used a hose to clean paths, driveways or verandas
06 Turned off the tap when brushing teeth
07 Collected shower water in a bucket and re-used
08 Checked for or fixed leaking taps
09 Covered the pool to prevent water evaporating (HIDE IF Q3 02)
10 Started the dishwasher before it contained a full load
11 Used the half flush on the toilet when appropriate
12 Used the washing machine with a full load
13 None of these

Q6 Please indicate whether you have ever done any of the following things? This can include if you have done these at a house in which you previously lived, or at an investment property. *Please click all that apply*

M/R
RANDOMISE CODES 01 TO 07
ROOT CODE 08 AT BOTTOM

01 Replaced a single flush toilet with a new dual flush toilet
02 Purchased a washing machine with a 5 star water efficiency rating
03 Planted drought resistant plants in your garden
04 Installed a rainwater tank
05 Installed water efficient showerheads and/or taps
06 Had a plumber check for leaky taps and pipes
07 Used a pool cover
08 None of these (SKIP Q7)

Q7 When you did these things, did you notice any change to your household water bill?

01 Yes
02 No (SKIP Q7a)
03 Don't know / don't receive a water bill (SKIP 7a, b)

Q7a What sort of change did you notice to your water bill?

OE

Q7b Why do you think you did not notice a change to your water bill?

OE

Section 1b – Paying for water

Q8 In a few words, please briefly describe how you think households pay for water?

OE

Q9 Are you the person mainly or jointly responsible for paying your quarterly household water bill?
S/R

01 Yes
02 No (SKIP Q9.1 and Q9a-d)
03 Don't know / don't receive a water bill (SKIP Q9a-d)

Q9.1 When did you receive your last water bill?
S/R

01 October
02 November
03 December
04 January
05 Don't know / can't say

Q9a Roughly, about how much was your most recent quarterly household water bill?

OE (# FIELD ONLY)

Q9b On a scale of 1 to 5, where 1 means not at all and 5 means a lot, how much does the amount of your household water bill change each quarter?

01 Not at all
02
03
04
05 A lot
06 Don't know / can't say

Q9c Compared with this time last year, would you say your household water bill has?
S/R
ROTATE CODES 01 TO 03 / ROOT CODE 04 AT BOTTOM

01 Gone up
02 Stayed the same
03 Gone down
04 Don't know / can't say

Q9d In a few words, please describe what charges you think are included on your water bill?

OE

Q10 Do you try to monitor your household water use via your water bill or water meter?
S/R

01 Yes (ASK Q10.1)
02 No (Skip Q10a)

Q10.1 In which of the following ways do you monitor your water use?

01 Using my household water bill
02 Using my household water meter
03 Both

Q10a Compared with this time last year, would you say your household water use has?

S/R
ROTATE CODES 01 TO 03
ROOT CODE 04 AT BOTTOM

01 Decreased
02 Stayed the same
03 Increased
04 Don't know / can't say

Q11 To your knowledge, please tick which of the following apply to how water is supplied and paid for. *Please tick all that you think apply.*

M/R
ROTATE STATEMENTS 01 TO 09

01 Every household pays an amount each quarter for their water supply connection
02 Water usage is the biggest component of household water bills
03 Households only pay for how much water they use each quarter, there are no other charges
04 Regardless of how much water a household uses, all households pay the same amount for each litre of water
05 The price per litre of water changes depending on what day and time of the year it is
06 Every household pays an amount on their water bill each quarter for their sewerage network connection
07 Only people who live in houses with a separate water meter pay a water bill
08 Most of the costs for water authorities to supply water stay the same, regardless of how much water is actually used
09 There is one organisation responsible for supplying water to your household

Section 2 – Environmental values

Q12 What would you say is the MOST important environmental issue facing NSW today?

OE

Q13 Overall, how concerned are you about environmental issues?

Not at all concerned	1	2	3	4	5	Very concerned

Q14 Which of the following statements best describes your thoughts and feelings about water?

S/R RANDOMISE CODES 01 to 05

01 Even if I have to pay a bit more, the future lies in more innovative use of water. We need to find better ways to use our natural resources
02 I want to know about rebates, water tanks, and other water efficient appliances. It's important to be efficient in our use of resources to protect the environment
03 I am very careful about the amount of water I use and would like to see some rewards – lower charges for lower use
04 I am mainly interested in having a reliable water supply. I just want clean water to come out of the taps and for things to be fixed quickly if they go wrong
05 I really don't think about the supply of water, I just want it to be as cheap as possible

Section 3 – Attitudes to water

Q15 Here are some comments that other people have made about the current water situation. To what extent do you personally agree or disagree with each of these, where one means strongly disagree and five means strongly agree?

M/R ROTATE STATEMENTS	SD		DK		SA
I use whatever water is needed. Water use is not something I think much about	1	2	3	4	5
Water shortages will return, it is only a matter of time	1	2	3	4	5
These days the price of water makes you careful about how much you use	1	2	3	4	5
Individual households can't really make a difference to the amount of water that is saved	1	2	3	4	5
The price of water is too cheap	1	2	3	4	5
Water should be priced to encourage people to use less	1	2	3	4	5
Water is a daily necessity, everyone should pay the same amount	1	2	3	4	5
Our household is very active in saving water and has made some significant changes in how much water is used	1	2	3	4	5
Our household has made some sacrifices to save water, but some things are hard to give up or difficult to change	1	2	3	4	5
The authorities are taking firm action to make sure that we have enough water in the longer term	1	2	3	4	5
I feel confident that Sydney will have enough water for the future	1	2	3	4	5
Sydney has good quality drinking water	1	2	3	4	5
Sydney's drinking water tastes good	1	2	3	4	5
Sydneysiders have done a good job reducing their water use over recent years	1	2	3	4	5

Q16 Sydney now has a desalination plant that pumps salt water from the ocean, removes the salt, cleans the water to drinking quality and adds it to Sydney's drinking water supply. It is currently switched off, and would be turned on when dam levels drop below 70%.

Energy used to run the desalination plant is offset by one of New South Wales' largest wind farms. When the plant is not running at full capacity or turned off all the additional energy generated by the wind farm is put back into the electricity grid. If the desalination plant provided a household's entire water supply, it would use about as much energy as a household refrigerator.

When the plant is turned on, it adds about an extra $10 per quarter to household water bills.

When dam levels reach 70%, which of the following would be your preference? *Please pick one only*

S/R ROTATE STATEMENTS 01 to 03

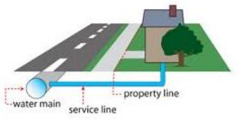
01 Turn on the desalination plant and pay the extra $10 per quarter until dam levels return to 80%.
02 Increase the price per litre of water used to encourage people to use less. The cost per litre of water would return to normal once dam levels return to 80%.
03 Introduce water restrictions. The type of water restrictions may change depending on dam levels. Water restrictions would be removed once dam levels return to 80%.

Section 4A – How do people pay for water?

To assist you with completing the final sections of this survey, we need to provide you with some information on how households are charged for water.

Generally, household water bills include two types of charges - ***water charges*** and ***other charges***. These are explained below.

All households pay ***water charges***. Water charges make up around (IF Qu1d 01/02/04) 50% / (IF Qu1d 03) 43% of charges on a typical water bill for people who live in a (IF Qu1d 01/02/04) house / (IF Qu1d 03) an apartment. Water charges are made up of two separate amounts:

1. Service 	This amount is similar to your phone line connection • This is your connection to the water supply and is paid every quarter • You pay the same amount each quarter, regardless of how much water you use • Households pay a different amount depending on whether they live in a house or an apartment, or whether they have a Service charges are around 20% of average total water charges
2. Usage 	This amount is similar to paying for each telephone call you make • You pay for each litre of water your household uses over three months • Each litre of water costs you the same amount, regardless of what day or time of the year it is • All households pay the same price per litre of water Usage amounts to around 80% of average total water charges

Other charges include your connection to the sewerage network, which all households pay the same amount every quarter. Other charges make up around (IF Qu1d 01/02/04) 50% / (IF Qu1d 03) 57% of a typical water bill for people who live in a (IF Qu1d 01/02/04) house / (IF Qu1d 03) an apartment.

The next section will ask for your preferences on how you would like to pay for your water charges. Please take a moment to ***familiarise yourself with what is included in water charges*** (ie service and usage charges).

Once you are satisfied you understand what is included, please click ‘Next’.

Section 4B – Scenarios for paying for water

Below are two different scenarios of how people prefer to be charged for water. Each involves changing the service charge amount and price per litre of water.

- **Scenario 1** *increases* the price per litre of water you use, and *decreases* the service charge.
- **Scenario 2** *decreases* the price per litre of water you use, and *increases* the service charge.

Scenario 1	***Scenario 2***
If your water use goes down, your bill amount would go down. If your water use goes up, your bill amount would go up.	If your water use goes up or down, your bill would stay about the same amount.
Usage charge ($/Ltr) ***Service charge***	***Usage charge ($/Ltr)*** ***Service charge***

Q17 Before we show you what each scenario might look like for you, which one would you prefer? *Please pick one only.*

S/R RANDOMISE CODES 01 AND 02

01 **Scenario 1** – If my water use goes up or down each quarter, my bill amount should go up or down.

02 **Scenario 2** – If my water use goes up or down each quarter, my bill should stay about the same amount.

Q18 In a few words, please briefly describe why you prefer Scenario 1 / Scenario 2 (CODE Q17 01 / 02)

OE

Section 4C – Scenarios for paying for water

We will now show you an estimate of how your water bill might change under each scenario. The questions in this section will help us provide the estimate.

Your most recent water bill will help you complete this section, and provide a more accurate estimate. It does not matter if you do not have a water bill.

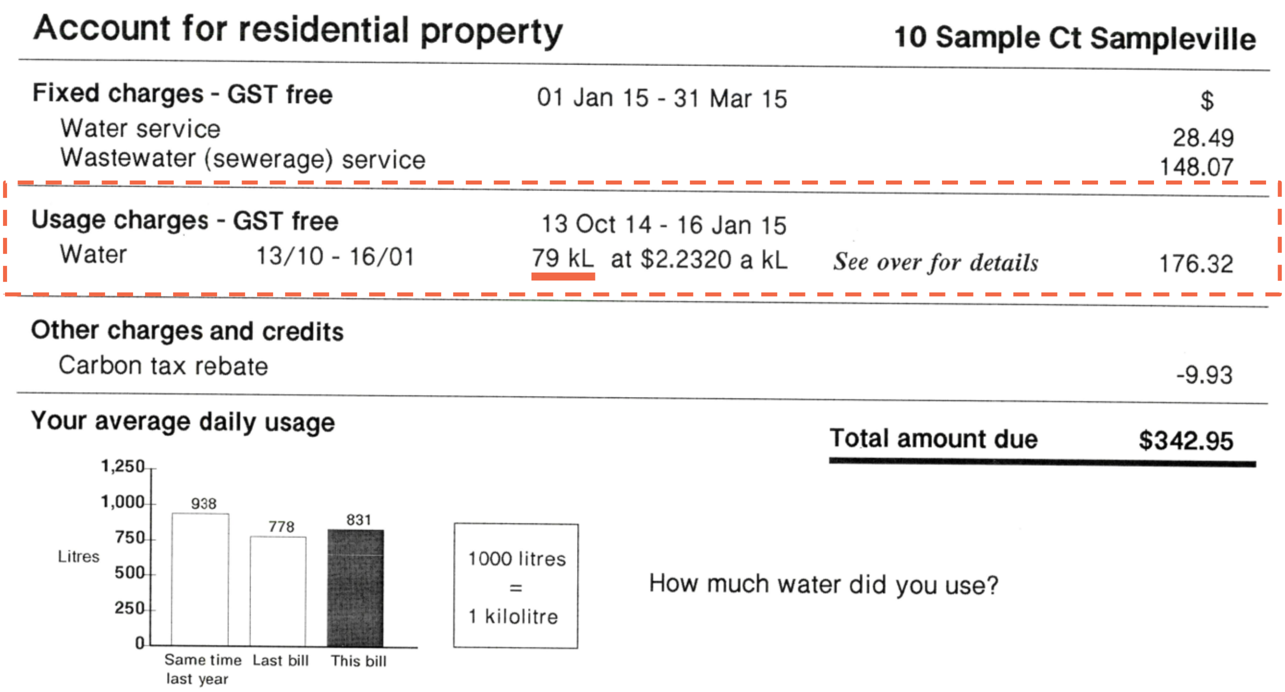
Q22 Do you have your most recent household water bill?

01 Yes

02 No (SKIP Q22a)

Q22a From the front page of your water bill, please type how many kilolitres of water your household used *(An example of where to find this information on your water bill is* ***highlighted*** *below. Please enter the* ***number*** *only)*

OE (# FIELD ONLY)



Account for residential property — **10 Sample Ct Sampleville**

Fixed charges - GST free	01 Jan 15 - 31 Mar 15		$
Water service			28.49
Wastewater (sewerage) service			148.07
Usage charges - GST free	13 Oct 14 - 16 Jan 15		
Water 13/10 - 16/01	79 kL at $2.2320 a kL	*See over for details*	176.32
Other charges and credits			
Carbon tax rebate			-9.93
		Total amount due	**$342.95**

Your average daily usage

Q22b Roughly, do you remember how much your most recent household water bill was?

01 Yes

02 No (SKIP Q22b1)

Q22b1 Approximately, how much was this bill?

OE (# FIELD ONLY)

Q22b2 Not to worry, we will show you what each scenario would look like for the typical (IF Qu1d 01/02/04) house with 3 people living in it / (IF Qu1d 03) apartment with 2 people living in it

Section 4C – Demonstrating the scenarios

Based on your answers in the previous section, your most recent household water bill is estimated at:

$ TABLE4C SUM01

This estimate is based on the following:
(CONDITIONAL FORMULAS FROM Qu1d and SECTION 4B)

Using your cursor, move the slider below left or right to change the price per litre of water and the service charge amount.

Moving the cursor left *increases* the price per litre of water, and *decreases* the service charge amount. **This represents Scenario 1**
Moving the cursor right *decreases* the price per litre of water, and *increases* the service charge amount. **This represents Scenario 2**

Scenario 1

↑ $ per litre of water

↓ Service charge

LINKED TO TABLE4C | DYNAMIC SLIDER REFERENCING USAGE CHARGE PRICE INTERVALS AND CORRESPONDING SERVICE CHARGE AMOUNTS

Scenario 2

↓ $ per litre of water

↑ Service charge

The table below shows you how your water bill might change based on the position of the slider. Please place the slider wherever you are most comfortable with the price per litre of water and service charge amount.

Table 4C: Estimated water bill

IFQu1d 01/02/04 SHOW AVERAGE HOUSE WATER USER @ TABLE4CB

IFQu1d 03 SHOW AVERAGE APARTMENT WATER USER @ TABLE4CB

Charge	A. Current estimated bill	B. New estimated bill	C. New estimated bill if usage increases by a third	D. New estimated bill if usage decreases by a third
WATER CHARGES				
Water Service	1. Service Charge Formula	**1. Service Charge Formula**	**1. TABLE5CB1**	**1. TABLE5CB1**
Water Usage	2. Usage Charge Formula	**2. Usage Charge Formula**	**2. TABLE5CB2 *0.3**	**2. TABLE5CB2 *(-0.3)**
Total	3. SUM TABLE4CA1 + TABLE4CA2	4. SUM TABLE4CB1 + TABLE4CB2	SUM TABLE4CC1 + TABLE4CC2	SUM TABLE4CD1 + TABLE54D2
OTHER CHARGES				
Wastewater Service Charge	4. Wastewater Service Charge Condition and Formula	TABLE4CA4	TABLE4CA4	TABLE4CA4
TOTAL				
Estimated Bill	SUM01: TABLE4CA3 + TABLE4CA4 + TABLE4CA5	SUM02: TABLE4CB1 + TABLE4CB2 + TABLE4CA4 + TABLE4CA5	SUM03: TABLE4CCSUM + TABLE4CA4 + TABLE4CA5	SUM04: TABLE4CDSUM + TABLE4CA4 + TABLE4CA5
Estimated $ change from current to new bill		***(TABLE4CSUM01-TABLE4CSUM02)***	***(TABLE4CSUM01-TABLE4CSUM03)***	***(TABLE4CSUM01-TABLE4CSUM04)***

Q24 Now you have seen what each scenario might look like for you, which of the following statements is closest to your view *Please pick one only.*

S/R RANDOMISE CODES 01 AND 02

01 I prefer the price per litre of water higher, and service charges lower

02 I prefer the price per litre of water lower, and service charges higher

Q24a In a few words, please briefly describe why you placed the cursor where you did?

OE

Q25 Do you have any other comments you would like to make about these scenarios, or how water is charged for?

Section 5 – Knowledge of Sydney Water

Q28 Have you ever seen or heard anything about Sydney Water?

01 Yes (ASK Q28a AND SECTION 6V2, SKPI SECTION6V2)

02 No (SKIP TO SECTION 6V1)

Q28a How did you hear about Sydney Water?

OE

Q28b In a few words, please describe what you have seen or heard about Sydney Water

OE

Section 6v1 – Service performance standards

V1Q26 Please indicate whether any of the following apply to you. *Please tick all that apply.*
M/R RANDOMISE CODES 01 TO 11

01 I have made a phone call to the water or sewerage authorities (ASK V1Q26a)
02 I have written a letter to the water or sewerage authorities (ASK V1Q26a)
03 I have complained to the water or sewerage authorities about my water or sewerage supply (ASK V1Q26a)
04 Water or sewerage authority repair crews have fixed a broken/leaky pipe at or near my house (ASK V1Q26b)
05 Water or sewerage authority repair crews have had to fix the same pipe at or near my house more than once (ASK V1Q26b)
06 My house, work or daily travel has been affected by flooding
07 I have visited the website of water or sewerage authority
08 I have had my household water switched off temporarily without being given notice beforehand
09 I have had my household water switched off temporarily but I was given notice beforehand
10 I would prefer higher water pressure at my house
11 I often visit the beach, harbour or riverside areas

V1Q26a Overall, thinking about your contact with water or sewerage authorities, how satisfied were you with this contact on a scale of 1 to 5 where 1 means extremely dissatisfied and 5 means extremely satisfied

Extremely dissatisfied	1	2	3	4	5	Extremely Satisfied

V1Q26b Thinking about when the water or sewerage authorities fixed pipes at or near your house, how satisfied were you with the job they did on a scale of 1 to 5 where 1 means extremely dissatisfied and 5 means extremely satisfied

Extremely dissatisfied	1	2	3	4	5	Extremely Satisfied

V1Q27a When judging the performance of water or sewerage authorities, which of the following is most important to you. *Please RANK them in order from MOST (#1) to LEAST important (#5)*
RANDOMISE STATEMENTS 01 to 05
Supply and Quality Attributes

01 The number of times my water is cut off
02 The length of time my water is cut off
03 Sewage leaking around or near my house
04 The water pressure coming from my taps
05 The taste, colour or smell of my water

V1Q27b When judging the performance of water or sewerage authorities, which of the following is most important to you. *Please RANK them in order from MOST (#1) to LEAST important (#8)*
RANDOMISE STATEMENTS 01 to 08
Customer Service Attributes

01 The length of time it takes to respond to a complaint
02 The length of time it takes to answer the phone
03 Letting me know when they have fixed a water or sewerage problem I report
04 Keeping me up to date about water or sewerage problems in my local area
05 How easy it is to lodge a complaint with water or sewerage authorities
06 Water or sewerage authority repair crews being pleasant and friendly
07 Water or sewerage authority repair crews fix broken pipes properly the first time
08 The length of time it takes water or sewerage authorities to fix broken pipes

V1Q27c When judging the performance of water or sewerage authorities, which of the following is most important to you. *Please RANK them in order from MOST (#1) to LEAST important (#4)*
RANDOMISE STATEMENTS 01 to 04

Environmental Attributes

01 Restoring rivers, creeks and streams to their natural state
02 Whether sewage leaks into waterways (ocean, harbour, rivers etc)
03 Minimising flooding during heavy downpours
04 Whether water restrictions are introduced in the future

Section 6v2 – Service performance standards

V2Q26 Please indicate whether any of the following apply to you. *Please tick all that apply.*
M/R RANDOMISE CODES 01 TO 11

01 I have made a phone call to Sydney Water (ASK V2Q26a)
02 I have written a letter to Sydney Water (ASK V2Q26a)
03 I have complained to Sydney Water about my water or sewerage supply (ASK V2Q26a)
04 Sydney Water repair crews have fixed a broken/leaky pipe at or near my house (ASK V2Q26b)
05 Sydney Water repair crews have had to fix the same pipe at or near my house more than once (ASK V2Q26b)
06 My house, work or daily travel has been affected by flooding
07 I have visited Sydney Water's website
08 I have had my household water switched off temporarily without being given notice beforehand
09 I have had my household water switched off temporarily but I was given notice beforehand
10 I would prefer higher water pressure at my house
11 I often visit the beach, harbour or riverside areas

V2Q26a Overall, thinking about your contact with Sydney Water, how satisfied where you with this contact on a scale of 1 to 5 where 1 means extremely dissatisfied and 5 means extremely satisfied

Extremely dissatisfied	1	2	3	4	5	Extremely Satisfied

V2Q26b Thinking about when Sydney Water fixed pipes at or near your house, how satisfied where you with the job they did on a scale of 1 to 5 where 1 means extremely dissatisfied and 5 means extremely satisfied

Extremely dissatisfied	1	2	3	4	5	Extremely Satisfied

V2Q27a When judging the performance of Sydney Water, which of the following is most important to you. *Please RANK them in order from MOST (#1) to LEAST important (#5)*
RANDOMISE STATEMENTS 01 to 05
Supply and Quality Attributes

01 The number of times my water is cut off
02 The length of time my water is cut off
03 Sewage leaking around or near my house
04 The water pressure coming from my taps
05 The taste, colour or smell of my water

V2Q27b When judging the performance of Sydney Water, which of the following is most important to you. *Please RANK them in order from MOST (#1) to LEAST important (#8)*
RANDOMISE STATEMENTS 01 to 08
Customer Service Attributes

01 The length of time it takes to respond to a complaint
02 The length of time it takes to answer the phone
03 Letting me know when they have fixed a water or sewerage problem I report
04 Keeping me up to date about water or sewerage problems in my local area
05 How easy it is to lodge a complaint with Sydney Water
06 Sydney Water repair crews being pleasant and friendly
07 Sydney Water repair crews fix broken pipes properly the first time
08 The length of time it takes Sydney Water to fix broken pipes

V2Q27c When judging the performance of Sydney Water, which of the following is most important to you. *Please RANK them in order from MOST (#1) to LEAST important (#4)*
RANDOMISE STATEMENTS 01 to 04

Environmental Attributes

01 Restoring rivers, creeks and streams to their natural state
02 Whether sewage leaks into waterways (ocean, harbour, rivers etc)
03 Minimising flooding during heavy downpours
04 Whether water restrictions are introduced in the future

Section 7 – Demographics

And some final questions about you…

D29a What is your total household income?

S/R

01 Less than $10,000
02 $10,000 to $19,999
03 $20,000 to $29,999
04 $30,000 to $39,999
05 $40,000 to $49,999
06 $50,000 to $59,999
07 $60,000 to $69,999
08 $70,000 to $79,999
09 $80,000 to $89,999
10 $90,000 to $99,999
11 $100,000 to $149,999
12 $150,000 or more
13 Prefer not to say

D29b Are you currently?

S/R

01 Employed for wages
02 Self-employed
03 Out of work and looking for work
04 Out of work but not currently looking for work
05 A homemaker
06 A student
07 Retired
08 Unable to work

D29c Which of the following best describes your current situation?

01 Married
02 Single
03 De factor relationship
04 Divorced
05 Widowed

D29d How long have you lived in NSW?

01 Less than six months
02 Six months to two years
03 Longer than two years

D29e Do you speak a language other than English at home?

01 No, English only
02 Yes, Italian
03 Yes, Greek
04 Yes, Cantonese
05 Yes, Arabic
06 Yes, Mandarin
07 Yes, Vietnamese
08 Yes, other – please specify

The University of Technology, Sydney and Sydney Water may conduct follow up research with water users in relation to this survey.

If you are interested in participating in any follow up research, please provide your name and contact details.

If selected to participate in further research, you may be provided with a financial incentive in acknowledgment of the time you spend participating.

If you do not wish to participate in further research, please click next to finish and complete the survey.

Thank you for completing this survey.

Name	
Day time contact phone number	
Mobile phone contact number	
Email address	

Appendix 5 – Regulation

This appendix relates to the discussion in Chapter 3 and Chapter 10 on water and wastewater pricing and marginal costs, and to the discussion in Chapter 4 and Chapter 10 on cost efficiencies.

5.1 Marginal costs

The Long Run Marginal Cost (LRMC) is usually defined as the additional cost of producing another unit of output, when all factors of production can be varied. In practice, we interpret the LRMC of water as the cost of investment (per megalitre of water) needed to ensure we can continue to meet demand over the long term. More specifically, the investment is usually in new bulk water resources, rather than new capacity in treatment or transport. As noted in Chapter 10, we question whether using LMRC as a reference point for setting charges should include estimates about the total costs of water supply – not just resources.

The principles and practice of the LRMC of water have been an important reference point within regulatory price setting for two decades. In 1994, the Council of Australian Governments (COAG) emphasised the need for greater consumption-based pricing, in its urban water pricing guidelines. In 2004, this principle was maintained and enhanced by the National Water Initiative's (NWI) emphasis on efficient pricing policies. In 2010, the NWI's Pricing Principles were adopted by State governments, which included a recommendation that usage charges should be based on LRMC.

The Independent Pricing and Regulatory Tribunal (IPART) has used estimates of the LRMC of water to set usage prices in its 2008 and 2012 determinations for Sydney Water. IPART continues to use LRMC as a principle for water usage pricing, even as it considers more sophisticated price structures.

5.1.1 Calculating the LRMC of water resources

By definition, the LRMC of water resources is a forward-looking concept. It estimates the change in costs of the water supply system for a given change in output. LRMC ignores the cost of past investments for the purposes of calculating LRMC. But it includes any unused capacity from those investments (technically, the benefit of that unused capacity in terms of water demand met and the costs of using it). For simplicity, we refer to this as 'spare' capacity.

Starting from current levels of demand and supply capacity, the LRMC calculation estimates how long it will be before current 'spare' capacity is used up and hence when investment in new capacity is likely to be needed. The greater the spare capacity, the longer it will be before new investment is needed, and the lower the LRMC figure will be, because of the 'time value of money'.

During 2014, Sydney Water carried out work to update and improve its model for estimating the LRMC of water resources. We wanted to test whether LRMC ought to remain as a prominent reference point in the setting of water usage charges. The context for this test was the end of the drought in Sydney, rising water supplies and that demand has not returned to pre-drought levels, which could indicate a permanent change in consumer behaviour.

We believe using the Average Incremental Costs (AIC) approach for our model provides a pragmatic yet robust estimate of the LRMC of water resources. The alternative would be to use the Marginal Incremental Cost approach (MIC). We believe this is more complex than the AIC method and more sensitive to the assumed demand increment, but is technically more consistent with the concept of marginality. AIC and MIC both are capable of producing similar results, and both methods have been used by regulators in Australia and the UK.

In practice, the AIC approach to estimating LRMC is simply the capital and operating costs (in $) of the new capacity plus the operating costs of unused existing capacity, divided by the benefit (in Megalitres, ML) of the unused capacity and new capacity. Because the calculation is done over a long time period, each of these numbers is converted to a present value, to give a LRMC estimate in '$ per ML'.

This can be expressed as follows:

$$\text{LRMC (AIC)} = \text{NPV}\left\{\frac{\text{Operating costs (spare capacity)} + \text{capital and operating costs (new capacity)}}{\text{additional output (spare+new capacity)}}\right\}$$

Crucially, this approach captures the costs and benefits of existing capacity that has already been built but is not fully used. Clearly, the greater the spare capacity[11], the lower the LRMC (assuming the benefits outweigh the costs).

5.1.2 Assumptions and constraints within the LRMC model

The LRMC calculation is a function of the following variables:

- current system yield[12]
- base year demand
- forecast growth in demand
- the operating costs of existing unused capacity
- the capital and operating costs of new water supply capacity.

There are several necessary assumptions embedded in the LRMC calculation, all of which can affect the LRMC, to varying extents. We have constructed a base case to give a current LRMC estimate, and then applied variations in our assumptions to provide a plausible range of LRMC estimates if the base case changes.

Sensitivity analysis suggests the plausible range of LRMC estimates is $0.97/kL to $3.10/kL with a base estimate of $1.16/kL. The fact that the base case estimate is near the lower end of the range reflects our assumptions about changes in the key variable – system yield. Based on our understanding of likely scenarios, we have assumed that there is more scope for system yield to fall compared with current yield (by up to 45,000 ML) than to rise (by up to 20,000 ML). In fact, it is only by assuming that Sydney Desalination Plant (SDP) could produce its theoretical maximum

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[11] Spare capacity is a function of both physical size of water assets (eg dams) and technical or policy constraints on the operation of those assets (eg when desalination can be used or how much water can be taken from certain dams).

[12] Calculated by Water NSW as the total volume of water (from dams, rivers and the desalination plant) that can be supplied reliably over the long term with the current operating rules determined under the 2010 Metropolitan Water Plan.

output of 90,000 ML that total system yield rises at all. All of the other assumptions about system yield assume a reduction.

Similarly, our base case assumptions about preferred discount rate (at the bottom of the potential range), how SDP is likely to operate (incremental output rather than full output immediately), and demand growth (at the top of the range), all reinforce the system yield assumption to produce a base case estimate of LRMC that is at the lower end of the plausible range.

However, it should be noted that the assumptions underlying our base case estimate reflect, in our view, the most likely scenarios.

Table A5-1 below provides details of the base case and variations.

Table A5-1 Assumptions used in estimating LRMC

Assumption	Base Value	Optional Value	
How much water the total water system (dams, rivers and the desalination plant) can reliably supply every year in the long run ('system yield')	610,000 Megalitres (ML)	595,000 ML 580,000 ML 565,000 ML	630,000 ML[13] 615,000 ML[13] 600,000 ML[13] 585,000 ML[13]
How much water we supply in the base year ('demand')	510,000[14] Megalitres		
How fast demand is expected to grow (assuming medium population growth and medium water savings, average weather conditions)	2,840 Megalitres per year on average, (based on $2.00 usage price[15], no leap year adjustment)	2,580, 2,600, 2,800 Megalitres per year on average (based on $2.23 usage price, leap year adjusted / unadjusted, and $2.00 usage price with leap year adjustment)	
The costs of building and operating the new supply capacity	$1.2 billion capital cost, once in any year $17 million a year fixed operating cost $730/ML a year variable operating cost		

[13] These four options are a consequence of assuming that SDP can produce 90,000 ML a year – they are not the result of other changes to system yield. Our base assumption is that SDP produces 70,000 ML a year.
[14] We assume average weather patterns when forecasting demand. The base year for LRMC calculation (2013–14) was exceptionally hot and demand was much higher as a consequence (around 530,000 ML). Using actual demand for the base year is counter intuitive when incremental demand is based on average weather conditions, so we have adjusted the base year demand to reflect what would have been supplied under average weather conditions.
[15] When modelling LRMC we were aware that a proposed reduction in usage price was likely to accommodate our proposed reduction in the Annual Revenue Requirement, ARR), but we did not know the exact figure. We used $2.00 as a reasonable estimate, for modelling purposes.

The benefits of the new capacity, in terms of additional water supplies	70,000[16] Megalitres a year	90,000 Megalitres
Whether the current SDP is run at full output immediately, or used to match demand as it grows	Used to match demand	Full output at once
Costs of meeting the impacts of potential Flood Review outcomes	$0	Over $1 billion, in any one year
Discount rate[17]	5.3%	6%, 7%

The main variable affecting the LRMC estimate is the current system yield (which, together with the base year demand, drives how much 'spare capacity' there is). Changes to this variable will have a greater impact on the LRMC estimate than changes in the forecast growth in demand, the operation of SDP and the choice of discount rate. The costs of meeting the impacts of potential Flood Review outcomes could also have a large (upwards) effect on LRMC. However, we have not modelled these in our range of LRMC estimates because there is too much uncertainty to make realistic assumptions about the timing and costs of the effects[18].

Another important assumption is the preferred method of augmentation. We have assumed an expansion of the existing desalination plant is the likely option. This was identified by Metropolitan Water Directorate (MWD) in its 2010 Metropolitan Water Plan (MWP), and is the option which Sydney Water used in its 2011 Price Review submission. Other options could be substituted into the LRMC model, if they are found to be more appropriate in future metropolitan water plans or Sydney Water modelling. What really matters for the LRMC calculation are the costs (in $) and benefits (in ML of water) from whatever option is chosen. The estimates in this paper are based on the indicative costs of the desalination plant expansion.

The LRMC model is not a perfect tool. We have necessarily included working assumptions, or made pragmatic decisions about the mechanics of the estimation techniques, in order to produce results that are robust but not overly-complicated. For example:

- Our demand forecast model incorporates a base price by which demand is measured, and assumes a level of price elasticity to measure the change in demand from price changes.

[16] The theoretical maximum output from the desalination plant is 250 ML a day or 90,000 ML a year. We have assumed a yield of 70,000 ML based on Sydney Catchment Authority's published figure (2012 Yield Update). This takes into account the operating restrictions for the desalination plant. Even in the absence of operating restrictions (such as is assumed in our LRMC model) it is likely that the desalination plant would be unable to run continuously at full output for an indefinite period, due to the need for planned and unplanned maintenance breaks. However, our LRMC model does allow for SDP's full, theoretical output (90,000 ML) to be assumed.

[17] We have used the current estimate of the long-term weighted average cost of capital (WACC) (as agreed with NSW Treasury) as our base case assumption. The alternative values we have modelled are from the NSW Government Guidelines for Economic Appraisal, July 2007 (for the 7% rate) and a further sensitivity check (6%). Changing the discount rate is an option within our LRMC model. A lower discount rate would increase the LRMC estimates slightly – each 1% change in the rate changes the LRMC by about 4%.

[18] The ability to model the costs of meeting the potential impacts of the Flood Review is part of our LRMC model, should this become appropriate in the future. However, the impact of the Flood Review on system yield is part of our modelled range of LRMC estimates, because these are more certain.

Available literature for the water sector internationally only considers elasticity in the context of price rises. However, as Sydney Water is proposing a price reduction, we have assumed the demand response would not be symmetrical. Instead, we assume the elasticity of demand for a price reduction is half that of a price rise. In other words, demand goes up by half the amount it would reduce, for a given change in prices. See Chapter 12 for more discussion about our research on price elasticity.

- A 50–year modelling period necessarily results in assumptions that are likely to be highly variable towards the end of the period, particularly around the level of forecast demand, operating and fixed costs of the desalination plant, and variable costs of buying water from Water NSW.
- Similarly, under some scenarios, a second augmentation of supply is needed. For ease of calculation we assume this to be from another desalination plant, with the same costs as the first desalination expansion. However, given the model assumes the augmentation is not needed until about 2050, both the choice of augmentation and the capital and operating costs are likely to be very different from those assumed.
- We assume a 30-year asset life, but the model does not include a residual value calculation where a second supply augmentation is built towards the end of the period. The absence of a residual value calculation is likely to overstate the resultant LRMC estimates (because a large proportion of total costs are included in the calculation, but fewer benefits are captured).
- We assume no operating restrictions apply to the use of the desalination plant (beyond those assumed by Water NSW which lead to a yield assumption of 70,000 Megalitres). In practice, we cannot see a second plant being commissioned while the existing plant was idle. But the current operating rules only allow for the desalination plant to produce water when dam levels are between 70% and 80% full.
- Similarly, we assume dam water would be used before desalination water, but this means the desalination plant would be gradually increasing output over the years as demand grew. However, the plant could be run at full output (as specified in the current operating rules) instead of drawing down dam water. But this greatly increases the estimates of LRMC, because desalination water is more expensive.
- There is no assumption about the value of water storages in the AIC calculation, or the cost of foregone consumption.
- We assume variable costs for the desalination plant are inflated on average by 1.1% a year, to account for ongoing maintenance and replacement of equipment. Fixed costs are not inflated.
- We have assumed that any additional yield required would come from the desalination plant (followed by a second desalination plant). If we were to increase dam capacity, this would result in an increase in yield, decreasing LRMC. However, this would introduce

additional capital costs which would increase LRMC. This situation has not been modelled for.

What our approach to LRMC modelling has highlighted is how variable the LRMC estimates can be depending on the inputs and assumptions used. It raises the question of how estimates of the LRMC, and the range of plausible values, should be used in setting prices.

5.1.3 Further detail about the system yield assumptions within the LRMC model

- Our base case is **610,000 ML a year**. This is the official current yield number, based on the water supply system in the 2010 Metropolitan Water Plan, a 10,000 ML a year impact of Upper Nepean e-flows introduced in 2010, plus Water Sharing Plan releases from Warragamba Dam. This would give an LRMC of $1.16/kL in our base case.
- We have liaised with Water NSW to decide how to use System Yield within our LRMC model. We understand from Water NSW that updated yield figures will be produced later this year, incorporating data from recent hydrology and dam inflows, the impact of Sydney Water's new long term demand forecast, revised forecasts about restrictions, probable changes to the Metropolitan Water Plan reference case (including the likely delays in turning the existing desalination plant on and bringing it out of deep shutdown), and the results of new bathymetric surveys of Warragamba Dam. The revised yield figure will probably be around 595,000 ML a year. This provides us with the basis for our revised base case (assuming system yield reduces but no other changes are made in the assumptions). The revised LRMC estimate under this scenario would be $1.52/kL.
- The potential impact of reducing Warragamba Dam Full Supply Level by 5 metres for flood management is being assumed as 30,000 ML a year. This figure is sourced from ongoing discussions with Water NSW and Metro Water Directorate. Using the base case (610,000 ML a year), the revised yield would be **580,000 ML a year**. Using the revised base case (595,000 ML a year), the revised yield would be **565,000 ML a year**.
- We did not consider a scenario for the Warragamba e-flows project which has an assumed yield impact of between 30,000 ML and 50,000 ML a year if a 90/10 e-flow option was introduced. This would take the reference case down to between 550,000 ML and 530,000 ML a year and the revised yield to between 535,000 ML and 515,000 ML a year. Although we understand that e-flows are still an option to be considered, we did not model this scenario due to the low likelihood of a 90/10 environmental flow being introduced concurrently with a 5 metre Full Supply Level decrease at Warragamba, because it brings yield very close to current demand.
- We did not consider any specific options to increase yield above 610,000 ML a year, although we note the alternative operation of SDP at full output (90,000 ML a year) would increase system yield by 20,000 ML a year across all of our options. We understand specific options are being considered for further work to be done to increase system yield (for example raising the dam wall at Warragamba).

As a result of these drivers, scenarios were modelled on:

- Total yield – 8 options (four of which are based on SDP at 70,000 ML/year and four of which assume SDP at 90,000 ML a year). Note that total yield increases with desalination yield increases.
- Desalination yield – the theoretical maximum output from the desalination plant is approximately 90,000 ML a year. We have assumed a yield of 70,000 ML a year based on Sydney Catchment Authority's published figure (2012 Yield Update). This takes into account the operating restrictions for the desalination plant. Even in the absence of operating restrictions it is likely that the desalination plant would be unable to run continuously at full output for an indefinite period, due to the need for planned and unplanned maintenance breaks. The 90,000 ML scenario is still included to demonstrate price impacts if operating at full capacity.
- Desalination supply mode – how costs would change if desalination was run to meet demand requirements or at full capacity.

5.1.4 Improvements to our LRMC model

Since 2014, Sydney Water has improved its model for estimating the LRMC of water resources. Key changes are:

Demand forecasts are updated

We assume average weather patterns when forecasting demand. The base year for LRMC calculation (2013–14) was exceptionally hot and demand was much higher as a consequence (around 530,000 ML). Using actual demand for the base year is counter intuitive when incremental demand is based on average weather conditions, so we have adjusted the base year demand to reflect what would have been supplied under average weather conditions (around 510,000 ML).

Considered pricing elasticity for demand

We are proposing a price decrease so we have considered how demand could change as a result. We believe the change will not be symmetric and this has been accounted for in the model (see Chapter 12).

Yield and spare capacity has been included

We have incorporated system yield into our LRMC calculations as it has a significant impact on any LRMC estimate. We have included a number of scenarios based on how yield may vary. With an explicit assumption about system yield, we have also been able to take account of the existence of spare capacity in the estimation of LRMC.

Change in analysis period

There has been a reduction in the analysis period for the model, from 100 years to a more plausible 50 years.

SDP inputs are variable

We have considered 70,000 ML and 90,000 ML yields for the desalination plant, and two operational supply regimes (matching demand, and immediate full output).

5.1.5 Range of LRMC estimates

The following tables show a range of Long Run Marginal Cost estimates as we vary total yield, desalination yield and desalination supply mode, and with two discount rates.

Table A5-2 and Table A5-3 use a demand forecast calculated assuming a usage price of $2.00/kL (close to our proposed price of $1.97 kL).

Tables Table A5-4 and Table A5-5 use a demand forecast based on the current usage price of $2.23/kL. The base case is highlighted in orange, the minimum and maximum estimates are highlighted in yellow.

In all tables, forecast demand is based on average demand across all years, with no adjustment for the effects of an extra day's demand in each leap year[19].

Table A5-2 LRMC estimate, demand based on $2.00/kL, SDP = 70,000 ML

System yield scenario (ML) (SDP = 70,000 ML)	5.3% Discount rate		6% Discount rate		7% Discount rate	
	LRMC (SDP matches demand)	LRMC (SDP at full output)	LRMC (SDP matches demand)	LRMC (SDP at full output)	LRMC (SDP matches demand)	LRMC (SDP at full output)
AA 610,000	**1.16**	1.62	1.14	1.61	1.11	1.59
AB 595,000	**1.52**	2.06	1.52	2.08	1.52	2.12
AC 580,000	**1.91**	2.36	1.93	2.39	1.95	2.45
AD 565,000	**2.29**	2.71	2.33	2.77	2.40	2.86

[19] Adjusting the demand forecast data to include an extra day every 4 years is possible in our LRMC model. Choosing this option has a very small impact on the LRMC, adding about $0.03/kL. Adding the extra day's demand is important for revenue modelling, but not for LRMC estimation.

Table A5-3 LRMC estimate, demand based on $2.00/kL, SDP = 90,000 ML

System yield scenario (ML) SDP = 90,000 ML	5.3% Discount rate		6% Discount rate		7% Discount rate	
	LRMC (SDP matches demand)	LRMC (SDP at full output)	LRMC (SDP matches demand)	LRMC (SDP at full output)	LRMC (SDP matches demand)	LRMC (SDP at full output)
BA 630,000	1.03	1.56	1.00	1.56	0.97	1.56
BB 615,000	1.30	1.90	1.29	1.92	1.27	1.96
BC 600,000	1.67	2.22	1.68	2.26	1.69	2.32
BD 585,000	1.96	2.43	1.99	2.49	2.03	2.57

Table A5-4 LRMC estimate, demand based on $2.23/kL, SDP = 70,000 ML

System yield scenario (ML) SDP = 70,000 ML	5.3% Discount rate		6% Discount rate		7% Discount rate	
	LRMC (SDP matches demand)	LRMC (SDP at full output)	LRMC (SDP matches demand)	LRMC (SDP at full output)	LRMC (SDP matches demand)	LRMC (SDP at full output)
AA 610,000	1.15	1.59	1.12	1.57	1.08	1.55
AB 595,000	1.60	2.24	1.60	2.27	1.60	2.31
AC 580,000	2.00	2.55	2.03	2.61	2.08	2.70
AD 565,000	2.45	2.93	2.50	3.00	2.57	3.10

Table A5-5 LRMC estimate, demand based on $2.23/kL, SDP = 90,000 ML

System yield scenario (ML) SDP = 90,000 ML	5.3% Discount rate		6% Discount rate		7% Discount rate	
	LRMC (SDP matches demand)	LRMC (SDP at full output)	LRMC (SDP matches demand)	LRMC (SDP at full output)	LRMC (SDP matches demand)	LRMC (SDP at full output)
BA 630,000	1.03	1.58	1.01	1.57	0.97	1.56
BB 615,000	1.37	2.09	1.36	2.13	1.35	2.19
BC 600,000	1.76	2.39	1.77	2.44	1.79	2.52
BD 585,000	2.12	2.69	2.16	2.75	2.21	2.85

5.1.6 Calculating the SRMC of water resources

We interpret the Short Run Marginal Cost (SRMC) of water to be the additional costs of supplying water at a point in time, without quickly being able to increase supply capacity. The SRMC is similar to the LRMC, but is measured over a shorter time period when capacity is largely fixed, and costs are driven more about how much water is currently available to supply the current level of demand, instead of water supply capacity to meet demand over the long run.

The SRMC of water can be much more variable than LRMC, because of this link to availability. When dams are full or demand is low, SRMC can be quite low, often below the LRMC figure. The costs of supplying extra water might be no more than the additional chemicals and energy used to treat and pump water, using existing spare capacity. However, when dam levels are lower or demand is very high (ie existing capacity is constrained), SRMC can be higher, because extra water might have to be supplied from more expensive sources, or need higher levels of treatment. SRMC can even include the cost to consumers of not being allowed to use water as they normally would – the opportunity cost of restrictions – including higher production costs or lower output for water-intensive industries and environmental degradation. This is hard to observe and to quantify[20].

In practice, it is difficult to obtain sufficient data to estimate the true short run marginal cost of water. Instead, one option is to use the short run average variable costs (SRAVC) when capacity is not constrained as a proxy for marginal costs. This calculation aggregates total variable water purchase costs, treatment and transport costs and divides by volumes purchased or volumes sold. It does not take account of fixed costs or other overheads For Sydney Water, this SRAVC figure is about $0.35–0.39/kL ($2014–15) based on SDP still in shutdown mode.

A second option is to use the costs of SDP as a proxy for SRMC. If SDP was activated and produced full output (90,000 ML) for a whole year, Sydney Water would incur $80 million in additional costs (based on IPART's 2013 determination for SDP). Dividing costs by output gives a figure of $0.89/kL. However, the approach by which Sydney Water would recover these additional costs depends on its preferences for setting tariffs. More details of our proposal for recovering the costs of SDP are in Chapter 10.

A more sophisticated approach to pricing could include the greater use of SRMC to send stronger price signals about the cost of using water when available supplies are falling. There are difficulties and risks with using SRMC to set prices over time, including the availability of a robust estimate and the limited effect on consumer decisions to make different investment decisions. However, short-term behaviour (primarily around water conservation efforts) can respond effectively to short-term price signals. Our proposal for recovering the additional costs of SDP may form the basis for further work on variable pricing for water.

[20] The Productivity Commission (2011) reported "Water restrictions are likely to have cost in excess of a billion dollars per year (nationally) from the lost value of consumption alone." See *Australia's Urban Water Sector Productivity Commission Inquiry Report Volume 1* (August 2011). Grafton & Ward (2008) estimated the costs of mandatory restrictions in 2004-05 in Sydney to be $235 million. See *Prices versus Rationing: Marshallian Surplus and Mandatory Water Restrictions*, R. QUENTIN GRAFTON and MICHAEL B. WARD, THE ECONOMIC RECORD, VOL. 84, SPECIAL ISSUE, SEPTEMBER, 2008, S57–S65.

5.2 Regulatory incentives

Chapter 10 explains the how stronger incentives can drive Sydney Water to make better, more efficient business decisions. This appendix sets out some stylised worked examples for operating expenditure (opex) and capital expenditure (capex) Efficiency Benefit Sharing Schemes (EBSS).

Opex and capex EBSS work in different ways, although the incentives to be efficient apply to both types of expenditure. For opex, the sharing ratio between customers and the firm is based on the length of the holding period. We propose a 4-year period, which gives a ratio about 75:25. For capex, the same ratio is then mechanically applied to the total benefits, which ensures consistency between decisions on opex and capex.

5.2.1 Opex EBSS

Opex is incurred every year, whether it is salaries, maintenance, renewals or something else. Therefore, the principle of the opex EBSS is to incentivise the firm to continue to seek efficiencies in every year of the regulatory period. The way this is achieved is by rewarding (or penalising) the incremental change in efficiency between years (the 'carryover').

It does not reward the total efficiency gain in any one year (ie not the difference between the regulatory allowance and the actual expenditure, except in the first year of the regulatory period). This is shown by the formulae:

$$C_t = E_t - E_{t-1} \text{ and } E_t = R_t - A_t$$

where

C_t = allowed carry-over in year t

E_t = efficiency gain in year t

R_t = regulatory opex allowance

A_t = actual opex

Gains are carried forward for the specified number of years and added to the revenue requirement in the next review period, as set out in Chapter 10. The following examples show how the EBSS works. Note that for simplicity, these examples do not show how the benefits would be shared between customers and the firm, as this remains the same for all examples.

5.2.2 EBSS for Opex – stylised example showing the principle of incremental change

Figure A5-1 shows a simple EBSS for opex, using a four-year holding period. In all years, the firm outperforms the regulatory allowance, and retains these benefits within the 4-year regulatory period (25+34+23+27=109).

The red-ringed numbers show the incremental improvement in efficiency between years 1 and 2 (the difference between an underspend of 34 in year 2, and underspend of 25 in year 1). This is carried forward for four years.

The incremental decrease in efficiency between years 2 and 3 is shown in the blue rings in the line below, also carried forward for four years. Note that opex in year 3 is still under the regulatory alowance (underspend of 23), but the efficiency saving is not as great as in year 2 (an underspend of 34). Thus, the EBSS show this as a loss of 11. This emphasises the point that firms should be encouraged to contunally improve on their opex efficiency.

Finally, efficiency increases again from year 3 to year 4, shown by the green rings. Overall, the total carryover would be an extra 26 units on the firm's ARR in the next regulatory period.

Figure A5-1 Example of EBSS for Opex

Efficiency increase Y1 to Y2

Efficiency decrease Y2 to Y3

Efficiency increase Y3 to Y4

Year	1	2	3	4	5	6	7	8	Future	Total	Sharing
Regulatory Allowance	775	774	773	772	800	800	800	800			
Actual Spend	750	740	750	745							
Under/Over	25	34	23	27							
Incremental Under/Over		9	-11	4							
Carry-over made in:											
1		25	25	25	25						
2			9	9	9	9					
3				-11	-11	-11	-11				
4					4	4	4	4			
SW in-period benefit	25	34	23	27					109		
SW carryover					27	2	-7	4	26		
Discount Factor	1.17	1.11	1.05	1.00	0.95	0.90	0.86	0.81	0.77	Total	Sharing
SW in-period + carryover	29.2	37.7	24.2	27.0	25.6	1.8	-6.0	3.3		142.8	0.24
Customer benefits						22.5	29.1	18.7	393.5	463.9	0.76

Total in-period benefit

Total carryover

Benefits discounted by relevant factor

What can also be seen in Figure A5-1 is the benefits sharing ratio for this particular example where the carryover period is 4 years.

Once the carryover period has expired for the firm, the customer then benefits from that efficiency saving in perpetuity. So, for the 25 saving in year 1, customers benefit from year 6 onwards; for the saving 9 in year 2, customers benefit from year 7 (and -11 from year 8 and 4 from year 9). From year 9 onwards, total benefits each year to customers equate to 27 (25+9-11+4=27).

Using a discount rate of 5.3%, we apply a discount factor to each year's benefits in order to calculate a NPV of the stream of benefits over time. For Sydney Water, total benefits = 142.8 (109 in-period + 26 carryover, discounted). For customers, total benefits = 463.9 (22.5+29.1+18.7=70.4 in years 5-8 + 393.5 in perpetuity).

Sydney Water's share of the total benefits is 142.8 / (142.8+463.9) = 24%.

Customers' share is therefore 76% (463.9/(142.8+463.9)).

5.2.3 EBSS for Opex – base, step and trend approach

Figure A5-2 uses the same example but shows how the base, step and trend could be applied. Instead of resetting the firm's baseline at 800 (as in the previous example), the firm has revealed its costs to be 750 in year 3 of the previous period. The regulator uses this revealed cost to set the baseline for the next review period. In Figure A5-2 below, the base year cost of 750 has been adjusted by 30 to take into account a step up in costs.

Note that our proposal gives IPART the flexibility to set whatever cost baseline it thinks is appropriate, informed by the actual costs revealed by the EBSS model. We do not propose that IPART only uses year 3 revealed costs as the baseline, but its decisions can be informed by the revealed cost approach. While IPART is not constrained to basing projections on revealed costs, the strengthened incentives for the firm to achieve the lowest possible costs means that the regulator should, in principle, give greater weight to revealed costs.

Figure A5-2 Example of EBSS for Opex showing base, step and trend

Base year = 750
Step up = 30

Year	1	2	3	4	5	6	7	8	
Regulatory Allowance	775	774	773	772	780	770	765	760	
Actual Spend	750	740	750	745					
Under/Over	25	34	23	27					
Incremental Under/Over		9	-11	4					
Carry-over made in:									
1		25	25	25	25				
2			9	9	9	9			
3				-11	-11	-11	-11		
4					4	4	4	4	
Within Period Benefit	25	34	23	27					109
Carry-Over					27	2	-7	4	26

Step up, downward trend

Total in-period benefit

Total carryover

5.2.4 EBSS for Opex – no incentive to inflate expenditure

Figure A5-3 shows how there is no incentive on the firm to inflate its costs in the hope or expectation that the regulator subsequently inflates the following regulatory period's cost baseline.

The firm uses the same actual spend profile as in Figure A5-1 and Figure A5-2, except in year 3 the actual spend is above the regulatory allowance (800 compared with 750 in Figure A5-1 and Figure A5-2). The firm hopes that in the next regulatory period, the new base year (including step up=30) will be 800+30=830, not 750+30=780.

However, the firm faces three challenges.

- First, the regulator is under no obligation (under our proposal) to rely exclusively (or at all) on the year 3 revealed costs as a benchmark for the next period's baseline. The regulator may still use an efficiency review to inform its views about appropriate costs, and set a baseline lower than the firm's revealed costs. This is shown in Figure A5-3 below, the firm has revealed a year 3 cost of 800, but the regulator has made a downwards adjustment of 50, before adding a step increase of 30.
- Second, by over-spending in year 3 against the regulatory allowance, the firm makes lower gains within period (25+34-27+27=59) than if it had continued to improve efficiency (total in-period benefit =109 in Figure A5-1 and Figure A5-2). The increase in carryover (net gain of 76-26=50) is negated by the loss of in-period benefits (net loss of 109-59=50).
- Third, for simplicity, the example does not apply the proposed cap to the total carryover. However, in practice the carryover would be capped at 50 (not 76). So the firm would be worse off, because total gains would be 109 (in-period=59 + capped-carryover=50) compared with 135 (in-period=109 + uncapped-carryover=26) in Figure A5-1 and Figure A5-2.

Figure A5-3 Example of EBSS for Opex with no incentive to inflate expenditure

Base year = 750
Step up = 30

Year	1	2	3	4	5	6	7	8	
Regulatory Allowance	775	774	773	772	780	770	765	760	
Actual Spend	750	740	800	745					
Under/Over	25	34	-27	27					
Incremental Under/Over		9	-61	54					
Carry-over made in:									
1		25	25	25	25				
2			9	9	9	9			
3				-61	-61	-61	-61		
4					54	54	54	54	
Within Period Benefit	25	34	-27	27					59
Carry-Over					27	2	-7	54	76

Step up, downward trend

Total in-period benefit

Total carryover

5.2.5 EBSS for Opex – a one-off increase in opex

Figure A5-4 shows how the EBSS mechanism works for one-off (ie not sustained) increases or decreases in controllable opex. In this simple example, we assume the firm's actual expenditure matches the regulatory allowance, except in year 2 when there is a one-off increase in expenditure caused by factors beyond the control of the utility.

Note that the normal incentive within the simple CPI–X model of regulation does allow in-period benefits or losses to be retained by the firm. So, in the absence of an EBSS, the firm would bear the loss in the normal way. Total in-period benefits would be -26 (ie there would be a loss).

With the EBSS scheme in place, there is a loss of 26 in year 2 of the initial regulatory period, as there is in the absence of an EBSS. However this is offset by a gain of 26 in the subsequent period.

This neutral outcome (ignoring the time value of money) insulates the firm against any unexpected expenditure not captured by an appropriate pass-through methodology.

Figure A5-4 Example of EBSS for Opex with a one-off increase in opex

One-off cost shock

EBSS 'sees' efficiency decrease Y1 to Y2

EBSS 'sees' efficiency increase Y2 to Y3

Year	1	2	3	4	5	6	7	8	
Regulatory Allowance	775	774	773	772	780	770	765	760	
Actual Spend	775	800	773	772					
Under/Over	0	-26	0	0					
Incremental Under/Over		-26	26	0					
Carry-over made in:									
1	0	0	0	0	0				
2			-26	-26	-26	-26			
3				26	26	26	26		
4					0	0	0	0	
Within Period Benefit	0	-26	0	0					-26
Carry-Over					0	0	26	0	26

Total in-period benefit

Total carryover

5.2.6 Capex EBSS

Capex is incurred in each year but, unlike opex, can be much more variable from year to year. Major capital projects are not undertaken each year and major capex is often referred to as being 'lumpy'. Therefore, there is not likely to be an obvious trend in capex (compared with opex) from year to year. Incentive-based regulation can still encourage a firm to incur capex efficiently, and customers can still benefit from decisions to reduce or defer capex.

Capex is financed over time through the return on and of capital via the Return on Asset Base (RAB). Prudent underspend (or overspend) is captured via adjustments to the RAB in a 'true-up' process at the start of the next regulatory period. This is the process by which benefits are returned to customers, because a lower RAB results in a lower ARR and lower prices going forward.

The total efficiency benefit is shown in the following formulae.

$$\mathrm{EB}^{n} = \sum_{n=1}^{p} X_n . FS \; - \sum_{n=1}^{p} FB_n$$

Where:

- EB^{n} is the nominal efficiency benefit in any given period

- $X_n = P_n - A_n$
- P_n is the allowable regulatory capex for the period year n
- A_n is actual capex for year n
- FS is the firm's share of the efficiency gains (same as that determined by the opex EBSS, in this case 25%)
- FB is the net financing benefit (cost) already accrued by the firm in terms of interest foregone or otherwise incurred due to an underspend/overspend of capex.

The nominal financing benefit assuming a discount rate equal to the nominal WACC (W) is calculated as:

$$\textbf{FB} = \mathbf{0.5}(\boldsymbol{W}.\boldsymbol{X_n}) + \boldsymbol{W}.\sum_{n+1}^{n}\boldsymbol{X_{n+1}}$$

Note that IPART's approach for capex is to assume revenue is received half-way during the year, so the in-period benefit in the first year is half the total figure. The Australian Energy Regulator (AER) takes the same approach. This is why the first part of the above equation is multiplied by an augmentation to the nominal WACC. In the following years the firm will retain a full year of benefit calculated as the underspend/ overspend multiplied by the nominal WACC; the right hand side of the above FB equation.

This means capex is treated differently from opex in the EBSS scheme.

The 'lumpy' nature of capex means there is no base, step and trend approach in a capex EBSS. The theory that revealed costs in year 3 flow through to base year costs in year 5 (as for opex) does not apply. Instead, the 'true-up' process means actual capex from one regulatory period (adjusted for prudency and efficiency) is added to the regulatory asset base and factored into prices for the next regulatory period.

Therefore there is no consideration of incremental efficiency gains from year to year in the EBSS. Instead, we look at the benefits over time of savings (or losses) resulting from underspend (or overspend) in actual expenditure.

5.2.7 Capex – stylised example showing how EBSS applies

Figure A10.5 shows how the EBSS mechanism would apply for capex. Note how actual spend is increasing in each year of the period. However, unlike for opex EBSS, this does not equate to an efficiency loss for the firm. For a capex EBSS, the incentive is to be more efficient than the regulatory allowance for that year.

In years 1-3, the firm outperforms the regulatory allowance. Total underspend = 45. This means (all else being equal) the RAB in period 5 would be 45 lower than otherwise would have been.

Because capex is financed by customers over time (unlike opex, which is remunerated $ for $ in each year) any actual underspend (or overspend) results in a (nominal) financing benefit in that year equal to the actual saving multiplied by the WACC.

So, in year 1, 20*5.3% = 1.06. Note that IPART's approach for capex is to assume revenue is received half-way during the year, so the in-period benefit in the first year savings are made is half the total figure. So the in-period benefit in year 1 of the underspend in year 1 is 1.06*0.5 = 0.53.

The red-ringed numbers show the year 1 benefit, the blue and green rings show the benefits made in years 2 and 3.

Figure A5-5 Example of EBSS for Capex

Discount rate 5.3%

Efficiency saving in Y2

Efficiency saving in Y2

Year	**1**	**2**	**3**	**4**
Regulatory Allowance	180	180	180	180
Actual Spend	160	165	170	180
Under/Over	20	15	10	0
Capital cost under/over	1.06	0.80	0.53	0
Carryover made in:				
1		1.06	1.06	1.06
2			0.80	0.80
3				0.53
4				
Within Period Benefit	0.53	1.46	2.12	2.39

First year in-period benefit is half

Full saving then carried over

Discount factor (mid-year)	1.20	1.14	1.08	1.00	
Discount factor (end-year)	1.17	1.11	1.05	1.00	**Total**
NPV capital cost under/over	23.96	17.07	10.81	0.00	51.83
Customer Share (76%)	18.21	12.97	8.21	0.00	39.39
SW Share (24%)	5.75	4.10	2.59	0.00	12.44
Financing cost/benefit	0.62	1.62	2.23	2.39	6.85
				Carryover	5.59

Benefits are calculated in the following way.

Total underspend for the period is 20+15+10+0=45, which when discounted = 51.83. As noted above, a mid-year discount factor is used. Then the sharing ratio derived from the opex EBSS is applied to the total NPV benefit, so customers receive 51.8*76% = 39.39 and the firm receives the remainder (= 12.44).

Of this 12.44, the firm has already kept benefits within period equal to 0.53+1.46+2.12+2.39 = 6.49 (undiscounted). The discounted sum = 6.85 (based on an end-year discount factor). The firm therefore is allowed to carryover 12.44-6.85 = 5.59 in remaining benefits.

This is added to the ARR at the next price reset as a separate, additional building block.

Figure A10.6 uses the same example to show the EBSS for capex when the firm overspends against the regulatory allowance. The effect would be a reduction in the ARR in the next period of 3.58.

Figure A5-6 Example of EBSS for Capex with overspend

Discount rate 5.3%

Efficiency loss in Y2

Efficiency loss in Y3

Year	1	2	3	4
Regulatory Allowance	180	180	180	180
Actual Spend	195	190	185	180
Under/Over	-15	-10	-5	0
Financing cost reduction	-0.80	-0.53	-0.27	0
Carry-over made in:				
1		-0.80	-0.80	-0.80
2			-0.53	-0.53
3				-0.27
4				
Within Period Benefit	-0.40	-1.06	-1.46	-1.59

First year in-period loss is half

Full losses then carried over

	1	2	3	4	Total
Discount factor (mid-year)	1.20	1.14	1.08	1.00	
Discount factor (end-year)	1.17	1.11	1.05	1.00	
NPV capital cost under/over	-17.97	-11.38	-5.40	0.00	-34.75
Customer Share (76%)	-13.66	-8.65	-4.11	0.00	-26.41
SW Share (24%)	-4.31	-2.73	-1.30	0.00	-8.34
Financing cost/benefit	-0.46	-1.18	-1.53	-1.59	-4.76
				Carryover	-3.58

5.2.8 Proposed methodology for managing risks to cost projects

In Chapter 10 we explain our proposal for managing risks that costs are materially different to what IPART allows in the determination. In this section, we propose the following methodology for calculating the final price impact to customers in any given year. In our view, a methodology does not equate to just a specific formula, but rather a process which includes a formula but also allows scope for a review of whether costs are being efficiently incurred, and some judgement by IPART that relevant thresholds have been met.

The process would begin with an application from Sydney Water for an adjustment to its ARR for the remaining period of the determination. We refer to this as an Incremental Revenue Requirement, or IRR.

The IRR formula is set out below.

$$Incremental\ revenue\ requirement\ (IRR)\ per\ customer_{\ kt} = \frac{(\delta ROA_{kt} + \delta RofA_{kt} + \delta Opex_{kt}) + \delta Tax_{kt}}{Customers_{kt}}$$

$Where:$

- $\delta_k^j RofA_{kt} = Change\ in\ Return\ of\ Assets = \left(\sum_{j=1}^{5} \frac{\delta_k^j.Capex_{kt}}{A_{kt}^j}\right)$
- $\delta_k^j ROA_{kt} = Change\ in\ Return\ on\ Assets =\ \left(\sum_{j=1}^{5} \delta_k^j.Capex_{kt}\right).WACC_{\ pt}$
- $\delta_k^j Opex_{kt} = Change\ in\ Operating\ expenditure.$

And

- $\delta_k^j = per\ cent\ of\ project\ k\ which\ falls\ into\ resource\ category\ j\ for\ project\ k\ at\ time\ t,$

  $$noting\ that\ \sum_{j=1}^{5} \delta_k^j = 1$$

- $A_{kt}^j = the\ assest\ life\ remaining\ for\ resource\ category\ j\ of\ project\ k\ at\ time\ t$
- $Capex_{kt} = total\ capex\ for\ project\ k\ in\ time\ t$
- $WACC_{\ pt} = the\ post - tax\ real\ WACC\ in\ period\ t$
- $j = is\ resource\ category\ type, being\ one\ of\ the\ following\ 5\ categories$
  - $civil$
  - $electronic$
  - $mechanical$
  - $electrical$
  - $non - depreciable.$
- $k = is\ specific\ cost\ project$
- $t = 1, \ldots, n\ time\ periods.$

Importantly each project *k* will be deemed to have a standard efficient split δ_k^j between the asset types *j* used in any particular project to simplify the calculation of the return of and on assets components. Further each of the asset types has a standard common asset life for all water, wastewater and stormwater projects, and slightly lower asset lives for corporate projects.

A non-exhaustive representative list of the asset splits per project is provided in Table A5-6 and the associated asset lives are presented in Table A5-7.

Importantly combining the IRR formula, the asset splits in Table A5-6 and the asset lives from Table A5-7, allows Sydney Water and IPART to understand how any $1 (or any other amount up to relevant cost project thresholds) of capex for a cost project within a particular year of a regulatory period, will impact final customer prices for that year should it occur. It should be noted that the opex impact of any $1 of a cost project within a regulatory period is $1 in the year it occurs.

This information and methodology allows IPART to practically adjust Sydney Water's prices ex-post (within a regulatory period) should a cost project occur within a regulatory period.

Table A5-6 Representative list of the splits for each project

	Civil	Electronic	Mechanical	Electrical	Non-depreciable
Biosolids	50%	10%	30%	10%	0%
Building	100%	0%	0%	0%	0%
Electronic (excluding IT)	0%	100%	0%	0%	0%
Electronic Control Meters	0%	100%	0%	0%	0%
Electronic Control Valves	0%	100%	0%	0%	0%
Field Monitoring Equipment	0%	0%	100%	0%	0%
IT	0%	100%	0%	0%	0%
Laboratory Equipment	0%	0%	100%	0%	0%
Land	0%	0%	0%	0%	100%
Modelling/Planning	0%	100%	0%	0%	0%
Odour Control Plant Renewals	0%	0%	50%	50%	0%
Plant and Equipment (eg cars/trucks, furniture etc)	0%	0%	100%	0%	0%
PSP Mains	30%	0%	0%	0%	70%
Rechlorination Plants	25%	5%	35%	35%	0%
Renewable Energy Assets	68%	7%	16%	10%	0%
Reservoir Mixers Renewals	0%	0%	50%	50%	0%
Reservoirs (except mixers)	100%	0%	0%	0%	0%
SCADA and IICATS	0%	100%	0%	0%	0%
SPS Growth	50%	10%	20%	20%	0%

SPS Renewals – Mechanical/Electrical only	0%	0%	50%	50%	0%
SPS Renewals – Others	50%	10%	20%	20%	0%
Stormwater mains/channels	100%	0%	0%	0%	0%
STP Growth	50%	10%	30%	10%	0%
STP Potable Water Savings	50%	10%	30%	10%	0%
STP Process and Reliability Improvement	0%	5%	48%	48%	0%
STP Renewals	0%	0%	50%	50%	0%
Wastewater Main Renewals	100%	0%	0%	0%	0%
Wastewater Mains Growth	30%	0%	0%	0%	70%
Water Mains	100%	0%	0%	0%	0%
Water Meters	0%	100%	0%	0%	0%
WFP Renewals	50%	10%	25%	15%	0%
WPS Growth	50%	10%	20%	20%	0%
WPS Renewals	50%	10%	20%	20%	0%

For the above range of resource category types, *j*, the approximate asset lives for the average project can be seen in Table A5-7.

Table A5-7 Representative list of the splits for each project

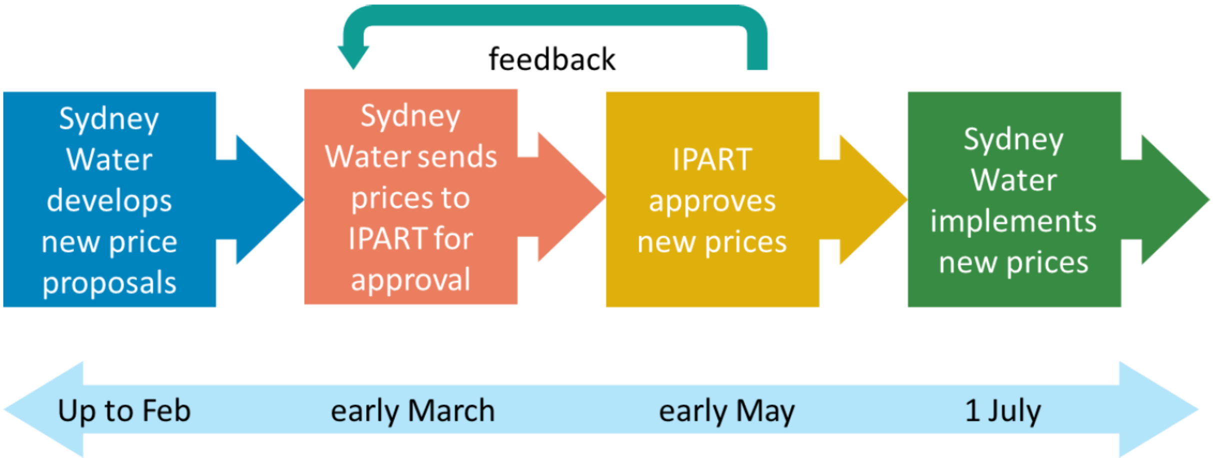
	Civil	Electronic	Mechanical	Electrical	Non-depreciable
Water/wastewater/stormwater	100	15	30	25	N/A
Corporate	68	10	30	25	N/A

5.2.9 Proposed process for managing risks

The process by which an appropriate methodology could be agreed and implemented is set out in Figure A5-7 below.

IPART and Sydney Water would need to agree the scope and scale of the adjustment methodology at the time prices were reset. During the regulatory period, Sydney Water would be able to apply to IPART in each year for an adjustment to ARR. We believe IPART would need up to 6 months to decide on an application (including providing a draft decision on which Sydney Water could comment).

Figure A5-7 Process for managing risks



Appendix 6 – Capital expenditure

This appendix provides additional information to Chapter 8 on capital expenditure projects.

6.1 Capital expenditure and variances 2012–13 to 2015–16

Major capital investments by program over 2012–13 to 2015–16 are listed in Table A6-1 below.

Table A6-1 Forecast/actual capital expenditure 2012–13 to 2015–16 ($m, $2015–16)

Project or Program Description	2012–13	2013–14	2014–15	2015–16	Totals		
	Actual	Actual	Actual	Forecast	Actual/ Forecast	IPART[21] determination	Variance
Reticulation Water Main Renewals	60	29	29	34	151	249	-98
North West Growth Centre	15	50	10	8	82	178	-96
Wet Weather Overflow Abatement	47	11	15	16	90	164	-74
Critical Water Main Renewals	52	29	31	29	140	214	-73
Avoid Fail Sewer Rehabilitation Program	51	41	45	46	183	242	-59
Infill Growth	1	11	4	22	37	90	-53
Vaucluse Diamond Bay Strategy	0	0	0	0	0	49	-49
System Reliability	0	0	0	2	2	37	-35
Odour and Corrosion Control including Chemical Dosing	0	1	5	0	6	29	-24
Dry Weather Overflow Reduction	15	11	10	12	48	66	-18
Appin Sewerage Scheme	10	1	1	0	12	29	-16
South West Growth Centre	36	13	28	59	137	152	-15
Growth – West Dapto Urban Release Area	1	0	6	4	12	26	-14

[21] The capital component of the 2012–16 IPART determination was delivered by IPART on an annual basis at a product level. To enable more meaningful analysis, we have calculated a more detailed allocation of the determination based on the recommendations from the 2011 Atkins Cardno efficiency review.

Water							
Castle WWTP Reliability	0	0	0	0	0	14	-14
Meter Investment Program	7	8	8	9	33	40	-7
Monitoring and Control - IICATS and SCADA	1	4	6	21	31	38	-6
Water Pumping Station Renewals Program	6	4	10	12	33	39	-6
Replace SP0259 Quakers Hill	14	3	0	0	17	22	-5
Information Technology – Access Replacement	2	3	11	0	16	17	-1
West Hoxton Sewerage Scheme	4	3	0	0	7	7	0
Wilton Sewerage Scheme	1	9	1	0	11	11	0
Douglas Park Sewerage Scheme	2	8	4	1	15	15	0
NSOOS and North Head Odour and Corrosion Management	1	6	30	15	51	51	0
Glenorie Sewerage Scheme	0	2	12	3	17	17	0
Cowan Sewerage Scheme	9	8	0	0	17	17	0
Galston Sewerage Scheme	0	3	18	5	26	25	0
Buxton Sewerage Scheme	4	24	7	1	36	36	1
Western Sydney Recycled Water Initiative (Replacement Flows)	1	0	0	0	1	0	1
Reservoir Reliability Program	6	5	22	24	57	57	1
Bargo Sewerage Scheme	8	33	9	1	50	49	1
Energy Management Program	1	6	1	1	9	7	1
Treatment Plant Office Upgrade	12	3	14	6	36	33	3

Metro IICATS – R&R Water Remote Terminal Units	7	8	7	1	24	21	3
Water Filtration Plant Renewals	3	4	7	6	20	17	4
Information Technology – Renewals and Business efficiency	30	37	37	82	186	181	6
Greenfield Growth	13	6	36	28	83	75	9
Malabar Odour Management	9	2	1	0	12	3	9
Corrosion and Odour strategy	0	0	2	7	10	0	10
Winmalee Tunnel improvement	1	6	3	0	10	0	10
Property Management and Acquisition	7	8	12	24	51	40	11
Cronulla STP Odour Control Reliability	12	0	0	0	12	1	11
Wastewater Pumping Station Renewals Program	25	9	24	15	72	56	16
Stormwater drainage Renewals	4	7	17	17	46	25	21
Malabar WWTP Improvement Program	1	5	48	38	92	45	47
Private sector delivered growth	40	72	58	63	233	163	70
Wastewater Treatment Plant Renewals Program	53	27	56	56	193	117	76
Other	75	39	28	27	169	66	103
Total	**647**	**560**	**676**	**696**	**2,580**	**2,827**	**-247**

The above growth expenditure excludes the following works funded under the NSW Government Housing Acceleration Fund (HAF):

	2012–13	2013–14	2014–15	2015–16	Total
Project or Program Description	**Actual**	**Actual**	**Actual**	**Forecast**	**Actual/Forecast**
Growth – HAF	5	16	18	9	48

6.2 Projects completed by year 2012–13 to 2015–16

Major projects completed in each year during the current price path, and project benefits, are outlined in Table A6-2 and Table A6-3 below. Major projects forecast to be completed during the current price path, and project benefits, are outlined in Table A6-4 and Table A6-5.

Table A6-2 Major projects completed or substantially complete in 2012–13

Project	Project benefits
Wastewater Main Renewals (outputs achieved in 2012–13)	Renewed 12.2 km of key wastewater mains that are nearing the end of their service life to reduce the impact of failures on the community and the environment. Rehabilitated 35 km of wastewater mains to reduce dry weather and repeat overflows affecting customers.
Water Main Renewals (outputs achieved in 2012–13)	Renewed and replaced 72.2 km of water reticulation mains (including decommissioning of 3.2 km of reticulation mains) and 18.4 km of water trunk mains (including decommissioning of 5.8 km of trunk mains) to maintain water supply and to reduce interruptions. Decommissioned water mains are redundant assets which are retired, resulting in maintenance cost savings and avoided renewal costs.
Water Flow Meter Program	Installed 263 flow meters over the life of the program to improve the efficiency of leakage identification and management, reduce operating costs and improve system capacity modelling.
Water Pressure Management Program	Delivered 180 pressure management schemes over the life of the program to reduce water mains breaks and leakage and achieve water savings of 27 ML a day.
Warriewood Wastewater Treatment Plant Upgrade	Improved reliability of operation at the plant and increased ability to cater for expected growth in the Pittwater area.
Hoxton Park Recycled Water Scheme	Provision of recycled water to new homes and industrial areas in Edmondson Park, Ingleburn Gardens and Hoxton Park development areas. Benefits include reduced potable water consumption and reduced downstream wastewater flows to the Malabar system.
South West Growth Centre, Spring Farm and Elderslie Major Drinking Water Mains	Constructed 12.2 km of trunk water mains to service growth in the areas of Oran Park, Turner Road, Spring Farm and Elderslie.
Edmondson Park Infrastructure	Provision of wastewater and water infrastructure to 2,000 new dwellings in Edmondson Park.

Project	Project benefits
Replace Wastewater Pumping Station SPS259 Quakers Hill	Construction of a new wastewater pumping station at Quakers Hill to replace an existing pumping station with a high risk of failure.
Malabar Odour Management	Upgraded the odour control facility at the Malabar Wastewater Treatment Plant to increase reliability, reduce the impact of odours on the local community and meet licence requirements.
Homebush Data Centre Refurbishment	Refurbishment of the Data Centre, upgrade of building services and structured IT cabling system. Benefits include increased operational reliability and safety, reduced operating costs and a reduced carbon footprint.
Appin Wastewater Scheme	Construction of a pressure sewerage system for about 550 properties in the urban village of Appin, to help protect the environment and reduce risks to public health.
Sydney Water Information Management Program	Delivered new systems to improve information management and enhance the efficiency of business operations.
Wet Weather Overflow Abatement Program	Completed the Illawarra and Quakers Hill catchments to reduce the frequency of wet weather overflows in those catchments.

Table A6-3 Major projects completed or substantially complete in 2013–14

Project	Project benefits
Wastewater main renewals (outputs achieved in 2013–14)	Renewed 15.6 km of key wastewater mains that are nearing the end of their service life to reduce the impact of failures on the community and the environment. Rehabilitated 21 km of reticulation wastewater mains to reduce dry weather and repeat overflows affecting customers.
Water main renewals (outputs achieved in 2013–14)	Renewed 33.1 km of water reticulation mains (including decommissioning of 1.7 km of water mains) to maintain water supply and reduce interruptions. Renewed 7.4 km of water trunk mains to maintain water supply and to reduce interruptions.
Camden Wastewater Treatment Plant Biosolids Amplification.	Project increased the biosolids treatment capacity of the plant from sewage flows of 10.5ML a day to 23 ML a day to provide for growth in the catchment.
Upgrade of Wastewater Pumping Station SPS614 Narellan	Amplification of SPS 614, Narellan, to service growth in the Turner Road precinct of the South West Growth Centre and adjoining development areas.

Table A6-4 Major projects forecast to be completed or substantially completed in 2014–15

Project	Project benefits
Wastewater main renewals (outputs achieved in 2014–15)	Renewal of 18 km of key wastewater mains that are nearing the end of their service life to reduce the impact of failures on the community and the environment. Rehabilitation of 25 km of reticulation wastewater mains to reduce dry weather and repeat overflows affecting customers.
Water main renewals (outputs achieved in 2014–15)	Renewal of 45 km of water reticulation mains to maintain water supply and reduce interruptions. Renewal of 11.7 km of water trunk mains to maintain water supply and to reduce interruptions.
Douglas Park Sewerage Scheme	Construction of a pressure sewerage system servicing around 150 existing lots in the subsidised priority sewerage service area of Douglas Park village.
New SPS 1146 Balmain to Replace SPS0008	Construction of wastewater pumping station SP1146 (replacing SP0008) to provide reliable ongoing wastewater services to the Balmain area while meeting operating licence requirements. The project also meets the demand of future growth and provides a safe working environment for Operational and Maintenance staff.
Picton Sewerage System Amplification (Stage 1)	Completion of a 350 metre lead-in gravity wastewater main to service West Picton, and upgrade of the Picton wastewater treatment plant’s tertiary treatment facilities to service growth in the Picton wastewater system.
Galston and Glenorie Sewerage Schemes	Construction of two pressure wastewater systems to service around 605 lots in the Priority Sewerage Program areas of Galston and Glenorie villages.
Bargo Sewerage Scheme	Construction of a pressure wastewater system to service around 830 existing lots in the Priority Sewerage Program area of Bargo village.
Buxton Sewerage Scheme	Construction of a pressure sewerage system servicing around 700 existing lots in the Priority Sewerage Program area of Buxton village.
Winmalee Tunnel Project	Amplification of drop shafts in the Winmalee Tunnel to ensure the wastewater system continues to operate safely and efficiently during heavy wet weather events and to protect drop shafts at Lugarno Avenue and Lawson Road from structural damage.
Cronulla Odour Management	Cronulla WWTP odour reduction project to reduce impacts on nearby residential/commercial development and increase plant reliability.
North West Growth Centre Package 2 (includes the Accelerated Housing Program)	Provision of water related services to the second release precincts of the North West Growth Centre. Including a 6.2 km wastewater main in North Kellyville servicing 2,000 dwellings, and a 4.1 km wastewater main in Riverstone East servicing 1,500 dwellings.

Project	Project benefits
Wilton Sewerage Scheme	Construction of a pressure wastewater system servicing 256 existing lots in the Priority Sewerage Program area of Wilton village and transfer of the wastewater to the water recycling plant at Bingara Gorge owned by Lend Lease Communities (LLC).
West Hoxton Sewerage Scheme	Construction of a gravity sewerage system servicing 91 existing lots within the priority sewerage service area of West Hoxton village and transfer via gravity main to the existing Hoxton Park wastewater system.
Cowan Sewerage Scheme	Construction of a pressure sewerage system servicing 248 existing lots in the subsidised priority sewerage service area of Cowan village and transfer of the wastewater to the existing Berowra sewerage system.
St Marys Wastewater Growth Servicing	Construction of wastewater infrastructure to provide for growth in the St Marys area while maintaining the sewerage network wet weather performance.

Table A6-5 Major projects forecast to be completed or substantially complete in 2015–16

Project	Project benefits
Wastewater main renewals (outputs achieved in 2015–16)	Forecast to renew 9 km of wastewater mains that are nearing the end of their service life to reduce the impact of failures on the community and the environment. Forecast to rehabilitate 25 km of reticulation wastewater mains to reduce dry weather and repeat overflows affecting customers.
Water main renewals (outputs achieved in 2015–16)	Forecast to renew 45 km of water reticulation mains to maintain water supply and reduce interruptions. Forecast to renew 11.7 km of water trunk mains to maintain water supply and to reduce interruptions.
Metropolitan IICATS Water RTU Renewals	Forecast to complete the replacement of remote terminal units used for telemetry and controls at 324 water sites to ensure critical assets are maintained at appropriate standards, and meet Sydney Water's current and future operational needs.
South West Growth Centre 2nd Release Precincts Wastewater Infrastructure	Forecast to complete wastewater infrastructure to service growth in the South West Growth Centre precincts of East Leppington, Leppington North, Leppington and the adjoining area of Emerald Hills.
North Head NSOOS Scrubber Replacement	Forecast to complete the replacement of the odour scrubber at the North Head treatment plant to reduce odour emissions and corrosion at the North Head WWTP and the Northern Suburbs Ocean Outfall System (NSOOS).

Project	Project benefits
West Dapto Infrastructure	Forecast to complete the first package of water and wastewater infrastructure to service projected growth from the West Dapto Urban Release Area and adjacent growth areas.
Menangle Park Wastewater Growth Servicing	Forecast to complete Stage 1 wastewater infrastructure to service initial development within the Menangle Park Release Area.
Field Services Management	The SIRIUS Program is replacing the legacy field mobility platform used by our maintenance workforce to manage day to day operational work. The new platform delivers a single consolidated mobility platform to support ongoing efficiency improvement programs and provide a foundation for future strategic improvements.

6.3 2012–13 to 2015–16 Capital Expenditure Outputs

Output Classification	Description	Output Measure	Output Target 2012–16 (a)	Output Delivered 2012–13	Output Delivered 2013–14	Output Delivered 2014–15	Output Forecast 2015–16	Output Forecast 2012–16 (b)	Variance 2012–16 (b – a)	Comments
Water										
Renewal of trunk water mains	Renewals of critical water mains that are nearing the end of their service life. Program aims to ensure assets continue to operate at an acceptable performance level in delivering water to customers, and minimising the impact on the community and the environment through failures	km	51	18.4	7.4	11.7	11.7	49.2	–1.8	49.2 km are forecast to be renewed over the 2012–13 to 2015–16 period (including 5.8 km of mains decommissioned), which is 2 km less than the four-year target. Continuity of supply is being satisfactorily managed with assets monitored and renewed as required.
Renewal/ reliability of distribution mains	Renewals and reliability upgrades of reticulation pipelines that are nearing the end of their service life. Program aims to ensure assets continue to operate at an acceptable performance level in delivering water to	km	287	72.2	33.1	45	45	195.3	-91.7	195 km are forecast to be renewed over 2012–13 to 2015–16 Including 4.9 km of mains decommissioned), which is 92 km less than the four-year target. The variance is mainly due refinements in decision-making processes resulting in reduced lengths of main needing renewal.

Output Classification	Description	Output Measure	Output Target 2012–16 (a)	Output Delivered 2012–13	Output Delivered 2013–14	Output Delivered 2014–15	Output Forecast 2015–16	Output Forecast 2012–16 (b)	Variance 2012–16 (b – a)	Comments
	customers, and minimising the impact on the community and the environment through failures									Continuity of supply is being satisfactorily managed with assets monitored and renewed as required.
Reservoir Renewals and Reliability Program		Number of Roofs Renewed	13	0	0	9	3	12	-1	12 reservoir roofs are forecast to be renewed over 2012–13 to 2015–16, 1 less than the four-year target.
		Number of Reservoirs Relined	24	1	0	5	2	8	-16	Variance due to an improved risk-based planning approach, which has resulted in deferral of planned relining work to align with roof renewals. Significant cost savings are being achieved through completing the relining and roof renewals together.

Output Classification	Description	Output Measure	Output Target 2012–16 (a)	Output Delivered 2012–13	Output Delivered 2013–14	Output Delivered 2014–15	Output Forecast 2015–16	Output Forecast 2012–16 (b)	Variance 2012–16 (b – a)	Comments
Water Pumping Station Renewals	Program to renew water pumping stations identified as fair, poor or very poor. Final target is subject to outcome of future site condition assessments.	Number of Pumping Stations Renewed	24	5	0	4	9	18	-6	Variance primarily due to decommissioning of water pumping stations that were planned for renewal. Water pumping stations have been condition assessed and assets renewed when required, maintaining continuity of supply.
System Reliability		Number of projects in construction phase	3	0	0	0	0	0	-3	Due to a risk-based revision of the system reliability strategy and approach, all system reliability projects have been deferred to beyond 2015–16.
Renewal of customer water meters	Program targeted to improve measurement and monitoring of water volume and service reliability	Number of meters renewed	384,400	63,578	69,727	85,300	100,100	318,705	-65,695	Variance primarily due to the evidence-based revision of the criteria used for replacing meters, which allows extended operational life of meters.
Wastewater										

Output Classification	Description	Output Measure	Output Target 2012–16 (a)	Output Delivered 2012–13	Output Delivered 2013–14	Output Delivered 2014–15	Output Forecast 2015–16	Output Forecast 2012–16 (b)	Variance 2012–16 (b – a)	Comments
Renew large diameter wastewater mains	Program to renew 'Avoid Fail' category sewers that are nearing the end of their service life, including rising mains	km	64	12.2	15.6	18	9	54.8	-9.2	Variance due to improved risk-based approach to renewals, including increased application of magnesium hydroxide coating to defer renewals. Access issues have also delayed some renewal works on the Northern Suburbs Ocean Outfall Sewer.
Rehabilitate sewers subject to dry weather overflows	Program to abate dry weather overflows that reach waterways and repeat overflows affecting customers	km	137	35	21	25	25	106	-31	Variance primarily due to the clearance of all backlog work and reduced renewals candidates being identified through CCTV condition inspections.
Sewage Treatment Plants (WWTP) renewals	Program to ensure North Head, Cronulla and Malabar WWTPs meet licence performance requirements through to 2023	Sites	3 Sites – North Head, Cronulla and Malabar	0	0	Malabar; 60% of the North Head project complete	Cronulla	2.6	-40% North Head	North Head: 60% completed in 2014–15 with the balance forecast to be completed beyond 2015–16 Cronulla: To be completed in 2015–16 Malabar: Completed in 2014–15.

Output Classification	Description	Output Measure	Output Target 2012–16 (a)	Output Delivered 2012–13	Output Delivered 2013–14	Output Delivered 2014–15	Output Forecast 2015–16	Output Forecast 2012–16 (b)	Variance 2012–16 (b – a)	Comments
	High-voltage electrical upgrades/renewals	Number	11	1	2	3	4	10	-1	Condition assessments have indicated that we are able to defer one project.
Reduce wet weather overflows	Program designed to abate repeat wet weather overflows to properties and those impacting on swimming and environmental sensitive sites. Catchments include: Northern beaches, Illawarra and Southern catchments	Catchments	3	2	0	0	1	3	0	Capital works completed in Northern Beaches and Illawarra catchments. Northern Beaches included two solutions, a local and major solution. Wolli Creek forecasted to be completed in 2016.
Stormwater										
Pipe and channel renewal and rehabilitation	Renewal and rehabilitation program of stormwater pipes and channels that have reached the end of their service	km	3.5	0.22	0.09	1.41	1.90	3.62	0.12	

Output Classification	Description	Output Measure	Output Target 2012–16 (a)	Output Delivered 2012–13	Output Delivered 2013–14	Output Delivered 2014–15	Output Forecast 2015–16	Output Forecast 2012–16 (b)	Variance 2012–16 (b – a)	Comments
	life.									
Stormwater condition assessment		km	91.76	33.2	49.9	44.6	46.1	173.8	82.04	Based on current condition assessment planning, 173.8 km is forecast to be completed compared with the original target of 91.76 km.

6.4 Proposed capital expenditure 2016–17 to 2019–20

Major capital investments by program over 2016–17 to 2019–20 are listed in Table A6-6 below.

Table A6-6 Forecast/actual capital expenditure 2016–17 to 2019–20 ($m, $2015–16)

Project or Program Description	2016–17	2017–18	2018–19	2019–20	Total
Information Technology	82	82	82	82	**328**
Wastewater Treatment Plant Renewals Program	70	70	73	77	**290**
Avoid Fail Sewer Rehabilitation Program	53	52	54	56	**215**
Private sector delivered growth	58	44	52	42	**196**
North West Growth Centre	34	87	60	2	**183**
Quakers Hill WWTP Renewal	6	21	72	75	**173**
Reticulation Water Main Renewals	34	34	34	34	**134**
Wet Weather Overflow Abatement	28	33	38	29	**127**
Critical Water Main Renewals	29	29	29	29	**116**
South West Growth Centre	49	22	18	26	**114**
Stormwater drainage Renewals	23	20	36	24	**103**
Reservoir Reliability Program	25	24	24	24	**97**
Infill Growth	30	44	16	5	**95**
Other Greenfield Growth	31	30	9	1	**71**
Wastewater Pumping Station Renewals Program	17	18	18	17	**69**
Water Pumping Station Renewals Program	15	17	13	13	**58**
Monitoring and Control – IICATS and SCADA	12	14	13	10	**48**
Dry Weather Overflow Reduction	12	12	12	12	**47**
Meter Investment Program	10	11	10	11	**42**
Other Projects	13	12	6	8	**39**
Property Management and Acquisition	10	8	8	7	**33**
Winmalee WWTP – nutrient upgrade	1	1	10	14	**26**
Water Filtration Plant Renewals	6	6	6	6	**25**

Project or Program Description	2016–17	2017–18	2018–19	2019–20	Total
West Dapto Urban Release Area	5	14	4	0	**23**
Corrosion and Odour strategy	13	5	0	4	**22**
System Reliability	6	2	5	5	**18**
Network OCU and CDU renewals	4	5	4	4	**17**
NSOOS and North Head Odour and Corrosion Management	9	6	0	0	**15**
Malabar WWTP Improvement Program	11	1	1	0	**13**
Networks Assets Data Improvement Project (DIP2)	8	4	0	0	**12**
Energy Management Program	4	6	1	1	**12**
Broader Western Sydney Employment Lands First Release Water	0	0	1	0	**1**
Total	**707**	**733**	**708**	**617**	**2,764**

The above growth expenditure excludes the following works funded under the NSW Government HAF:

Project or Program Description	2012–13	2013–14	2014–15	2015–16	Total
Riverstone Lead-Ins	9	0	0	0	**9**

Table A6-7 Overview of major capital projects forecast for 2016–17 to 2019–20

Project	Total Project cost ($m, $2015–16)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Quakers Hill WWTP Renewal	174.3	Primarily asset condition, reliability and redundancy with some capacity for growth.	90% renewal 10% growth	1) Renew existing plant 2) Transfer dry weather flow from Quakers Hill to Riverstone (new plant constructed at Riverstone) 3) Consolidate biosolids processing from Quakers Hill to St Marys WWTP and renew Quakers Hill WWTP	Medium	High
Towards 2020	158	Current billing systems is based on a bespoke mainframe solution that is 28 years old	100% Renewal	1) Implement a Commercial Off The Shelf solution 2) Re-write existing system 3) Create new bespoke system	High	High
Riverstone WWTP Stage 1 Amplification	77.6	Population growth will exceed plant capacity by 2018	100% growth	1) Defer upgrade and merge with a renewal of Quakers Hill 2) package ultimate capacity upgrade into multiple stages	Medium	High
Green Square Trunk	40.2	Amplification of stormwater drainage	100%	1) Detention basins	High – contract	High

Project	Total Project cost ($m, $2015–16)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Drainage		assets to accommodate growth at Green Square and mitigate existing flood risk	growth	2) land acquisition or amplify existing assets	awarded	
NWGC – Package 3 Wastewater	40.1	New assets required to service greenfield release areas (Box Hill, Riverstone, Riverstone East and Vineyard in the NWGC	100% growth	No existing assets. Optimise packages of work to service catchments of development demand within precincts	Medium	High
North Head WWTP – Biosolids Amplification	40.1	Improve current performance of biosolids product quality, which will diminish further as loads to the plant increase due to population growth in the catchment.	80% reliability 20% growth	Transfer, treat and dispose at an off-site facility	Medium	Medium
SWGC – First Release Wastewater Stage 2 Oran	36.2	New assets required to service Oran Park in the SWGC	100% growth	Build new treatment plant or build SPS and use adjacent network and Camden treatment plant	Medium	High

Project	Total Project cost ($m, $2015–16)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Park						
WWOA Program – HotSpots 3 – Woolloomooloo	32.8	Separation of combined sewer and stormwater system to remove sewerage pollution in Sydney Harbour and odours in Woolloomooloo.	100% mandatory	Second pipeline to be sewer or stormwater depending on practicality and cost.	Medium	High
SWGC – Second Release Water Stage 2 Leppington North, Austral	29.2	New assets required to service greenfield release areas (Leppington North and Austral)	100% growth	Existing assets at capacity (Stage 1 service). Optimise packages of work to service catchments of development demand within precincts	Medium	Medium
Spatial Transformation	$29	Critical business enabler providing accurate and timely spatial information to customers and staff	60% Renewal 40% Efficiency	1) Replace existing GIS platform with a contemporary platform 2) Maintain and enhance current GIS platform 3) Data visualisation tools to	Med	High

Project	Total Project cost ($m, $2015–16)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
				provide façade		
Winmalee WWTP – nutrient upgrade	26.4	EPA requirement to achieve Pollution Reduction Program outcomes.	100%	Three treatment options will be considered to achieve either a high, medium or low level of nitrogen and phosphorus effluent discharge concentration.	Medium	Medium
NWGC – Package 3 Water	25.2	New assets required to service greenfield release areas (Box Hill, Riverstone, Riverstone East and Vineyard in the NWGC	100% growth	No existing assets. Optimise packages of work to service catchments of development demand within precincts	Medium	High
Integrated Contact Centre and Self Service	25	Delivery of improved customer experience across assisted and self- service channels	40% Renewal 60% Efficiency	1) Multi-channel/Omni-channel software package leveraging Systems of Record consolidation 2) Customised best practice solution 3) Enhance and extend current products and services	Med	High

Project	Total Project cost ($m, $2015–16)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Rouse Hill WWTP – Biosolids Amplification	20.5	Biosolids digester capacity will be exceeded by 2015 due to growth in the Rouse Hill and Castle Hill WWTP catchments	80% reliability 20% growth	Transfer, treat and dispose at an off-site facility	Low (Strategic planning estimate)	Medium

6.5 Capital expenditure by drivers 2016–17 to 2019–20

Sydney Water's capital program is driven by the following categories of investment:

- Existing standards – investment in renewal or rehabilitation of assets to meet regulated system performance standards and required customer service levels
- New mandatory standards – expenditure required to meet new regulatory standards, such as system performance under Environment Protection Licences
- Urban growth – development of water, wastewater and stormwater infrastructure to meet the needs of new customers (greenfield and infill growth) or increased requirements of existing customers
- Business efficiency – investment in business capability, such as investments in information technology, or cost-effective renewable energy projects which deliver savings in operating expenditure
- NSW Government programs – including desalination, recycled water schemes, demand management projects.

6.5.1 Overview of Products by Driver

A large proportion of the total capital budget is invested in maintaining existing standards (ie renewals and reliability) of Sydney Water's existing assets alone. The second largest individual expenditure driver is growth. Investment in projects to meet mandatory standards, business efficiency and government directed programs make up the remainder of the investment program.

Water investment 2016–17 to 2019–20

$731 million ($2015–16) will be invested in the water supply system over the next price period. This investment will contribute towards maintaining an acceptable risk profile for these assets, serving urban growth (31%) and maintaining current performance standards (69%). This includes compliance with Australian Drinking Water Quality guidelines, maintaining a low level of water main breaks and leaks and achieving water pressure standards.

Table A6-8 Water capital expenditure by driver ($m, $2015–16)

Driver	2016–17	2017–18	2018–19	2019–20	Total
Business efficiency	0	0	0	0	0
Government program	0	0	0	0	0
Growth	64	65	61	37	227
Mandatory standards	0	0	0	0	0
Existing standards	131	125	124	124	504
Total	**195**	**189**	**185**	**161**	**731**

Wastewater investment 2016–17 to 2019–20

$1,500 million ($2015–16) will be invested in the wastewater system (including $9 million HAF expenditure in 2016–17). This investment will contribute towards maintaining an acceptable risk profile for these assets, maintain current performance standards (59%), serving urban growth (27%), meeting mandatory wet weather overflow abatement requirements (10%) and provide a positive investment return for corrosion prevention and energy efficiency and energy efficiency works (3%).

Table A6-9 Wastewater capital expenditure by driver ($m, $2015–16)

Driver	2016–17	2017–18	2018–19	2019–20	Total
Business efficiency	25	17	1	1	45
Government program	0	2	0	1	3
Growth	125	155	91	38	409
Mandatory standards	28	34	48	43	154
Existing standards	193	196	246	255	890
Total	**372**	**405**	**387**	**337**	**1,500**

Stormwater system investment 2016–17 to 2019–20

$159 million ($2015–16) will be invested in the stormwater system. This investment will contribute towards maintaining the existing risk profile for these assets, maintaining current performance standards (45%), serving urban growth (36%) and introduces a new set of works for flood mitigation in high risk urban areas and waterway health projects at high value sites (20%).

Table A6-10 Stormwater capital expenditure by driver ($m, $2015–16)

Driver	2016–17	2017–18	2018–19	2019–20	Total
Business efficiency	0	0	0	0	0
Government program	0	0	0	0	0
Growth	26	22	7	2	57
Mandatory standards	0	0	0	0	0
Existing standards	23	20	36	24	103
Total	**49**	**42**	**42**	**25**	**159**

Corporate capital expenditure 2016–17 to 2019–20

$383 million ($2015–16) will be invested in corporate assets (excluding capitalised borrowing costs). This investment will renew key information technology platforms, including our billing system. It will also enable improved financial return on property disposals and compliance with property, safety and heritage regulations.

Table A6-11 Corporate capital expenditure by driver ($m, $2015–16)

Driver	2016–17	2017–18	2018–19	2019–20	Total
Business efficiency	28	26	26	25	105
Government program	0	0	0	0	0
Growth	0	0	0	0	0
Mandatory standards	1	1	1	1	5
Existing standards	70	69	67	67	273
Total	**99**	**96**	**94**	**94**	**383**

Table A6-12 2016–17 to 2019–20 Capital Expenditure Outputs

Output Classification	Description	Output Measure	Output Target 2016–17 – 2019–20
Water			
Trunk water mains	Renewals of critical water mains	km	47
	Renewal of large valves	Number	100
Reticulation water mains	Renewals and reliability upgrades of reticulation mains	km	180
Reservoirs	Roof renewal or extensive repair of reservoirs	Number	33
	Renewal or extensive repair of rechlorination plants	Number	18
Water pumping stations	Renewal of water pumping stations	Number	18
	High-voltage electrical upgrades	Number	17
Wastewater			
Large wastewater mains	Renewal of large gravity mains	km	34
	Renewal of pressure mains	km	4
	Rehabilitation of the NSOOS	km	6.4
Wastewater pumping stations	Renewal of wastewater pumping stations	Number	58
	Renewal of vacuum sewerage systems	Number	6
	High-voltage electrical upgrades	Number	5
Wastewater reticulation mains	Renewal of wastewater reticulation mains	km	112
Stormwater			
Stormwater channels, culverts and pipes	Renewal of open channels, culverts and pipes	km	7
	Relining pipes	km	2
	Renewing fences	km	5

Appendix 7 – HoustonKemp Economists Report

Equity Beta for a Benchmark Australian Water Network Service Provider

This appendix relates to the discussion in Chapter 9 on using the equity beta in IPART's methodology for setting the weighted average cost of capital. The HoustenKemp Report is attached as a separate document.

Appendix 8 – Water demand, chargeable wastewater and property forecasting method

This appendix provides additional information to Chapter 12 on water and wastewater demand and property forecasting.

8.1 Introduction

Prior to the 2012 price determination Sydney Water used a "top down" approach to forecasting demand. Forecasts were based on a constant "per capita baseline demand" of 426 litres per person per day (LPD). This included all components of demand, ie residential and non-residential consumption but also unmetered demand and network losses.

This per capita baseline demand was multiplied by forecasts of the total population served by Sydney Water to forecast total baseline demand. This forecast was then reduced by subtracting the estimated water savings from water conservation activities such as Sydney Water's water efficiency programs, leak reduction activities and water recycling programs.

For the 2008 price determination, the IPART commissioned McLennan Magasanik Associates (MMA) to review Sydney Water's forecasts. MMA considered that the "top down" approach had several limitations and that directly forecasting residential and non-residential water use was preferable.[22]

For the 2012 price determination Sydney Water developed a new approach which addressed the concerns raised by MMA. The new approach relies on detailed segmentation of the customer base and econometric analysis of water consumption in each segment. It was based on a method developed by Sydney Water and Dr Vasilis Sarafidis, then lecturer in econometrics at the University of Sydney and an expert in panel data econometrics, for a study of the price elasticity of residential water consumption.[23]

As part of the 2012 price determination process IPART organised a workshop, attended by a number of modelling experts and other stakeholders, at which Sydney Water presented its new approach. At this workshop it was acknowledged that the new approach was "a significant improvement on past techniques and represents best practice".[24] However, there were some concerns that the model may be underestimating the potential "bounce back" of demand following the lifting of restrictions.

The forecasts presented in this submission are based on updated and refined versions of the models developed for the 2012 determination.

In 2013, Sydney Water updated the non-residential models using the same segmentation and time series regression approach used for the 2012 determination.

In 2014, Sydney Water updated the residential demand forecasting model for the 2016 price determination. We have re-estimated the residential models using only data from the period after

[22] McLennan Magasanik Associates, *Review of Consumption for Sydney Water Corporation*, Final report to the Independent Pricing and Regulatory Tribunal, 2008.
[23] B. Abrams, S. Kumaradevan, F. Spaninks and V. Sarafidis, "An Econometric Assessment of Pricing Sydney's Residential Water Use", *The Economic Record*, 2012, Vol. 88, pp 89–105.
[24] Independent Pricing and Regulatory Tribunal. *Review of prices for Sydney Water Corporation's water, sewerage, stormwater drainage and other services. From 1 July 2012 to 30 June 2016. Final Report*, June 2012, pp 96.

water restrictions were lifted. We engaged Dr Sarafidis, now with Monash University, to estimate the econometric models for the residential segments.

Sydney Water has also updated its model to forecast the chargeable wastewater volume for this submission.

This appendix provides some further detail on models. Section 8.2 discusses the models for residential and non-residential water demand, Section 8.3 discusses the update of the chargeable wastewater model and Section 8.4 the property forecast method.

8.2 Demand forecasting method

8.2.1 Residential water demand

Residential demand accounts for about two thirds of total water demand. About 70% of residential water use is by single dwellings (mainly detached and semi-detached houses) and the remaining 30% by multi-residential dwellings (flats and strata units, including townhouse strata units).

Sydney Water has undertaken panel data regression analysis of residential water use at the property level. The panel dataset consists of the demand data of individual properties in multiple quarters. Therefore, it provides both cross-sectional and time series information about water demand.

A key advantage of panel data analysis is the ability to obtain more accurate estimates of how various factors such as price, weather and water efficiency programs influence demand than can be obtained using only cross-sectional data or only time series data. Using panel data analysis one can also control for omitted variables for which data is not available at the level of an individual property, eg number of people living at the property.

Developing reliable econometric models using panel data requires sophisticated estimation methods together with experience in modelling and analysing large datasets. Sydney Water engaged Dr Vasilis Sarafidis, an expert in panel data econometrics, to estimate the models using datasets developed by Sydney Water.

Segmentation, sample size and sampling period

Residential properties were segmented on the basis of the following characteristics:

- dwelling type (single dwellings, townhouse units, strata units, flats and dual occupancies)
- Building Sustainability Index (BASIX) status, ie built prior to or after the BASIX regulation came into effect
- presence of a reticulated recycled water supply (eg Rouse Hill)
- tenancy status, ie owner-occupied or tenanted
- participation in Sydney Water’s water efficiency programs.

Single dwellings were also segmented on the basis of lot size. The number of lot size segments and the range of lot sizes in each were determined using the k-means partitional clustering algorithm included in Stata 12, a widely used statistical software program.

Townhouse units and strata units were also segmented into blocks consisting of two units and those consisting of more than two units.

Sometimes the level of segmentation was limited by the number of available properties. For example, the sample of post-BASIX townhouses is fairly small. This means that it was not practical to segment them any further on recycled water supply, tenancy status, participation in water efficiency or number of units in the block.

Also, some segmentation variables cannot be meaningfully applied to some dwelling types. For example, consumption by strata units can only be analysed on the level of a block of units due to common meters. Within a block some units will be owner occupied while others will be tenanted. Therefore we cannot segment strata units on tenancy status.

The final number of segments was 60 – see Figure A8-1. A separate model was estimated for each segment, with the exception of dual occupancies. We found that if we treated dual occupancies as two single dwellings and applied the models for single dwellings this resulted in a very close fit. Since dual occupancies are a small segment (about 2% of all dwellings) with negligible growth, we decided not to estimate a separate model for them but instead simply apply the models for single dwellings to this segment. Therefore the total number of models estimated is 59.

Figure A8-1 Residential segments

Dwelling type	BASIX	Recycled water supply	Tenancy	Participated in a Sydney Water efficiency program	Lot size groups	Number of units
Single dwelling	Pre-BASIX	No	Owner-occupied	No	7	
				Yes, before July 2009	8	
				Yes, after July 2009	4	
			Tenanted	No	6	
				Yes, before July 2009	6	
				Yes, after July 2009	4	
		Yes	Owner-occupied	No		
				Yes		
			Tenanted	No		
				Yes		
	BASIX	no	Owner-occupied	No		
				Yes		
			Tenanted			
		Yes	Owner-occupied	No		
				Yes		
			Tenanted			
Townhouse strata unit[25]	Pre-BASIX		Owner-occupied	No		2
						> 2
				Yes		2

[25] The difference between a townhouse strata unit and a strata unit is that the former have their own meter whereas the latter have a common meter only. In the case of townhouse units we can analyse the consumption of individual units. In the case of strata units we can only meaningfully analyse the consumption of the block as a whole or the average consumption in the block (ie total consumption divided by the number of units in the block).

				> 2
		Tenanted	No	2
				> 2
			Yes	2
				> 2
	BASIX			
Strata unit	Pre-BASIX			2
				> 2
	BASIX			
Flats	Pre-BASIX			
	BASIX			
Dual occupancies				

The difference between strata units and flats is mainly one of ownership. In the case of strata units there is a separate title and separate owner for each unit. In the case of flats there is a single title and owner for the block only. For example, the block may be owned by the Department of Housing or it may be held under a company title arrangement. This has implications for billing purposes which is why Sydney Water distinguishes between them.

Segmentation allows for “response heterogeneity”, ie different responses by each segment to the explanatory variables included in the model. For example, single dwellings on relatively large lots have, on average, larger garden areas than single dwellings on relatively small lots. Therefore, single dwellings on relatively large lots are likely to use more water for garden watering than single dwellings on relatively small lots and therefore demand by the former is likely to be more sensitive to weather. Segmenting properties on lot size and estimating a separate model for each segment is likely to result in more accurate estimates than would be obtained by estimating a single model.

The total sample consisted of about 440,000 single dwellings, 15,000 townhouse units and 22,000 blocks of strata units and flats (representing about 249,000 dwellings). The sample size within each of the 60 segments varied from a few hundred to several thousand.

The sampling period covers the 15 quarters from July 2010 to March 2014. The dataset consists of the consumption, in the form of 15 quarterly meter readings, for all sample properties over this period together with data on weather conditions (rainfall, temperature and (pan) evaporation), season, participation in Sydney Water’s efficiency programs and water usage price.

Unlike the dataset that was used to estimate the models that were used for the 2012 price determination, we do not include any data from the period affected by water restrictions (October 2003 to June 2009). Also, we did not use data from the first year following the lifting of restrictions to estimate the new models. This is because we estimate, based on the analysis that was carried out for the old model, that it takes about one year for the full effect of bounce back to occur.

A major challenge in preparing the dataset was to match weather conditions to the quarterly consumption of each property. Because of the large number of meters installed (more than 1.3 million) not all meters are read on the same date. It takes about 10 weeks to read all meters each quarter. Therefore, the exact period covered by two meter readings taken at two different properties in the same quarter can differ by up to 10 weeks. Consequently, the weather conditions that applied during the period covered by each of these two readings, even though they are taken in the same quarter, can differ substantially.

To account for this we determined the exact dates covered by each individual meter reading. We then took the daily weather observations for that period to calculate the correct values of the weather variables that applied during those dates.

Also, because of the size of Sydney Water's area of operations, even on the same day there can be large differences in weather conditions at two different locations. To account for this we used data from 12 weather stations spread over Sydney Water's area of operations.[26] The value of the weather variables for each property are a weighted average of the observations from these 12 stations where the weights are based on the distance of each property to each station – the closer the station, the larger the weight.

Model specification and estimation

The model specification is as follows:

$$\begin{aligned}\ln c_{it} = \alpha \cdot \ln c_{it-1} &+ \beta_1 \cdot p_{it-1} + \beta_2 \cdot dtemp_{it} + \beta_3 \cdot drain_{it} + \beta_4 \cdot devap_{it} \\ &+ \beta_5 \cdot tempgt30c_{it} + \beta_6 \cdot raingt2mm_{it} + \beta_7 \cdot wf_{it} + \beta_8 \cdot tlr_{it} + \beta_9 \cdot wmr_{it} \\ &+ \beta_{10} \cdot lyg_{it} + \beta_{11} \cdot tlr_{it} + \beta_{12} \cdot rwt_{it} + \beta_{13} \cdot sum_{it} + \beta_{14} \cdot aut_{it} + \beta_{15} \cdot spr_{it} \\ &+ u_{it}\end{aligned}$$

$$u_{it} = \eta_i + \varepsilon_{it},\ |\alpha| < 1$$

where[27]

$\ln c_{it}$ denotes the natural logarithm of average daily consumption (litres a day) of household *i* in quarter *t*

$\ln c_{it-1}$ denotes the natural logarithm the average daily consumption of household *i* in the previous quarter *t*-1.

$price_{it-1}$ denotes the (real) water usage price (dollars per kL; $2011–12) paid by household *i* in quarter *t*-1.

$dtemp_{it}$ denotes the average maximum temperature (°C) for household *i* in quarter *t*.

$drain_{it}$ denotes the average daily rainfall (mm) for household *i* in quarter *t*.

$devap_{it}$ denotes the average daily evaporation (mm) for household *i* in quarter *t*.

$tempgt30c_{it}$ denotes the number of days when the temperature exceeded 30°C for household *i* in quarter *t*

$raingt2mm_{it}$ denotes the number of days that rainfall exceed 2 mm for household *i* in quarter *t*

wf_{it}, tlr_{it}, wmr_{it}, lyg_{it}, tlr_{it}, rwt_{it} denote if household *i* had participated in the following water efficiency programs in quarter *t*: WaterFix, toilet replacement, washing machine rebate, Love your Garden, toilet replacement, rainwater tank rebate.

sum_{it}, aut_{it}, spr_{it} denote the season during quarter *t* for household *i*.

[26] Evaporation is based on four stations because only four of these 12 stations collect evaporation data.
[27] Where it says "household *i* in quarter *t*" this should be really be read as saying "the period covered by the meter read for household *i* taken in quarter *t*". See the discussion about alignment of weather data and consumption in the preceding section.

β_1 to β_{15} are the regression coefficients. The error term, denoted u_{it}, is composite and consists of a household specific, time invariant component denoted η_i and the usual random noise component denoted ε_{it}. The household specific component η_i allows for unobserved, household specific effects that may be correlated with the explanatory variables such as geographical location and household size.

The above specification is the most general specification. The exact specification differed slightly between segments. For example, the models for segments consisting of households that did not participate in any of Sydney Water's water efficiency programs did not included the variables used to indicate when the property participated in these programs.

To estimate the regression coefficients, the variables are all converted to first "differences". That is, the model estimates the change in water use between the current and previous quarter as a function of the change in the explanatory variables (eg price, temperature) between the two quarters. The regression coefficients for the variables in first differences will correspond with those for the original equation above. That is, the regression coefficient for, say, the first difference in price is the same as the regression for price in the equation above. First differencing is applied for technical reasons. It controls for the effect of the unobserved household specific effects captured by η_i because this variable "drops out" when the equation is rewritten to first differences.

Because the model is converted to first differences to estimate the regression coefficients β_1 to β_{15} there is no estimate for the constant term. However, a constant can be estimated in a second step. This involves using the estimated model excluding the constant to estimate consumption in each quarter. The average of the difference between observed and estimated consumption in each quarter provides an estimate of the constant. We carried out this procedure for each property separately to calculate a property specific constant.

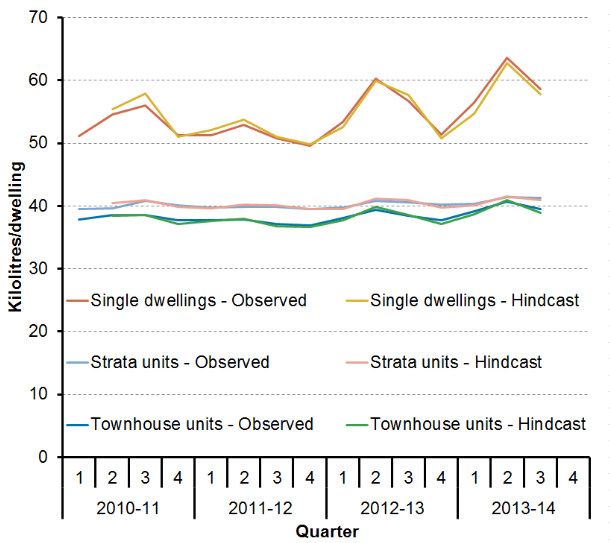
The technique chosen to estimate the regression coefficients is the Generalised Method of Moments (GMM) because the model includes endogenous variables which means Ordinary Least Squares (OLS) is not appropriate. More specifically, we used the xtabond2 estimation command in Stata which implements the GMM estimator developed originally by Hansen[28] and extended for dynamic panel data models by Arellano and Bond[29], Ahn and Schmidt[30], and Blundell and Bond[31], among others. GMM is a common choice when the explanatory variables are endogenous. In the present model, the lagged dependent variable (ln c_{it}) together with first differencing introduces endogeneity. In the old model, the price variable also introduced endogeneity because tier pricing applied during the period that was used to estimate the model. However, as tier pricing no longer applied during the period used to estimate the new model, price is not endogenous in the current model.

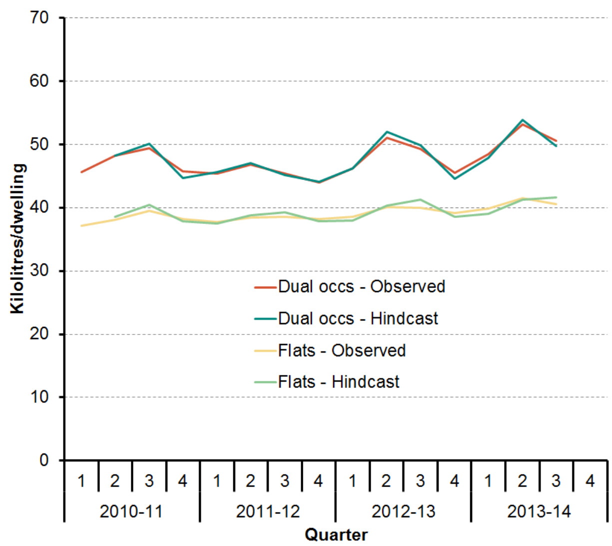
[28] L. Hansen. "Large Sample Properties of Generalized Method of Moments Estimators", Econometrica, 50, 1982, pp 1029–54.
[29] M. Arellano and S. Bond. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", Review of Economic Studies, 58, 1991, pp 277–97.
[30] S. Ahn and P. Schmidt. "Efficient Estimations of Models for Dynamic Panel Data", *Journal of Econometrics*, 68, 1995, pp 5–28.
[31] R. Blundell and S. Bond. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models", *Journal of Econometrics*, 87, 1998, pp 115–43.

Results

There is a close fit between the observed consumption over the estimation period and the estimates obtained from the model – see Figure A8-2 which shows observed and estimated average demand for the five residential dwelling types.

Figure A8-2 Observed average demand and model estimates for the five dwelling types





There have been significant variations in demand over the estimation period. As discussed in Chapter 12, these coincide with significant variations in weather conditions which are known to affect demand. While 2010–11 was relatively cool and wet, 2012–13 and 2013–14 were relatively hot and dry. The model can “explain” the increase in demand in the last two years on the basis of the variables included in the model only, most importantly weather variables.

There is no need to include an additional variable for bounce back to replicate the apparent upward trend in demand in the last two years. In other words, there is no evidence for any further bounce back of demand in the last three to four years.

We did experiment with model specifications that included variables to capture bounce back (such as time trends) but these did not improve model performance. The coefficients for these variables were not statistically significant. In fact, sometimes the coefficients had negative (although not statistically significant) values. If further bounce back had occurred this should have resulted in positive coefficients.

Forecasting approach

The estimated models can be used to forecast demand by inserting the expected values of the explanatory variables in the estimated models. In the model prepared for the 2012 determination this was carried out at the level of segments. In the new model this is carried out at the level of individual properties. The forecasts for the individual properties are then averaged to calculate a forecast of average demand for each of the five dwelling types. This forecast is then multiplied by the forecast number of properties for each of these five dwelling types to forecast total residential demand.

The main steps involved in this approach are:

1. For each existing residential property

- determine which of the 60 segments it belongs to
- apply the model for that segment to the property to estimate a constant term specific for that property
- use the model including the constant term to forecast demand for the property over the forecasting period by inserting expected values of the explanatory variables over the forecasting period.[32]

2. Average the forecast for the individual properties by delivery system, dwelling type and BASIX status. That is, take the forecasts of all pre-BASIX single dwellings in the Prospect system and average them, take the forecasts of all post-BASIX single dwellings in the Prospect system and average them, take the forecast of all pre-BASIX townhouse units in the Prospect system and average them, and so on.
3. Multiply the forecasts of average demand by dwelling type and BASIX status for each system by the forecast number of properties by dwelling type and BASIX status for each system. For example, multiply the forecast of average demand by post-BASIX strata units in the Macarthur system by the forecast number of post-BASIX strata units in the Macarthur system. The forecast number of pre-BASIX dwellings is the number of pre-BASIX dwellings as at quarter 4, 2013–14. The forecast number of post-BASIX dwellings is the number of post-BASIX dwellings as at quarter 4, 2013–14 plus the forecast dwelling growth.

To forecast demand it is assumed that long-term average weather conditions will apply. That is, the values of the weather variables that are inserted in the model to forecast demand for the forecasting period are their long term average values where long term refers to the 30-year period ending June 2013. Thirty years is a standard period used in meteorology to calculate climatic averages.

The forecast presented in this submission covers the five year period up to 2019–20, the last year of the next price path. It is impossible to forecast exact weather conditions five years ahead. Therefore we use long term average weather conditions to forecast demand.

Weather conditions vary from year to year, sometimes very significantly, eg 2011–12 vs 2012–13. This means that even if the model was able to perfectly forecast the effect of all other variables such as price and property growth, actual demand will always deviate at least somewhat from forecast demand. It is estimated that these essentially unpredictable fluctuations in weather conditions over the forecasting period can cause actual demand to differ from forecast demand by up to plus or minus 5 per cent in any one year.

However, over the four years covered by the price determination, such deviations are likely to average out to a large degree. While in some years weather will result in higher than forecast demand (eg 2012–13 and 2013–14) in other years it will result in lower than forecast demand (eg 2011–12). It is estimated that this reduces the potential difference between forecast and actual demand over the full four years to up to plus or minus 2 per cent. Therefore, we believe the assumption of average weather conditions is reasonable to forecast demand over the next price path.

[32] The resulting forecast also needs to be converted from logs to levels which involve the calculation of a correction factor for the bias this conversion introduces. Also, because the dependent variable of the model is average daily demand, the forecast is multiplied by the number of days in the quarter.

Also, there are no real practical alternatives to this approach. The Bureau of Meteorology publishes three month outlooks which are too short to be useful for the purpose of forecasting demand to 2019–20. Moreover they are generally termed in probabilistic terms, eg "a 60% probability of higher than average temperatures" and do not include evaporation, an important variable in many of the models.

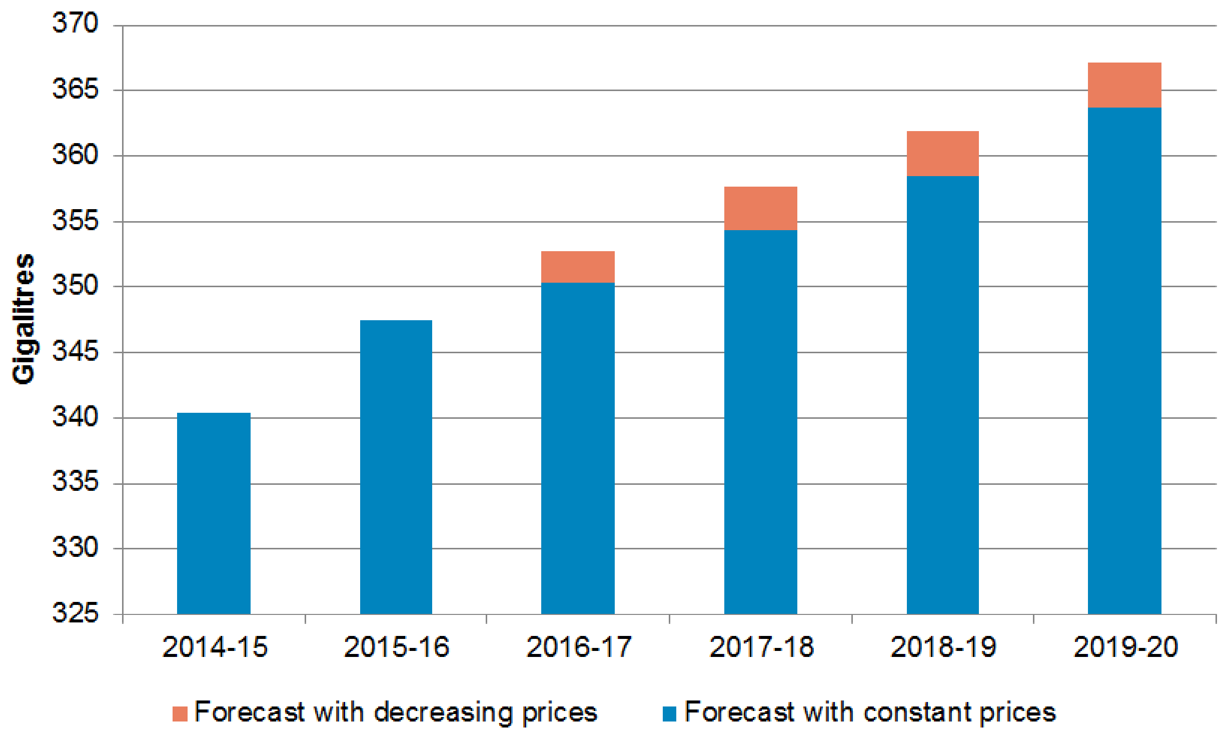
The variables relating to water efficiency participation, were kept constant at their current values as many of these programs have been discontinued or the number of participants is very low.

This submission proposes a decrease in the water usage price. The new model includes price and could therefore be used to forecast demand under the lower price by simply inserting the proposed price. However, price variations over the period used to estimate the new model coefficients were negligible. The price elasticities that were estimated by Sydney Water's 2010 price elasticity study on the other hand are based on a period with large changes in price.[33] We therefore consider these estimates to be more robust than those obtained from the new model and have used them to estimate the effect of the lower price on demand.

Using the new model we first calculated a forecast assuming no price change, ie the price variable was set constant at its current (2014–15) level. We then applied the price elasticities from the 2011 study to this forecast to adjust it for the proposed price decrease. The elasticities were halved to account for asymmetric price effects. The basis for this adjustment to the price elasticities is described more fully in the next section.

The resulting forecast is shown in Figure A8-3.

Figure A8-3 Forecast billed metered residential demand



The total height of the bars in Figure A8-3 represent the forecast of total (billed metered) residential demand. The blue part represents the forecast assuming constant prices. The red part

[33] B. Abrams, S. Kumaradevan, F. Spaninks and V. Sarafidis, "An Econometric Assessment of Pricing Sydney's Residential Water Use", *The Economic Record*, 2012, Vol. 88, pp 89–105.

represents the estimated additional demand due to the proposed price decrease. Dwelling growth is forecast to increase total residential demand by about 3 to 4 GL a year (the higher growth in 2015–16 and 2019–20 is due to these years including a leap day). The proposed price decrease is expected to increase demand by 2.4 GL a year in 2016–17 and 3.5 GL a year by 2019–20.

Price elasticities

As discussed in Chapter 12, the demand for water may exhibit asymmetric price effects. No empirical evidence is currently available, most likely due to the rareness of periods with decreasing water prices. However, evidence of asymmetric price effects is available from some other markets, in particular from studies of the energy, and petrol, gas and transportation markets. These studies are summarised in Table A8-1.

Table A8-1 shows that when asymmetries in elasticity responses in regression estimates are explicitly taken into account, the elasticity for decreases in price is approximately 50% less than the elasticity for price increases. Based on these results Sydney Water has decided to halve the elasticities from the 2010 price elasticity study[33] to estimate the effect of the proposed price decrease as the estimates of that study are based on a period of (large) price increases only.

Table A8-1 Studies of asymmetric price responses

Asymmetric Response					
Study	**Industry**	**PE (increase)**	**PE (decrease)**	**Short / Long Run**	**Ratio (decrease / increase)**
Average		**-0.342**	**-0.160**		**0.49**
Gately (1993a)[34]	Oil / Petrol	-0.22	-0.004	SR	0.02
		-0.14	-0.038	SR	0.27
		-0.18	-0.034	SR	0.19
		-0.13	-0.055	SR	0.43
		-0.11	-0.058	SR	0.55
		-0.18	-0.056	SR	0.32
Gately (1993b)[35]	Oil / Petrol	-0.09	-0.170	SR	1.85
		-0.05	0.033	SR	-0.67
Gately (1991)[36]	Oil / Petrol	-0.67	-0.310	LR	0.46
		-0.77	-0.240	LR	0.31
Adeyemi & Hunt (2007)[37]	Electricity	-0.04	-0.021	SR	0.58
		-0.52	-0.300	LR	0.58
Gately & Huntington (2002)[38]	Energy	-0.04	-0.010	SR	0.25
		-0.03	-0.010	SR	0.33
		-0.04	-0.020	SR	0.50
	Oil	-0.08	-0.040	SR	0.50

[34] D. Gately. "Imperfect Price-Reversibility of U.S. Gasoline Demand: Asymmetric Responses to Price Increases and Declines", Energy Journal, 13 (4), 1993a, pp 179-207.
[35] D. Gately. "The Imperfect Price-Reversibility of World Oil Demand", The Energy Journal, 14(4), 1993b, pp 163-182.
[36] D. Gately. "Imperfect Price-Reversibility of U.S. Gasoline Demand: Asymmetric Responses to Price Increases and Declines", C.V. Starr Center for Applied Economics Research Report, 1991, New York, No. 91-55.
[37] O. I. Adeyemi and L. C. Hunt. "Modelling OECD industrial energy demand: asymmetric price responses and energy-saving technical change", Energy Economics, 29(4), 2007, pp 693–709.
[38] D. Gately and H. G. Huntington. "The asymmetric effects of changes in price and income on energy and oil demand", The Energy Journal, 23(1), 2002, pp 19–55.

		-0.08	-0.040	SR	0.50
		-0.05	-0.010	SR	0.20
		-0.04	-0.010	SR	0.25
Wadud (2014)[39]	Transportation (aviation)	-0.09	0.000	SR	0.00
		-0.51	0.000	LR	0.00
Dargay (1992)[40]	Energy	-0.50	-0.100	LR	0.20
Dargay & Gately (1997)[41]	Transportation (road)	-0.18	-0.040	SR	0.22
		-0.60	-0.130	LR	0.22
Griffin et al (2005)[42]	Oil	-0.12	-0.058	SR	0.47
		-0.15	-0.151	SR	0.99
	Energy	-0.09	-0.067	SR	0.79
	Oil	-0.11	-0.142	SR	1.31
		-0.13	-0.154	SR	1.21
	Energy	-0.06	-0.107	SR	1.70
		-0.03	-0.074	SR	2.39
Hass et al (1998)[43]	Oil & Natural Gas	-0.52	0.000	SR	0.00
		-0.50	0.000	SR	0.00
		-0.85	0.000	SR	0.00
		-0.69	0.000	SR	0.00
		-0.96	0.000	SR	0.00
		-0.79	-0.370	SR	0.47
		-1.07	-0.330	SR	0.31
		-1.56	-0.750	SR	0.48
		1.18	-0.860	SR	-0.73
		-0.14	-0.220	SR	1.57
		-0.46	-1.440	SR	3.13
Dargay (1990)[44]	Energy	-0.44	-0.060	SR	0.14
		-0.95	-0.900	LR	0.95
		-0.25	-0.160	SR	0.64
		-0.75	-0.480	LR	0.64
		-0.47	0.000	SR	0.00
		-1.06	0.000	LR	0.00
		-0.19	0.000	SR	0.00
		-0.63	0.000	LR	0.00

[39] Z. Wadud. "The asymmetric effects of income and fuel price on air transport demand", Transportation Research Part A: Policy and Practice, 65, 2014, pp 92–102.
[40] J. M. Dargay. "Are Price and Income Elasticities of Demand Constant?" Oxford Institute for Energy Studies, Oxford, EE16, 1992.
[41] J.M. Dargay and D. Gately. "The Demand for Transportation Fuels: Imperfect Price-reversibility?", Transportation Research, 1997.
[42] J. M. Griffin and C. T. Schulman. "Price asymmetry in energy demand models: A proxy for energy-saving technical change?" The Energy Journal, 26(2), 2005, pp 1-21.
[43] R. Haas, J. Zöchling and L. Schipper. "The Relevance of Asymmetry Issues for Residential Oil and Natural Gas Demand: Evidence from Selected OECD Countries 1970–95", OPEC Review, 22, 1998, pp 113–143.
[44] J.M. Dargay. "Have Low Oil Prices Reversed The Decline in Energy Demand? A Case Study for the UK", Oxford Institute for Energy Studies, 1990.

8.2.2 Non-residential water demand

Non-residential properties account for around 23% of total water demand. The non-residential sector is characterised by a long-term downward trend in average demand. Another important feature of this sector is that virtually all property growth in the last 20 years or so has been in the form of non-residential strata units (eg units in business parks). In fact, traditional "stand alone" non-residential properties, in particular agricultural properties, have declined in number in the last few years. The average demand of these units is significantly less than that of other non-residential properties.

For the 2012 submission we developed a new approach to forecasting non-residential demand. Non-residential properties were grouped into 8 segments. We then applied a combination of seasonal decomposition and time series regression analysis to estimate seasonality, weather sensitivity and time trends in average demand of each segment. It was found that all segments exhibited a statistically significant downward trend in average demand. In most cases demand was falling at a decreasing rate, ie the trend line was "flattening out".

It was estimated that the lifting of restrictions increased non-residential demand (bounce back) by 2-3% only. Most segments exhibited some bounce back. Bounce back was most pronounced (although still limited) in the Government and Institutional segment and the Every Drop Counts (EDC) segment. These were also the segments that were most affected when restrictions were introduced.

To forecast demand the estimated trends in average demand were extrapolated over the forecasting period. The resulting forecasts of average demand for each segment were multiplied by the forecast number of properties in each segment to forecast total non-residential demand. See Sydney Water's 2011 submission for more details.

The models were updated in 2013 using more up to date demand data. This appendix briefly discusses the update. The main changes that were made are:

- minor changes to segmentation
- models were re-estimated using more up-to-date data
- separate models were developed for each delivery system
- we simplified assumptions for forecasting purposes.

Non-residential segments

For the 2012 determination we segmented non-residential properties based on property type, participation in the EDC Program (Sydney Water's water efficiency program for the non-residential sector) and their demand in to the following eight segments:

- Top 6
- EDC participants
- Industrial
- Commercial
- Government, Institutional and Other
- Agricultural

- Industrial units
- Commercial units

EDC participants consist of properties who have participated in Sydney Water's EDCs Program, regardless of property type. Segments are mutually exclusive. For example, an Industrial property that participated in EDC is included in the EDC segment only, not in the Industrial segment. Or to put it another way, the Industrial segment consists of all Industrial properties that have not participated in EDC. Those that have are included in the EDC segment. The Top 6 segment consists of the 6 largest non-residential users.

For the update we combined commercial and industrial units into a single segment called Non-residential units, reducing the number of segments by one.

We also introduced a new segment Standpipes[45] (standpipes were included in Government, Institutional & Other segment in the old model.) Standpipes account for a very small proportion of demand only. The reason why they were treated as a single segment for the update is purely technical. For the update we estimated a separate model for each segment in each delivery system. However, individual standpipes cannot be assigned to a delivery system as they do not have a fixed location. Therefore we created a separate segment Standpipes and estimated a single model for them covering all systems. The forecast Standpipe demand is then distributed over the systems in proportion to total demand in each system.

Modelling and forecasting approach

For the 2012 price determination we estimated 13 models: one for each of the six customers included in the Top 6 segment and one for each of the other segments. For the update we estimated a total of 72 models: one for each of the Top 6 customers as before and one for each segment in each delivery system. For example, we estimated a model for Industrial properties in the Prospect system, a model for Industrial properties in the Illawarra system, a model for Industrial properties in the Macarthur system, and so on. As mentioned above, only a single model covering all delivery systems was estimated for Standpipes.

As for the model for the 2012 price determination we used a combination of seasonal decomposition and time series regression to model historical demand. The updated models were estimated using monthly demand data covering the period up June 2012.[46] The models for the 2012 determination were based on data up to September 2010.

Visual inspection of demand by each segment showed that the downward trend in average demand had largely "flattened out" in most segments. Therefore, for forecasting purposes it was assumed that average demand would stay constant at its current value. We used the regression analysis to separate seasonal and weather effects from trend and shocks. We then used the trend component of the model to estimate a "weather corrected" average demand. This weather corrected average is then used for forecasting purposes.

To model average monthly demand for each segment, it is first converted to average daily demand by dividing by the number of days in the month. This monthly average daily demand is then

[45] A metered standpipe is a short metal pipe that has a tap at the top and a fitting at the bottom that connects to a hydrant.
[46] The monthly demand data has been derived from quarterly meter reads by converting quarterly meter readings to average daily demand values and summing these over a month.

seasonally-adjusted using the ratio to moving average method to estimate a seasonal factor for each month.

A linear regression is then applied to the seasonally-adjusted demand to separate weather effects from trends and shocks. The model specification is:

$$q_t = \alpha + \beta_1 R_t + \beta_2 E_t + \beta_3 T_t + \sum_{i=1}^{n-1} \gamma_i D_{it} + \epsilon_t$$

where:

q_t	denotes the seasonally-adjusted average daily demand in month *t*
t	denotes time measured in months
R_t	denotes average daily rainfall at time *t*
E_t	denotes average daily evaporation in month *t*
T_t	denotes average maximum temperature in month *t*
D_{it}	denotes a set of time dummies each indicating a 6 month period
ε_t	is the error term
α, β_1 to β_3 and γ_i (i=1…n-1)	are regression coefficients to be estimated
n	is the number of six months periods.

Rainfall, evaporation and temperature measurements were taken from the Prospect and Sydney airport weather stations. Recordings were combined into a single value by taking a weighted average. The weight for Prospect Dam was 73% and that for Sydney Airport 27%. The rainfall, evaporation and temperature measures that are included in the model are the deviations of these variables from their long-term averages, as measured over the 30-year period from July 1982 to June 2012.

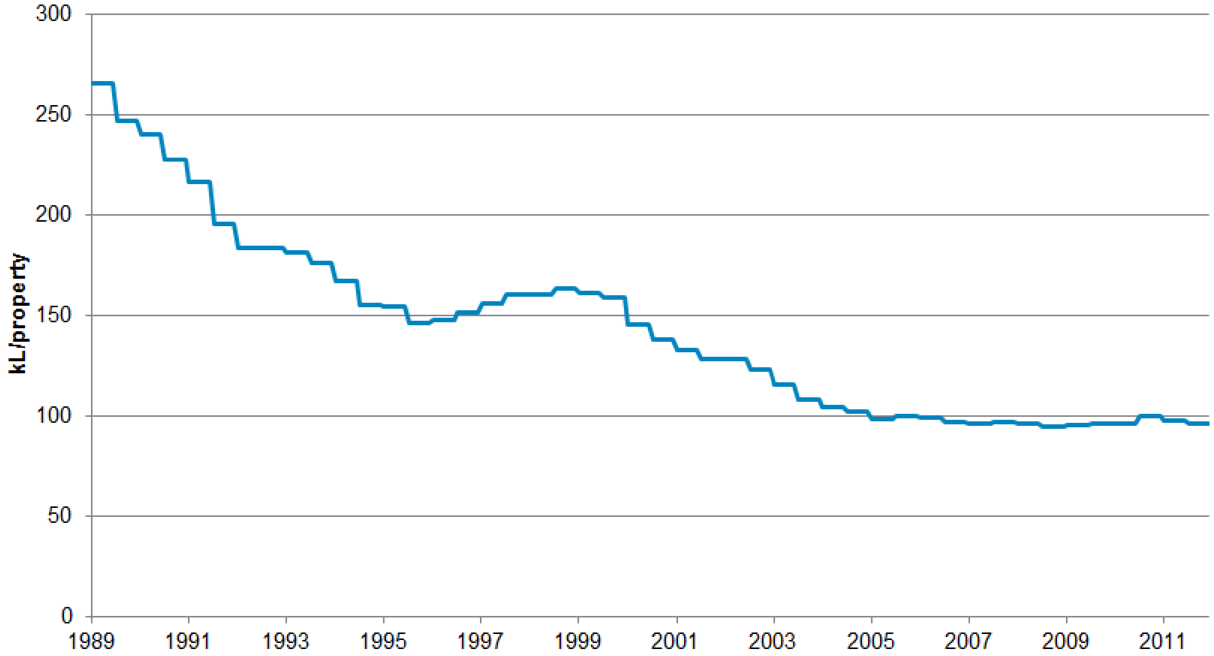
The purpose of the model is to estimate movements in (seasonally-adjusted) average daily demand, corrected for shorter term fluctuations due to weather variations from their long-term averages. These movements or trends are quantified through the use of time dependent dummy variables which quantify the changes in the trend value of average demand using a time step of six months.

We used this approach to estimate the trend because it is less time intensive than the approach that was taken for the old model. The specification of the time trend for the old models proved very time intensive. For example, sometimes a linear specification provided best results, sometime a semi-log specification and sometimes a double-log specification. Also, sometimes additional variables had to be introduced to account for one-off events that affected the trend variables.

Using this approach for all 72 segments in the new model would have been extremely time intensive. Using the above equation, this is not necessary because the use of time dummies allows for a large variety of shapes for the trends and can also absorb shocks. That is, there is no need to “customise” the shape of the trend for each segment. To minimise the risk of the dummies “picking up” short-term weather effects in addition to the trend, the period that is covered by each dummy variable is six months.

As an example, Figure A8-4 shows the estimated six monthly trend value of average demand for the Industrial segment in the Prospect delivery system as estimated using this approach.

Figure A8-4 Trend of seasonally-adjusted average demand for the Industrial segment (Prospect)

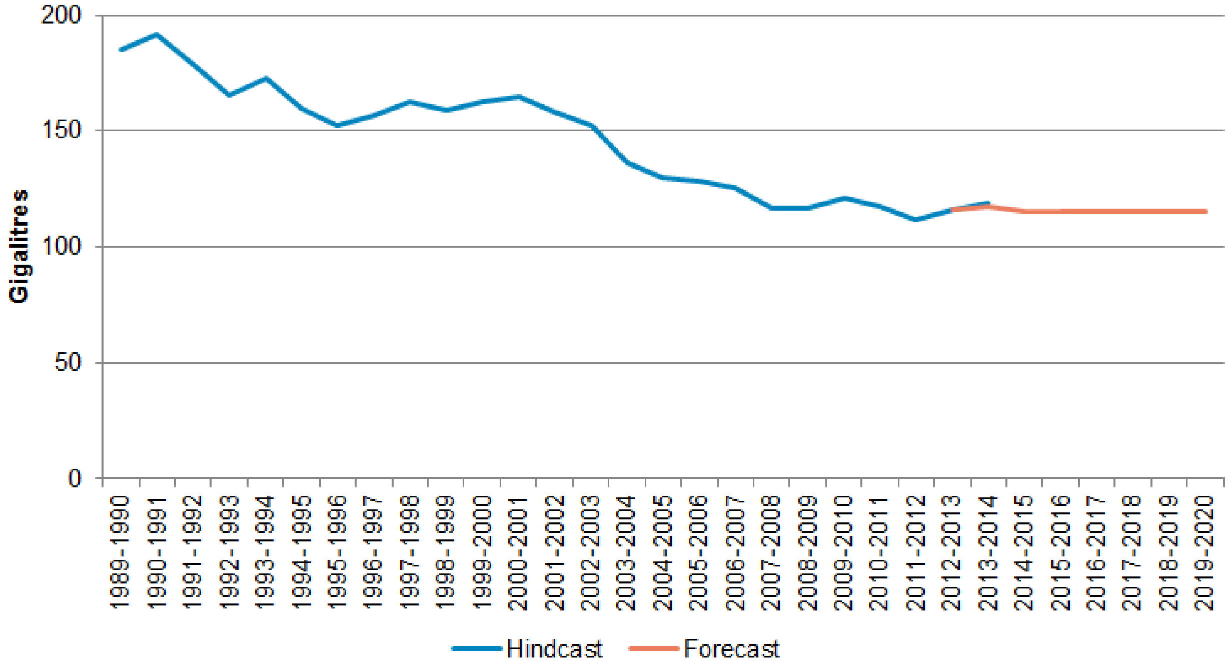


Once the model is estimated it is used to estimate a constant, “climate corrected” average daily demand over the last three years for each segment in each system, that is, the average daily demand assuming long term (30 year) average weather conditions. For forecasting purposes this average daily demand is extrapolated over the forecasting period.

To convert this to a forecast for monthly demand it is multiplied by the applicable monthly seasonal factor and the number of days in the month. This is then multiplied by the forecast number of properties in that segment to forecast total monthly demand for each segment.

Figure A8-5 shows the forecast total non-residential demand.

Figure A8-5 Forecast total non-residential demand



8.3 Chargeable wastewater model

Non-residential properties are liable for wastewater usage charges in addition to the wastewater service charge. The wastewater usage charge depends on the chargeable wastewater volume (CWWV). The CWWV is the volume of wastewater discharged over and above an allowance that is free of charge. The wastewater discharge is calculated by multiplying metered water consumption by a discharge factor which is property specific. If this discharge exceeds the free allowance, the property is charged sewer usage for the part of the discharge that exceeds the allowance. If the discharge is less than or equal to the free allowance, the CWWV is zero:

$$\mathrm{CWWV} = \begin{cases} (C\times DF)-(DA\times D) & \text{if } (C\times DF)>(DA\times D) \\ 0 & \text{if } (C\times DF)\leq(DA\times D) \end{cases}.$$

(C x DF) is the discharge volume which is calculated by multiplying metered consumption (C) by the discharge factor (DF). (DA x D) is the free allowance which is calculated by multiplying a daily allowance (DA) by the number of days (D) over which consumption was measured (the number of days since the previous meter reading).

The daily allowance is set by IPART. The daily allowance had been 1.37 kL a day since at least 1998. In 2012, IPART determined to gradually decrease the allowance as follows:

- 2012–13: 1.233 kL/d
- 2013–14: 1.096 kL/d
- 2014–15: 0.959 kL/d
- 2015–16: 0.822 kL/d

The effect of this decrease on the CWWV cannot be forecast accurately using aggregate measures such as total or average consumption and average discharge factors. The daily allowance introduces a threshold in the calculations which means the average or total CWWV cannot be written as a simple function of such aggregate parameters. By extension, it is not possible to calculate the effect of a change in the daily allowance using aggregates.

The following example illustrates this. Suppose a customer has the following consumption:

- quarter 1: 50 kL over 92 days
- quarter 2: 75 kL over 92 days
- quarter 3: 150 kL over 90 days
- quarter 4: 75 kL over 91 days.

Further, suppose the daily allowance is 0.959 kL a day. As shown in Table A8-2, column “Year 1”, the customer’s discharge exceeds the allowance in quarter 3 only when the CWWV is 30 and the total CWWV for year 1 is 30 kL. However, if we calculate the total CWWV for year 1 using the customer’s total annual consumption we get a CWWV of 0 kL, a 30 kL error.

Now suppose the daily allowance is decreased to 0.822 kL a day in year 2 and the customer has the same consumption profile. As shown in Table A8-2, the CWWV for year 2 is 43 kL. So, all else being equal, the effect of the lower daily allowance is to increase the total CWWV for this customer by 13 kL.

If we use annual aggregate consumption, we find an annual CWWV of 0 kL as before and we erroneously conclude that the lowering of the daily allowance does not affect this customer whereas in reality, all else being equal, it results in a 13 kL (43%) increase in this customer’s CWWV.

Table A8-2 CWWV – quarterly vs annual calculations

						Year 1		Year 2
Daily allowance						0.959		0.822
1. Chargeable wastewater volume calculated using quarterly consumption								
Quarter	Consumption	Days	Discharge factor	Discharge	Free allowance	CWWV	Free allowance	CWWV
1	50	92	0.78	39	88.2	0	75.6	0
2	75	92	0.78	58.5	88.2	0	75.6	0
3	150	90	0.78	117	86.3	30	74.0	43
4	75	91	0.78	58.5	87.3	0	74.8	0
Total						30		43
2. Chargeable wastewater volume calculated using total annual consumption								
Quarter	Consumption	Days	Discharge factor	Discharge	Free allowance	CWWV	Free allowance	CWWV
1 to 4	350	365	0.78	273	350	0	300	0

Aggregating consumption over multiple customers to calculate their total CWWV or the effect of changes in the daily allowance, even if this were done on a quarterly basis, will also not give accurate answers in general.

Again, suppose the daily allowance is 0.959 kL a day and that there are two customers with the following consumption and discharge factors in quarter 1 of year 1:

- customer 1: consumption of 150 kL over 91 days, discharge factor is 0.7
- customer 2: consumption of 140 kL over 91 days, discharge factor is 0.55.

As shown in Table A8-3, the total CWWV for these two customers is 17 kL. Using the total consumption of these two customers and applying their average discharge factor gives a total CWWV of 6 kL, an 11 kL or 65% error.

If the daily allowance were decreased to 0.822 kL a day then the total CWWV is 32 kL, a 15 kL or 88% increase. Using the total consumption and average discharge factors gives a CWWV of 31 kL.[47] We would, incorrectly, conclude that the lower CWWV would result in a 25 kL or 417% increase in the total CWWV.

[47] This is very close to the correct figure but this is purely a coincidence. In general, there is no guarantee that the aggregate method will give the correct answer, as illustrated by the large error in year 1.

Table A8-3 CWWV – individual vs combined calculations

						Year 1		Year 2
Daily allowance						0.959		0.822
1. Chargeable wastewater volume calculated using individual consumption figures								
Customer	Consumption	Days	Discharge factor	Discharge	Free allowance	CWWV	Free allowance	CWWV
1	150	91	0.7	105	87.3	17	74.8	30
2	140	91	0.55	77	87.3	0	74.8	2
Total						17		32
2. Chargeable wastewater volume calculated using combined consumption figures								
Customer s	Total consumption	Total days*	Average discharge factor	Total discharge	Total free allowance	Total CWWV	Total free allowance	Total CWWV
1, 2	290	182	0.625	181.25	174.5	6	149.6	31

*Total consumption is measured over 91 days but days for each customer is added because else the total free allowance (daily allowance x number of days) would be too low.

As these two examples illustrate, to correctly estimate the effect of changes in the parameters that determine the CWWV such as the daily allowance, the calculations have to be carried out at the level of individual properties and quarter by quarter. This is the approach Sydney Water has taken to develop a model to forecast the CWWV. The modelling approach was developed in 2011 for Sydney Water's submission to IPART's determination of 2012 to 2016 and has been updated for this submission.[48]

The model is driven by a database of meter readings of non-residential properties covering the four financial years from 2010–11 to 2013–14. The database includes all non-residential properties, not just those that actually paid wastewater usage charges during this period. A significant proportion of non-residential properties did not pay any wastewater usage charges during this period because their discharge was less than the free allowance. However, as the allowance decreases over time, the discharge of some of them may exceed the free allowance and the model needs to capture this to accurately forecast the effect of decreasing allowances.

The database is used to simulate on a property by property, quarter by quarter basis what the CWWV would have been if some alternative value for the daily allowance had applied. For example, in 2014–15 the daily allowance has been decreased to 0.956 kL a day. The model calculates, property by property, the CWWV for every meter read taken in 2010–11 to 2013–14 if this allowance had applied instead of the allowances that actually applied at the time. The results

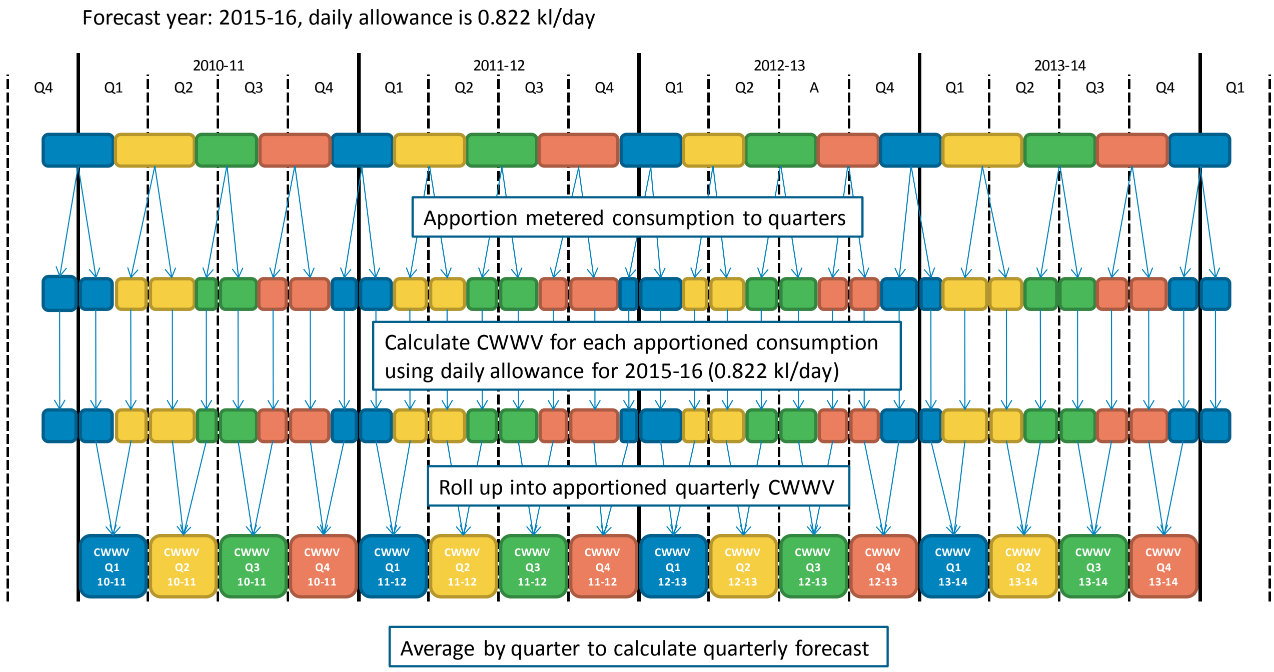
[48] Although Sydney Water assumes no changes to the daily allowance for the next price path (2016–17 to 2019–20) the model still needs to be able to estimate the effect of changes in the daily allowance. The starting point for the forecast over the next price path is the daily allowance in the last year of the current price path, 2015–16. In 2015–16 the daily allowance will decrease to 0.822 KL a day. The model therefore needs to be able to forecast the effect of the decrease to 0.822 KL a day which had not yet been implemented when the forecast for the next price path was prepared, even if the daily allowance does not decrease any further over the next price path.

are then averaged by quarter which gives us our forecast for 2014–15. This process is repeated for every year in the forecasting period.

As the model only includes existing properties, a forecast for new properties needs to be added. To do so, we first prepare a forecast for each existing property and use this to calculate the average forecast CWWV for each of the non-residential segments as distinguished in the non-residential demand forecasting model. This average is then multiplied by the forecast number of new properties in each of these segments.

The approach is illustrated graphically in Figure A8-6.

Figure A8-6 CWWV forecasting approach



$$\text{Forecast CWWV Q1 2015-16} = (CWWV_{Q1\ 2010\text{-}11} + CWWV_{Q1\ 2011\text{-}12} + CWWV_{Q1\ 2012\text{-}13} + CWWV_{Q1\ 2013\text{-}14}) / 4$$

$$\text{Forecast CWWV Q2 2015-16} = (CWWV_{Q2\ 2010\text{-}11} + CWWV_{Q2\ 2011\text{-}12} + CWWV_{Q2\ 2012\text{-}13} + CWWV_{Q2\ 2013\text{-}14}) / 4$$

$$\text{Forecast CWWV Q3 2015-16} = (CWWV_{Q3\ 2010\text{-}11} + CWWV_{Q3\ 2011\text{-}12} + CWWV_{Q3\ 2012\text{-}13} + CWWV_{Q3\ 2013\text{-}14}) / 4$$

$$\text{Forecast CWWV Q4 2015-16} = (CWWV_{Q4\ 2010\text{-}11} + CWWV_{Q4\ 2011\text{-}12} + CWWV_{Q4\ 2012\text{-}13} + CWWV_{Q4\ 2013\text{-}14}) / 4$$

The top line of rectangles in Figure A8-6 represents the quarterly meter readings of a property. No special meaning (eg volume of consumption) is to be attached to the colour or size of each rectangle. Colours are simply used to clearly distinguish meter readings from each other.

The width of each rectangle represents the period covered by the meter readings. Meters are not all read on the first day of each quarter. Due to the large number of meters it takes about 10 weeks every quarter to read all meters. Therefore, most meter readings partially cover two quarters.

The first step is to apportion the consumption measured by each meter readings over the two quarters in proportion to the number of days covered by that meter reading in each quarter. For example, suppose the meter read taken in quarter 1 of 2010–11 covered a total of 90 days, 40 of which were in Q4 of 2009–10 and the remaining 50 in quarter 1 of 2010–11. Further, suppose the consumption over this period was 80 kL. We apportion 44.4% (40/90) of the 80 kL or 35.6 kL to Q4 of 2009–10 and the remainder of 44.4 kL to quarter 1 of 2010–11.

This replicates what actually happens for billing purposes. Prices and daily allowances change on the first day of the financial year (ie 1 July). Because meter readings taken in the July to

September quarter will partly cover the previous financial year and partly cover the current financial year, consumption is apportioned to each year before applying the daily allowance and price that applied in each year to the apportioned consumption to calculate the charge that applies to the consumption value that occurred in each year. These charges are then added to give the total charge for that meter reading.

To forecast the CWWV for some year, we calculate the CWWV for each apportioned consumption value using the daily allowance that will apply in the forecast year. Figure A8-6 illustrates this for 2015–16 when the daily allowance will decrease to 0.822 kL a day. To forecast the CWWV for 2015–16, we first apply a daily allowance of 0.822 kL a day to each apportioned consumption to calculate the CWWV for that apportioned consumption value.

Next we aggregate the "apportioned" CWWVs into a total CWWV for each quarter. This results in four CWWV values for each quarter. In the next step we average these to obtain a single CWWV for each quarter. That is, we average the apportioned CWWV for quarter 1 of 2010–11 (assuming the 2015–16 daily allowance), the CWWV for quarter 1 of 2011–12 (assuming the 2015–16 daily allowance) and so on. This becomes our forecast for quarter 1 of 2015–16.

This process is repeated for each property in the dataset and for each year in the forecasting period by applying the daily allowance that will apply in that year to the historical meter reads of each property.

8.4 Property growth forecasts

8.4.1 Dwellings and Growth

Our residential customer base is made up of over 1.06 million single dwellings and around 680,000 multi-units. Sydney currently houses around 64 percent of the State's population. This is in contrast to only 40 percent a century ago.

When looking at the historical dwelling growth over the last 24 years the average has been around 1.3 percent a year. Trends also show that dwelling growth has been cyclical. Annual dwelling growth has been as high as 30,000 in 1999–2000 and as low as 15,000 in 2006–07. The high point represented 1.9 percent and the low point was 0.7 percent of the total properties connected to our water service. Non-residential growth represents 0.14 percent of the total properties connected to our water service.

There have been many more new houses built than the numbers suggest. The net growth is disguised by the knock down rebuilds; one old house is demolished and is replaced by one new water efficient house.

The type of new housing has also been influenced by State strategic policies aimed at increasing the number of affordable rental housing, dual occupancy smaller lots, secondary dwellings, granny flats, boarding houses, group homes, and seniors living. The number of multi units made up 56 percent of the growth in the early 1990s, their prevalence has risen steadily and last year they accounted for 65 percent.

The number of single dwellings continues to grow at a steady pace albeit on smaller lots. There has been an increasing shift away from larger lot sizes, the traditional quarter acre urban lot is a concept of the past. In 1991, lot sizes under 550 square metres in greenfields made up 4 percent, by 2006 they accounted for 27 percent and have increased to 32 percent in 2014.

Wastewater growth

Wastewater dwelling growth follows a similar pattern to water, though peaks and troughs happen in different years due to the water service being connected in the early stages while the building is under construction and the sewer service is connected at a later date. Existing dwellings connecting in priority sewerage areas also influence the patterns of growth seen in wastewater.

Stormwater growth

It has been quite difficult to determine a trend for dwelling growth with stormwater services using the customer billing system. All the catchment boundaries, excluding Rouse Hill, were redeclared in 2011. Historic net dwelling completions, as reported to the Department of Planning and Environment, were used to determine the growth trend. Net dwelling completions in the newly declared catchments have ranged from a minimum of 3,700 to a maximum of 7,910 in 2013–14, with the average being 4,890 per year since 2006–07.

Rouse Hill – Stormwater

Dwelling growth follows very close to forecasts. The services are supplied within discreet greenfield locations that have very detailed infrastructure planning, extensive analysis of land ownership, vacant land stocks, building activity and development take-up rates.

Non-residential

The total number of standalone non-residential properties has been steadily declining. The old style individual property is being redeveloped for residential or is being replaced by commercial and industrial units. Mixed development, shop top and business parks are the new style of non-residential properties connecting to our services. Non-residential unit growth has been as high as 3,000 units in 2003–04 and as low as 625 in 2011–12.

8.4.2 Growth Forecasts

Comparisons of growth across determination periods and across products are difficult as:

- Some property types have switched from being non-residential to residential. For example, houses and units in retirement villages may start out being captured as residential but end up being non-residential depending on the exemption status and trade waste requirements. Boarding houses with more than ten rooms are counted as non-residential; and non-residential units in mixed multi premises are reported with residential.
- In some instances the dwelling is counted and at other times the property or the numbers of meters is reported. For example, shops in mixed developments are counted as dwellings. Dual occupancies in future may be counted as one property instead of two dwellings.
- Tariff simplification, policy changes and new property types also further complicate the growth comparison analysis.

The following paragraphs attempt to compare the forecasts that we used for growth over time and the reasons for our revision in the growth forecasts.

In the 2008 determination, our dwelling growth forecast was based on Metropolitan Development Plan (MDP) 2006–07 without variation. As a consequence, the forecast was too high by about

50,000 dwellings or was about 3 percent overly optimistic. Definitional differences could explain some of the gap.

For the 2012 determination the MDP 2008–09 forecast was brought back to a realistic level, aligning with historical dwelling trends recorded in the billing system. Growth leading up to setting the forecast for 2012 pricing submission was at record low rates due to the impact of the global financial crisis, the uncertainty around the Growth Centres Commission and a lack of available greenfield land. The forecast of 66,230[49] dwellings was based on the short term average growth of greenfield and infill in general and was not as site specific as the new forecast. In hindsight, actual growth taking place in the current 2012 determination timeframe has been more active than expected with the development market and dwelling approvals returning to similar levels of a decade ago. The State Government has set up housing and infrastructure funds, precinct acceleration and urban reactivation programs and shortened or removed approval times to stimulate growth, and the growth centres have finally started to produce dwellings. Greenfield growth represented around 19 percent prior to 2012, in the last two years it has increased to 28 percent.

The 2012 non-residential property forecast assumed that the historic average growth would continue. Around 6,810[50] non-residential properties were forecast; however growth has been half of what was expected. The standalone individually metered properties continue to decline as was forecast. The growth analysis of non-residential served properties over time has also largely been impacted by billing simplification, property consolidations, and redevelopment into residential.

The non-residential growth with water and wastewater during 2017–20 is forecast to average 1,042 per year.

The short-term forecast is expected to be consistent with the long term average at around 1.3%. The new forecast is location specific and the key data sources used to allocate future growth to major sites, town centres, transport nodes and greenfield release areas are the MDP 2010–11 and the Illawarra Urban Development Program. They are informed by using appropriately zoned land, vacant land stock and building construction analysis and consultations with Local Council and developers.

The location of the growth is further refined according to State Government housing strategies, Australian Bureau of Statistics (ABS) dwelling approvals, Local Council development application activity, recent completions, proposed developments and infrastructure servicing plans.

The forecast for the 2016 pricing submission uses a longer term average and was built using a lower level of detail: each greenfield was individually examined; all major sites have been reviewed; new data sources have been incorporated. Total residential growth during the 2016 determination period is forecast to be around 96,000 dwellings with water and wastewater services. This assumes that all dual occupancies are counted as two dwellings and it excludes dwellings in *Water Industry Competition Act* 2006 (WIC Act) served locations.

Residential growth in stormwater catchments (excluding Rouse Hill) during the 2016 determination period is forecast to total around 29,590 dwellings and assumes that dual occupancies are counted as two dwellings. This is up from the 21,000 forecast in 2012 determination and is based on

[49] The previous determination reported 53,000 property growth this was only three years' worth of growth and not the full four years.
[50] The 2012 determination reported growth of around 5,000 non-residential properties this was only three years' worth of growth and not the full four years.

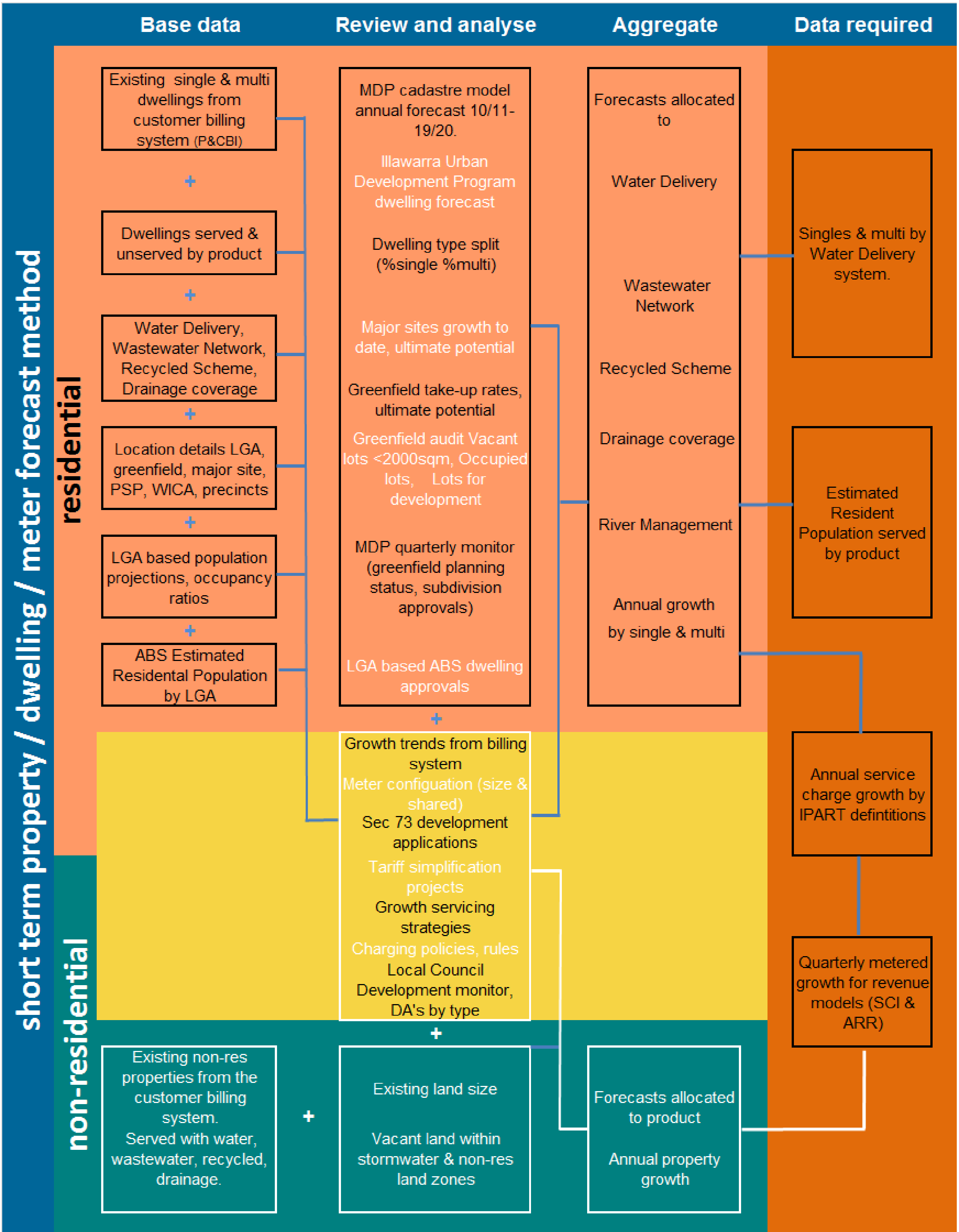
historic net dwelling completions and the major sites having remaining dwelling potential. The forecast is supported by the number of dwelling approvals and residential applications determined in the Local Government Areas with our stormwater assets.

The non-residential, vacant and occupied property growth in stormwater catchments during the 2016 determination is expected to total around 2,730. Whilst vacant land pays the residential stormwater service charge it is counted in this instance with the non-residential as it is not yet a dwelling. The growth forecast is down from the previous 4,920 expected during 2012–16. The new number is based on a lack of vacant land zoned for non-residential development, the decline in standalone type buildings, and the declining number of non-residential applications. The land size based service charges may also be affecting businesses relocating outside of our catchments. The previous forecast assumed that many more properties would apply for the low impact category. The new forecast assumes growth only in the small, medium and large land size categories and no growth in the very large and largest land sizes.

It is assumed that all new growth will be metered. New residential and non-residential properties will either share a common meter or have their own individual water meter. No growth is expected in the number of larger sized meters due to the declining standalone non-residential properties.

Growth in smaller sized meters is forecast to increase due to the mandatory individual metering of units in multi-story buildings.

8.4.3 Methodology



Assumptions

1.7 million existing dwellings, 115,000 non-res properties.

Annual dwelling growth has ranged between 1.9% and 0.7% of the total properties connected to water.
Forecast dwelling type split between single & multi is held constant for 5 years.

short term property / dwelling / meter forecast method

Assumptions continued

Greenfield growth follows historic development rates. Most sites have been assigned 99% houses & 1% multi unit.

Greenfields start to produce dwellings in the year forecast.

Major sites continue to grow until fully developed. New major sites start and finish in the years forecast.

PSP areas have exisitng dwellings (not new dwellings).

Vacant serviced lots are most likely to have a dwelling built in the short term. Occupied lots less than 2000 sqm assumed to be a single dwelling under construction.

WICA sites do not pay service charges, however need to be considered for water demand calculations.

Precincts continue to be served by the exisiting hydraulic system.

MDP "other dwellings" counted with multis. MDP cadastre model easily totals to any level of geography - gives consistency across products.

Population growth is linear between census years. Non-private population is assigned to multi units. Projections are not targets & may differ from targets in the Sydney Metro Strategy & Regional Plans.

Population projections are based on assumptions about fertility, mortality & migration at LGA level, except in the Metro area it is based on the future number of dwellings.

All dwellings have the average number of occupants (LGA basis), no dwellings are unoccupied (no vacancy rate has been applied).

House completions follow ABS building approvals, but may take several quarters for a house or years to become a multi storey billing entity.

All growth will be metered either by a shared meter or individually. Development types do not have a one to one translation in the customer billing system.

Residential forecasts higher than previous detemination.

No new polices change the tariff structure short term. Dual occupancies pay per dwelling for water service & wastewater. Shops in mixed developments counted as residential.

Observed seasonal trends applied to create a quarterly split.

Forecast used for Water Demand calculations, Drinking Water Compliance Program, Sydney Catchment Authority.

Major sites in stormwater catchments have remaining residential dwelling potential & support increase in forecast.

Non-res growth in stormwater follows reduced number of development applications & lack of vacant land in catchments.

No substantial growth in mixed developments. Mixed multi premise will be strata titled & individually metered.

Non-res standalone properties continue to decline in number. Industrial & commercial units replace the old style standalone developments. No growth in exempt standalone.

Growth in small sized meters only, due to declining standalone non-res & individual metering.

Recycled properties connect as per plan & do not exceed demand constraints. No new residential schemes start in the short term.

Property & Consumption data source has re-created history using effective dates & update dates. Historic reports from other sources may have stated different numbers previously. Property type & billing categories have changed over time.

Property type & services captured on the last day of each month.

Appendix 9 – Price submission tables in nominal dollars

IPART has requested that Sydney Water provide all financial tables in nominal dollars. There are three chapters that present financial tables, Chapters 5, 7 and 8. Chapter 5 presents tables in either real or nominal dollars where required. In Chapter 7 and 8 tables are presented in real dollars ie $2015–16, for ease of understanding when comparing across years.

This appendix presents the relevant tables from both Chapter 7 and 8 in nominal dollars.

The inflation rates used to convert nominal dollars to $2015–16 and vice versa are those specified by IPART in the Submission Information Package (SIP), see Table A9-1.

Table A9-1 Inflation figures set by IPART to covert dollars between nominal and real ($2015–16)

To convert	Use
$2010–11 into $2011–12	2.3% (2012 annual average/2011 annual average, All groups CPI Australia)
$2011–12 into $2012–13	2.4% (June Quarter 2013/June Quarter 2012, All groups CPI Australia)
$2012–13 into $2013–14	3.0% (June Quarter 2014/June Quarter 2013, All groups CPI Australia)
$2013–14 into $2014–15	2.4% (Bloomberg Mean Consensus inflation forecast as at 10/10/2014, given that ABS data is not available).
$2014–15 into $2015–16	2.5% (Mid-point of the RBA inflation target range, given the Bloomberg Mean Consensus Inflation forecast in not available for this future period, as at 10/10/2014).

9.1 Chapter 7 Operating expenditure tables in nominal $

Table A9-2 Total operating expenditure ($ nominal, million ‘000)

Total regulated operating expenditure	2012–13 Actual	2013–14 Actual	2014–15 Forecast	2015–16 Forecast	Total
IPART determination – total regulatory opex	1,311,105	1,339,229	1,367,308	1,392,975	5,410,618
IPART allowance – bulk water cost	511,996	521,808	536,300	545,176	2,115,280
IPART allowance – core regulatory opex	799,109	817,422	831,008	847,799	3,295,338
Actuals and forecast – total regulatory opex	1,304,733	1,259,628	1,292,112	1,336,985	5,193,458
Variation from determination	6,372	79,602	75,196	55,990	217,160
Percentage variation	0.5%	5.9%	5.5%	4.0%	4.0%

Table A9-3 Core operating expenditure ($ nominal, million ‘000)

Core regulated operating expenditure	2012–13 Actual	2013–14 Actual	2014–15 Forecast	2015–16 Forecast	Total
IPART allowance – core regulated opex	799,109	817,422	831,008	847,799	3,295,338
Actuals and forecast – core regulated opex	782,557	732,287	759,184	793,086	3,067,114
Variation from determination	16,552	85,135	71,824	54,713	228,224
Percentage variation	2.1%	10.4%	8.6%	6.5%	6.9%

Table A9-4 Comparison bulk water costs for the current determination period ($ nominal, million '000)

Comparison Bulk Water Costs	2012-13	2013-14	2014-15	2015-16	Total
IPART allowance	511,996	521,808	536,300	545,176	2,115,280
Actuals and forecasts	522,176	527,341	532,928	543,899	2,126,344
Variation from determination	(10,180)	(5,533)	3,372	1,277	(11,064)
Percentage variation	(2.0%)	(1.1%)	0.6%	0.2%	(0.5%)
Variation by business area					
Water NSW bulk water	(1,930)	(3,024)	147	122	(4,685)
Desalination (SDP Pty Limited)	(4,060)	(59)	119	(1,147)	(5,147)
BOO water filtration costs	(4,190)	(2,450)	3,106	2,302	(1,232)
Variation from determination	(10,180)	(5,533)	3,372	1,277	(11,064)

9.2 Chapter 8 Capital expenditure tables in nominal $

Table A9-5 2012–13 to 2015–16 capital expenditure by driver ($m, nominal)

Driver	2012–13	2013–14	2014–15	2015–16	Total
Business efficiency	20	16	46	59	**141**
Government program	42	87	51	12	**193**
Growth	97	146	139	184	**566**
Mandatory standards	50	17	18	18	**103**
Existing standards	388	268	406	423	**1,486**
Total	**597**	**534**	**660**	**696**	**2,489**

Table A9-6 Maintaining services expenditure (renewal and reliability) ($m, nominal)

Maintaining services	2012–13	2013–14	2014–15	2015–16	Total
Determination	392	395	400	348	**1,535**
Actual/Forecast	388	268	406	423	**1,486**
Variance	**-3**	**-127**	**6**	**75**	**-49**

Table A9-7 Maintaining water services expenditure (renewal and reliability) ($m, nominal)

Maintaining water services	2012–13	2013–14	2014–15	2015–16	Total
Determination	153	162	151	169	**635**
Actual/Forecast	145	87	109	127	**469**
Variance	**-8**	**-75**	**-42**	**-41**	**-166**

Table A9-8 Maintaining wastewater expenditure (renewal and reliability) ($m, nominal)

Product	2012–13	2013–14	2014–15	2015–16	Total
Determination	175	177	192	129	**673**
Actual/Forecast	192	122	238	204	**756**
Variance	**17**	**-54**	**46**	**75**	**84**

Table A9-9 Maintaining stormwater services (renewal and reliability) ($m, nominal)

Product	2012–13	2013–14	2014–15	2015–16	Total
Determination	8	9	4	2	**23**
Actual/Forecast	4	7	17	17	**45**
Variance	**-4**	**-1**	**13**	**15**	**22**

Table A9-10 Maintaining corporate infrastructure ($m, nominal)

Product	2012–13	2013–14	2014–15	2015–16	Total
Determination	56	48	53	48	**205**
Actual/Forecast	47	51	43	74	**215**
Total	**-8**	**3**	**-10**	**26**	**10**

Table A9-11 Growth capital expenditure ($m, nominal)

Growth Program	2012–13	2013–14	2014–15	2015–16	Total
Determination	141	172	177	169	**659**
Actual/Forecast	97	146	139	184	**566**
Total	**-43**	**-26**	**-38**	**14**	**-93**

Table A9-12 Mandatory standards expenditure ($m, nominal)

Mandatory Standards	2012–13	2013–14	2014–15	2015–16	Total
Determination	74	78	20	31	**202**
Actual/Forecast	50	17	18	18	**103**
Variance	**-24**	**-61**	**-2**	**-13**	**-99**

Table A9-13 Government programs expenditure ($m, nominal)

Mandatory standards	2012–13	2013–14	2014–15	2015–16	Total
Determination	67	66	44	22	**199**
Actual/Forecast	42	87	51	12	**193**
Variance	**-25**	**21**	**7**	**-9**	**-6**

Table A9-14 Business efficiency ($m, nominal)

Business efficiency	2012–13	2013–14	2014–15	2015–16	Total
Determination	35	30	27	27	**120**
Actual/Forecast	20	16	46	59	**141**
Total	**-15**	**-14**	**18**	**31**	**21**

Table A9-15 2012–13 to 2015–16 capital expenditure by product ($m, nominal)

Product	Determination	Forecast/Actual	Variance	Percentage difference
Water	928	680	-248	-27%
Wastewater	1,441	1,410	-30	-2%
Corporate	320	328	8	2%
Stormwater	27	69	42	157%
Regulated Recycled	0	1	1	-
Total	**2,716**	**2,488**	**-228**	

Table A9-16 Information Technology technology Expenditure expenditure 2012–16 ($m, nominal)

	2012–13	2013–14	2014–15	2015–16	Total
Determination	47	42	47	55	**191**
Actual/Forecast	29	39	47	82	**197**
Total	**-17**	**-4**	**0**	**27**	**6**

Appendix 10 – Financial Leases

[Commercial-in-confidence]