Appendix 4A

Overview of 7 separate price schedules

Price proposal 2020–24

Sydney water proposes prices, in 7 separate price schedules and 20 price tables (and 115 prices) for the 2020 proposal.

Schedule	Services	Table	No of prices
1	Water Supply Services	1. Meter Connection Charge	9
		2. Water supply services charge for Unmetered properties	1
		3. Water usage charge for Filtered Water	2
		4. Water usage charge for Unfiltered Water	1
2	Wastewater Services	5. Sewerage Usage Charge	2
		6. Meter connection charge	9
		7. Deemed sewerage usage charge	1
3	Stormwater drainage services	8. Stormwater drainage service charge	10
4	Rouse Hill Stormwater Drainage Services and Kellyville Village Stormwater Drainage Services	9. Rouse Hill Stormwater Drainage Service charge	2
		10. Rouse Hill land drainage charge for New Properties and Redeveloped Properties within Kellyville Village Area	1
		11. Kellyville Village stormwater drainage charge	10
5	Rouse Hill Recycled Water Supply	12. Rouse Hill recycled water usage charge	1
6	Trade Waste services	13. Pollutant charges for Industrial Customers	8
		14. Corrosive substance charges for Industrial Customers	2
		15. Trade waste industrial agreement charges for industrial customers by risk index	7
		16. Commercial agreement charges for Commercial Customers	2
		17. Wastesafe charges for Commercial Customers	1
		18. Substance charges for Commercial Customers	7
		19. Trade waste ancillary Charges	4
7	Ancillary and miscellaneous customer services	20. Charges for ancillary and miscellaneous customer services	35

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Schedule 1
Water supply services

Price proposal 2020–24

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1.2. Water supply services – Annual Rates (based on an equivalent of 365 days) 3

Schedule 1 Water supply services

1.1. Water Supply Services – Daily Rates

Table 1 Water meter connection charge ($2019-20)

Meter Size	2020-21 $/day	2021-22 $/day	2022-23 $/day	2023-24 $/day
20mm	0.20127	0.20127	0.20127	0.20127
25mm	0.31448	0.31448	0.31448	0.31448
32mm	0.51525	0.51525	0.51525	0.51525
40mm	0.80508	0.80508	0.80508	0.80508
50mm	1.25794	1.25794	1.25794	1.25794
80mm	3.22032	3.22032	3.22032	3.22032
100mm	5.03175	5.03175	5.03175	5.03175
150mm	11.32143	11.32143	11.32143	11.32143
200mm	20.12699	20.12699	20.12699	20.12699
For meter sizes not specified above, the following formula applies	$\frac{(\text{Meter size})^2 \times \text{20mm meter charge}}{400}$			

Note: It is assumed that SDP is in shutdown mode but including membrane charge.

Table 2 Water supply service charge for Unmetered Properties ($2019-20)

Charge	2020-21 $/day	2021-22 $/day	2022-23 $/day	2023-24 $/day
Water supply service charge	1.25136	1.25136	1.25136	1.25136

Table 3 Water usage charge for Filtered Water ($2019-20)

Charge	2020-21 $/kL	2021-22 $/kL	2022-23 $/kL	2023-24 $/kL
Water usage charge	2.13	2.13	2.13	2.13
SDP uplift to water usage charge	0.13	0.13	0.13	0.13

Table 4 Water usage charge for Unfiltered water ($2019-20)

Charge	2020-21 $/kL	2021-22 $/kL	2022-23 $/kL	2023-24 $/kL
Unfiltered water usage charge	1.83	1.83	1.83	1.83

1.2. Water supply services – Annual Rates (based on an equivalent of 365 days)

Table 5 Water meter connection charge ($2019-20)

Meter Size	2020-21 $/year	2021-22 $/year	2022-23 $/year	2023-24 $/year
20mm	73.46	73.46	73.46	73.46
25mm	114.79	114.79	114.79	114.79
32mm	188.07	188.07	188.07	188.07
40mm	293.85	293.85	293.85	293.85
50mm	459.15	459.15	459.15	459.15
80mm	1,175.42	1,175.42	1,175.42	1,175.42
100mm	1,836.59	1,836.59	1,836.59	1,836.59
150mm	4,132.32	4,132.32	4,132.32	4,132.32
200mm	7,346.35	7,346.35	7,346.35	7,346.35
For meter sizes not specified above, the following formula applies	$\frac{(\text{Meter size})^2 \times \text{20mm meter charge}}{400}$			

Note: It is assumed that SDP is in shutdown mode but including membrane charge.

Table 6 Water supply service charge for Unmetered Properties ($2019-20)

Charge	2020-21 $/year	2021-22 $/year	2022-23 $/year	2023-24 $/year
Water supply service charge	456.75	456.75	456.75	456.75

Table 7 Water usage charge for Filtered Water ($2019-20)

Charge	2020-21 $/kL	2021-22 $/kL	2022-23 $/kL	2023-24 $/kL
Water usage charge	2.13	2.13	2.13	2.13
SDP uplift to water usage charge	0.13	0.13	0.13	0.13

Table 8 Water usage charge for Unfiltered water ($2019-20)

Charge	2020-21 $/kL	2021-22 $/kL	2022-23 $/kL	2023-24 $/kL
Unfiltered water usage charge	1.83	1.83	1.83	1.83

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Schedule 2
Wastewater services

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2.2 Wastewater Services – Annual Rates (based on an equivalent of 365 days) 3

Schedule 2 Wastewater Services

2.1 Wastewater Services – Daily Rates

Table 1 Wastewater usage charge for non-residential properties ($2019-20)

Charge	2020-21 $/kL	2021-22 $/kL	2022-23 $/kL	2023-24 $/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	0.61	0.61	0.61	0.61

Note: The discharge allowance is 0.411kL/day.

Table 2 Wastewater meter connection charge ($2019-20)

Meter Size	2020-21 $/day	2021-22 $/day	2022-23 $/day	2023-24 $/day
20mm	1.80310	1.80310	1.80310	1.80130
25mm	2.81735	2.81735	2.81735	2.81735
32mm	4.61595	4.61595	4.61595	4.61595
40mm	7.21242	7.21242	7.21242	7.21242
50mm	11.26941	11.26941	11.26941	11.26941
80mm	28.84968	28.84968	28.84968	28.84968
100mm	45.07762	45.07762	45.07762	45.07762
150mm	101.42465	101.42465	101.42465	101.42465
200mm	180.31049	180.31049	180.31049	180.31049
For meter sizes not specified above, the following formula applies	$\frac{(\text{Meter size})^2 \times \text{20mm meter charge}}{400}$			

Note: The prices assume the application of a Discharge Factor (df) 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 df% is less than 100%.

Table 3 Deemed wastewater usage charge ($2019-20)

Charge	2020-21 $/day	2021-22 $/day	2022-23 $/day	2023-24 $/day
Deemed wastewater usage charge	0.25071	0.25071	0.25071	0.25071

2.2 Wastewater Services – Annual Rates (based on an equivalent of 365 days)

Table 4 Wastewater usage charge for non-residential properties ($2019-20)

Charge	2020-21 $/kL	2021-22 $/kL	2022-23 $/kL	2023-24 $/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	0.61	0.61	0.61	0.61

Note: The discharge allowance is 0.411kL/day.

Table 5 Wastewater meter connection charge ($2019-20)

Meter Size	2020-21 $/year	2021-22 $/year	2022-23 $/year	2023-24 $/year
20mm	658.13	658.13	658.13	658.13
25mm	1,028.33	1,028.33	1,028.33	1,028.33
32mm	1,684.82	1,684.82	1,684.82	1,684.82
40mm	2,632.53	2,632.53	2,632.53	2,632.53
50mm	4,113.33	4,113.33	4,113.33	4,113.33
80mm	10,530.13	10,530.13	10,530.13	10,530.13
100mm	16,453.33	16,453.33	16,453.33	16,453.33
150mm	37,020.00	37,020.00	37,020.00	37,020.00
200mm	65,813.33	65,813.33	65,813.33	65,813.33
For meter sizes not specified above, the following formula applies	$\frac{(\text{Meter size})^2 \times \text{20mm meter charge}}{400}$			

Note: The prices 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 df% is less than 100%.

Table 6 Deemed wastewater usage charge ($2019-20)

Charge	2020-21 $ /year	2021-22 $/year	2022-23 $/year	2023-24 $/year
Deemed wastewater usage charge	91.51	91.51	91.51	91.51

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Schedule 3

Stormwater drainage services

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Schedule 3 Stormwater drainage services

3.1 Stormwater drainage services - daily rates

Table 8 – Stormwater drainage service charges ($2019-20)

Charge	2020-21 $/day	2021-22 $/day	2022-23 $/day	2023-24 $/day
Residential multi premises	0.07364	0.07364	0.07364	0.07364
Residential property – low impact	0.07364	0.07364	0.07364	0.07364
Residential standalone property	0.23594	0.23594	0.23594	0.23594
Non-residential property within a non-residential multi premises	0.07364	0.07364	0.07364	0.07364
Non-residential property – small (200m^2 or less)	0.07364	0.07364	0.07364	0.07364
Non-residential property – medium (201m^2 to 1,000m^2)	0.23594	0.23594	0.23594	0.23594
Non-residential property low impact	0.23594	0.23594	0.23594	0.23594
Non-residential property – large (1,001m^2 to 10,000m^2)	1.37484	1.37484	1.37484	1.37484
Non-residential property – very large (10,001m^2 to 45,000m^2)	6.11052	6.11052	6.11052	6.11052
Non-residential property – largest (45,001m^2 or greater)	15.27635	15.27635	15.27635	15.27635

3.2 Stormwater drainage services - annual rates (based on an equivalent of 365 days)

Table 8 – Stormwater drainage service charges ($2019-20)

Charge	2020-21 $/year	2021-22 $/year	2022-23 $/year	2023-24 $/year
Residential multi premises	26.88	26.88	26.88	26.88
Residential property – low impact	26.88	26.88	26.88	26.88
Residential standalone property	86.12	86.12	86.12	86.12
Non-residential property within a non-residential multi premises	26.88	26.88	26.88	26.88
Non-residential property – small (200m^2 or less)	26.88	26.88	26.88	26.88
Non-residential property – medium (201m^2 to 1,000m^2)	86.12	86.12	86.12	86.12
Non-residential property low impact	86.12	86.12	86.12	86.12
Non-residential property – large (1,001m^2 to 10,000m^2)	501.82	501.82	501.82	501.82
Non-residential property – very large (10,001m^2 to 45,000m^2)	2,230.34	2,230.34	2,230.34	2,230.34
Non-residential property – largest (45,001m^2 or greater)	5,575.87	5,575.87	5,575.87	5,575.87

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Schedule 4

Rouse Hill Stormwater Drainage Services and Kellyville Village Stormwater Drainage Services

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Schedule 4 Rouse Hill stormwater drainage services and Kellyville Village stormwater drainage services

4.1 Rouse Hill stormwater drainage services and Kellyville Village stormwater drainage services - daily rates

Table 9 – Rouse Hill stormwater drainage charge ($2019-20)

Charge	2020-21 $/day	2021-22 $/day	2022-23 $/day	2023-24 $/day
Rouse Hill stormwater charge for residential properties, vacant land and non-residential properties with land size ≤ 1,000m^2	0.38735	0.36234	0.33734	0.31148
Rouse Hill stormwater charge for non-residential properties with land size > 1,000m^2	0.38735 × ((land area in m^2)/1000)	0.36234 × ((land area in m^2)/1000)	0.33734 × ((land area in m^2)/1000)	0.31148 × ((land area in m^2)/1000)

Table 10 – Rouse Hill land drainage charge for new and redeveloped properties within the Kellyville Village area ($2019-20)

Charge	2020-21 $/day	2021-22 $/day	2022-23 $/day	2023-24 $/day
Rouse Hill land drainage charge	0.91987	0.91987	0.91987	0.91735

Table 11 – Kellyville Village stormwater drainage charge ($2019-20)

Charge	2020-21 $/day	2021-22 $/day	2022-23 $/day	2023-24 $/day
Residential multi premises	0.07364	0.07364	0.07364	0.07364
Residential property – low impact	0.07364	0.07364	0.07364	0.07364
Residential standalone property	0.23594	0.23594	0.23594	0.23594
Non-residential property within a non-residential multi premises	0.07364	0.07364	0.07364	0.07364
Non-residential property – small (200m^2 or less)	0.07364	0.07364	0.07364	0.07364
Non-residential property – medium (201m^2 to 1,000m^2)	0.23594	0.23594	0.23594	0.23594
Non-residential property low impact	0.23594	0.23594	0.23594	0.23594
Non-residential property – large (1,001m^2 to 10,000m^2)	1.37484	1.37484	1.37484	1.37484
Non-residential property – very large (10,001m^2 to 45,000m^2)	6.11052	6.11052	6.11052	6.11052
Non-residential property – largest (45,001m^2 or greater)	15.27635	15.27635	15.27635	15.27635

4.2 Rouse Hill Stormwater Drainage Services and Kellyville Village Stormwater Drainage Services – Annual Rates

Table 9 – Rouse Hill stormwater drainage charge ($2019-20)

Charge	2020-21 $/year	2021-22 $/year	2022-23 $/year	2023-24 $/year
Rouse Hill stormwater charge for residential properties, vacant land and non-residential properties with land size ≤ 1,000m^2	141.38	132.26	123.13	114.00
Rouse Hill stormwater charge for non-residential properties with land size >1,000m^2	141.38 × ((land area in m^2)/1000)	132.26 × ((land area in m^2)/1000)	123.13 × ((land area in m^2)/1000)	114.00 × ((land area in m^2)/1000)

Table 10 – Rouse Hill land drainage charge for new properties ($2019-20)

Charge	2020-21 $/year	2021-22 $/year	2022-23 $/year	2023-24 $/year
Rouse Hill land drainage charge	335.75	335.75	335.75	335.75

Table 11 – Kellyville Village stormwater drainage charge ($2019-20)

Charge	2020-21 $/year	2021-22 $/year	2022-23 $/year	2023-24 $/year
Residential multi premises	26.88	26.88	26.88	26.88
Residential property – low impact	26.88	26.88	26.88	26.88
Residential standalone property	86.12	86.12	86.12	86.12
Non-residential property within a non-residential multi premises	26.88	26.88	26.88	26.88
Non-residential property – small (200m^2 or less)	26.88	26.88	26.88	26.88
Non-residential property – medium (201m^2 to 1,000m^2)	86.12	86.12	86.12	86.12
Non-residential property low impact	86.12	86.12	86.12	86.12
Non-residential property – large (1,001m^2 to 10,000m^2)	501.82	501.82	501.82	501.82
Non-residential property – very large (10,001m^2 to 45,000m^2)	2,230.34	2,230.34	2,230.34	2,230.34
Non-residential property – largest (45,001m^2 or greater)	5,575.87	5,575.87	5,575.87	5,575.87

Note: The annual rates are calculated based on an equivalent of 365 days

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Schedule 5

Rouse Hill recycled water supply

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Schedule 5 Rouse Hill recycled water supply

Table 12 – Rouse Hill recycled water usage charge ($2019-20)

Charge	2020-21 $/kL	2021-22 $/kL	2022-23 $/kL	2023-24 $/kL
Rouse Hill recycled water usage charge	1.92	1.92	1.92	1.92

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Schedule 6
Trade waste services

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Schedule 6 - Trade waste services

Sydney Water currently offers 34 Tradewaste and Wastesafe services that have quoted charges. We propose to reduce the number of charges to 31 with the removal of the sale of trade waste data charge and the Wastesafe missed service charges.

Tradewaste revenue account for a very small proportion (around 0.9%) of Sydney Water's total revenue. The estimated revenue for 2019-20 is around $33.0 million ($2019-20) but this is forecast to drop to an average of $24.6 million ($2019-20) across the 2020 Price Determination period mainly due to proposed overall price decreases in the Industrial and Commercial Pollutant charges, from lower forecast management charges and wastesafe charges. Industrial agreement risk level prices will increase slightly.

The trade waste cost and allocation models have been reviewed, and changes are reflected in the proposed prices for the 2020-24 pricing period.

We have included an upwards real adjustment of 1.4% to account for corporate costs in the Tradewaste and Wastesafe proposed prices, cumulatively for each year over the four-year pricing period..

1.1 Trade waste services

There are two groups of trade waste costs:

- Cost associated with treatment (pollutant charges)
    - These are charged on a volumetric basis
- Cost associated with managing trade waste dischargers (agreement fees).
    - These are fixed charges

Table A6.1 Trade waste costs and charges

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 2012–16 price path. No major changes made to the trade waste charges in the 2016 price period, apart from the inclusion of corporate overheads costs, as determined by IPART.

We are proposing to maintain the current price structure, but with proposed prices that reflect our latest review of our model, and the update of cost and volume inputs. This has had the effect of lowering many of the proposed prices for both treatment and management costs that are outlined in the following pages.

We propose a change in how we manage Wastesafe missed services by charging customers the existing higher substance fees for the period of non-compliance instead of using the missed service charge. In effect the charge moves from a management charge to a treatment charge. This better reflects the higher pollutant load when non-compliance is occurring.

1.2 Treatment costs

A full review and update of cost and volume inputs into the trade waste models has been undertaken. The last time this was completed was for the 2012-16 price path.

The purpose of the trade waste pollutant model is to identify transport, treatment and corrosion costs, determine the proportion responsible to trade waste, and allocate these into prices for both industrial and commercial trade waste customers.

Firstly, a review and full rebuild of the trade waste pollutant model has been undertaken to simplify, reduce inconsistency, improve traceability and clarity.

Data inputs for the model include:

- Industrial & commercial pollutant masses and volumes
- Wastewater system influent loads and volumes
- Treatment Plant & system corrosion costs
- Corporate overheads are incorporated into all trade waste prices

A range of years of historical data has been collated and are forecast for the price determination period of 2020-24.

The trade waste pollutant model produces a dollar per kilogram basis per pollutant. The same rates are applied to both commercial and industrial dischargers but in different ways.

Industrial customers are charged on a dollar per kilogram basis per pollutant from sampling they undertake. A different rate per pollutant is applied according to the treatment type, ie: Primary and Secondary/Tertiary.

Commercial customers are divided into similar process groups. For each process group, Sydney Water has estimated typical discharge characteristics of individual pollutants. These customers are then charged on a per kiloliter basis via either the water meter or assessed discharge methods. The same rate is applied wherever they are located due to commercial businesses simple processes and pre-treatment giving limited control over improving waste quality discharge.

1.3 Pollutant charges

Only substances that drive treatment and corrosion mitigation costs are chargeable. These substances are:

- BOD
- suspended solids
- grease
- nitrogen
- phosphorus
- temperature
- pH
- Sydney Water monitors and enforces compliance with acceptance standard limits for other domestic and non-domestic pollutants as these have the potential to adversely impact biosolids and recycled water quality. They can also present a significant risk to the environment or Sydney Water's staff.
- All pollutants will see reductions in the $/kg rate. The corrosion component of the BOD charge increases slightly. These are shown in table A6.2 below.

Many factors have influenced the pollutant charges including, the rebuilding of the pollutant model to simplify, reduce inconsistency, improve traceability and clarity. A number of observations can be made across the model inputs, including: increasing commercial and industrial volumes, decreasing industrial numbers, flow changes from non-trade waste sources and expenditure mix changes.

Pollutant charges for industrial customers

Table A6.2 Pollutant charges for industrial customers ($2019–20)

Pollutant[a]	Acceptance standard (mg/L)[b]	Domestic equivalent	2019-20 $/kg#	2020-21 $/kg#	2021-22 $/kg#	2022-23 $/kg#	2023-24 $/kg#
-Primary WWTPs	See note 1	230	0.320 + [0.138 x (BODkg/L)/600]	0.292 + [0.155 x (BODkg/L)/600]	0.296 + [0.157 x (BODkg/L)/600]	0.300 + [0.159 x (BODkg/L)/600]	0.304 + [0.161 x(BODkg/L)/600]
BOD – secondary and tertiary WWTPs	See note 1	230	2.083 + [0.138 x (BODkg/L)/600]	1.349 + [0.155 x (BODkg/L)/600]	1.368 + [0.157 x (BODkg/L)/600]	1.387 + [0.159 x (BODkg/L)/600]	1.407 + [0.161 x (BODkg/L)/600]
Suspended solids – primary WWTPs	600	200	0.582	0.423	0.429	0.435	0.441
Suspended solids – secondary and tertiary WWTPs	600	200	1.686	0.915	0.928	0.941	0.954
Grease – primary WWTPs	110	50	0.526	0.382	0.387	0.392	0.398
Grease – secondary and tertiary WWTPs	200	50	1.611	0.950	0.963	0.977	0.991
Nitrogen[c] – secondary/tertiary inland WWTP	150	50	1.910	1.066	1.081	1.096	1.111
Phosphorus[c] – secondary/tertiary inland WWTP	50	10	6.849	1.247	1.265	1.283	1.301

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

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.

The oxygen demand of effluent is specified in terms of BOD. Acceptance standards for BOD are to be determined by the transportation and treatment capacity of the receiving system and the end use of sewage treatment products.

per kg of mass above domestic equivalent

Corrosive substance charge

Temperature and acidity (pH) charges were introduced in the year 2012. These charges can only be applied to customers within a corrosion declared catchment. To date these charges have not been used as customers have been successfully managed using Effluent Improvement Programs (EIP's). For this submission, Sydney Water proposes to leave these charges unchanged in real terms apart from the incremental annual increases in corporate overheads.

Table A6.3 Corrosive substance charges for industrial customers - corrosion impacted catchment ($2019–20)

Pollutant	Units	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
Acidity (pH<7)	Per ML of wastewater where pH<7#	72.563	79.520	80.634	81.762	82.907
Temperature	Per ML of wastewater with temperature >25 °C*	8.034	8.804	8.928	9.052	9.179

#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.

1.3.1 Substance charges for commercial customers

As described above, the trade waste pollutant model produces a dollar per kilogram charge per pollutant.

Commercial customers are divided into similar process groups. For each process group, Sydney Water has estimated typical discharge characteristics of individual pollutants. These customers are then charged on a per kiloliter basis via either the water meter or assessed discharge methods. The same rate is applied wherever they are located due to simple processes and pre-treatment giving limited control over improving waste quality discharge.

We propose reductions in the commercial substance charges due to the decreases in the $/kg rates for chargeable pollutants except for charges for equipment hire wash and for low and high strength BOD food (if pre-treatment is not maintained in accordance with requirements) which will increase slightly.

Table A6.4 Commercial customer distribution

Process	Count	%
Low strength BOD food	17,909	74.32
Higher strength BOD food	1,238	5.14
Automotive	4,105	17.03
Laundry	562	2.33
Lithographic	74	0.31
Photographic	7	0.03
Equipment hire wash	139	0.58

There are 24,000 chargeable commercial processes as shown in the above Table A6.4. Most processes are food-based businesses. 99% of commercial processes will receive charge reductions.

Table A6.5 Substance charges for commercial customers ($2019–20)

Process	Units [a]	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
Low strength BOD food	Per kL	2.473	1.692	1.716	1.740	1.764
Higher strength BOD food	Per kL	4.063	2.326	2.359	2.392	2.425
Automotive	Per kL	0.806	0.481	0.488	0.495	0.502
Laundry	Per kL	0.504	0.403	0.409	0.415	0.421
Lithographic	Per kL	0.388	0.277	0.281	0.284	0.288
Photographic	Per kL	Nil	Nil	Nil	Nil	Nil
Equipment hire wash	Per kL	3.684	4.148	4.206	4.265	4.325
Ship to shore	Per kL	Nil	Nil	Nil	Nil	Nil
Miscellaneous	Per kL	Nil	Nil	Nil	Nil	Nil
Other (default)	Per kL	Nil	Nil	Nil	Nil	Nil
Charge for low and high strength BOD food if pre-treatment is not maintained in accordance with requirements.[b]	Per kL	12.187	13.283	13.469	13.658	13.849

[a] Per kL of trade waste discharged into the wastewater system (as determined by Sydney Water in accordance with its Trade Waste Policy).

[b] This charge applies if pre-treatment is not maintained in line with Sydney Water's Trade Waste Policy.

Note: Shopping Centres with centralised pre-treatment (CAF, biological treatment) will be managed as industrial customers (Risk Index 6) and receive site-specific substance charges.

1.4 Management Costs

Management costs include labour and overheads for tasks directly attributable to managing customers discharging wastewater into the wastewater network. These include site visits, audits and sampling program.

Labour is the most significant component across trade waste management charges. Since costs were last reviewed in 2011-12 a full update of cost inputs and allocation has been undertaken.

Corporate overheads are incorporated into all trade waste prices since 2016-17. In the 2016 determination, IPART calculated the corporate common costs at 15.6% and applied an upward cumulative real adjustment of 1.9% each year over a two determination period to get to that level. For this price review, Sydney Water has calculated corporate common costs at 14%. Applying the same approach that was included in 2016-20 determination, we propose an upward real cumulative adjustment of 1.4% each year to be applied to the Tradewaste and Wastesafe prices.

Management Charges

1.4.1 Trade waste industrial agreement charges

Trade waste industrial agreement charges are to recoup the costs of managing and monitoring industrial customers.

Industrial customers are split into seven groups based on risks associated with their wastewater discharge. Each group has a different frequency of inspection and sampling by Sydney Water staff. A customer may move up or down this index based on the discharge performance.

No changes are proposed for the inspection and sampling requirements.

Table A6.6 Trade waste industrial agreement overview

Risk Level	Number of inspections per customer per year	Number of customers	Total inspections per year
1	13	0	0
2	13	2	26
3	13	11	143
4	6	22	132
5	4	96	384
6	2	505	1010
7	1	83	83
TOTAL		719	1778

All costs associated with managing industrial agreements are summed and divided by the total inspections to derive a cost per inspection. The annual charge per risk level is derived by multiplying the cost per inspection by the number of inspections required. The daily rate is then calculated by dividing the number of days with that financial year.

The unit cost has increase slightly. The underlaying drivers are updated labour and sampling costs, and a changing distribution of customers across the risk index.

These charges will be applied at a daily rate per quarter. An annual total is provided in table A6.8 for reference.

Table A6.7 Trade waste industrial agreement charges for Industrial Customers by risk index ($2019–20)

Risk Level	Unit	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
1	$/day	24.90728	28.81510	29.21851	29.62757	29.96027
2	$/day	24.90728	28.81510	29.21851	29.62757	29.96027
3	$/day	24.90728	28.81510	29.21851	29.62757	29.96027
4	$/day	11.49677	13.29927	13.48546	13.67425	13.82781
5	$/day	7.66893	8.86618	8.99031	9.11617	9.21854
6	$/day	3.83447	4.43309	4.49515	4.55808	4.60927
7	$/day	1.91723	2.21656	2.24759	2.27906	2.30465

Table A6.8 Trade waste industrial agreement charges for Industrial Customers by risk index ($2019–20) for reference

Risk Level	Unit	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
1	$/year	$9,116.07	$10,517.51	$10,664.75	$10,814.06	$10,965.46
2	$/year	$9,116.07	$10,517.51	$10,664.75	$10,814.06	$10,965.46
3	$/year	$9,116.07	$10,517.51	$10,664.75	$10,814.06	$10,965.46
4	$/year	$4,207.82	$4,854.23	$4,922.19	$4,991.10	$5,060.98
5	$/year	$2,806.83	$3,236.16	$3,281.46	$3,327.40	$3,373.99
6	$/year	$1,403.41	$1,618.08	$1,640.73	$1,663.70	$1,686.99
7	$/year	$701.71	$809.04	$820.37	$831.86	$843.50

1.4.2 Trade waste commercial agreement charges

Trade waste commercial agreement charges are to recoup the costs of managing and monitoring commercial customers. Costs include labour and overheads for tasks directly attributable, including site visits, audits and sampling program.

All costs associated with commercial agreements are allocated by process. Where an agreement has multiple processes, the additional processes don't cost as much to manage as stand-alone agreements with just one process. Approximately one third of all processes are secondary or additional processes. Using these criteria, a unit cost is derived. The daily rate is then calculated by dividing the number of days with that financial year.

Since the last full review of costs in 2011, significant restructures have occurred in the commercial agreement area. These changes have led to efficiencies that are being passed onto these customers.

These charges will be applied at a daily rate per quarter. An annual total is provided in table A6.10 for reference.

Table A6.9 Commercial agreement charges for Commercial Customers ($2019–20)

Service	Units	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
Commercial agreement charge – first process	$/day	0.44986	0.28821	0.29224	0.29634	0.29966
Commercial agreement charge – each additional process	$/day	0.15441	0.09606	0.09740	0.09877	0.09988

Table A6.10 Commercial agreement charges for Commercial Customers ($2019–20) for reference

Service	Units	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
Commercial agreement charge – first process	$/year	$164.65	$105.20	$106.67	$108.16	$109.68
Commercial agreement charge – each additional process	$/year	$56.51	$35.06	$35.55	$36.05	$36.56

1.4.3 Wastesafe charges

Sydney Water uses Wastesafe, an electronic tracking system, to monitor the generation, collection, transportation and disposal of liquid waste collected in liquid waste traps. There are 14,000 liquid waste traps currently monitored.

There are two charge types within the wastesafe tariff structure:

1) a fixed quarterly charge for the administration of the wastesafe system and
2) a missed service charge that is only applied when liquid waste traps are non-compliant.

1.4.3.1 Wastesafe Fixed Quarterly Charge

The review of cost inputs for the fixed charge per liquid waste trap showed that the move to a new software provider lowered cost significantly. These savings will be passed on to wastesafe customers. We propose to reduce the annual charges by over 60% from about $117 in 2019-20 to $40 in 2020-21.

1.4.3.2 Wastesafe Missed Service Charge

In 2013-14 a missed service process was implemented with the aim to improve compliance. This process involved reminder letters and if still not compliant a visit to the customer. Compliance performance has not seen the desired improvement and has remained consistently below under 90%.

Since implementation, several changes have occurred within the business including restructuring of staff, new software and planning for the new billing system.

Sydney Water is proposing a modification to the missed service process. The same process of issuing reminder letters will continue. However, if the non-compliance is not rectified by getting a pump out performed, we propose that we apply the higher charge for the volume of waste generated during the period of non-compliance instead of applying the missed service charge. The higher charge is an existing substance charge for commercial customers outlined in Table A6.5 above.

The quality of wastewater generated by a liquid waste trap that is not adequately maintained is of a higher concentration and pollutant load than that of a pit that is compliant. This higher load is not currently paid by customers when they are not compliant. The missed service charge, when applied, has not proved to increase compliance from customers.

Currently the missed service charge is dependent on the size of the liquid water trap; that is a charge of $322.70 per event if the size is less than 2,000 litres or a charge of $645.42 per event if the size is greater than 2,000 litres. The higher process charge is dependent on the process type and the volume of waste discharged. A low BOD process customer will see an increase from $1.692/kL to $13.283/kL while a high BOD process customer will see an increase from $2.326/kL to $13.283/kL for the period of non-compliance.

The customer impact will therefore vary according to liquid trap size, the process and volume. Customers will pay more via the higher substance charge when non-compliant. This higher substance charge may be less or more than previous missed service charges.

Sydney Water proposes to:

- to maintain the fixed $ per liquid waste trap charge and charged at a daily rate
- remove the missed service (pump out) inspection charge for liquid waste traps
- apply the “Charge for low and high strength BOD food if pre-treatment is not maintained in accordance with requirements” (as outlined in table Table A6.5) when services are consistently missed.

Table A6.11 Wastesafe charges for Commercial Customers ($2019–20)

Service	Units	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
Fixed $ per liquid waste trap charge	$/day	0.31998	0.10867	0.11019	0.11173	0.11299
Missed service (pump out) inspection charge for liquid waste traps ≤ 2,000 litres	Per event	322.70	n/a	n/a	n/a	n/a
Missed service (pump out) inspection charge	Per event	645.42	n/a	n/a	n/a	n/a

for liquid waste traps > 2,000 litres	

Table A6.12 Wastesafe charges for Commercial Customers ($2019–20) for reference

Service	Units	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
Fixed $ per liquid waste trap charge	$/year	$117.311	$39.66	$40.22	$40.78	$41.35

1.4.4 Trade waste ancillary charges

Sydney Water has several other trade waste ancillary type charges. These are to be charged to Tradewaste customers when they apply for industrial agreements. These cover the cost of establishing and processing these customers wishing to discharge to the wastewater network.

There is no application charge for commercial customers to encourage them to apply.

Sydney Water also charges an additional inspection fee which are chargeable to both Industrial and Commercial customers when they exceed the number of allowed inspections in a year. Industrial customers have a number of inspections included with their annual agreement charge. Commercial agreements also allow for 1 uncharged visit per year. Where an additional inspection is required, the annual inspection charge will be raised.

We have performed a comprehensive time motion study for these two charges and multiplied the time period by the average hourly rate to derive the proposed prices. These charges are levied on each occurrence.

Table A6.13 Trade waste ancillary charges ($2019–20)

Service	Units	2019-20 $	2020-21 $	2021-22 $	2022-23 $	2023-24 $
Additional inspection	Per inspection	219.44	199.12	201.90	204.73	207.60
Application – standard	Per application	529.72	787.41	798.43	809.61	820.95
Application – non standard	Per hour	162.27	108.61	110.13	111.67	113.23
Application fee – variation	Per application	636.88	443.48	449.69	455.99	462.37
Sale of data	Per hour	158.14	n/a	n/a	n/a	n/a

Schedule 7

Ancillary and miscellaneous customer services

Price proposal 2020–24

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Schedule 7 – Ancillary and miscellaneous customer services

1.1 Overview

Sydney Water currently offers 41 ancillary and miscellaneous customer services. Only 24 of these services attract charges. There is a total of 34 quoted prices relating to these 24 services.

These account for a very small proportion of Sydney Water's total revenue, around 0.5%. The estimated revenue for 2019-20 is $11.4 million (in $2019-20), however this is forecast to increase to an average of $12.6 million (in $2019-20) across the 2020 price determination period.

Fifteen services that attracted a charge were reviewed. These services accounted for around 92% of all ancillary and miscellaneous customer services transactions. The majority of these charges decreased.

To account for corporate costs, an upwards real adjustment of 1.4% was applied to prices cumulatively for each year of the four-year price path. This was applied to all ancillary and miscellaneous customer services.

In addition, we are proposing to introduce a new charge for the annual test of backflow prevention devices and updated the definition of the 'request for asset construction details' ancillary service to improve clarity.

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.

In 2012, Sydney Water conducted a comprehensive review of its miscellaneous services, analysed customer requirements and calculated the cost of providing the services in line with the Independent Pricing and Regulatory Tribunal's (IPART's) Pricing Principles for miscellaneous charges. As a result, Sydney Water simplified its charging arrangements for ancillary services and reduced the number of chargeable services from 55 to 23.

In 2016, Sydney Water made a small number of adjustments to prices and structures of existing miscellaneous services, namely the shift in delivering services such as property service diagrams, service location diagram and lodging development applications from a network of agents (Quick

Check Agents) to providing these services directly to customers via an online portal Sydney Water Tap In™. We also removed services that belonged to NSW Fair Trading and introduced two new services; a remote read meter (one off fee) and an inaccessible meter fee.

For the 2020 price review, Sydney Water is proposing some minor adjustments to prices for existing ancillary and miscellaneous services. We are also proposing a new ancillary charge for the annual test of backflow prevention devices. This brings the number of quoted prices to 35.

In addition to the price changes from direct and divisional specific costs as identified in the review process, we have also added some corporate costs to the chargeable ancillary and miscellaneous services. An upwards real adjustment of 1.4% was cumulatively applied to all prices for each year of the four-year price path

This is in line with the treatment determined by IPART in the 2016 price review. Details on Sydney Water's allocation of common costs is available in **Attachment 4:** section 5.4.2.

1.2 Reviewed ancillary services

We reviewed fifteen ancillary services that contained twenty-one prices. These services accounted for around 92% of all ancillary and miscellaneous customer services transactions.

The reviewed services include conveyancing and diagram related services that are available electronically via third party providers or Sydney Water's Tap in™ online portal. Meter related ancillary services such as the workshop test of a water meter and the replacement of meter damaged by the customer or customer's agent were also reviewed.

It included an update of labour, management costs, IT system costs and contractor costs (where applicable). These adjustments reflected changes in our operating environment or changes to our business processes. It also includes an allocation for corporate costs of 1.4%.

Table A7-1 below compares the prices for reviewed ancillary and miscellaneous customer services.

Table A7-1 Summary of reviewed ancillary and miscellaneous services ($2019-20)

Item No.	Ancillary service	Current price 2019-20	Proposed price 2020-21	Price change	Change%
1	Conveyancing certificate	$7.12	$7.03	-$0.09	-1%
2	Property sewerage diagram b) electronic C) online	 $11.73 $29.66	 $13.42 $24.10	 $1.69 -$5.56	 14% -19%
3	Service location diagram b) electronic c) online	 $7.12 $20.07	 $7.66 $16.24	 $0.54 -$3.83	 8% -19%
4	Special meter reading statement	$30.33	$36.58	$6.25	21%
5	Billing record search statement	$30.33	$33.89	3.56	12%
6	Building over/ adjacent to asset advice	$50.98	$46.15	-4.83	-9%
7	Water reconnection	$30.33	$55.46	25.13	83%
8	Workshop test of water meter A) 20, 25, 32 mm meters B) 40, 50 mm light C) 50, 80, 100, 150 mm meters D) 200, 250, 300 mm meters	 A) $257.34 B) $357.41 C) $584.87 D) $1299.69	 A) $177.63 B) $219.52 C) $244.76 D) $408.29	 A) -$79.71 B) -$137.89 C) -$340.11 D) -$891.40	 A) -31% B) -39% C) -58% D) -69%
11	Water service connection approval application (32-65 mm)	$256.67	$327.96	$71.29	28%
12	Water service connection approval application (80 mm or greater)	$256.67	$327.96	$71.29	28%
20	Statement of available pressure and flow	$144.89	$135.85	-$9.04	-6%
23	Building plan approval application	$20.09	$17.30	-$2.79	-14%
24	Asset adjustment application	$282.99	$267.21	-$15.78	-6%
26	Water pump application	$144.89	$135.85	-$9.04	-6%
37	Replacement of meter damaged by customer/ customer's agent A) 20 mm B) 25,30, 40mm	 A) $145.55 B) $310.91	 A) $193.72 B) $268.19	 A) $48.17 B) -$42.72	 A) 33% B) -14%

For this price review, it is assumed that to escalate $2018-19 to $2019-20, a CPI of 2.5% for costs and CPI of 2.2% for prices were used.

Based on our review, we are proposing to:

- Reduce the prices of 13 ancillary services, with decreases ranging from $0.09 - $891.40 per charge. The proposed reduction in charges are mainly due to changes in contractor's costs and fees as well as the CAPEX payback of Sydney Water's online portal.
- Raise the prices of 8 ancillary services, with increases ranging from $0.54 - $71.29 per charge. The proposed increase in charges reflect current meter contract costs and changes in our business and operating environments.

1.3 Ancillary services adjusted for corporate costs only

For the nine ancillary services where we propose to maintain the same price level, we have also applied corporate costs of 1.4% cumulatively each year. Table A7-2 shows the price impact of the additional corporate costs.

Table A7-2 Ancillary services where we propose to maintain the same price level with cumulative 1.4% corporate overheads included ($2019-20).

Item No.	Ancillary service	Current price 2019-20	Proposed price 2020-21	Price change	Change %
21	Request for asset construction details	$50.30	$51.01	$0.71	1.4%
22	Supply system diagram	$144.89	$146.92	$2.03	1.4%
33	Development requirements A) complying development B) development requirements - other	 A) $194.93 B) $515.48	 A) $197.66 B) $522.70	 A) $2.73 B) $7.22	 1.4% 1.4%
35	Water and sewer extension application	$515.48	$522.70	$7.22	1.4%
36	Monthly meter reading request by customer	$11.73	$11.90	$0.17	1.4%
38	Integrated service connection application	$257.34	$260.94	$3.60	1.4%
39	Sydney Water hourly rate	$146.86	$148.92	$2.06	1.4%
40	Remote read meter (one off fee) A) 20 mm B) 25 mm C) 32 mm, 40 mm, 50 mm light D) 50 mm heavy, 80mm, 100 mm	 A) $214.01 B) $225.49 C) $247.48 D) $434.16	 A) $217.01 B) $228.65 C) $250.95 D) $440.24	 A) $3.00 B) $3.16 C) $3.47 D) $6.08	 1.4% 1.4% 1.4% 1.4%
41	Inaccessible meter fee	$9.76	$9.89	$0.13	1.4%

1.4 New service – Annual test of backflow prevention device

We are proposing to introduce a new ancillary charge for the annual test of backflow prevention devices.

Sydney Water provides assurance for our drinking water quality through the administration and management of backflow containment on a customer's property. Backflow can occur when there is a cross connection on the customer's property and/ or a reduction in mains pressure which creates a syphoning effect.

All connections to our water mains must have suitable backflow containment.

If the property's hazard rating is low, Sydney Water's 20 mm and 25 mm water meters already includes a simple in-built backflow prevention device. However, If the property's water meter is larger than 25 mm, the property owner must install a separate backflow device.

A testable backflow prevention containment device must be installed at the property where the hazard rating is medium or high. The hazard rating is determined by the activities and/ or processes undertaken at the property. If the hazard rating varies due to multiple processes, the highest hazard rating applies.

The Australian New Zealand standard for Plumbing and Drainage AS/NZS 3500:1, defines the three hazard ratings as:

- Low Hazard – any condition, device or practice which in connection with the water supply system would constitute a nuisance but not endanger health.
- Medium Hazard – any condition, device or practice which in connection with the water supply system could endanger health.
- High Hazard – any conditions, devices or practice which is connected with the water supply system and has the potential to cause death.

Annual testing of testable backflow devices is mandatory under AS/NZS 3500 to ensure functionality. All backflow devices must be installed by a licenced and backflow accredited plumber.

Sydney Water maintains a register of testable backflow prevention containment devices and annual reports. Installation and annual test reports must be submitted electronically to Sydney Water to demonstrate compliance.

Sydney Water has a register of approximately 31,000 testable backflow containment devices. Whilst the majority (80%) of testable backflow devices have up to date annual test reports, around 6,000 devices are non-compliant, i.e. the property owner has not tested and/ or hasn't submitted a copy of the annual test report to Sydney Water. This presents a significant risk to the quality of our water supply

To minimise this risk and manage non-compliant customers, Sydney Water is proposing a new ancillary charge for the annual test of backflow prevention devices.

This will involve a Sydney Water contracted backflow plumber to visit the property and conduct an annual test of the testable backflow device (in situ) and lodge the test report.

Sydney water proposes a fee of $229.44 ($2019-20) to be levied only on non-compliant customers. This is the reflective cost of managing non-compliant customers and having a backflow accredited plumber test the device.

Amended definition for request for asset construction details

We are proposing to amend the definition for the request for asset construction details (item 21) ancillary service to provide clarity around this service.

The current definition for the 'request for asset construction details' is:

> *Detailed plans of Sydney Water's assets showing water, wastewater and drainage. Plans are also known as work orders, long sections or benchmarks.*

Our amended definition is:

> *Construction details about Sydney Water's assets that shows the depths of our pipes and structures. The fee is charged by product per drawing and covers the plan, index and related sheets that are directly associated to nominated assets.*

Sydney Water's proposed prices for ancillary and miscellaneous services

Table A7-3 shows prices for ancillary and miscellaneous services over the four-year price path. These include an upwards real adjustment of 1.4% to prices (for each year) to account for corporate costs.

Table A7-4 provides an explanation for ancillary and miscellaneous services, where required.

Table A7-3 Proposed charges for ancillary and miscellaneous services ($2019–20)

Item	Service	2020-21	2021-22	2022-23	2023-24
1	Conveyancing Certificate Electronic	7.03	7.13	7.23	7.33
2	Property Sewerage Diagram				
	(a) Over the counter	N/A	N/A	N/A	N/A
	(b) Electronic	13.42	13.61	13.80	13.99
	(c) Online (Tap In)	24.10	24.44	24.78	25.13
3	Service Location Diagram				
	(a) Over the counter	N/A	N/A	N/A	N/A
	(b) Electronic	7.66	7.76	7.87	7.98
	(c) Online (Tap In)	16.24	16.47	16.70	16.93
4	Special Meter Reading Statement	36.58	37.09	37.61	38.14
5	Billing Record Search Statement - up to and including 5 years	33.89	34.36	34.84	35.33
6	Building over/Adjacent to Asset Advice	46.15	46.80	47.45	48.12
7	Water Reconnection	55.46	56.24	57.03	57.82
8	Workshop Test of Water Meter				
	(a) 20, 25 and 32 mm meters	177.63	180.12	182.64	185.20
	(b) 40 and 50 mm light meters	219.52	222.59	225.71	228.87
	(c) 50 mm heavy, 80, 100 and 150 mm meters	244.76	248.19	251.66	255.19
	(d) 200, 250 and 300 mm meters	408.29	414.01	419.81	425.69
9	Water Service Disconnection	Nil	Nil	Nil	Nil
10	Water Service Connection Installation Application	Nil	Nil	Nil	Nil
11	Water Service Connection Approval Application (32-65 mm)	327.96	332.55	337.21	341.93
12	Water Service Connection Approval Application (80 mm or greater)	327.96	332.55	337.21	341.93
13	Application to assess a Water Main Adjustment	N/A	N/A	N/A	N/A
14	Standpipe Hire – Security Bond	N/A	N/A	N/A	N/A
15	Standpipe Hire – Annual Fee	N/A	N/A	N/A	N/A
16	Standpipe Water Usage Fee	N/A	N/A	N/A	N/A
17	Backflow Prevention Device Application and Registration Fee	N/A	N/A	N/A	N/A
18	Backflow Prevention Device Annual Administration Fee	N/A	N/A	N/A	N/A
19	Major Works Inspection Fee	N/A	N/A	N/A	N/A
20	Statement of Available Pressure and Flow	135.85	137.75	139.68	141.64
21	Request for Asset Construction Details	51.01	51.72	52.44	53.17
22	Supply System Diagram	146.92	148.98	151.07	153.18
23	Building Plan Approval Application	17.30	17.54	17.79	18.04
24	Asset Adjustment Application	267.21	270.95	274.74	278.59

Item	Service	2020-21	2021-22	2022-23	2023-24
25	Water Main Fitting Adjustment Application	Nil	Nil	Nil	Nil
26	Water Pump Application	135.85	137.75	139.68	141.64
27	Extended Private Service Application	Nil	Nil	Nil	Nil
28	Wastewater Connection Installation Application	Nil	Nil	Nil	Nil
29	Wastewater Ventshaft Relocation Application	Nil	Nil	Nil	Nil
30	Disuse of Wastewater Pipe or Structure	Nil	Nil	Nil	Nil
31	Stormwater Connection Approval Application	Nil	Nil	Nil	Nil
32	Application for inspection of Stormwater Connection	Nil	Nil	Nil	Nil
33	Development Requirements Application				
	(a) Development requirements – complying development	197.66	200.43	203.24	206.09
	(b) Development requirements - other	522.70	530.02	537.44	544.96
34	Road Closure Application	Nil	Nil	Nil	Nil
35	Water and Sewer Extension Application	522.70	530.02	537.44	544.96
36	Monthly Meter Reading request by Customer	11.90	12.07	12.24	12.41
37	Replacement of Meter Damaged by Customer/Customer's Agent				
	(a) 20mm	193.72	196.43	199.18	201.97
	(b) 25, 30 and 40 mm	268.19	271.94	275.75	279.61
38	Integrated Service Connection Application	260.94	264.59	268.29	272.05
39	Sydney Water Hourly Rate	148.92	151.00	153.11	155.25
40	Remote read meter (one off fee)				
	(a) 20mm	217.01	220.05	223.13	226.25
	(b) 25mm	228.65	231.85	235.10	238.39
	(c) 32mm, 40mm, 50mm light	250.95	254.46	258.02	261.63
	(d) 50mm heavy, 80mm, 100mm	440.24	446.40	452.65	458.99
41	Inaccessible meter fee (quarterly charge)	9.89	10.03	10.17	10.31
42	Backflow Annual Test (new)	229.44	232.65	235.91	239.21

*N/A means that Sydney Water either does not provide the relevant service, or the service has been combined with other services and recovered by one charge.

#Nil means service provided that has no charge.

Table A7-4 An explanation of Ancillary and Miscellaneous services (where required).

Item no.	Ancillary and miscellaneous service
2	**Property Sewerage Diagram** – diagram showing the location of the private house service line.
3	**Service location diagram** – diagram showing the location of Sydney Water's pipe and structures and property wastewater connection point
6	B**uilding Over/Adjacent to Asset advice** – a letter from Sydney Water regarding a building's compliance with Sydney Water's standards and regulations for building over or adjacent to its pipes or structures.
7	**Water Reconnection** – reconnection of water service at meter, following payment of overdue accounts.
9	**Water Service Disconnection** – Application for the disconnection of an existing water service. This covers administration only. A separate charge will be payable to Sydney Water if it also performs the physical disconnection.
10	**Water Service Connection Installation Application** – Application for an accredited supplier to install a new connection point into Sydney Water's water main. This covers administration only. A separate charge will be payable to Sydney Water if it also performs the physical connection.
11	**Water service connection approval application (32-65mm**) – Application for Sydney Water to approve a water service connection that requires detailed hydraulic assessment. This covers administration and system capacity analysis as required.
12	**Water service connection approval application (80mm or greater)** – Application for Sydney Water to approve a water service connection that requires detailed hydraulic assessment. This covers administration, system capacity analysis as required, and time taken to determine cost of physical installation.
21	**Request for asset construction details (amended)**– *C*onstruction details about Sydney Water's assets that shows the depths of our pipes and structures. The fee is charged by product per drawing and covers the plan, index and related sheets that are directly associated to nominated assets.
22	**Supply system diagram** – A large plan that shows Sydney Water's wastewater, water and stormwater assets. The information can be provided in hard copy or electronic format.
23	**Building plan approval application** – Application for approval of building plans, to determine if proposed buildings works will affect Sydney Water's pipes or structures.
24	**Asset Adjustment Application** - Application for Sydney Water to investigate the feasibility of relocating a water, wastewater or stormwater asset.
25	**Water main fitting adjustment application** – Application for Sydney Water to investigate the feasibility of lowering or raising a water main fitting. This covers administration only. A separate charge will be payable to Sydney Water if it also performs the physical connection.
26	**Water pump application** – Application for Sydney Water to assess the impact on its water assets, in regard to the installation of a pump on a private water service.
27	**Extended private service application** – Application for Sydney Water to approve a water service connection, for a property where a normal point of connection is not available.

Item no.	Ancillary and miscellaneous service
28	**Wastewater connection installation application** – Application for an accredited supplier to insert a new point of connection into a Sydney Water wastewater pipe. This covers administration only. A separate charge will be payable to Sydney Water if it also performs the physical connection.
29	**Wastewater ventshaft relocation application** – Application for Sydney Water to investigate the feasibility of relocating or adjusting a wastewater ventshaft. This covers administration only and does not include design review or assessment.
30	**Disuse of wastewater pipe or structure** – Application for Sydney Water to investigate the feasibility of ceasing to use an existing wastewater pipe or structure. This covers administration only and does not include design review or assessment.
31	**Stormwater Connection Approval Application** – Application for Sydney Water to determine the conditions of connecting to a Sydney Water stormwater pipe or channel >300 mm.
32	**Application for inspection of Stormwater Connection** – Application for an inspection of the connection to Sydney Water's stormwater pipe or channel >300mm
33	**Development Requirements Application** – Application to determine the servicing requirements for a proposed development or subdivision (including development charges if applicable). Sydney Water will only issue a compliance certificate (Section 73 Certificate) if the development consent is submitted with the application, otherwise it will issue a letter of general requirements only. Sydney Water will determine its full requirements when an application is received with the development consent from the relevant planning authority. a) Development requirements – complying development b) Development requirements – other
34	**Road Closure Application** – Application for a permanent road closure
35	**Water and Sewer Extension Application** – Request for approval to expand reticulation systems, to provide a new point of connection.
36	**Monthly Meter Reading request by Customer** – This monthly charge will cover the additional costs that Sydney Water will incur to process customer requests to have the water meter read and billed monthly.
37	**Replacement of Meter Damaged by Customer/Customer's Agent** – This charge allows Sydney Water to recoup the cost of replacing meters that have been damaged other than by normal wear and tear. Sydney Water will continue to pay for the replacement of meters that are faulty or due to be replaced as part of the regular maintenance programs.
38	**Integrated Service Connection Application** – This is a service that consolidates a number of existing services into a single application form. The charge will apply only to complex connections where detailed hydraulic assessment is required. Standard connections will not incur any application charges.
39	**Sydney Water Hourly Rate** – This hourly rate will apply across all divisions of Sydney Water, to allow Sydney Water to recover the full cost of providing services for customers, where a designated charge otherwise does not apply.

Item no.	Ancillary and miscellaneous service
40	**Remote Read meter (one off fee)** – This charge recovers the cost of installing a Remote Read Meter. Consistent with the Customer Contract, Sydney Water may only install a Remote Read Meter in the following circumstances where the customer has granted permission for the Remote Read Meter to be installed: • To replace an existing Meter that has been made inaccessible after 1 July 2016 on two or more occasions; • To replace an existing Meter at the customer's request; or • As a new Meter for a new connection.

41	**Inaccessible meter fee (quarterly charge)**– This charge recovers the costs of attempted Meter readings and managing estimated accounts where a customer's Meter is inaccessible. Sydney Water may only levy this charge where:
	• A customer's meter is inaccessible after 1 July 2016;
	• Sydney Water had provided that customer with four or more consecutive estimated bills; and
	• The customer has not responded to other contact from Sydney Water, including requests that the customer:
	  o Relocate the Meter at its cost
	  o Install a remote Meter reading device, and
	  o Read the Meter and provide Sydney Water with the reading (ie, self-reading).

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Appendix 4B

Prices for section 12A review Dishonoured or declined payment and late payment fees

Price proposal 2020–24

Appendix 4B - Prices for section 12A review (dishonoured or declined payment and late payment fees)

4.1 Context

Sydney Water ‘s Customer Contract states that we may charge customers:

- interest on their overdue account balance or
- a late payment fee, but only if the maximum late payment fee is specified by IPART as part of a review conducted under the *Independent Pricing and Regulatory Tribunal Act 1992* (NSW).

Under the Customer Contract, if the customer’s payment of the bill is dishonoured or declined, Sydney Water may charge a dishonoured or declined payment fee.

A late payment fee and a dishonoured or declined payment fee are not fees for the provision of a monopoly services, and as such is not within IPART’s scope of review under section 11 of the IPART Act. In the 2016 determination, in pursuant to Section 12A of the IPART Act, the state government has referred[1] IPART to carry out periodic investigation and report on the fees at each pricing review, in accordance with the terms of reference for review received from the government.

We present below our fee proposals for the review.

4.2 Late payment fee

Typically, around 30% of Sydney Water’s customers have not paid their bills by the due date, despite having 21 days to pay. Around 15% of customers are significantly overdue, many of whom are not in financial hardships.

These late payments increase Sydney Water’s costs. The costs include printing and posting reminder bills and overdue notices, phone calls and other follow up actions as well as the funding cost that comes from the delay in receiving revenue. Sydney Water applies a late payment fee or interest accrued to the overdue bill, whichever is greater to recover these costs.

A detailed review of Sydney Water’s late payment fee was conducted during the 2016 price review. The fee reflected the combined interest and debt recovery costs across a range of different customer situations. IPART determined that Sydney Water’s proposed fee is reasonable, simple to understand, and below that charged by other service providers.

For this price review, Sydney Water is proposing to maintain the late payment fee at $4.74 ($2019-20), with an upwards real adjustment of 1.4% for corporate costs that is in line with IPART’s determination in 2016. Details on Sydney Water’s allocation of common costs is available in Attachment 4: Proposed Prices, Section 5.4.

Table 4B-1 below demonstrates that Sydney Water’s late payment fee continues to be below that charged by other service providers.

[1] Appendix C, Review of prices for Sydney Water Corporation, Water- Final Report, June 2016

Table 4B-1 Comparison of late payment fees

Company	Late payment fee
AGL – electricity	$12.73 (not subject to GST)
AGL – gas	$12.73 (not subject to GST)
Origin/Integral	$10.90 (not subject to GST)
Energy Australia	$12.00 for market retail contracts (excludes customers on Flexi Saver and Secure Saver energy plans)
Optus	$15.00 (no GST applies) If the bill is more than $50 and the total amount owing is not paid the due date.
Telstra	$15.00 for overdue amounts more than $70

We estimate around 250,000 instances of late payment in 2020-21, and may remain steady over the four-year price path. The estimated revenue from late payment fees is shown in Table 4B-2.

Table 4B-2 Estimated fees and revenue for late payments ($2019-20 without inflation)

	2019-20	2020-21	2021-22	2022-23	2023-24
Late payment fee ($)	$4.74	$4.81	$4.88	$4.95	$5.02
Late payment revenue ($million)	$1.19	$1.20	$1.22	$1.24	$1.26

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

4.2.1 Terms and conditions for the late payment fee

Under Sydney Water's Customer Contract, any late payment fee will be charged in accordance with any terms and conditions specified by IPART as part of the price review.

Sydney Water proposes to maintain the terms and conditions identified in the 2016 price determination[2] for the late payment fee. We are confident that these terms and conditions provided the required safeguards for vulnerable customers and ensured that the fee does not unfairly affect customers who are experiencing financial difficulty and cannot pay their bill.

The full list of terms and conditions is outlined below.

Sydney Water will not charge a late payment fee where:

- there is a billing matter being considered by the Energy and Water Ombudsman NSW (EWON)
- the customer has made an arrangement with Sydney Water to pay by instalments or another payment plan
- part of the bill is being paid using Sydney Water's payment assistance scheme

[2] IPART, Review of prices for Sydney Water Corporation, Final Report, June 2016, p211

- Sydney Water is 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 Sydney Water's BillAssist program
- the customer has been identified as being in hardship
- the customer pays by Direct debit, or
- EWON has asked Sydney Water to waive the fee.

The fee will only be levied:

- if the customer has been notified in advance of the late payment fee and the circumstances in which it may be levied, and
- at least 7 days after the due date.

4.3 Dishonoured or declined payment fee

The dishonoured and declined payment fee covers the cost of processing reversals where a financial institution has declined a payment to Sydney Water. This does not include any fees incurred from Australia Post or banks. Fees from Australia Post or banks are passed directly to the customer in addition to Sydney Water's dishonoured or declined payment fee.

Sydney Water is proposing to maintain the dishonoured or declined payment fee at $14.26 ($2019-20), with an upwards real adjustment of 1.4% for corporate costs applied cumulatively each year for the term of this price review (see Table 4B-3).

Table 4B-3 Estimated fees and revenue for dishonoured and declined payment ($2019-20 without inflation)

	2019-20	2020-21	2021-22	2022-23	2023-24
Dishonoured or declined payment fee ($)	$14.26	$14.46	$14.66	$14.87	$15.08
Dishonoured or declined payment revenue ($)	$3,900	$3,955	$4,010	$4,067	$4,124

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

We estimate around 275 instances of dishonoured or declined payment in 2020-21, and may remain steady over the four-year price path.

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Appendix 4C

Long run marginal cost for water services

Price proposal 2020–24

Appendix 4C – Marginal costs

This appendix relates to the discussion in Attachment 4 on water pricing and marginal costs.

4.1 Context

The Long Run Marginal Cost (LRMC) is usually defined as the additional cost of producing a unit of output, when all factors of production can be varied. In practice, we estimate the LRMC of water as the incremental cost (per kilolitre of water) to ensure we can continue to meet demand over the long term.

Historically, our modelling of LRMC for water has been based on costs associated with new bulk water resources. We have updated our models by taking the further step of incorporating non-bulk water related costs in our estimation of LRMC. Non-bulk water costs include distribution network costs (ie the piping) and the fixed costs of building and operating water filtration plants (WFPs). For modelling simplicity purpose, we have included the remaining water services costs in a category known as the 'bulk water' component in our LRMC modelling. This component includes the cost of water supply and variable costs associated pumping and treating the water.[1]

In investigating and estimating the LRMC of the non-bulk water component, we engaged subject matter experts - Sapere Research Group (Sapere):

- to outline our approach to estimating LRMC for non-bulk infrastructure costs, and
- to provide an independent assessment of this approach.

A copy of the Sapere's report is attached as Attachment 4C(i) to this Appendix.

The LRMC of water has been an important reference point for regulatory price setting over the last two decades. The concept of marginal water use first became important in 1994 when 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's) emphasis on efficient pricing policies. In 2010, the NWI's Pricing Principles were adopted by the NSW Government, including a recommendation that usage charges should be based on LRMC.

The IPART has used estimates of the LRMC of water to set usage prices in its 2008, 2012 and 2016 determinations for Sydney Water. IPART continues to use LRMC as a principle for water usage pricing, even as it considers more sophisticated price structures.

[1] The variable costs of pumping and treatment (e.g. costs of chemicals) have been incorporated into the 'bulk' costs. Consequently, the remaining costs do not vary with short-term changes in demand. Of note, there are other water-related costs such as the costs of customer servicing costs which are recovered via connection charges.

4.2 Calculating the LRMC of water resources

The LRMC of water resources is a forward-looking concept. It estimates the change in the future costs of the water supply system for a given change in output. As a forward-looking concept, LRMC excludes the cost of past investments, however it does include 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 unused capacity as 'spare' capacity.

Starting from current levels of demand and supply capacity, the LRMC calculation takes into consideration the amount of time that it takes to utilise the spare capacity[2] imbedded in the supply system and the subsequent timing of augmented investment. In practice, the general rule for LRMC modelling is that the greater the spare capacity a system has, the longer it will be before new investment is needed, and the lower the LRMC figure will be. This general rule reflects the fact that LRMC is a point in time estimate of a future stream of costs, and in order to be meaningful, estimate must apply a discount rate to future costs that reflect the 'time value of money'. As a result, the further into the future the augmentation investment, the greater is the level of discounting and the lower the resulting LRMC.

During 2018, Sydney Water carried out work to update and improve its model for estimating the LRMC of water resources, including the consideration for non-bulk water components. We now use both the Average Incremental Costs (AIC) approach and the Turvey/Marginal Incremental Cost (MIC) approach. Based on our experience, we have found that the AIC provides a pragmatic yet robust estimate of the LRMC of water resources, while our simplified MIC model is very sensitive to the assumed starting system yield assumption and the demand increment adopted. We recognise that the MIC is theoretically more consistent with the economic concept of marginality. However, AIC and MIC both are capable of producing similar results, and both methods have been used by regulators in Australia and the UK. We note the comment made by Sapere in its report (page 3, Attachment 4C(i)) that when marginal costs are relatively stable, then the two methods should give very similar results.

In practice, the AIC approach to estimating LRMC is simply the capital and operating costs (in $) of the new capacity plus the operating costs of unused existing capacity, divided by a measure of the additional water supplied (in kilolitres, kL). Essentially the calculation is a ratio that describes the average cost per additional unit of water. Because the calculation is done over a long-time period (ie 50 years in our case), it is converted to a present value (PV), to give a LRMC estimate in '$ per kL'.

This can be expressed as follows:

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

[2] 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).

4.3 LRMC – Non-bulk

4.3.1 LRMC model – non-bulk component

In calculating the marginal cost of water, Sydney Water has distinguished between costs that are driven by changes in water use and costs that are driven by other factors (such as housing growth) that are correlated with water use.

Sydney Water is expecting to incur substantial costs as a consequence of servicing higher population growth and higher water demand. However, much of the cost of servicing growth is driven by the need to service new areas and is largely independent of average per capita water demand. These growth related costs are not relevant in calculating the LRMC. For pricing purposes, it is necessary to identify costs that are driven by water use, and exclude costs that are driven by new connections.

Identifying costs that are dependent on changing levels of water demand is difficult. LRMC focuses on costs that change as a result of changes in water consumption. We note the non-bulk costs for both the distribution network and water filtration plants are designed to cater for peak demand, which is based on the estimated maximum day demand (MDD). Consequently, a change in total demand that does not change the MDD will not impact on costs and conversely, a change in MDD will generate a relatively material cost impact.

In our non-bulk LRMC model, the non-bulk costs that would change with changes in water consumption/demand are separately analysed as (i) Distribution Network (network) costs and (ii) Water Filtration (WFP) costs. In estimating the LRMC for the distribution network infrastructure, the following steps were taken:

- Estimate the PV of a change in costs due to a 10% change in MDD; the ±10% MDD vs expected base case is identified.
- Calculate the PV of the change in demand; in effect, this is applying the Turvey method to assess impact of small change in demand.
- Calculate the LRMC, using the following formula

$$\frac{PV\ of\ costs}{PV\ of\ change\ in\ demand}$$

In estimating the LRMC for the WFP, we adopted an AIC approach:

$$AIC_{WFP} = \frac{PV\ of\ WFP\ costs\ driven\ by\ incremental\ demand}{PV\ of\ incremental\ demand}$$

Note that the WFP costs only include investments that were driven by increases in demand. The details of our approach in measuring our non-bulk LRMCs are described by Sapere in the Attachment 4C(i) to this Appendix.

4.3.2 Modelling Results – non-bulk component

Our modelling estimates that the LRMC of the distribution network to range between the $0.06 to $0.12 per kL, and the LRMC for WFPs is ranged between $0.09 to $0.19 per kL. Thus, we estimate that the LRMC of the total non-bulk component ranges from $0.15 to $0.30 per kL. As stated in the Section 4.1, this non-bulk LRMC figure does not include Sydney Water's variable costs for transport and treatment of bulk water.

Sapere noted in its report that the Sydney Water's approach to estimating the LRMC of the non-bulk component to be reasonable.

A copy of our spreadsheet non-bulk model with its key underlying assumptions and results is available to IPART upon request.

4.4 LRMC – Bulk

4.4.1 LRMC model – bulk component

The Bulk Water LRMC Model calculation is a function of the following key variables:

- Current system yield: The best current estimate of yield of 570GL published by WaterNSW[3] is considered as the base case.
- Base year demand: The forecast growth demand profile for 2018-19 (as at October 2018) produced by Sydney Water's Analytics team is used as the base case
- The operating costs of existing unused capacity, Shoalhaven transfer and related costs are considered
- The capital and operating costs of new water supply capacity, incremental yields and new investments from WaterNSW augmentation capital plan are assumed.

There are several necessary assumptions embedded in the LRMC bulk model calculation. 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. Table 4C-1 below provides details of the base case and variations.

[3] WaterNSW, Greater Sydney's water supply system yield, May 2018.

Table 4C-1 Assumptions used in estimating bulk water 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')	570,000 ML	545,000 ML 620,000 ML
How much water we supply in the base year ('demand')	565,000[4] ML	
How fast demand is expected to grow	Average weather conditions, without water restrictions[5] and water usage price of $2.13 per kL ($2019-20)	±1.5% of base case
The costs of building and operating the new supply capacity	See Table 4C-2	Variance in Lower Cordeaux dam capex
The benefits of the new capacity, in terms of additional water supplies	See Table 4C-2	
Discount rate[6]	5.0%	5.3%

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 choice of lead time and the choice of discount rate, i.e. the LRMC estimate is very sensitive to the yield assumption, especially when using MIC approach under the "low" starting yield condition.

Another important assumption is the preferred method of augmentation. We have assumed the following supply augmentation plan (see Table 4C-2) as the likely options in the sequence of program priority. The estimates in this paper are based on the indicative costs and yields of the efficient supply augmentation plan. Other options can be substituted into the LRMC model, if they are found to be more appropriate. The LRMC calculation are the costs (in $ million) and benefits (in ML of water) from the efficient augmentation options that we have chosen.

[4] We assume average weather conditions without water restrictions when forecasting demand. This is a rounded number to 1 GL.
[5] Water restrictions are measures for responding to droughts, as described in 2017 Metropolitan Water Plan. However, Sydney Water's Water Wise Rules are always in place as business as usual.
[6] We have used the current estimate pre-tax weighted average cost of capital (WACC) for pricing submission as our base case assumption. The alternative value we have modelled is long-term pre-tax WACC IPART's bi-annual market update addendum 28 Feb 2019.

Table 4C-2 Bulk water supply augmentations[7]

Augmentation	Additional yield (GL per year)
Burrawang to Avon dam with spur line	20
Tallowa dam raising	25
Desalination stage 2	75
Lower Cordeaux dam	35

The LRMC model relies on a number of subjective assumptions and are bound or limited by the availability of relevant modelling data. By necessity we have had to incorporate working assumptions in our modelling that reflected pragmatic decisions about the mechanics of the estimation techniques, and are aimed at producing results that are reasonably robust but not overly-complicated. For example:

- We use a 50-year modelling period. It is difficult to define the length of LRMC modelling. Longer period is likely to be highly variable towards the end of the period, particularly around the level of forecast demand, variable costs of buying water from WaterNSW and SDP. If modelling period is too short, some necessary augmentations may be excluded, resulting in low LRMC.
- We assume a 70-year asset life for bulk water supply assets. With a 50-year modelling period, there will be a residual value of a supply augmentation at the end of the modelling period. The absence of a residual value calculation is likely to overstate the resultant LRMC estimates. Thus, for our modelling, we converted the capital costs into annualised costs and use the values in our model.
- We assume no operating restrictions apply to the use of the desalination plant (beyond those assumed by WaterNSW which lead to a yield assumption of maximum 90,000 ML). It is highly unlikely that a second plant would be commissioned while there is material levels of spare capacity in the existing plant, noting that the current operating rules assume it with not be producing water when dam levels are above 70% full.
- Similarly, we assume dam water would be used before desalination water, which results in the desalination plant would be gradually increasing output over the forecast period in response to demand growth. This may result in the desalination plant running at full output (as specified in the current operating rules) instead of drawing down dam water. However, this is highly unlikely and would greatly increases the estimates of LRMC, because desalination water is more expensive.

Our approach to LRMC modelling highlights how variable the LRMC estimates can be depending on the inputs and assumptions used. We have sought to address the risks associated with uncertainty regarding our modelling assumptions by undertaking extensive scenario analysis. We incorporated 82 scenarios giving 164 results, using both AIC and MIC methods. These scenarios focused on the following key modelling parameters:

[7] WaterNSW, Greater Sydney Supply Augmentation Plan, Summary report, November 2017

- Low, medium and high capital costs
- Short, medium and long lead time
- Low, medium and high yields
- Low, medium and high demand
- Mid-point and long-term pre-tax WACC

4.4.2 Modelling Results – Bulk component

We have adopted a base case and underlying assumptions that reflect observed outcomes and the most likely scenarios. The LRMC base case estimate for bulk component is $2.10 per kL (AIC method) and $0.92 per kL (MIC method) respectively.

Sensitivity analysis based on key parameter scenarios results in a range of LRMC bulk estimates (assumed real pre-tax WACC 5.0%):

- AIC model has $1.51 per kL to $2.77 per kL (see Table 4C-3), and
- MIC method produces a range of $0.58/kL to $1.85/kL (see Table 4C-4).

Table 4C-3 Sensitivity analysis results (AIC method) – bulk water

Costs	Lead - time	Yield	Low demand	Medium demand	High demand
Low	Short	Low	2.32	2.16	2.06
		Medium	2.04	1.97	1.90
		High	1.53	1.51	1.52
	Medium	Low	2.46	2.25	2.11
		Medium	2.19	2.10	2.01
		High	1.66	1.64	1.65
	High	Low	2.52	2.30	2.16
		Medium	2.32	2.22	2.09
		High	1.81	1.78	1.79
Medium	Short	Low	2.42	2.25	2.15
		Medium	2.12	2.05	1.97
		High	1.56	1.55	1.56
	Medium	Low	2.57	2.35	2.21
		Medium	2.28	2.19	2.09
		High	1.70	1.68	1.70
	High	Low	2.64	2.42	2.28
		Medium	2.41	2.32	2.18
		High	1.86	1.84	1.85
High	Short	Low	2.52	2.34	2.24
		Medium	2.19	2.12	2.05
		High	1.60	1.59	1.60
	Medium	Low	2.68	2.45	2.32
		Medium	2.36	2.27	2.17
		High	1.74	1.73	1.75
	High	Low	2.77	2.53	2.40
		Medium	2.51	2.41	2.28
		High	1.90	1.89	1.90

Table 4C-4 Sensitivity analysis results (MIC method) – bulk water

Costs	Lead - time	Yield	Low demand	Medium demand	High demand
Low	Short	Low Medium High	0.80 1.31 1.58	0.80 1.17 1.64	0.68 0.87 1.64
	Medium	Low Medium High	0.58 1.15 1.70	0.72 0.92 1.69	0.73 0.67 1.61
	High	Low Medium High	0.62 0.96 1.67	0.77 0.72 1.66	0.78 0.58 1.45
Medium	Short	Low Medium High	0.88 1.37 1.65	0.90 1.23 1.70	0.79 0.94 1.71
	Medium	Low Medium High	0.67 1.22 1.78	0.83 1.00 1.76	0.85 0.75 1.69
	High	Low Medium High	0.71 1.04 1.75	0.89 0.80 1.74	0.91 0.67 1.54
High	Short	Low Medium High	0.95 1.43 1.72	1.00 1.30 1.77	0.89 1.01 1.78
	Medium	Low Medium High	0.75 1.29 1.85	0.94 1.07 1.83	0.97 0.83 1.76
	High	Low Medium High	0.81 1.11 1.83	1.02 0.88 1.82	1.05 0.75 1.62

Our modelling results show that both AIC and MIC methods produce similar results when the starting system yield assumption is high, ie in situations where there is significant spare capacity. These results are reflected in the results of the scenario analysis (under both methods) where the yield assumption is high.

In the “low” yield scenarios (assumption of a breach in the supply demand balance), where the system yield is assumed to be much lower than the current demand (ie the system has no spare capacity and investments should have been fulfilled already to meet the demand), our MIC model produced very low LRMC estimates relative to the AIC method

The MIC model results are very sensitive to the assumed starting system yield assumption and the demand increment, and need practical adjustment in its cost input estimations for the LRMC calculation in addressing the low yields scenarios. We believe that in these circumstances, the AIC provides a pragmatic yet robust estimate of the LRMC of water resources.

The sensitivity to yield assumptions in the MIC model reflects the data constraints we have around the re-optimisation of capital programing. The underlying assumed capital program used in our modelling is drawn from an established planning framework that is based on a number of pre-existing demand supply balance assumptions. With the recent growing concerns about water availability and the increased water demand due to above average weather, the situations may have rendered the assumptions underlying our LRMC modelling under the low yield scenarios as unrealistic, thus may warrant further investigation. Accordingly, we place less confidence in the results modelled based on these scenarios.

A copy of our spreadsheet Bulk model with its key underlying assumptions and results is available to IPART upon request.

4.5 Total LRMC estimates – bulk and non-bulk water

The following tables (Table 4C-5 and Table 4C-6) summarise a range of LRMC estimates based on scenarios of total yield, the lead time associated with augmentations, likely demand changes and expenditure profiles.

Table 4C-5 LRMC estimates with AIC method – bulk water supply ($/kL)

Scenario	System yield GL/year	Lead time year	Demand	Capital costs	LRMC - AIC $/kL
Base case	570	5	Sydney Water forecast	Low	2.10
Low LRMC	620	3	Sydney Water forecast	Low	1.51
High LRMC	545	7	1.5% less Sydney Water forecast	High	2.77

Note: LRMC includes Sydney Water's variable costs associated pumping and treatment.

Table 4C-6 LRMC estimates – non-bulk water investments ($/kL)

	Distribution network		Water treatment plant		Total non-bulk
	Low	High	Low	High	Average
LRMC	0.06	0.12	0.09	0.19	0.23

Note: LRMC does not include Sydney Water's variable costs associated pumping and treatment.

Our AIC model indicates that the total LRMC based on a "no-drought" current factors, is $2.33 per kL (i.e. $2.10 (bulk) + $0.23 (non-bulk)). Sensitivity analysis suggests the plausible range of LRMC estimates is $0.72 per kL to $3.08 per kL (see Table 4C-7). The lower end is the result of the analysis using the MIC approach.

Table 4C-7 Total LRMC (bulk and non-bulk water) – maximum and minimum results from sensitivity analysis

	AIC method			MIC method		
	Low demand	Medium demand	High demand	Low demand	Medium demand	High demand
Max LRMC from scenario	3.08	2.84	2.71	2.16	2.14	2.09
Min LRMC from scenario	1.67	1.65	1.66	0.72	0.86	0.72

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Attachment 4C(i)

LRMC Sapere's report

Price Proposal 2020–24

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Sydney Water Corporation

Review of the Long Run Marginal Cost of Sydney Water's non-bulk water costs

Dr Richard Tooth

31 July 2018

About the Author

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About Sapere Research Group Limited

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Glossary

ADD	Average Day Demand
AIC	Average Incremental Cost
IPART	Independent Pricing and Regulatory Tribunal
Estimation Period	The period over which LRMC is estimated; often a period of many (e.g. 25) years
LRIC	Long Run Incremental Cost
LRMC	Long run marginal cost
MDD	Maximum Day Demand
Non-bulk costs	Costs excluding bulk water and variable costs of water delivery
NPV	Net Present value
PV	Present value
Sapere	Sapere Research Group
Turvey method	The perturbation method to calculating LRMC
WFP	Water Filtration Plant

1. Introduction and summary

Sydney Water Corporation (SWC) is preparing for its pricing determination beginning 1 July 2020.

A key issue for the pricing determination is the price of potable water, which is set with regard to the Long run marginal cost (LRMC) of additional supply.

I have been asked to provide advice and a review of SWC's calculation of the LRMC of the non-bulk component of the LRMC of water. The non-bulk costs include distribution network costs (i.e. the piping) and the fixed costs of building and operating the water filtration plants (WFPs). The remaining water services costs in the LRMC are included in a category known as the 'bulk water' component. This component includes the cost of water supply and variable costs associated pumping and treating the water.[1]

The bulk water costs are commonly understood to being the most significant component of LRMC and SWC has significant experience in estimating this component. In contrast the non-bulk costs have, until now, received comparatively little attention, in-part due to lack of information. SWC has recently more closely investigated the LRMC of the non-bulk cost component.

In this paper I provide a description of SWC's approach to measuring the LRMC of the non-bulk infrastructure costs and provide my assessment of this approach. I begin by providing a discussion of some of the issues faced in estimating LRMC, including some common issues and some that are particularly relevant to the issue of network infrastructure pricing.

In summary, in my opinion, SWC's approach to estimating the LRMC of the non-bulk components is reasonable. Furthermore, I believe some of the SWC's analysis to be innovative (in comparison to what is publically available). I have not verified all the data and the data sources; nevertheless, in my opinion the results are reasonable and consistent with expectations.

[1] I understand that the variable costs of pumping and treatment (e.g. costs of chemicals) have been incorporated into the 'bulk' costs. Consequently the remaining costs do not vary with short-term changes in demand. Of note, there are other water-related costs such as the costs of customer servicing costs which are recovered via connection charges.

2. Background

2.1 Pricing and LRMC

The purpose of calculating LRMC for the price determination[2] is to inform the setting of the usage price of water. Pricing is important as it can provide a signal to both consumers and suppliers for the efficient use of resources. The common recognised starting point for efficient pricing is to set the price equal to marginal cost. A price set below marginal cost can encourage an individual to consume additional units even when the benefits to the individual are outweighed by the costs to society. Conversely a price set above marginal cost can discourage individuals from consuming additional units despite the benefits to them outweighing the costs to society.

LRMC is a measure of marginal-cost, which is used to address the issue of 'lumpy' investments. Lumpy investments are investments (common in utility industries) that result in large increases in capacity. Due to the lumpiness of the investment, there will generally be excess capacity and rare occasions of capacity constraints. The implication of this is that the (short run) marginal cost for this component will generally be very low and occasionally very high. Pricing at LRMC is used to ensure that pricing is stable but still sends consumers (and suppliers) a price signal to encourage efficient decisions over the long-run.

LRMC, as used in practice,[3] is a forward estimate of the per-unit cost of meeting a permanent change in water use, typically measured on a per-kilolitre (kL) basis. LRMC is calculated by averaging (costs and water use) over many years, thereby smoothing the 'lumpy' investment costs.[4]

2.2 Methods and issues in calculating LRMC

Unfortunately there are often issues in measuring LRMC. There is no single 'agreed' method and I have observed great variation in how methods are applied. I understand that often people find the estimate of LRMC highly sensitive to the method and assumptions used.

To resolve issues, it is useful to keep in mind the purpose of calculating LRMC; in this case, to set a price to inform efficient demand and supply decisions.

I have attached as an addendum, another paper I have written on the LRMC methods and issues. A brief summary of the key relevant points follows.

---

2 A LRMC may be used for some non-pricing purposes.

3 The standard textbook definition of LRMC is the cost of supplying an additional unit (the marginal cost) assuming that all factors of production can be varied. However, in practice all factors of production (including capital investments) cannot be varied; facilities such as a desalination plant are built to manage a range of demand levels and therefore will rarely be of the optimal size for a particular level of demand.

4 The use of LRMC is widely adopted. The National Water Initiative pricing principles, which have been agreed to by state and territory governments, include the principle that drinking water prices shall be set with regard to LRMC.

2.2.1 Overview of methods

The two most common methods for estimating LRMC in the water industry are:

- the Turvey perturbation (Turvey) method, and
- the Average Incremental Cost (AIC) method.

The Turvey and AIC methods share a similar approach. Both methods involve forecasting costs and demand over a long time period (the Estimation Period) and estimating LRMC as the present value (PV) of costs required to meet a change in future demand divided by the PV of that change in future demand. That is:

$$\text{LRMC} = \frac{PV\ of\ change\ in\ costs\ due\ to\ a\ change\ in\ demand}{PV\ of\ the\ change\ in\ demand}$$

The two methods differ in that:

- the Turvey method considers the impact of small permanent change in demand relative to the existing forecast
- the AIC method considers the impact of the forecast growth in demand relative to current level of demand.

While some reports have found large differences in results from the two methods, these have (in my opinion) generally been a result of an incorrect (or poor) application of the appropriate formulas. As demonstrated analytically (see the attached paper), both methods can be thought of as providing a time-averaged estimate of future marginal costs. In effect, with respect to the (discounted) costs of meeting additional demand:

- the Turvey method gives equal weight to the marginal cost of meeting additional demand in each period over the Estimation Period.
- the AIC method gives greater weight to the marginal costs of additional demand in the near term.

If marginal costs are relatively stable then the two methods should give very similar results.

2.2.2 Key issues

The timing of investments and the Estimation Period

The LRMC formula is calculated over an Estimation Period (e.g. 30 years). It is important that the numerator and denominator in the equation reflect the same period; that is, the change in costs and the change in demand driving the change in cost reflect the same period. If for example, a longer-period of demand is used in the denominator than the numerator, the change in demand is likely to be overstated and the measure of LRMC will be understated.

In practice, matching the timing of the investments with demand can be difficult. Many investments have very long asset lives, with the implication they may have a substantial residual value at the end of the Estimation Period. Without adjustment for this residual value, a large investment in the end of the Estimation Period may overstate the costs. Similarly the LRMC may be understated if the next large investment occurs just outside the Estimation Period.

The issue relates to the problem of lumpy investments. The larger the 'lumps' (the size of investments), the larger the risk LRMC will be inaccurate and, conversely, the risks are less when there are many smallish investments dispersed over a number of years.

The issue can be addressed by smoothing the lumps. This might be achieved by using a very long Estimation Period; however, in practice this is difficult because long-term estimates of both investment and demand may not be available. Another option is to make adjustments (downward adjustment) for the residual asset value. My preferred approach for mitigating the issue is to convert capital costs into annuitized costs, thereby smoothing (spreading) the investment costs over more periods.

Distinguishing between costs that are driven by water use and other factors

In calculating the marginal cost of water, it is important to distinguish between costs that are driven by changes in water use and costs that are driven by other factors (such as housing growth) that are correlated with water use.

SWC is expecting to incur substantial costs in servicing higher population growth and higher water demand as a consequence. However, much of SWC's cost of servicing growth is driven by the need to service new areas and is largely independent of water demand. As such, not all these costs are relevant for the calculation of LRMC that is used to set the water price. For example, expectations of higher or lower water demand may change the size of the distribution infrastructure but it does not change the need to install the distribution infrastructure.

Identifying the costs that are dependent on changing levels of water demand can be difficult. An appropriate thought experiment is to consider how costs vary with changes in average levels of water consumption. Only the costs that would change with changes in water consumption should be included.

Peak and non-peak demand

The non-bulk costs (both the distribution network and WFPs) are designed to cater for peak demand use, which (for planning purposes) is based on the estimated maximum-day-demand (MDD).

Consequently, a change in total demand that does not change the MDD will not impact on costs and conversely, a change in MDD can have a significant change in costs.

This raises an issue in estimating LRMC. LRMC is typically calculated using estimates of annual demand, which if measured on a daily basis, is known as average-day-demand (ADD). ADD is substantially lower than MDD. If MDD were used as the basis of measuring changes in annual demand, then changes in annual demand would be larger and the value of LRMC would be lower.

The issue of the optimal pricing approach is analysed in Appendix 1. As demonstrated in this appendix, the optimal price (and therefore, the appropriate calculation of LRMC) depends on the relative responsiveness of demand to price during peak and non-peak times.[5]

In summary, if the demand response to a change in price on MDD and ADD is:[6]

- the same in absolute terms (i.e. in terms of per kL per day) then the optimal price is the LRMC calculated using change in annual demand divided by the MDD:ADD ratio or (alternatively stated) the annual demand used in the denominator of the LRMC equation needs to be increased multiplying by the MDD:ADD ratio
- the same in percentage terms (i.e. in terms of % change on the day)[7] then the optimal price is the LRMC calculated using the change in annual demand.

The rationale for such an adjustment is clear. If the demand response is the same in absolute terms and the MDD:ADD ratio is 2:1, then a 2 per cent change in ADD is required to achieve a 1 per cent change in MDD. In such case the denominator of the LRMC equation needs to be larger than annual demand.

I am unaware of any research that has examined how the demand for water responds to price on peak and non-peak days. I expect some types of demand responses to be similar in absolute terms and some similar in percentage terms (see table below). In summary, I expect the demand response on the MDD will be more than on ADD in absolute terms but less in percentage terms. Consequently, I expect the optimal price will be between the LRMC estimated using annual demand and this value divided by the MDD:ADD ratio.

Table 1: Expectation of demand responses to prices on peak and non-peak days

Reason	Demand response
Some demand responses involve water use reductions that should be the same for peak and non-peak days. For example, installation of water efficient appliances would result in a similar reduction in water use on all days.	Similar in absolute terms
The potential for water use reduction is larger on peak days. Furthermore much of peak water demand is likely to relate to watering and other uses that are commonly described as discretionary.	Similar in percentage terms
Some demand responses will involve a larger reduction in water in high	More in

5 In theory, it would be efficient to reflect this in pricing with higher prices at peak times and lower prices at non-peak times. However, such differential pricing is not considered practical — a single price for water use is required. In setting the single price, a balance is required. A higher water price discourages water use on peak and non-peak times. Too low a price would result in excessive peak use and excessive costs.

6 In theory, it is possible that on the MDD responsiveness to price in percentage terms is greater than that for ADD; in which case, the LRMC would be higher than traditionally calculated.

7 If the percentage change is the same and the MDD:ADD ratio is 2:1 then in absolute terms (i.e. in kLs) the reduction will be double on the MDD than on the ADD.

Reason	Demand response
water-use months than in other months but by a similar amount on each day. For example, efficient timed irrigation may reduce water use by a similar amount across all days in the summer period.	absolute terms, less in percentage terms

3. Sydney Water's estimate of LRMC

SWC has provided me with an Excel spread sheet containing details of the data used and LRMC modelling of the network costs. This spread sheet is separated into analysis relating to distribution network and the water filtration costs. These separate components are discussed below.

3.1 Distribution network costs

3.1.1 The process

Distribution network costs are calculated by supply zones. SWC has estimated some broad planned capital expenditure (capex) costs for all supply zones in growth servicing strategies. For planning purposes SWC has also undertaken estimates of the servicing costs should the MDD be 10 per cent higher or 10 per cent lower than the expected (base) case. This analysis is useful in providing a basis for estimating the marginal cost of a change in water demand; that is, the impact of a change in demand that is independent of development growth.

My understanding of SWC's approach is as follows

SWC estimated the (distribution) Networks Capex Requirements as part of work undertaken in 2014 on Growth Servicing Strategies. This analysis included for each supply zone details of forecast capex expenditure in 2020, 2031 and 2036 under three scenarios

- Base scenario i.e. SWC's best forecast
- MDD + 10% i.e. a scenario whereby MDD is increased by 10 per cent, and
- MDD -10% i.e. a scenario whereby MDD is decreased by 10 per cent.

The capex in the different scenarios vary in terms of the timing of expenditure and whether some expenditure is required. Under the MDD+10% scenario (relative to the base case) some new capex is required and some capex is brought forward (from 2036 to 2031 and some from 2031 to 2020). Similarly the under the MDD -10% scenario some capex is not required and some capex is pushed back.

SWC used this information to estimate the LRMC for the distribution network infrastructure as the PV of the cost changes between the scenarios divided by the PV of the change in demand (i.e. the impact of a change in MDD) to drive the cost change. In effect, this is applying the Turvey perturbation method by examining the impact of small change on demand.

Specifically, SWC undertook the following steps

1. **Estimate the PV of a change in costs due to a 10% change in MDD**

This was done by calculating the change in costs for the Silverwater supply network and then scaling this amount upward to reflect the entire network. This approach was adopted because:

- For simplicity — there are 45 supply networks for which cost estimates were available and the process of modelling a single supply network was time consuming

- The Silverwater network is a significant part of the network and considered representative of the network
- There was concern that the results for the small networks would be subject to significant variation.

A scaling factor of 7 was used reflecting that the forecast capital cost (under the base scenario) for the entire network was 7 times that of Silverwater network.

The PV of cost changes for the Silverwater network for the change-scenarios (MDD+10% and MDD-10%) was calculated using SWC's pre-tax weighted average cost of capital (WACC). As the forecasts were conducted in 2014, the NPV calculation used 2014 as the base year. The average of the PV results for both scenarios was used.

2. Calculate the PV of the change in demand

The second step involves calculating the PV of the change in annual demand that would drive the cost change; that is the change in annual demand to cause a 10% change in MDD.

As discussed earlier, I expect the MDD response to a change in price to be less in percentage terms than the ADD response. Consequently I expect that a 10% increase in MDD is likely to be caused by a change in annual demand that is between:

- a 10% increase in annual demand, and
- a 10% increase in annual demand multiplied by the MDD:ADD ratio.

SWC has estimated both the LRMC at both ends of this range (i.e. using both changes in annual demand).

Another consideration is the Estimation Period. The Estimation Period of the demand change should match the length of time over which there was data on cost changes. Costs were report from 2014 through to 2036. However, the +10% scenario included significant incremental investments in 2036 that would service demand in later periods as well. To account for this the Estimation Period was extended 2041.

3. Calculate the LRMC

The final step was to calculate a LRMC of the network component as:

$$\frac{PV\ of\ costs}{PV\ of\ change\ in\ demand}$$

As two estimates of the PV of the change in demand were determined, two values for the LRMC were calculated.

3.1.2 Discussion of results and approach

SWC's modelling estimates that the LRMC of the distribution network to range between and $0.05 to $0.11 per kL.

In my opinion, these results appear reasonable. The process applied and the simplifications and assumptions used seem reasonable. The results do not appear to be overly sensitive to the assumptions. The results appear to be most sensitive to the assumption regarding the MDD issue.

3.2 Water filtration costs

3.2.1 The process

To estimate the LRMC associated with the WFPs, SWC adopted an AIC approach. That is:

$$AIC_{WFP} = \frac{PV\ of\ WFP\ costs\ driven\ by\ incremental\ demand}{PV\ of\ incremental\ demand}$$

The incremental costs are based on SWC's 2014 forward estimates of WFP capital costs, including capital costs that would occur in the period 2024 through to 2046. In addition to capex, SWC has estimated the opex requirements (excluding variable costs) to be 2% of new capex.

I understand SWC was careful to ensure that the WFP costs only included investments that were driven by increases in water demand.

A consideration for the WFP calculation is the Estimation Period. The capex is only known for the period up to 2046; however this includes very significant investments in 2036 and 2046 suggesting that the capital investment will service growth for a longer period and that the Estimation Period should extend past 2046. SWC has chosen that the Estimation Period should extend to 2066-67. I understand that this period was adopted because, based on historical experience, the extra capacity is able to service about 20-30 more years before another upgrade is required due to growth.

The WFP costs are also driven by MDD and not annual demand. An implication is that the LRMC calculated using the PV of incremental increase of annual demand in the denominator may overstate the true LRMC. To adjust for this SWC create a range of values

- An upper value being the AIC_{WFP} value as per the formula above
- A 'lower' being the upper value divided by the MDD:ADD ratio.

3.2.2 Discussion of results and approach

In my opinion SWC's approach to estimating the LRMC of WFP is reasonable. The key challenging issues relate to selecting an Estimation Period for demand to match the expenditure and addressing the issue that costs are driven by peak and not annual demand. SWC's approach to these issues appears reasonable.

SWCs' estimates of the LRMC for WFPs costs appear reasonable. Of note, the 'lower' range value (12 cent per kL) is calculated on a similar basis and is comparable in magnitude to an estimate of WTP capex and opex I had previously estimated for drinking water services in South Australia.[8]

8 The estimate is in Tooth and Hefter (2013, p. 44). Based on public data on water treatment options (relating to Torrens Lake) I estimated the per-unit costs of building and operating different water treatment options. In term of per kL of annualised capacity (i.e. daily capacity x 365) the marginal cost of increasing a plant size was 14 to 19 cents per kL. This was inclusive of some variable pumping and treatment costs that are not in SWCs estimate.

Appendix 1: LRMC and peak pricing

Consider the challenge of optimal pricing when the cost of servicing is driven by the demand during a peak period but the price must be the same for all periods.

To analyse this, assume the following:

- There are N periods (e.g. days). Demand in a period (subscript i) is $Q_i = Q_i(P)$ (with inverse demand function, $P_i = P_i(Q)$). Q_m is the demand in the period with maximum demand
- The annualised cost is equal to CQ_m where C is the annualised cost per unit of peak-period demand. For simplicity, assume annualised costs are the same each year
- Annual demand is $D = \sum_{i=1}^{N} Q_i(P) = N\bar{Q}$ where $\bar{Q} = D/N$ is average period demand
- Δ denotes forecast change. For example, ΔQ_m denotes the forecast change in maximum demand due to growth. Assume that $\frac{\Delta Q_m}{\Delta \bar{Q}} = \frac{Q_m}{\bar{Q}}$; that is the forecast ratio of maximum period demand growth to average period demand growth is the same as is current.

Long run marginal cost as measured with changes in annual demand will be

$$LRMC_{Annual\ Demand} = \frac{C\Delta Q_m}{\Delta D} = \frac{C}{N}\frac{\Delta Q_m}{\Delta \bar{Q}} = \frac{C}{N}\frac{Q_m}{\bar{Q}}$$

We find the optimal price (P*) by selecting the price that maximises total net surplus (S), which is the combination of consumer and produce surplus on the peak and non-peak periods less the cost. Analytically total net surplus is:

$$S = \sum_{i=1}^{N} \int_0^{Q_i} P_i(Q)dQ - Q_m C$$

To find the optimal price (P^*) we differentiate S with respect to price and set to zero, giving:

$$\sum_{i=1}^{N} \frac{dQ_i}{dP} P^* - C\frac{dQ_m}{dP} = 0$$

Denote $Q'_m = \frac{dQ_m}{dP}$, $\bar{Q}'=\frac{d\bar{Q}}{dP}$ and $N\frac{d\bar{Q}}{dP} = \sum_{i=1}^{N} \frac{dQ_i}{dP}$. Then

$$P^* = \frac{C}{N} \times \frac{Q'_m}{\bar{Q}'} = \frac{C}{N}\frac{Q_m}{\bar{Q}} \times \frac{Q'_m}{\bar{Q}'} / \frac{Q_m}{\bar{Q}} = LRMC_{Annual\ Demand} \times \frac{Q'_m}{\bar{Q}'} / \frac{Q_m}{\bar{Q}}$$

If the <u>absolute</u> demand responses are the same (i.e. $Q'_m = \bar{Q}'$) then:

$$P^* = LRMC_{Annual\ Demand} \div \frac{Q_m}{\bar{Q}}$$

i.e. the LRMC based on annual demand divided by the ratio of peak to average demand

If the <u>percentage</u> demand responses are the same (i.e. $\frac{Q'_m}{Q_m} = \frac{\bar{Q}'}{\bar{Q}}$) then:

$$P^* = LRMC_{Annual\ Demand}$$

References

Tooth, R and Hefter, E. (2013). LRMC - Drinking Water services in SA Final report. Report for the Essential Services Commission of South Australia. March 2013.

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Appendix 8A

Water demand forecasting model

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1 Water demand forecasting model

1.1 Model overview

This Appendix describes our water demand forecasting model.

The demand forecasting model is a bottom-up model. That is, separate models are used to forecast the different components of total demand. These forecasts are then combined into a forecast of total demand. The components of total demand are based on the water balance.

The starting point for the water balance is the total volume of filtered and unfiltered water that enters the distribution system. This is referred to as "total system input" but we will refer to it as total demand here. The water balance disaggregates this total demand into a number of components.

Table 1-1 shows the water balance for 2016–17. Rather than showing volumes, which can be highly variable between years, we show what percentage of total demand is accounted for by each component. This illustrates the relative importance of each component. Percentages vary from year-to-year, but variations generally do not exceed 1 percentage point.

Table 1-1 Water Balance 2016–17

Total demand	Revenue water	Billed metered consumption	Residential	65.1%
			Non-residential & Other	24.2%
		Billed unmetered consumption		0.7%
	Non-revenue water	Unbilled metered consumption		0.1%
		Unbilled unmetered consumption		0.6%
		Unauthorised consumption		0.1%
		Customer meter under-registration		1.8%
		Real losses		7.5%

There are various ways of splitting total demand but the most relevant for revenue forecasting, one of the major purposes of the demand forecast, is into revenue and non-revenue water. The former refers to that part of total demand which generates revenue and makes up about 90% of total demand. Non-revenue water is that part of total water use which does not generate revenue. While it is not of interest for the purpose of revenue forecasting it is still of interest for the demand forecast as it is required to forecast raw water purchases and treatment costs.

Most revenue water is consumption by metered residential customers as recorded on their meters. This billed metered residential consumption makes up almost two thirds of total demand. Billed metered consumption by non-residential and “other” properties makes up just under a quarter of total demand. Consumption by unmetered properties makes up less than 1% of total demand.[1]

The largest component of non-revenue water is real losses or system leakage, responsible for about 7.5% of total demand. Unbilled metered consumption (0.1%) refers to metered consumption which is not billed, mainly consumption by Sydney Water properties. Unbilled unmetered consumption (0.6%) refers to water used for unmetered and unbilled activities such as firefighting and water used in network maintenance such as flushing mains. Unauthorised consumption (0.1%) refers to water theft, eg. illegal connections and use of unmetered standpipes. Customer meter under-registration (1.8%) refers to the volume of water used by metered customers that is not registered by the meters. Meters tend to have small inaccuracies and tend to under-register true consumption.

A separate model and approach is used to forecast each component of the water balance. For example, the models for billed metered consumption which are critical for forecasting water sales revenue are based on detailed segmentation and econometric analysis. Components such as unbilled metered and unbilled unmetered demand which are relatively small and constant over time are forecast on the basis of historical averages. Real losses are forecast on the basis of Economic Level of Leakage calculations, system growth and investment in leakage repair and detection.

The remainder of this section discusses the models or assumptions used to forecast each component. The emphasis will be on the models for billed metered residential and non-residential demand. These are the most complex and most relevant to revenue forecasting.

1.2 Residential forecast models

The residential demand forecasting model builds on a method used in a 2011 study of the residential price elasticity by Sydney Water and Dr Vasilis Sarafidis, Associate Professor, Econometrics and Business Statistics, Monash University, and previously lecturer in econometrics at the University of Sydney.[2]

The approach was first used to build the forecasting model for the 2012 price review. The models were updated in 2014 in preparation for the 2016 price review and have again been updated for the 2020 review. We engaged Dr Sarafidis to carry out the econometric analysis for the update. Data preparation and implementation of the econometric models in a forecasting model were carried out by Sydney Water analysts.

The approach relies on a combination of detailed segmentation of residential properties and econometric analysis of historical demand in each segment. The regression models are then used

[1] Note that by definition billed unmetered consumption cannot be measured directly and needs to be estimated. This applies to most components of the water balance except for billed metered consumption and unbiled metered consumption. Total consumption is measured by the meters at the outlet of the filtration plants.
[2] Abrams, B., S. Kumaradevan, F. Spaninks and V. Sarafidis. An Econometric Assessment of Pricing Sydney’s Residential Water Use. The Economic Record, Vol. 88, No. 280, March 2012, page 89.

to generate forecasts of average demand for each segment which is then multiplied by the forecast number of properties for each segment.

Estimating segment specific models reduces the potential for so-called aggregation bias. For example, we bill the owner of a house which means that owner-occupied properties face a stronger price signal than tenanted properties and may therefore respond more strongly to price changes. If a single model was estimated for both types of properties this might result in a biased estimate of the overall average price effect.[3]

Also, different types of dwellings tend to grow at different rates. For example, the number of units grows much faster than the number of houses. Unless units and houses have exactly the same consumption patterns, which they do not, a single model for units and houses could quickly become inaccurate when used for forecasting as the proportion of units and houses in total dwellings changes and deviates from the proportions in the sample as used to estimate the model.

The variables considered in the regression analysis include water usage price, various weather variables and season. The remainder of this section discusses the segmentation variables, regression model specification and results, implementation of the models for forecasting purposes and hindcast results.

1.2.1 Segments

For the recent update residential properties were segmented on the basis of the following variables:

- Sydney Water dwelling type classification
- built before or after the introduction of the BASIX regulation
- if they have a reticulated recycled water supply (single dwellings only)
- tenure, ie. owner-occupied or tenanted (single dwellings and townhouse strata units only)
- lot size band (single dwellings only)
- Number of units in the property (units only).

This resulted in a total of 34 segments as shown in Table 1-2. For technical reasons, segments 28 and 30 were combined for the regression analysis. Also, no models were estimated for dual occupancies. In the implementation phase the models estimated for single dwellings were recalibrated to forecast dual occupancy demand. As a result, 31 regression models were estimated instead of 34.

[3] Ibid.

Table 1-2 Residential Segments

PROPERTY TYPE	BASIX	RCLD	TENURE	LOT SIZE (m^2)	#UNITS	SEGMENT #
SINGLE DWELLINGS	PRE	NO	OWN-OCC	<=332	NA	1
				333-508	NA	2
				509-662	NA	3
				663-870	NA	4
				871-1262	NA	5
				>1262	NA	6
			TENANT	<=332	NA	7
				333-508	NA	8
				509-662	NA	9
				663-870	NA	10
				871-1262	NA	11
				>1262	NA	12
		YES	OWN-OCC	NA	NA	13
			TENANT	NA	NA	14
	POST	NO	OWN-OCC	NA	NA	15
			TENANT	NA-	NA	16
		YES	OWN-OCC	NA	NA	17
			TENANT	NA	NA	18
VERTICAL STRATA UNITS	PRE	NA	NA	NA	2	19
				NA	>2	20
	POST	NA	NA	NA	2	21
				NA	>2	22
TOWNHOUSE STRATA UNITS	PRE	NA	OWN-OCC	NA	2	23
				NA	>2	24
		NA	TENANT	NA	2	25
				NA	>2	26
	POST	NA	OWN-OCC	NA	2	27
				NA	>2	28
		NA	TENANT	NA	2	29
				NA	>2	30
FLATS	PRE	NA	NA	NA	NA	31
	POST	NA	NA	NA	NA	32
DUAL OCCUPANCIES	PRE	NA	NA	NA	NA	33
	POST	NA	NA	NA	NA	34

NA: Not applicable or not used; OWN-OCC: owner-occupied; Property type FLATS includes mixed developments

1.2.2 Model specification

Panel regression analysis was used to model historical demand data in each segment. The dependent variable is the (natural logarithm of) quarterly average daily demand. Explanatory variables include the (real) water usage price, weather variables and season. To test if price effects are asymmetric, ie if consumption is less responsive to price decreases than to price increases, price is included twice in the model together with an indicator variable which indicates if price has increased or decreased. This allows the estimation of two price elasticities, one for price increases and one for price decreases.

The formal specification of the model is:

$$\ln c_{it} = \alpha \times \ln c_{it-1} + \beta_1 \times \left(price_{it-1} \times I_{(\Delta price_{it-1}<0)}\right) + \beta_2 \times \left(price_{it-1} \times \left(1 - I_{(\Delta price_{it-1}<0)}\right)\right) + \sum_{k=1}^{8} \gamma_k \times weather_{k,it} + \sum_{k=2}^{4} \delta_k \times season_{k,it} + u_{it}$$

$$u_{it} = \eta_i + \varepsilon_{it}$$

$$|\alpha| < 1$$

$\ln c_{it}$ denotes the natural logarithm of average daily consumption by property *i* as measured by the meter read taken in quarter *t*. Because it takes about 10 weeks each quarter to read all meters, the exact dates covered by the quarter *t* meter reading will not be the same for every property. For example, suppose *t* refers to the quarter starting 1 July 2018 and ending 30 September 2018. For properties whose meters are read at the start of this quarter, the quarter t meter reading will record consumption for the period from early April to early July 2018. For those properties whose meters are read at the end of the cycle, about mid-September, the quarter *t* meter read will record consumption over the period from about mid-June to about mid-September 2018. Also, because the number of days covered by each meter is not necessarily the same for each property, demand is converted to an average daily demand over the period.

$price_{it-1}$ is the real usage price faced by property *i* in quarter *t*-1 and $I_{(\Delta price_{it-1}<0)}$ is an indicator variable which takes on the value 1 if price has decreased in quarter t-1 and the value 0 otherwise. What this effectively accomplishes is that β_1 will measure the effect of a price decrease and β_2 will measure the effect of a price increase. By comparing the two coefficients we can test if price effects are indeed asymmetric as was assumed for the forecast included in our 2015 submission.

$\sum_{k=1}^{8} \gamma_k \times weather_{k,it}$ denotes the eight weather variables that have been included in the model:

- $d\_precip\_30y_{it}$: average daily rainfall anomaly
- $d\_pen\_pet\_30y_{it}$: average daily evaporation anomaly
- $d\_tmax\_30y_{it}$: average maximum temperature anomaly
- $gt30c_{it}$: number of days with temperature greater than 30 degrees C
- $gt40c_{it}$: number of days with temperature greater than 40 degrees C
- $gt2mm_{it}$: number of days with rainfall greater than 2mm
- $continuous0mm_{it}$: longest consecutive number of days with no rainfall and
- $continuous1mm_{it}$: longest consecutive number of days with no rainfall or rainfall not exceeding 1 mm (0<=rainfall<=1).

The reference period for the rainfall, evaporation and maximum temperature anomalies is July 1998 to June 2017.

Note all weather variables are property specific. That is, for each property *i* we calculate the value of the weather variables at its specific location and for the specific dates covered by its quarter *t* meter reading. To calculate the location and meter reading date specific weather variables for each property we use daily gridded weather data produced by the Bureau of Meteorology.

$\sum_{k=2}^{4} \delta_k \times season_{k,it}$ denotes three (pseudo) dummy variables for season. The base season is spring.

A number of other weather variables were included initially, namely:

- number of days with temperature greater than 35 degrees C
- longest consecutive number of days with no rainfall or rainfall not exceeding 2mm
- longest consecutive number of days with temperature greater than 30, 35 and 40 degrees C

These were found not to be statistically significant and removed from the final specification.

The price elasticity is not constant but depends on the level of price. The short run, (ie. one period ahead) price elasticity is given by $\beta_1 \times price$ for price decreases and $\beta_2 \times price$ for price increases. The long run elasticities which quantify the effect after full adjustment to the new price are given by $\frac{\beta_1}{(1-\alpha)} \times price$ and $\frac{\beta_1}{(1-\alpha)} \times price$.

1.2.3 Results

Dr Sarafidis carried out model estimation in collaboration with Sydney Water staff. In this section we focus on results relating to the price elasticity. Table 1-3Table 1-3 shows the average long-term price elasticities for single dwellings and multi-dwellings (strata units, flats and dual occupancies). These were calculated by averaging estimates for the subsegments, weighted by their share of total consumption.

The estimated price elasticities are largely consistent with those obtained by earlier studies. Single dwelling demand is much more elastic than multi-dwelling demand. While price elasticities for price decreases are somewhat smaller, in absolute terms, than those for price increases, the difference is less than was assumed for the forecast for the 2016 price review.

Table 1-3 Long term price elasticities

	Price decrease	Price increase
Single dwellings	-0.212	-0.218
Multi-dwellings	-0.058	-0.063

The elasticities used for the 2016 review were -0.25 for single dwellings and -0.049 for multi-dwellings. To calculate the effect of the proposed price decrease in 2016 these were multiplied by an asymmetry factor of 0.75[4] which gives an elasticity of, respectively, 0.19 and 0.037 for single and multi-dwellings, slightly less than the estimates for price decreases from the updated model. This means that the forecast for the 2016 price review will have underestimated the effect of the price decrease somewhat. However, the underestimate would be fairly small, in the order of 2GL/year.

1.2.4 Implementation

To use the regression models to forecast demand requires a number of additional steps. These are of a highly technical nature and will not be described in detail.

The main purpose of these steps is to re-calibrate the models to so-called apportioned consumption. This measure of consumption splits consumption measured by meter reads that cover a period that is partly in one financial year and partly in another financial year. Consumption is split over the two years based on the number of days covered in each financial year. By doing so the demand forecast for each financial year can simply be multiplied by the assumed price for that financial year to forecast revenue. There is no need to calculate a weighted average price for meter reads that cover a period that is partly in one and partly in another year.

In addition, the models are applied to each individual property on our database and a so-called property specific constant term is estimated for each property. This is to ensure proper weighting of the segments in the final forecast.[5] It also allows for proper weighting of localised factors such as weather.

To generate a forecast, we first generate a forecast for each individual property. This is done by inputting into the model for that property the assumed values of the explanatory variables (price, weather and season) for each quarter for which a forecast is required. Price will be the same for all properties but the value of the weather variables will depend on the location of the property.

The values of the weather variables are the average values for that quarter for the location. These values are based on regional climate change projections produced by the NARCLiM project – see below for more detail.

We then average these forecasts by property type and BASIX status.[6] This is done separately for each delivery system. This gives us 11 forecasts of average demand for each system:

- pre-BASIX single dwellings
- post-BASIX single dwellings – no recycled water
- post-BASIX single dwellings – with recycled water
- pre-BASIX townhouse units
- post-BASIX townhouse units

[4] This is the value adopted for the forecast as used by IPART for its 2016 determination. In our original forecast included in our 2015 submission we used a value of 0.5 which would result in a larger difference with the new estimates presented in Table 1-3.

[5] Only properties with at least 4 quarters of apportioned consumption data are included to allow a meaningful estimate of the property specific constant.

[6] Before doing so the forecasts need to be converted from logarithms to levels. This requires the calculation of a bias correction factor. This is a rather technical step and is not discussed here.

- pre-BASIX vertical units
- post-BASIX vertical units
- pre-BASIX flats
- post-BASIX flats
- pre-BASIX dual occupancies
- post-BASIX dual occupancies.

Because these averages are based on individual forecasts for (virtually) all dwellings in each system, they are property weighted for the specific proportion of each of the subsegments in each system. For example, the distribution of proportion of single dwelling over the six lot size bands is likely to differ to some degree between the systems.

In the final step the forecasts of average demand for each of the above 11 segments are multiplied by the forecast number of dwellings in each of these segments in each system.

1.2.5 Defining average weather conditions – the NARCLiM projections

As explained above, when producing the demand forecast for the price submission we input average weather conditions into the forecasting model. In the past we have based average conditions on observed weather data for the last 30 years. However, in the presence of climate change, such an approach may not produce valid estimates. It assumes weather conditions are stationary. That is, weather conditions vary from year to year but there is no systematic upward or downward trend. This assumption is not valid in the presence of climate change which, for example, results in an underlying upward trend in temperatures.

To address this problem, we have adopted the climate change projections for the 2020–40 period as produced by the NARCLiM project to calculate average weather conditions for the forecast presented in this submission.

NARCLiM is the acronym for the NSW and ACT Regional Climate Modelling Project. It is a research partnership between the NSW and ACT government and the Climate Change Research Centre at the University of NSW. Other project partners included, amongst others, Sydney Water and the Sydney Catchment Authority (now WaterNSW), Hunter Water and the NSW Department of Transport (now Transport for NSW).

The project was developed in response to the need for high resolution climate change projections for use in regional and localised decision making. It provides planners and policy makers with high resolution projections of the impacts of climate change and is now endorsed for use by the Common Planning Assumptions Group.

NARCLiM takes the outputs of global climate change models, which produce averaged results for large areas, and translates them into projections for much smaller areas. In particular, results are downscaled to areas that measure approximately 10x10 km covering the whole of NSW and the ACT.

The project took the outputs of four global models, chosen for their performance in the Australian context and downscaled them using regional climate models using three different approaches. This means a total of 12 projections were produced.[7]

Projections were produced for the 2020–2040 and 2060–2080 period. We have used the projections for 2020–2040 to define the average weather conditions for our demand forecast.

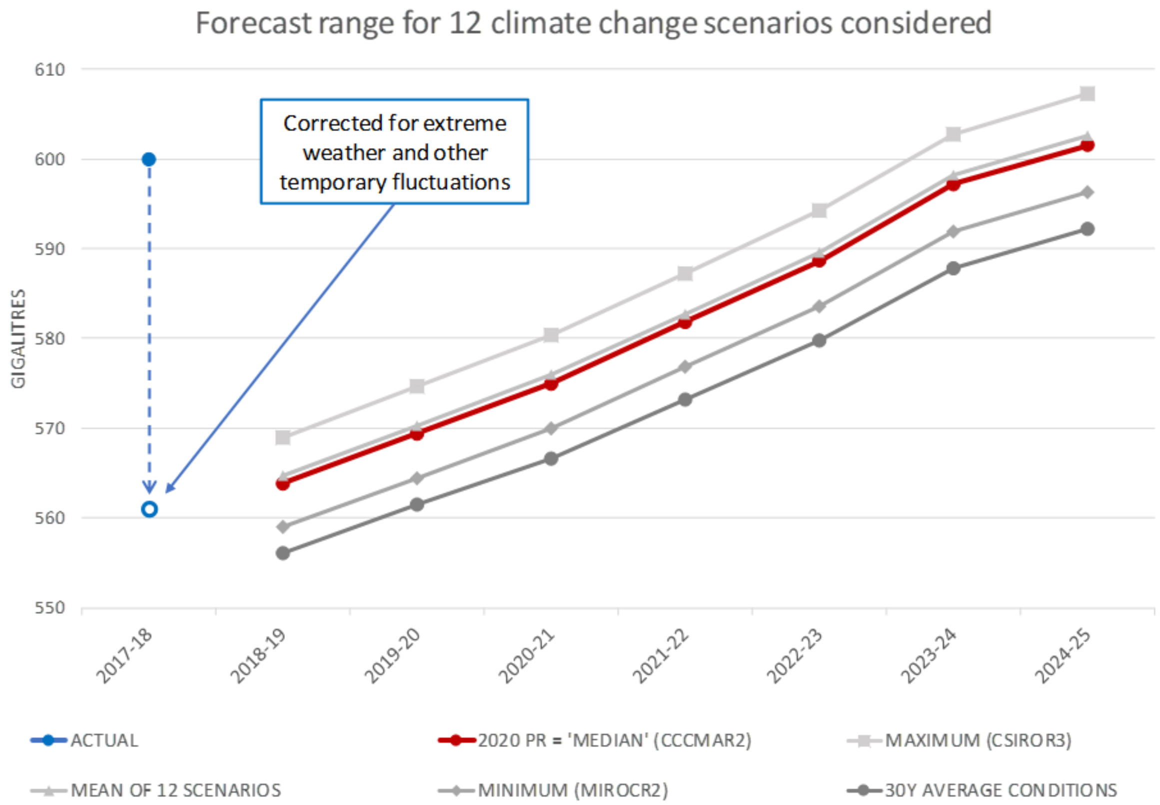

Figure 1-1 Range of forecasts produced for different NARCLiM climate projections

We produced a demand forecast for each of the 12 NARCLiM climate projections. For this submission we have chosen to use the median of these 12 forecasts which is also very close to the average of the 12 forecasts.

Figure 1-1 shows the highest and lowest of the 12 forecasts produced as well as the median forecast and the forecast that would result if average conditions were based on observed conditions in the last 30 years (to June 2018).

The difference between the highest and lowest forecast is about 10 GL. This range is mainly caused by uncertainty about the impacts on rainfall patterns. All forecasts based on the NARCLiM projections are higher than the forecast based on the 30-year average although the difference between the lowest forecast based on NARCLiM and the forecast based on the 30-year average is quite small.

[7] For further information on the NARCLiM project see https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/About-NARCliM/ and https://climatechange.environment.nsw.gov.au/.

For this submission we have chosen to use the median of the forecasts produced using the NARCLiM scenarios, highlighted red in Figure 1-1. This forecast is about 8 GL/year or 1.4% higher than the forecast based on 30-year average conditions. Note that the 2017–18 actual corrected for variations due to temporary factors (eg weather) is consistent with the median forecast, ie. is consistent with the upward trend in demand as per the median forecast.

1.2.6 Model performance

To test performance of the updated model it was used to hindcast metered demand (excluding unfiltered) over the period from 2009–10 to 2016–17. Results are shown in Figure 1-2. The model can closely reproduce observed demand. The average (absolute) error is less than 1%. Note the hindcast shown is for total metered consumption, ie includes non-residential demand.

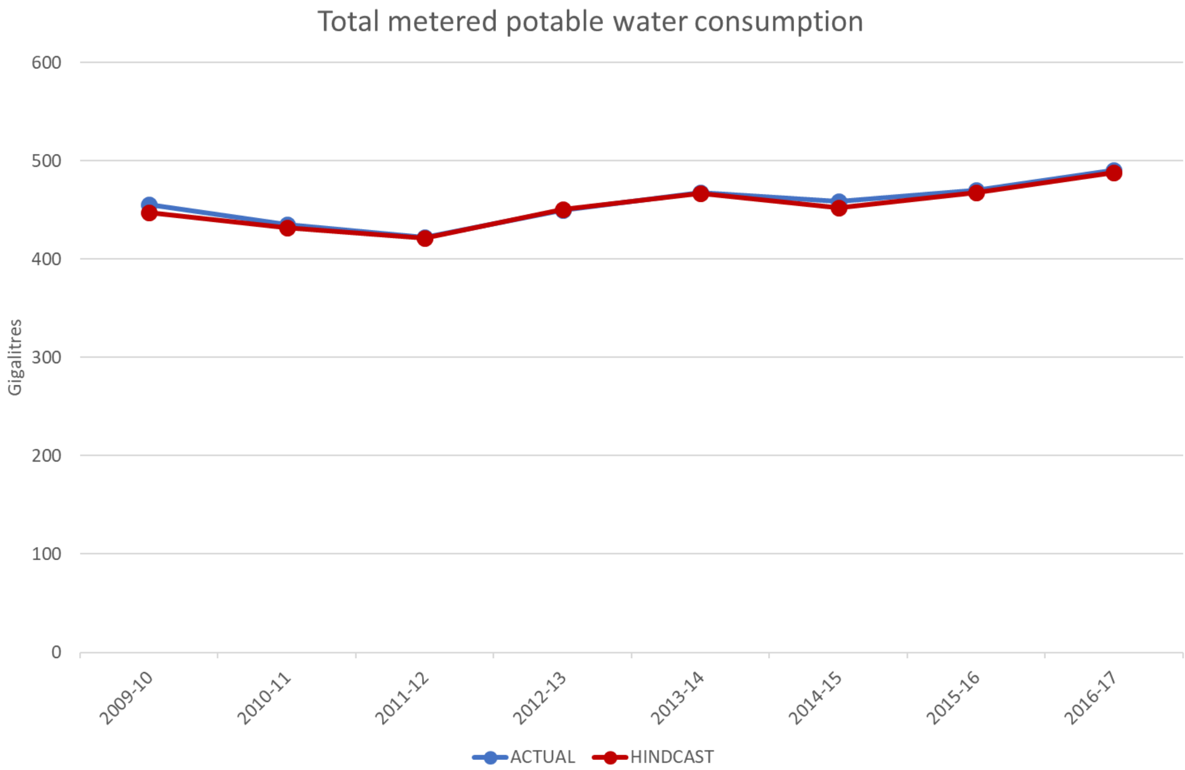

Figure 1-2 Hindcast performance of the updated model

1.3 Non-residential forecast models

The non-residential forecast models are based on time series analysis of the following segments of non-residential customers:

- Top 6
- Every Drop Counts
- Industrial

- commercial
- government
- agricultural

The Every Drop Counts segment refers to properties that have participated in Every Drop Counts (EDC), our water efficiency program for the non-residential sector. We kept these properties separate from the other segments as they tended to have a very different demand profile over the period used to estimate the models. In particular, average demand by EDC participants was trending down much more sharply than average demand by other properties of the same type. In addition, we developed separate forecasts for the six highest use customers.

We used time series regression analysis to model changes in average demand for each segment over time and their response to weather and the lifting of restrictions. We presented the results of this analysis to IPART for the 2012 price review.

We updated the non-residential models in 2013 as part of the development of our long-term forecasting model. We used the same segmentation and time series analysis approach. However, we combined industrial and commercial strata units into a single segment non-residential strata unit. For technical reasons we also defined standpipes as a separate segment. We also estimated separate models for each segment in each delivery system which meant the total number of models increased to 72 compared to 13 before. Each model was estimated using data up to June 2012.

Some simplifications were made during the re-estimation of the models. In particular, the original analysis found that there was a very slight downward trend in average demand in some segments. This downward trend was then extrapolated to forecast demand. In the more recent data up to June 2012 that was used for the update, this downward trend appeared to be flattening out. That is the average demands appeared to converge to a constant. Therefore, instead of extrapolating the downward trend to forecast demand, we assumed a constant average demand for the forecasting period.

The main purpose of the time series analysis was to quantify the historical trend and estimate the seasonal pattern and responsiveness to weather. The models were then used to estimate a weather corrected, constant average demand for each segment in each water delivery system as at 2011–12. This average was then used to forecast demand by multiplying it by the forecast number of properties in each segment in each system.

As explained above, in the last few years the model has tended to underestimate non-residential demand even when allowing for the hot and dry conditions. This is not due to an underestimate of non-residential property growth: if anything, property growth in this sector has been less than forecast.

The most likely cause is an increase in the average size of non-residential properties resulting in an increase in average demand. To correct for this effect a “densification factor” has been added to the model.

The densification factor is the ratio of the most recent population forecast and the forecast population as available when the model was updated in 2013, when average non-residential demand was stabilising:

$$d = \frac{pop_t}{pop_t^{2013}}$$

where pop_t is the most recent population forecast for time t (or actual if available) and pop_t^{2013} is the population forecast for time t as was available at the time the model was updated in 2013. Effectively, this factor corrects for the acceleration in the population growth rate since 2013, which can be seen as a proxy for the acceleration in the size of the workforce, which was not accompanied by an acceleration in the growth of the number of non-residential properties.

The model may also have underestimated the effect of the 2016 price decrease. Similar to the residential sector, an asymmetry factor was applied to the non-residential price elasticity. As shown above, the analysis that was carried out for the updated residential model found no evidence for a significant asymmetric response to price changes. We have therefore removed the asymmetry factor from the non-residential model as well.

Finally, and as discussed above, assumptions relating to so-called Other Properties were corrected which has added another 3.3 GL/year to the forecast.

The model with the above changes was used to hindcast non-residential demand over the period 2012–13 to 2016–17. There remained an average underestimate of 1.1 GL/year over this period. As a final correction, this 1.1 GL/year was added to the forecast model as a fixed factor.

As shown in Figure 1-2, the updated residential models and non-residential models are able to closely reproduce historical demand. Whereas the old models underpredicted 2016–17 demand by almost 11 GL, even after allowing for actual weather conditions and property growth, the updated models are able to reproduce actual demand to within 1%.

1.4 Billed unmetered demand

This refers to consumption by properties which do not have a meter. Their consumption is forecast by applying the model for metered properties of a similar type. That is, it is assumed that the average consumption of unbilled properties is similar to the average use of metered properties of the same type. For unmetered non-residential properties the forecast is based on the (current) deemed usage as determined by IPART.

Note that from a revenue forecasting point of view the forecast consumption of these properties is not required. Forecast revenue from unmetered properties depends on the number of such properties and their deemed usage which is included in their service charge. However, as their consumption contributes to total demand, which determines water purchase and treatment costs, a forecast of their estimated consumption is still required.

1.5 Real losses

Real losses refers to system leakage, ie. water leaking from our distribution system. The real losses forecast is based on Economic Level of Leakage calculations together with estimates of the savings from investments in leakage detection and resources devoted to leakage repair. It also includes an allowance for the growth in the number of connections over time.

Figure 1-3 shows the actual and forecast leakage rate (megalitres/day). Leakage is forecast to decrease in 2018–19 and 2019–20 as a result of an increase in resources devoted to leakage detection and repair following an increase in losses in the last few years. Thereafter it is projected to increase slightly due to the increasing number of connections and growth of the distribution system.

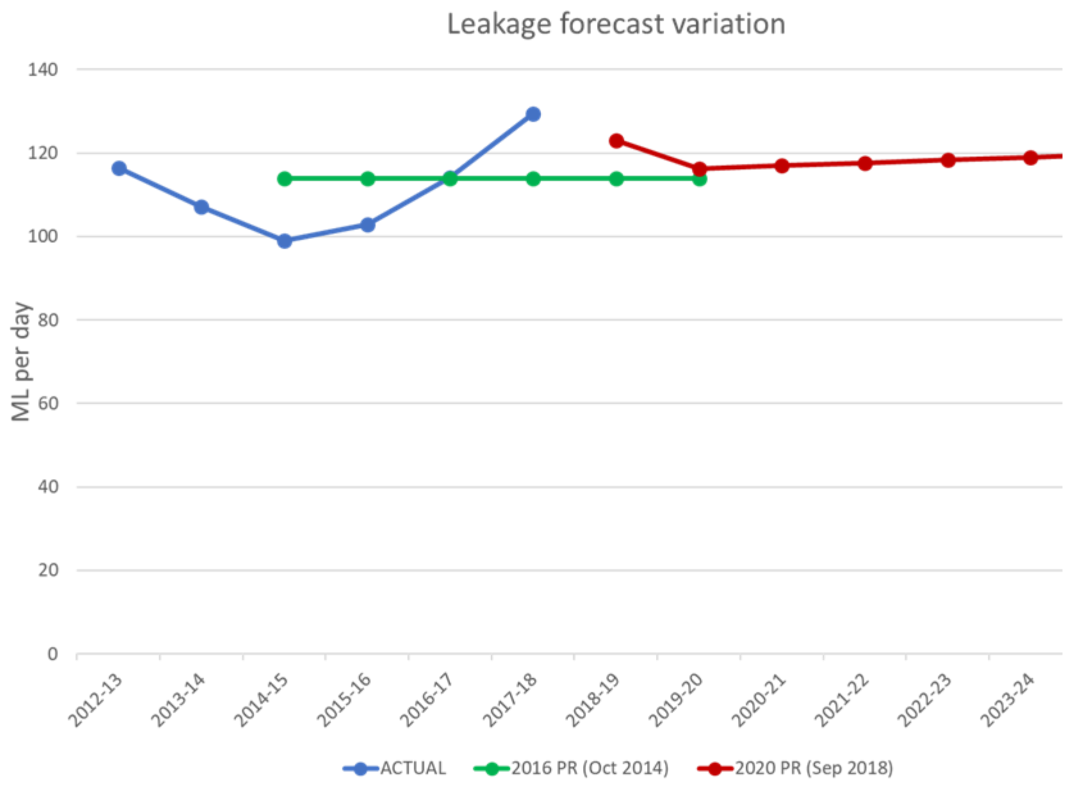

Figure 1-3 Real losses forecast

1.6 Customer meter under-read

Customer meter under-read is assumed to be 2% of billed metered demand, consistent with assumptions used in the calculation of the water balance.

1.7 Unbilled unmetered consumption

Unbilled unmetered consumption varies somewhat from year to year but does not exhibit any systematic upward or downward trend. For forecasting purposes, it is assumed constant at 3,500 ML/year. This is based on a historical average.

1.8 Unauthorised consumption

Unauthorised consumption is assumed to be 0.1% of total demand, consistent with the assumptions used for the water balance calculations.

1.9 Recycled water top up

1.9.1 Rouse Hill and other operational schemes

Recycled water top up in Rouse Hill is forecast on the basis of historical average top up (top up per dwelling) and the forecast number of properties in this scheme.

1.9.2 Schemes not yet operational

Top up is based on average consumption recorded by the recycled water meter which is currently 100% top up and forecast property growth for each scheme. Schemes are assumed to become operational in 2020–21. Top up following commissioning is forecast based on top up rates in the Rouse Hill scheme which is already operational.

SW231 06/19

Appendix 8B
Confidential

Price proposal 2020–24

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Appendix 9A
Capital expenditure tables

Price Proposal 2020–24

Capital expenditure tables

This appendix provides additional information to Attachment 9 on capital expenditure projects.

Projects completed by year 2016–17 to 2019–20

Major projects completed in each year during the current price path, and project benefits, are outlined in Table A1-2 and Table A1-3 below. Major projects forecast to be completed during the current price path, and project benefits, are outlined in Table A1-4 and Table A1-5.

Table A1-1 Major projects completed or substantially complete in 2016-17 (projects >$10 million)

Project	Project benefits
Wastewater Main Renewals (outputs achieved in 2016–17)	Renewed 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 20.1 km of wastewater mains to reduce dry weather and repeat overflows affecting customers.
Water Main Renewals (outputs achieved in 2016–17)	Renewed and replaced over 30 km of water reticulation mains and 15 km of critical water mains to maintain water supply and to reduce interruptions.
South West Growth Centre Second Release Precincts (Wastewater)	Constructed wastewater infrastructure to service growth in the precincts of East Leppington, Leppington North, Leppington and Emerald Hills.
Astrolabe Park, Stormwater Renewal	Replaced existing stormwater culverts and constructed gross pollutant traps and a wetland to ensure service reliability and to improve the quality of stormwater discharging to the Botany wetlands.
St Marys Wastewater Growth Strategy	Constructed a new wastewater pumping station and wastewater mains to service growth and maintain wet weather performance in the St Marys area.
Riverstone Wastewater lead-in Mains	Provided wastewater related services in the North West Growth Centre to service growth. This is part of the Accelerated Housing Program.
South West Growth Centre - Austral Precinct	Provided wastewater related infrastructure in the Austral precinct of the South West Growth Centre to service growth in the Austral precinct.

Table A1-2 Major projects completed or substantially complete in 2017-18 (Threshold projects >$10 million)

Project	Project benefits
Wastewater Main Renewals (outputs achieved in 2017–18)	Renewed 5.0 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 17.3 km of reticulation wastewater mains to reduce dry weather and repeat overflows affecting customers.
Water Main Renewals (outputs achieved in 2017–18)	Renewed 27.2 km of water reticulation mains to maintain water supply and reduce interruptions. Renewed 6.6 km of critical water mains to maintain water supply and to reduce interruptions.
North Head Wastewater Treatment Plant Odour Scrubber	Replaced an odour scrubber to reduce corrosion and odour emissions.
Menangle Park Wastewater (Stage 1)	Constructed a new wastewater pumping station and wastewater mains to service growth within the Menangle Park Release Area.
Powells Creek Stormwater Renewal	Renewed a section of the Powells Creek open channel, using a naturalisation approach, to protect public safety and reduce the risk of flooding, creek erosion and subsidence.
Second Release Precincts Leppington North Wastewater	Provided seven wastewater lead-in mains to facilitate growth in nine precincts across the South West Growth Centre area.
Emerald Hills and Central Hills Growth Servicing	Provided wastewater infrastructure to support continuing growth in Emerald Hills, Central Hills and East Leppington precincts.
Canterbury Town Centre	Provided new water and wastewater services to the town centre and upgraded the existing wastewater pump station.
Picton Sewerage Scheme Amplification (Stage 1)	Amplified and upgraded the Picton wastewater recycling plant to provide for growth.

Table A1-3 Major projects forecast to be completed or substantially completed in 2018-19 (Threshold projects >$10 million)

Project	Project benefits
Wastewater Main Renewals (outputs forecast in 2018–19)	Renewal of 4.9 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 24.8 km of reticulation wastewater mains to reduce dry weather and repeat overflows affecting customers.
Water Main Renewals (outputs forecast in 2018–19)	Forecast to renew 21.1 km of water reticulation mains to maintain water supply and reduce interruptions. Forecast to renew 2.1 km of critical water mains to maintain water supply and to reduce interruptions.
Riverstone Wastewater Treatment Plant Upgrade (Stage 1)	Increase capacity at the plant to meet license requirements and provide for growth in the catchment. Upgrade to 14.2 ML/d treatment capacity.
Malabar Wastewater Treatment Plant Improvement Program	Upgrade to improve reliability, capability and performance of the plant.
Picton Sewerage Scheme Amplification (Stage 2)	Conduct amplification and upgrade works to the Picton recycling plant and new wastewater pumping station to provide for growth, including a lead-in main, pump station upgrade and plant upgrades.
South West Growth Centre – First Release Precincts (Turner Road)	Provide water related infrastructure to service new customers in the first release precincts of the South West Growth Centre.
South West Growth Centre – Second Release Precincts (Water)	Upgrade of a water pumping station and provide new water booster stations and pipelines to service Austral and second release precincts including Leppington.
Strangers Creek Trunk Drainage Construction	Rehabilitated the Strangers Creek waterway to manage the impacts of urbanisation, increase available land for development and manage flood risk.
Servicing Growth at Calderwood	Provide water and wastewater services for new customers in Calderwood.
Oran Park Wastewater Servicing (Stage 2), Package 1	Provide wastewater services for new customers in Oran Park and South Catherine Fields.
Woolloomooloo Wastewater Stormwater Separation Project	Eliminate the combined wastewater system and improve the environmental health of Woolloomooloo Bay.

Table A1-4 Major projects forecast to be completed or substantially complete in 2019-20 (Threshold projects >$10 million)

Project	Project benefits
Wastewater Main Renewals (outputs forecast in 2019–20)	Forecast to renew 2 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 14 km of reticulation wastewater mains to reduce dry weather and repeat overflows affecting customers.
Water Main Renewals (outputs forecast in 2019–20)	Forecast to renew 17.8 km of water reticulation mains to maintain water supply and reduce interruptions. Forecast to renew 7.9 km of critical water mains to maintain water supply and to reduce interruptions.
Green Square Trunk Stormwater Drainage	Provide amplified stormwater capacity to facilitate the development of the Green Square Town Centre and reduce flood risk in Green Square urban renewal precinct.
Marsden Park Residential Servicing (Stage 1 - SP1160)	Provide wastewater services for new customers in the Marsden Park precinct (developer delivered).
South West Growth Area – South West Front Servicing	Collaborate with RMS to provide trunk water services along the Northern Road for new customers in the South West Growth Area.
Marsden Park SPS1173	Provide wastewater services to new customers in the industrial and residential precincts of Marsden Park.
Leppington and Leppington North Wastewater (Stage 2)	Provide wastewater services to new customers in Leppington and Leppington North.
Liverpool Central Business District Stage 1	Provide wastewater services to new customers in the Liverpool central business district.
Schofields SP1202 Pressure Main and Gravity Main (Package 3, Work Lot C4)	Provide wastewater services for new customers in Schofields.
Rouse Hill Area 20 Water (Package 3, Work Lot C3)	Provide water services for new customers in Area 20 of Rouse Hill.
Western Sydney Aerotropolis Water Retic	Provide initial water services to facilitate construction of Western Sydney Airport.

Project	Project benefits
Box Hill water and wastewater servicing (Package 3, Work Lot C1)	Provide water and wastewater services to new customers in the Box Hill Precinct.

1.2 2016–17 to 2019–20 Capital Expenditure Outputs

Output Classification	Description	Output Measure	Output Target 2016-20 (a)	Output Delivered 2016–17	Output Delivered 2017–18	Output Forecast 2018–19	Output Forecast 2019–20	Output Forecast 2016–20 (b)	Variance 2016–20 (b – a)	Comments
Water										
Renewal of Critical Water Mains	Renewals of critical water mains nearing the end of their service lives. Program aims to ensure assets operate with acceptable performance and failure risks (including to the community and environment) are managed.	Km	30.4	14.7	6.6	2.1	7.9	31.3	0.8	31.3 km of renewals are forecast over 2016-20. This is on track to achieve the four–year target. Around 2.4km of planned renewals will be deferred to 2020-24 following a risk review and prioritisation of higher risk work.
Renewal of Large Valves	Renewals of large valves 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.	Number of Valves Renewed	112.2	21.0	19.0	11.0	25.0	76.0	-36.2	76 large valves are forecast to be renewed over 2016-20, which is 36 less than the four–year target. The variance is mainly due to the reallocation of resources to higher priority programs of work and issues with access to the network.

Output Classification	Description	Output Measure	Output Target 2016-20 (a)	Output Delivered 2016–17	Output Delivered 2017–18	Output Forecast 2018–19	Output Forecast 2019–20	Output Forecast 2016–20 (b)	Variance 2016–20 (b – a)	Comments
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 customers, and minimising the impact on the community and the environment through failures.	Km	152.7	30.0	27.2	21.1	17.8	96.1	-56.6	A total of 96 km are forecast to be renewed over 2016-20, which is significantly less than the four–year target. The variance is mainly due to refinements in candidate selection criteria resulting in less candidates being selected for renewal.
Reservoir Reliability Program	Program to renew reservoirs that are at the end of their useful life to ensure reliability of compliance to current licensed service levels.	No. of Reservoir Renewals	20.6	5.0	4.0	4.0	7.0	20.0	-0.6	20 reservoirs are forecast to be renewed over 2016-20, in line with the four–year target.
Water Pumping Station Renewals	Program to renew water pumping stations identified as fair, poor or very poor condition. Final target is subject to outcome of future site condition assessments.	No. of Pumping Stations Renewed	11.9	1.0	2.0	3.0	2.0	8.0	-3.9	Forecast to deliver four water pumping station renewals less that target. Water pumping stations have been condition assessed and assets are renewed based on condition and risk consequence.

Output Classification	Description	Output Measure	Output Target 2016-20 (a)	Output Delivered 2016–17	Output Delivered 2017–18	Output Forecast 2018–19	Output Forecast 2019–20	Output Forecast 2016–20 (b)	Variance 2016–20 (b – a)	Comments
		HV Upgrades	12.7	3.0	2.0	2.0	4.0	11.0	-1.7	Forecast to deliver 2 fewer WPS HV upgrades less that target. HV equipment at WPS sites have been condition assessed and assets will be renewed based on condition and risk consequence.
Wastewater										
Renew Large Diameter Wastewater Mains	Program to renew 'Avoid Fail' category sewers that are nearing the end of their service lives, including rising mains.	Km	31.8	6.0	5.0	4.8	1.9	17.7	-14.1	Forecast to deliver significantly fewer main renewals than target due to Northern Suburbs Ocean Outfall project taking longer to rehabilitate due to project complexity and significant access, structural and safety issues. In addition to this there have been delays in the South Western Suburbs Ocean Outfall rehabilitation project.
		Number of Manholes	60.0	13.0	25.0	19.0	0.0	57.0	-3.0	Program largely on track to deliver manhole renewals target.

Output Classification	Description	Output Measure	Output Target 2016-20 (a)	Output Delivered 2016–17	Output Delivered 2017–18	Output Forecast 2018–19	Output Forecast 2019–20	Output Forecast 2016–20 (b)	Variance 2016–20 (b – a)	Comments
		Km of Pressure Mains	4.0	0.0	0.0	0.0	0.0	0.1	-3.9	Planning completed but pressure main renewal to be delivered in next price path.
Rehabilitate Sewers subject to Dry Weather Overflows	Program to abate dry weather overflows that reach waterways and repeat overflows affecting customers.	Km	98.6	20.1	17.3	24.8	14.0	76.1	-22.5	It is planned to complete 76km of sewer rehabilitation over 2016-20. This is less than the target due to risk based reprioritisation of work.
Sewage Treatment Plants (WWTP) Renewals	Program to ensure WWTPs meet its licence performance requirements through to 2023.	No. of Renewals Projects	106.0	36.0	29.0	67.0	36.0	168.0	62.0	Forecast variance over 2016-20 due to more high priority asset renewals being identified than initially forecast and increased deterioration in asset condition.
		Number of Chemical Dosing Systems	27.0	7.0	7.0	6.0	2.0	22.0	-5.0	

Output Classification	Description	Output Measure	Output Target 2016-20 (a)	Output Delivered 2016–17	Output Delivered 2017–18	Output Forecast 2018–19	Output Forecast 2019–20	Output Forecast 2016–20 (b)	Variance 2016–20 (b – a)	Comments
		Number of Odour Control Renewals	7.0	3.0	1.0	5.0	1.0	10.0	3.0	
		Number of Solids of Treatment Renewals	53.0	13.0	19.0	19.0	29.0	80.0	27.0	
Wastewater Pumping Station Renewals	Program to renew wastewater pumping stations that have reached the end of their service life.	Number of Pumping Stations	16.7	10.0	2.0	6.0	5.0	23.0	6.3	Forecast to deliver six additional wastewater pumping station renewals than target due to an increased number of candidates requiring major renewal than initially forecast.
		Number of Pump Renewals	32.6	13.0	4.0	1.0	1.0	19.0	-13.6	
Stormwater										

Output Classification	Description	Output Measure	Output Target 2016-20 (a)	Output Delivered 2016–17	Output Delivered 2017–18	Output Forecast 2018–19	Output Forecast 2019–20	Output Forecast 2016–20 (b)	Variance 2016–20 (b – a)	Comments
Conduit and Open Channel Renewal and Rehabilitation	Renewal and rehabilitation of stormwater conduits (pipes, box culverts) at the end of their service life.	km	5.2	0.4	0.0	1.0	0.7	2.1	-3.1	Forecast to deliver 3.1kms less than target due to deferral of City Area 30 project in line with reprioritisation of infrastructure capital renewal programs
	Renewal and rehabilitation of open channels that have reached the end of their service life.	km	2.2	0.5	1.8	0.2	0.3	2.8	0.6	Staging of Johnstons Creek renewal forecast to contributing additional outputs in the current period.
Stormwater Condition Assessment		Km	119.0	40.1	31.1	40.0	40.0	151.2	32.2	Based on current condition assessment planning we are forecasting to exceed the condition assessment target by 32 km.

1.3 Proposed capital expenditure 2020–21 to 2023–24

Table A1-5 Overview of major capital projects forecast for 2020–21 to 2023–24

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Greater Parramatta and Olympic Park Stage 1	101.2	Priority growth area. Insufficient network capacity to accommodate forecast growth.	100% growth	Subject to conclusion of options phase activities.	Planning level	High - delivery is subject to market conditions
Malabar Wastewater System Augmentation	123.4	Required for Environmental Protection Licence compliance in relation to wet weather overflows	100% growth	Subject to conclusion of options phase activities	Planning level	High - delivery is subject to market conditions
North West Growth Area Package 4 (Water + Wastewater)	50.8	Land rezoned and subdivisions approved. Insufficient network capacity to accommodate forecast growth	100% growth	Subject to conclusion of options phase activities	Planning level	High - delivery is subject to market conditions
South West Growth Area western front stage 2A - reservoir and link mains (renamed SWGA Package 2 Oran Park)	59.4	Land rezoned and subdivisions approved. Limited bulk water supply to service recently released precincts in the South West Grown Area	100% growth	Subject to conclusion of options phase activities	Planning level	High - delivery is subject to market conditions

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Western Sydney Airport Growth Area Stage 1 Cecil Pk (W + WW) (renamed WSAGA Drinking Water Stage 1)	39.5	Limited services with insufficient capacity to supply initial stages of the Aerotropolis or the full construction demands for the Western Sydney Airport	100% growth	Subject to conclusion of options phase activities	Planning level	High - delivery is subject to market conditions
Growth in South West Growth Area and Liverpool	118.7	Critical project for water and wastewater servicing in the South West Priority Growth Area and the Liverpool CBD, including servicing 15,000 new dwellings, mitigating demand risks on the Cecil Park reservoir, and facilitating: • renewal of the existing Liverpool Reservoir; and • upgrade works are planned at the	100% growth	An acceptable range of alternatives for each of the components of the project was assessed	Planning level	High - delivery is subject to market conditions

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
		Prospect Treatment Plant				
Menangle Park Stage 2	34.8	Land rezoned and designated priority growth area. Insufficient network capacity to accommodate forecast growth	100% growth	Subject to conclusion of options phase activities	Planning level	High - delivery is subject to market conditions
Metro Northwest Urban Renewal Corridor	33.9	Designated priority urban renewal corridor. Insufficient water and wastewater network capacity to accommodate forecast growth	100% growth	Subject to conclusion of options phase activities	Planning level	High - delivery is subject to market conditions
SP0067 replacement and Wet Weather Overflow Abatement	106.6	Forecast growth in the SP0067 catchment (including the Greater Parramatta to Olympic Peninsula) exceeds the current dry weather pumping capacity of the largest pumping station in the North Head wastewater network.	100% growth	Subject to conclusion of options phase activities	Planning level	High - delivery is subject to market conditions, commercial negotiations and planning authority decisions.

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
South West Growth Area SW Delivery	28.6	No wastewater services available in the area. Land released / rezoned and ongoing enquiries from developers regarding servicing timeframes	100% growth	An acceptable range of alternatives for each of the components of the project was assessed	Planning level	High - delivery is subject to funding and Environmental Impact Statement associated with main road upgrade
Erskineville Flood Safe	31.3	Identified flood hazard area. High priority in City of Sydney floodplain risk management plan. Collaborative project with shared funding agreements (50:50) and governance arrangements	100% renewal	Various route options and configurations are being considered. New flood estimation methodology being applied.	Preliminary cost estimate	Medium - delivery is subject to both funding approvals from both project partners
Alexandra Canal Renewal	23.9	State heritage listed canal. Main trunk drainage system for southern Sydney. Condition grade 4 and 5 asset with High 2 consequence of failure.	100% renewal	Subject to conclusion of options phase activities	Medium	Medium - high complexity project

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Tidal Open Channel Renewals	38.5	Trunk stormwater network assets, condition grade 5 with Very High 1 and High 2 consequence of failure.	100% renewal	Various	High	High - plan ready
Castle Hill Wastewater Treatment Plant (WWTP) - treatment modifications (Phase 1)	26.9	Castle Hill WWTP's load is currently overloaded based on bioreactor solids retention time. Its observed that the hydraulic design ADWF is projected to be exceeded in 2021	100% growth	Subject to conclusion of options phase activities	Medium	High - required 2020
Cronulla WWTP Upgrade	51.3	Cronulla WWTP can reliably treat sewage loads from the existing catchment, service future growth, address unacceptable risk of Environment Protection Licence non-compliance	70% renewal / 30% growth	Subject to conclusion of options phase activities	Medium	Medium - await OABC approval
Lowes Creek - Land Acquisition	61.5	Servicing Growth in the South West Growth Area, both in sequence and out of sequence	100% growth	Subject to conclusion of options phase activities	Low	Low - required 2020

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Lowes Creek WWTP - Effluent Transfer	222.0	Effluent can not be all consumed in reuse	100% growth	Subject to conclusion of options phase activities	Low	Low - required 2026
Lowes Creek WWTP - Stage 1: 30 ML/d tertiary treatment plant and advanced water treatment plant (RO)	492.2	Servicing Growth in the South West Growth Area, both in sequence and out of sequence	100% growth	Subject to conclusion of options phase activities	Low	Low - required 2026
Malabar WWTP - Additional Anaerobic Digester Capacity	29.7	Anaerobic digester capacity is expected to be exceeded in 2023 based on the continued system operating philosophy	100% growth	Subject to conclusion of options phase activities	Low	Low - required 2023
North Head WWTP Biosolids Amplification	91.9	Upgrade the sludge processing and treatment capacity at North Head WWTP. The upgrade will improve the reliability and quality of the biosolids from grade B4 to B2 and reduce	50% renewal / 50% growth	High - Project delivery business case approved	High	High

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
		odour to the surrounding community				
Orchard Hills WFP - Amplification	45.5	It is forecast that the filters, clear water pumping and rising main to the reservoirs will have insufficient capacity to meet the demand by in 2024, capacity amplification to 300 ML/d	100% growth	Subject to conclusion of options phase activities	Low	Medium - required 2024
Picton WWTP - Additional IDAL Capacity, Inlet Works Amplification, Sludge Lagoon	24.2	The Growth Servicing Investment Plan assessment identified that the plant's capacity will be exceeded in 2025	100% growth	Subject to conclusion of options phase activities	Low	Medium - required 2026
Quakers Hill/St Marys PARR	299.6	The project will eliminate the risk of structural failure of the Quakers Hill IDALS and address the capacity issues including growth to service new customers at Quakers Hill (223,000 EP by 2030) and St Marys	75% renewal / 25% growth	High - Project Delivery Business case approved	High	High

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
		WRPs (288,000 EP by 2026).				
Richmond WRP - North Richmond WWTP Consolidation Tertiary Denitrification	96.7	North Richmond WRP's is at treatment capacity based on total nitrogen load capacity in the secondary treatment process and the plant hydraulic capacity is expected to be exceeded in 2020	100% growth	Subject to conclusion of options phase activities	Low	Medium - required 2023
Riverstone WWTP - Centralised Biosolids and Tertiary Upgrade (Phase 2)	312.4	Additional digesters and biosolids processing for the servicing of Castle Hill WRP, Rouse Hill WRP and Riverstone WWTP needed by 2025	100% growth	Subject to conclusion of options phase activities	Low	Medium - required 2025
Rouse Hill - Liquid Amplification and Sludge Transfer (Phase 2)	164.7	Rouse Hill WRP's treatment capacity is forecast to be overloaded in 2019-20 with the introduction of Castle Hill WRP sewage transfer. The upgrade is required on two	100% growth	Subject to conclusion of options phase activities	Low	Medium - required 2023

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
		stages liquid stream by 2025				
Rouse Hill WRP - Interim Sewage Transfer Scheme to Riverstone (Phase 1)	41.4	Castle Hill WRP's load is currently overloaded based on bioreactor solids retention time, operational change to transfer sewage to Rouse Hill won't be possible	100% growth	Subject to conclusion of options phase activities	Low	Medium - required 2020
South Creek WWTP - Land Acquisition	61.5	Servicing future Sydney airport and surrounding area	100% growth	Subject to conclusion of options phase activities	Low	Low - required 2020
South Creek WWTP - Stage 1: 12 ML/d Tertiary Treatment Plant	234.0	Servicing future Sydney airport and surrounding area	100% growth	Subject to conclusion of options phase activities	Low	Low - required 2026
ST01 - Bondi Inlet Works	49.3	Address poor reliability, high failure rates, manual intervention and lack of redundancy of screening processes	100% renewal	Subject to conclusion of options phase activities	Planning level	Low - candidate yet to define scope of works

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
ST10 - Cronulla Inlet Works	23.4	Improve screening performance and reduce manual intervention.	100% renewal	Subject to conclusion of options phase activities	Planning level	Low - candidate yet to define scope of works
ST14 - Wollongong Renew Inlet Works Odour Control Unit	20.2	Improve odour ventilation and address corrosion within the existing inlet works Odour Control Unit (OCU)	100% renewal	Maintain BAU, Structural Remediation, New Odour Control Unit, Additional OCU discharge capacity, New Primary Sedimentation Tank covers	Medium	Medium - await OABC approval
ST23 – Glenfield Renew Dewatering	28.3	Upgrade biosolids processing facility to address performance and capacity issues	65% growth / 35% renewal	Subject to conclusion of options phase activities	Medium	Low - await DABC approval
West Camden WRP - Stage 3 Upgrade	182.2	West Camden WRP for native catchment growth and interim servicing of South West Growth Area sub-catchments	100% growth	Subject to conclusion of options phase activities	Low	Medium - required 2021

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Nepean WFP Amplification & Raw Water Upgrade	43.6	It is forecast that the filter capacity will be exceeded in 2026. Additional production capacity is currently planned to be provided which will see the filter capacity increased to 33 ML/d. The objective of the upgrade is to enhance production capacity in periods of poor raw quality. The upgrade includes derating of the existing dual media filters to 15 ML/d, installation of ultrafiltration units with a production capacity of 18 ML/d and an additional rising main.	46% renewal / 54% growth	Subject to conclusion of options phase activities	Medium	Medium - required 2024
Lane Cove	107.2	Mandatory criteria though PRS	100% mandatory	I/I management and storage	Medium	High
Mid Parramatta	145.0	Mandatory criteria though PRS	100% mandatory	I/I management and storage	Medium	High

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
NSOOS Desilt and Rehab Package B	82.1	Condition assessment at 0 YESL, currently in poor condition	100% renewal	Delivery options used lessons learned from Package A	High	High
NSOOS Desilt and Rehab Package C	43.9	Condition assessment at 0 YESL, currently in poor condition	100% renewal	N/A	Low	High
NSOOS Desilt and Rehab Package D	20.0	Condition assessment at 0 YESL, currently in poor condition	100% renewal	N/A	Low	High
Prospect Creek	106.7	Mandatory criteria though PRS	100% mandatory	I/I management and storage	Medium	High
STS Licence non - compliance Wollongong, Shellharbour and Wallacia	23.0	Mandatory criteria though PRS	100% mandatory	I/I management and storage	High	High
SWSOOS Rehabilitation Package B	25.6	Condition assessment at 0 YESL, currently in poor condition	100% renewal	N/A	Low	High

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
Upper Parramatta	126.4	Mandatory criteria though PRS	100% mandatory	I/I management and storage	Medium	High
Vaucluse Diamond Bay	63.5	Eliminate last cliff face wastewater discharge. Reputational risk if project deferred as community engagement commenced 29/5/18	100% discretionary standard	Detailed assessment to be completed	Medium	Medium
Potts Hill Renewal - Roofing & Lining of Potts Hill Reservoirs WS0455 & WS0456	34.6	Renewal - to ensure the treated potable water is not subject to contamination in transit from the treatment plant to the customer's tap	100% renewal	1. Do nothing – continuing deterioration of the covers to the point where repairs are not possible 2. Like for like replacement – replacement with a contemporary floating cover and liner. 3. Replace with a more substantial infrastructure with	Low	Low - candidate yet to progress to IABC and define scope of works

Project	Total Project cost ($m, $2019–20)	Justification	Cost split	Options considered	Cost estimate certainty	Delivery certainty
				greater asset life expectancy.		

1.4 Capital expenditure by drivers 2020–21 to 2023–24

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

- Existing mandatory 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.
- 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.
- Government programs – including desalination, recycled water schemes, demand management projects.
- Discretionary programs – investment justified based on 'community willingness to pay'

1.4.1 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 2020–21 to 2023–24

See at Table A1-6 below a breakdown by investment driver of Sydney Water's forecast capital expenditure o water infrastructure over the next price path.

Table A1-6 Water capital expenditure by driver ($m, $2019–20)

Driver	2020–21	2021–22	2022–23	2023–24	Total
Business efficiency	0	0	0	0	**0**
Government programs	0	0	0	0	**0**
Growth	65	87	86	66	**304**
New mandatory standards	0	0	0	0	**0**
Existing mandatory standards	138	140	145	147	**570**

Discretionary standards	0	0	0	0	**0**
Total	**204**	**227**	**231**	**213**	**874**

Wastewater investment 2020–21 to 2023–24

Table A1-7 shows a breakdown by investment driver of Sydney Water's forecast capital expenditure on wastewater infrastructure over the next price path.

Table A1-7 Wastewater capital expenditure by driver ($m, $2019–20)

Driver	2020–21	2021–22	2022–23	2023–24	Total
Business efficiency	1	1	1	3	**8**
Government programs	0	0	0	0	**0**
Growth	267	299	348	373	**1,287**
New mandatory standards	38	32	54	55	**179**
Existing mandatory standards	305	278	460	471	**1,514**
Discretionary standards	12	16	20	16	**64**
Total	**623**	**627**	**884**	**917**	**3,051**

Stormwater system investment 2020–21 to 2023–24

Table A1-8 below shows a breakdown by investment driver of Sydney Water's forecast capital expenditure on stormwater infrastructure over the next price path.

Table A1-8 Stormwater capital expenditure by driver ($m, $2019–20)

Driver	2020–21	2021–22	2022–23	2023–24	Total
Business efficiency	0	0	0	0	**0**
Government programs	0	0	0	0	**0**
Growth	10	10	5	6	**31**
New mandatory standards	0	0	0	0	**0**

Existing mandatory standards	30	43	39	42	**154**
Discretionary standards	0	0	0	0	**0**
Total	**40**	**54**	**43**	**48**	**185**

Corporate capital expenditure 2020–21 to 2023–24

Table A1-9 shows a breakdown by investment driver of Sydney Water's forecast capital expenditure on corporate items over the next price path.

Table A1-9 Corporate capital expenditure by driver ($m, $2019–20)

Driver	2020–21	2021–22	2022–23	2023–24	Total
Business efficiency	29	30	31	23	**114**
Government programs	0	0	0	0	**0**
Growth	0	0	0	0	**0**
New mandatory standards	0	0	0	0	**0**
Existing mandatory standards	108	88	59	58	**313**
Discretionary standards	0	0	0	0	**0**
Total	**137**	**117**	**90**	**82**	**427**

Table A1-10 2020–21 to 2023–24 Capital Expenditure Outputs

Output Classification	Description	Output Measure	Output Target 2020–21 to 2023-24
Water			
Critical water mains	Renewals of critical water mains	km	42
	Renewal of large valves	Each	80
Reticulation water mains	Renewals and reliability upgrades of reticulation mains	km	121.6
Reservoirs	Roof renewal or extensive repair of reservoirs	Each	28
	Renewal or extensive repair of rechlorination plants	Each	24
Water pumping stations	Renewal of water pumping stations	Each	4
	High–voltage electrical upgrades	Each	5
Wastewater			
Large wastewater mains	Renewal of large gravity mains	km	26.4
	Renewal of pressure mains	km	18.7
	Rehabilitation of the NSOOS/SWSOOS & BOOS	km	12.5
Wastewater pumping stations	Renewal of wastewater pumping stations	Number	16
	High-voltage electrical upgrades (reliability upgrade)	Number of packages	4
Wastewater reticulation mains	Renewal of wastewater reticulation mains	km	100

Stormwater

Stormwater channels, culverts and pipes	Renewal of open channels, culverts and pipes	km	8.7
	Relining of stormwater pipes	km	2.2
	Renewing fences	km	6.1
Treatment*	Wastewater treatment	# Unit Type	188
	Chemical system renewal	# Unit Type	9
	Odour control	# Unit Type	8
	Power supply	# Unit Type	46
	Solids treatment	# Unit Type	61
	Recycled water treatment	# Unit Type	1
	Water filtration	# Unit Type	18

*Outputs are subject to change pending any deferral of projects from 2016-20 program, due to risk assessment by management.

Appendix 9B
Confidential

Price proposal 2020–24

SW231 06/19

Appendix 11A
Working capital allowance

Price proposal 2020–24

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Working Capital Allowance

11.1 Context

Working capital is recognised by IPART as a legitimate business costs, and allow for it to be recovered by us through regulated prices. For setting our proposed prices, we have included in our building block's revenue requirement calculation, an explicit allowance for working capital. This allowance compensates for costs that we incur due to delays between us delivering regulated services and receiving payment for those goods or services.

IPART updated its method in November 2018[1]. The previous method for calculating working capital allowance was reviewed in 2005. The updated method differs from IPART's previous method, specifically in the calculation of receivables and the assumptions around inventory and prepayments. Therefore the allowance for net working capital requirements has changed.

In this attachment, we outline our working capital allowance calculations, and the rationales to support our proposal. We have made changes in line with the updated methods as determined by IPART. One of the key changes or considerations is in relation to receivables, where adjustments are made to better reflect differences in timing between consumption of services and receipt of payment, including for those customer groups that need some form of payment arrangement or extended time for payment due to their difficult financial circumstances. We believe the alignment of these parameters will help us manage our cashflow better and continue to provide high quality services in a compassionate manner to our customers.

11.2 Proposal – Working Capital Allowance

Table 1 shows the key four variables – receivables, payables, inventory and prepayments, that make up our proposed working capital. Consistent with IPART formula, our proposed working capital allowance is calculated as the sum of receivables minus payables plus inventory plus prepayments. The rationale and analysis of each key variables that support the proposal are explained below.

The estimated allowance is a return of the required net working capital, calculated using a nominal post-tax WACC of 6.6%. This nominal WACC is derived from a real post-tax WACC of 4.1%, the WACC that we use in our 2020-24 pricing proposal. Further details of our proposed WACC can be found in **Attachment 6**: **Weighted average capital cost**

[1] IPART, Working Capital Allowance, Policy Paper, November 2018

Table 1 Proposed working capital allowance (million)

	2020-21	2021-22	2022-23	2023-24	Total
Receivables	335.5	347.7	357.1	366.4	1,406.6
Payables	189.4	193.9	213.8	215.3	812.4
Inventory	16.6	16.6	16.6	16.6	66.3
Prepayments	9.6	9.6	9.6	9.6	38.3
Net working capital	172.2	180.0	169.4	177.3	698.8
Rate of return	6.6%	6.6%	6.6%	6.6%	
Return on working capitals[1]	**11.0**	**11.5**	**10.8**	**11.3**	**44.7**

1 This is a mid-year value.

11.3 Receivables

We welcome the updated method for calculating receivables under IPART's 2018 Working Capital Allowance policy (see **Box**) where IPART has allowed for consideration in the calculation

(i) for days billed in arrears, and

(ii) payments made after the due date under the current business practices.

Box 11.1 IPART's formula for calculating receivables for a water business[2]

In 2018 Working Capital Allowance policy paper, IPART measures receivables for water business

1) Half the net number of days in the billing cycle for which services are billed in arrears, and

2) Efficient days of delay between the last day of billing cycle and receipt of payment, having regard to actual business practice.

The formula for calculating receivables for a water business is

$$Receivables = \frac{50\% \times net\ number\ of\ days\ billed\ in\ \boldsymbol{arrears} + \boldsymbol{days\ delay}\ before\ payment}{365\ days} \times annual\ revenue$$

Where the net number of days billed in arrears is calculated as

$$\begin{pmatrix} Net\ number \\ of\ days\ billed \\ in\ arrears \end{pmatrix} = \begin{pmatrix} days\ fixed\ charges \\ in\ \boldsymbol{arrears} \\ -\ days\ fixed\ charges \\ in\ \boldsymbol{advance} \end{pmatrix} \times \begin{pmatrix} \%\ revenue \\ from\ fixed \\ charges \end{pmatrix} + \begin{pmatrix} days\ usage \\ charges\ in \\ arrears \end{pmatrix} \times \begin{pmatrix} \%\ revenue \\ from\ usage \\ charges \end{pmatrix}$$

For simplicity, IPART will use the same split in revenue between fixed and usage charges for the whole regulatory period.

11.3.1 Net number of days billed in arrears

IPART's policy paper notes that including half the net number of days in the billing cycled for which services are billed in arrears will compensate the business for delays between when it delivers a service (ie every day) and when it can issue a bill (ie during a billing cycle when meters are read).

Sydney Water raises about 2 million of bills in our billing system at the beginning of a quarter. However, bills will not be released from the billing system to customers until their meter reading is completed in that quarter. The bills are gradually issued to customers after the meter reading data comes in throughout a quarter.

Thus, in a quarter, Sydney Water's customers will always pay their water usage charge in arrears, and some customers will pay their service charge in arrears, and others in advance, depending on when in the quarter their bills are issued.

[2] IPART, Working Capital Allowance, Policy Paper, November 2018, Section 3.1, page 8

For example, if Sydney Water issues about the same number of bills each business day across a quarter, the service charge would have been 50% in arrears and 50% in advance. However, in practice, for each quarter Sydney Water issues

- about a hundred thousand bills per day (majority is to unmetered properties) during the first 7 business days, and about thirty thousand bills each day from there on.
- no bills in the last two weeks of a quarter.

With the implementation of the new billing system3, all bulk billed customers (of which is about 4% of total bills raised) will be paying all their service charges in arrears.

For these reasons there will be a difference between the number of days fixed service charges are paid in advance compared to the number of days such charges are paid in arrears. We have made adjustments to incorporate our business practice into the calculation formula and estimated that the applicable net number of days fixed service charge in arrears for Sydney Water is 28 days. This means that on balance, Sydney Water is running a deficit with respect to the payment of fixed charges across its customers.

We have also estimated the other key parameters that are applicable to the formula:

Days fixed charges in advance	63 days
Days usage charges in arrears	91 days
Share of fixed charge: usage charge in total revenue	56%:44%

11.3.2 Efficient days delay before payment

In our proposed working capital allowance calculation, we have included an allowable time of 30 days (see Table 2 below) accepted in principle by IPART[4] for the time difference between the date of bill and the date when Sydney Water receives the payment.

Table 2 Typical days for bill payment after bill issue

	Number of delay days
Number of days' notice for bill payment	21
+ delay in bank payment being transferred to Sydney Water account	2
+ days (after notice days) before late payment fee is applied	7
Total average delay days	**30**

[3] Sydney Water's new billing system is planned to replace the existing system and in full operation at the end of 2018-19 financial year.
[4] IPART, Working Capital Allowance, Policy Paper, November 2018, Section 3.3, page 11

This 30 day period will be applicable for the majority of Sydney Water customers who pay bills within the permitted period. IPART has acknowledged that its approach to determining receivables will appropriately recognise, where available, customer profile and actual business practice of the water utility. To that end, we have incorporated in our proposal, the calculation of receivables that includes delay days before payment that takes into consideration the following:

1) the impact of customers on payment plans or similar arrangements. This group of customers are not levied with late payment fee under Sydney Water's Operating Licence and IPART's Sydney Water 2016 Price Determination.

   The customers on payment plans consist of about 6.3% of total customers. On average, our customers on payment plans take 87 days to clear their payment obligations with Sydney Water.

2) the extended delays in payment for those customers who are unable to clear their payment obligations in the short term, ie between > 30 days and <365 days, due to their financial circumstances, but have not sought payment assistance through our payment plans.

   Note that for a large proportion of these customers, we have also often waived their penalty charges (such as late payment fees or overdue interest charge) in line with our customer credit/debt management policies/process, business practices and procedures.

   As shown below, we have estimated the percentage of customers under the above-mentioned circumstances and their days delay in payment, of whom we also have waived their penalty charges:

   - about 2.5% of customers (who pay within 31 to 60 days) take on average 41 days to pay their bills;
   - approximately 0.2% of customers (who pay within 61 to 90 days) take on average 77 days to pay their bills;
   - about 0.8 % of customers (who pay within 91 to 180 days) take on average 120 days to pay their bills; and
   - approximately 0.5% of customers (who pay within 181 to 365 days) take on average 270 days to pay their bills.

We have included in our Working Capital allowance (receivable) calculation, an account for the appropriate extended delays before payment for those customers that we have extended our assistance through allowing them for a longer timeframe to pay their bills without penalty. Based on the current number of days, as set out above, for these customers to clear their payment obligations, we estimated that on average a further 9 days would be required.

In summary, taking into consideration the above, we have included in our receivable calculation, an equivalent of 39 efficient days of delay (i.e., the accepted 30 days after bill issue as shown in Table 2 plus the additional 9 extended days to account for those customers who do not pay their bills by the 30-day period).

Sydney Water's processes for managing overdue payments and policies for supporting customers with financial difficulties is explained in Section 11.7.

11.3.3 Summary - working capital requirement for Receivables

Applying the above relevant estimated the parameters in the updated receivable formula, we estimate that the total receivables in 4 years of next determination period (as shown in Table 1), is about $1,407 million, average of $352 million each year in real terms.

11.4 Payables

IPART retained its methodology of accounting for payables within working capital allowance calculation. We continue to measure payables in days of operating expenditure plus net capital expenditure and use 30 days as the number of days. This aligns with Sydney Water's business practices, where trade accounts payables and accrued expenses at Sydney Water (other than for interest on loans) are normally settled within 30 days.

11.5 Inventory

Under IPART's updated policy, inventory is measured as a fixed dollar value that remains unchanged in real terms over the determination period. This value will be determined with reference to the business's actual recent historical inventory and/or other relevant information.

We agree with and support this approach. It is simpler and more transparent than the previous method.

We propose $16.6 million each year as our forward inventory level in our submission. Our approach to measuring our inventory is in line with the improved stock take processes that we undertook in June 2018. These improved processes comprise of:

- annual end of year stocktake count of all inventory
- cyclical counts of selected portions of inventory throughout the year
- purchase of all inventory through delegation and through procurement processes
- all inventory issued are attached to workorders in our Maximo system
- usage of the Maximo system to value inventory on an ongoing 'perpetual basis'.

The result has been an increase in stock, spare parts and materials to about $17 million across various depots and warehouses. We expect our forward inventory level to maintain around this level at the end of each financial year.

11.6 Prepayments

Prepayments reflect the difference between supplier prepayments (expenses paid prior to receipt of input) and customer prepayments (revenue received prior to provision of service). In this context, our proposed estimate relates to supplier prepayments as customer prepayments do not generally occur.[5]

Whilst Sydney Water recognises that historically prepayments have not been a significant portion of the overall calculation of the working capital allowance, our current business approach in recent years outsourced more of our essential input services, with suppliers commonly requiring modern payment terms that include some level of prepayments. As we are always seeking appropriate and efficient terms for payment to better manage cashflows and capital requirements, some level of supplier prepayment will be required and will be efficient to do so. We support that IPART's updated working capital allowance methodology has not disincentivised such efficient practices.

We have included a proposed $9.6 million prepayment per annum in our working capital calculation as the prudent and efficient amount for Sydney Water prepayment to suppliers. This fixed dollar amount is proposed to be remain unchanged in real terms over the determination period based on our assessment of the efficient level of prepayments over the next four years.

This proposed estimate is supported by our measurement of prepayment in recent years that shows that our suppliers' prepayments ranged between $10m to $30m. The prepaid items include:

- IT licences and maintenance prior to the start of the provision of the software/hardware services[6]; and,
- insurance, rent and land tax.

There prepayments will continue and we have proposed a prepayment allowance of $9.6 million based on a conservative expectation of the appropriate levels over the next determination period.

11.7 Sydney Water's business practice for delayed payments

This section provides an overview Sydney Water's business practices for managing delayed payments. It includes an outline of the steps we take to engage with customers and recover overdue accounts.

Sydney Water's payment terms are 21 days for all customers. Once the payment terms have expired, accounts are considered overdue.

Under section 4.4.5 - Overdue account balances of our *Customer Contract,* we can charge:

- interest on overdue account balances or

[5] This excludes the advanced billing of customers for fixed charges, which IPART has addressed in its proposed revision to the calculation of receivables.
[6] These are expected to significantly increase for Sydney Water with the imminent changes to its key billing and financial technology platforms.

- a late payment fee

We will not charge interest on overdue account balance or late payment fee if:

- We have already agreed with the customer a deferred payment date, or an arrangement to pay by instalment with response to the overdue account balance, or
- The customer has entered into a payment arrangement with us.

The late payment fee will not exceed the maximum amount specified by IPART and will be charged in accordance with its terms and conditions. For details on our proposed late payment fee, see Appendix 4B.

We use the NSW Government Lawlink (Local Courts) interest rate calculation to calculate the interest we charge. This calculation is the Reserve Bank of Australia (RBA) cash rate plus 4%.

When accounts become overdue, a reminder notice is issued eight days after the expiry date. Consistent with the information provided in Table 2, the late payment fee is applied 7 days after the account due date, in addition to the 21-day payment term, ie after a total delayed day of about 30 days. We may then charge interest or a late payment fee (whichever is higher) on overdue amounts. As payments are received for any account, monies are credited to the oldest debt ahead of more recent debits.

11.7.1 Debt recovery notice

If the outstanding account is still unpaid after a further seven days (36 days from the date of issue of the original account[7]), then a disconnection notice listing any outstanding debt is sent to the customer. Payment is requested within seven days.

This notice lists options that are available to the customer and advises what sanctions may result if payment or contact with Sydney Water is not made.

If Sydney Water does not receive payment and no contact has been made with us, we'll hand deliver a notice that lists our intent to restrict or disconnect the water supply.

A hand delivered notice to the property address is done to ensure that any occupier or tenant who may not be aware of the impending supply restriction is given an appropriate warning of the possible restriction. The notice is delivered either by hand, or where there is no occupier at the address at the time of delivery, the notice is placed under the door of the premises or in the letterbox.

An information sheet is available to tenants or lessees who may wish to avail themselves of the option to pay Sydney Water some or all of the outstanding debt in lieu of rent payments due to the owner. This is covered in section 62 of the *Sydney Water Act 1994*.

[7] The 36 days is calculated as the 21 days for initial credit period plus 8 days before reminder notice plus further 7 days before issuing of disconnection notice.

At all times during these debt recovery processes, it is Sydney Water's intent to engage with the owners and/or occupiers of the property to ensure that some form of mutually acceptable payment arrangement can be negotiated.

11.7.2 Restriction or disconnection of supply

If a customer does not respond to reminder notices or fails to make payment arrangements or to comply with agreed arrangements, Sydney Water may consider restriction or disconnection of the water supply.

When we restrict the water supply, a disc with a small hole is placed inside the meter that allows enough water flow for essential use.

Restriction or disconnection is only carried out as a final option to recover the unpaid debt and is not carried out until the expiry date of the hand delivered notice.

Restriction is only carried out between the hours of 7:30am to 3:00pm on weekdays, but not on Fridays or the day prior to a public holiday.

Sydney Water will attempt to notify the customer of its intent to restrict or disconnect the water supply prior to taking such action. Customers experiencing financial hardship will have the opportunity to seek assistance from Sydney Water and negotiate a mutually acceptable payment arrangement.

Sydney Water may also disconnect or restrict services if a customer does not comply with provisions contained in the *Customer Contract* or the *Sydney Water Act 1994*.

11.7.3 Recovery of overdue debt by legal action

Overdue accounts may also be subject to legal recovery action. Any costs incurred, as a result of undertaking recovery action must be met by the property owner. Sydney Water may take action at any or all other properties owned by a particular customer (when the property ownership is identical in name) in order to resolve the overdue and outstanding debt(s).

The decision on whether to initiate recovery action and the type of action taken will be influenced by the size of the debt, the length of time it has been overdue and the customer's previous payment history with Sydney Water. All reasonable attempts will be made to ensure that customers have ample warning that recovery action is imminent.

Legal debt recovery action may result in substantial costs being added to the outstanding debt already owed to Sydney Water, including any interests or late payment fees.

11.7.4 Social Assistance

Sydney Water assists customers experiencing financial hardship maintain access to services. These customers can access payment assistance or hardship relief for the duration of their need, either short or longer term.

We also partner with welfare agencies and counsellors to tailor the assistance provided for customers experiencing payment difficulty.

Sydney Water also provides government funded pensioner concessions for eligible customers.

11.7.5 Assistance available

All residential customers can request assistance in resolving their debts to Sydney Water. They may request to defer payment or seek to pay off the debt by way of instalment arrangements. Such arrangements will generally be negotiated so that the debt is resolved before the next account falls due for payment.

Business customers who are experiencing short term payment difficulties will be given consideration dependent upon their circumstances. Water will not be restricted unless payment arrangements are broken or cheques provided to pay overdue amounts are dishonoured.

Sydney Water will consider the circumstances of each individual request and these requests will be considered sympathetically and with a view of settling the account as soon as practicable.

Assistance available to customers include:

- Deferment of the payment in full to a mutually acceptable date
- Offer of instalment arrangements, which are mutually acceptable
- If a customer is experiencing financial hardship, they may be assessed by an accredited welfare agency for payment assistance.
- Business customers may be offered short-term payment arrangements based on reasonable commercial considerations and market conditions.
- Sydney Water will consider the current circumstances of individual customers into account, along with payment history, in assessing the most appropriate arrangements.
- Arrangements will generally be negotiated so that the debt is resolved before the next account falls due for payment.
- Customers financial hardship and circumstances will be taken into consideration prior to commencing legal action for debt recovery.

Where Sydney Water and the customer have agreed on arrangements to settle outstanding accounts, we will take no further action against them as long as the agreed arrangement is maintained. If the customer maintains the agreed arrangements, no further interest will be calculated and added to the account.

11.7.6 Information for customers

Sydney Water will make information available to customers listing the availability of assistance or special arrangements. This will include information on bills with options such as deferred payment and payment by instalments.

11.7.7 Complaints and dispute resolution

If a dispute arises between Sydney Water and the customer and a resolution cannot be reached, the customer has the right to refer the matter to the Energy and Water Ombudsman NSW (EWON) for further investigation and subsequent resolution.

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